Committee on the History, Philosophy, and Sociology of Soil Science
International Union of Soil Sciences
And
Council on the History, Philosophy, and Sociology of Soil Science
Soil Science Society of America

August 2002 Number 10

NEWSLETTER

Changes are Coming

In this Newsletter we have assembled again some important news on the forthcoming meetings dealing with the topics in the history of soil science at the World Congress of Soil Science in Bangkok and the Soil Science Society of America annual meeting in Indianapolis. As usual we have included several book notes and reviews, brief articles. Judging from previous responses, these are appreciated by our readers.

Since the inception of the Commission in 1982 (previously the Working Group, and then Committee) we have promoted the topic of the History, Philosophy and Sociology of Soil Science within the International Union of Soil Sciences (IUSS), previously the International Soil Science Society. The Commission has organized some well-attended symposia during World Congresses of Soil Science (since 1990) and published the Newsletter. An increasing number of articles and books being published on the history of soil science indicates that these efforts were not in vain. A science that does not remember and honor its history and the scientists who have contributed to it loses a great deal of perspective on its achievements.

This is the last and No 10 Newsletter produced by the current leadership. At the 17th WCSS in Bangkok, August 2002, there will be elections for the new leadership. As there are excellent nominations for the positions of Chair and Secretary, we wish to welcome Benno Warkentin and Hans van Baren to this new activity. Good luck to you!

I would like to thank my colleague Douglas Helms for outstanding services to the Commission and help in the preparation of all the Newsletters since 1986. It was a pleasure to work with you, Douglas, and the USDA office over all these years. The recently published excellent book on our shelves, *Profiles in the History of US Soil Survey*, will always remind us of you. We are looking forward to additional contributions in the history of soil science from you and hope to consult with you and cooperate also in the future.

Dan H. Yaalon
(Jerusalem, Israel)

INSIDE

J. Douglas Helms and Dan H. Yaalon prepared this newsletter with the editorial and design assistance of Paul Reich, Natural Resources Conservation Service, and Faye Helms Griffin of Simpsonville, South Carolina.

Meetings

World Congress of Soil Science, Bangkok, August 2002

Symposium 31, "Attitudes Toward Soil and Land Use: Past and Present" will be jointly sponsored by the International Union of Soil Sciences Committee on the History, Philosophy and Sociology of Soil Science and Commission VIII on Soil and the Environment.

The papers to be presented orally are as follows:

Marc Latham	Changing trends and attitudes in tropical soil and land use research and methodologies
Antoinette WinklerPrins	A history of perceiving the soil in the Amazon basin
Edmundo Barrios	Integration of local soil knowledge for improved soil management strategies
Jonathan Sandor	Soil knowledge embodied in a Native American runoff agro ecosystem
Darwin Anderson	Soil science and agricultural land use in Canada
Orawan Siriratpiriya	Sustainable development of rice ecosystem with the balance of local wisdom and greenhouse gases emission reduction in Thailand
Isabel Ramos	Appraising the role of soil in Mediterranean landscapes: focus on Portugal

The poster presentations are as follows:

Sudesh Sharma	Attitude of farmwoman towards soil management and land use in Kandi area of Jammu province of India
Kundapur Sudhir	Sustained crop production under long term fertilizer use in a red soil in India
Algirdas Motuzas	Soil science and plant nutrition development in Lithuania
Zhou Yong	Establishment and application of land resources and eco-environment database
Hariadi Kartodihardjo	Tragedy of wetland degradation in Central Kalimantan, Indonesia
Yury Semenov	Study of soil water-protection functions for land-use zoning
Line Boulonne	A soil monitoring network for French soils: representativeness study and implementation
Arends Ernesto	Agroforestry as an alternative land use system in settled areas of Caparo forestry reserve in Venezuela
Ranjith Mapa	Land use in Sri Lanka: past, present and future
Terrence McDonough	Practicing development in south Asia: Issues and ethics in project design and implication
Insang Jo	Changes of land use and research goal of soil science in Korea
Xiaoju Wang	Characteristics of environmental deterioration induced by tea growing and its control
Bui Tan Yen	Exploring land use options for agricultural development in Bac Kan Province, Vietnam
Richard Dick	Soil enzyme activity as a sensitive indicator of ecosystem disturbance
Maria Zita Toribio	Human-ecological dimensions of protected area planning and management
Klaudia Oleschko	Entropy based triangle for designing sustainable soil management

◆

Charles E. Kellogg Symposium

A special symposium on November 14, 2002, at the annual meeting of the Soil Science Society of America (Indianapolis, Indiana) will examine the career of Charles Edwin Kellogg, former head of soil survey program of the U. S. Department of Agriculture.

Robert Kellogg, emeritus professor of English, at the University of Virginia, will speak about his father. Richard W. Arnold, former head of the soil survey program, will discuss Kellogg's supervision of the soil survey program. Robert Grossman will speak on Kellogg's influence on young soil scientists in the soil survey program. Henry Mount, soil scientist in the Natural

Resources Conservation Service (NRCS) will recount Kellogg's 1954 study tour of Ghana. Douglas Helms, NRCS Senior Historian, will discuss Kellogg's views on soils and society.

Douglas Helms
Natural Resources
Conservation Service

◆

SSSA History Special Session Promises Lively Discussion

The Council on the History, Philosophy and Sociology of Soil Science (Soil Science Society of America) is sponsoring a History Special Session at the 2002 Annual Meetings in Indianapolis, Indiana. Session 1 of this eclectic program, entitled "Aspects of Soil Science History, Philosophy and Sociology," begins on November 11, Monday afternoon, at 1:00 pm and consists of invited papers.

Donald J. Eckert of the Ohio State University begins the program with a "History of the Basic Cation Saturation Ratio Concept of Soil Test Interpretation" in which he "will explore the development of the Basic Cation Saturation Ratio Concept, a long-lived, extremely controversial approach to soil test interpretation."

The second presentation will be "Edward Elway Free, Studies in Soil Chemistry and Physics" by Eric C. Brevik of Valdosta State University, who will review the contributions of the little--known Free to soil science.

In "Sergei Winogradsky's 'Direct Method' and the Formation of an International Network of Soil Microbiologists including: C.B. van Niel, H.J. Conn, S.A. Waksman, L.G. Rommell, A.J. Kluyver, and others," Lloyd T. Eckert, Jr., of The Johns Hopkins University will examine the formation and development of a broad international network of ecologically-minded soil microbiologists in the 1920s-1940s around debates concerning Sergei Winogradsky's 'Direct Method.'

Next, Benno Warkentin of Oregon State University will demonstrate in "Strands of Soil Physics, Soil Mechanics and Agricultural Engineering" that these aforementioned disciplines converged and then diverged to apply mechanical properties to different soil uses

After a short break, during which Benno Warkentin will update the audience on the History of Soil Science book project, Joseph Heckman of Rutgers University will speak on "Sir Albert Howard's 'War in the Soil' And the Origins of Organic Agriculture," giving a brief biography of Howard and his controversial concepts of soil fertility.

The biographical theme will continue with "Remembering the Life and Work of Francis Doan Hole" by John P. Tandarich of Hey and Associates Inc., Vance T. Holliday of the University of Wisconsin-Madison (who has just moved to the University of Arizona), Donald L. Johnson of the University of Illinois at Urbana-Champaign, and Daniel R. Muhs of the U.S. Geological Survey, Denver, CO. The life, work and, particularly, the diverse contributions to soil science and geography of the late Francis D. Hole (1913-2002) will be recalled.

The last afternoon presentation by Rienk van der Ploeg of the Institute of Soil Science, University of Hannover, Germany, will regale us about "John Lawes' Rothamsted Fertilizer Experiment and Liebig's Big Bluff."

Session 2, beginning at 7:00 pm on Monday evening, promises to be a lively panel discussion entitled "What's in a Name: Toward a Philosophy of Soil Science." While traditional agronomy departments are being disbanded as universities and colleges reorganize, soil science is disappearing from view. Some questions to be considered are, "What is soil science? What is its scope? Is it a field and/or laboratory science? Is it pure and/or applied science? Is it agricultural and/or environmental science? Where, in the academic world, does it belong?"

The Council will have it regular business meeting on Sunday, November 10, 5:00-7:00 PM.

For additional information please contact John P. Tandarich 312-922-0777, chicago@heyassoc.com

◆

NEWS

The "History of Soil Science" Book

Work on this important project by the IUSS and SSSA Committees on History, Philosophy and Sociology of Soil Science is proceeding. The authors chosen by the Editorial Committee for the different chapters have responded enthusiastically. They come from more than 15 countries. Their challenge is to write about the ideas that have led to our present understanding of soil. Short statements and abstracts submitted by the authors are now being evaluated for coverage and potential overlap. First draft copies are due in February 2003.

The final content, chosen after much discussion, is as follows:

I. Introduction

The discipline of soil science, concepts of soil, overview of soil science in society, soil science as a global science, soil basics.

II. Soil Awareness in History of Civilizations

A. Attitudes to soil and land use in different civilizations

Greek and Roman, China, Asia (southern)

B. Ethnopedology
C. Ethical, moral, and religious

III. Landscapes and Soils

A. Soil geography and human activities
Changes in landscape. Human influences on landscapes
B. Soil conservation
History of soil conservation ideas
Stewardship, conservation ethics, sustainability and soil health
C. Soil in land use decisions
Using soils knowledge for policy decisions

IV. Soil as Natural Body

A. Genesis, descriptions and classification
Development of seminal ideas in pedology by people who furthered its understanding and acceptance
Early harbingers of bio-pedo concepts
The contribution of Dokuchaev
The Hilgard-Whitney controversy
Changes in concepts and bases of soil classification
B. Soil properties and processes

Development of the seminal ideas in each of these branches, including notes on the people who furthered our understanding, the societal context, and applications to soil management

a) Hydrology, physical sciences, soil mechanics, and engineering
b) Chemistry and surfaces, including mineralogy
c) Biology, including micro morphology
d) Soil in an ecological context
Diversity, soil functions, in ecosystems, soil as a habitat
e) Soil geomorphology
f) Cross discipline contributions

V. Uses and Users

A. From gathering to horticulture to agriculture
B. Soils and environmental issues
Some informative examples, such as soil and water quality
C. Modification of soils for human use
Reclamation, restoration. Some informative examples.

VI. Communication of Soil Knowledge

A. Education. Teaching different audiences
B. Professional communication
History of journals, conferences, specialized workshops, soil science archives
C. Quest for professional legitimacy and authority
D. Soil science contributions to global, scientific, and environmental initiatives

Benno Warkentin
for the Editorial Committee
Lloyd Ackert, Rienk van der Ploeg,
Donald Sparks, John Tandarich,
Benno Warkentin and Dan Yaalon

Lewis and Clark Commemoration will include soils

From 2003 through 2006, an official observance will commemorate the bicentennial of Meriwether Lewis and William Clark's historic journey to explore the headwaters of the Missouri

River and to find an overland route to the Pacific Ocean by way of the Columbia River. More than 25 million visitors are expected to follow in the explorers' footsteps, traveling through Idaho, Illinois, Indiana, Iowa, Kansas, Kentucky, Missouri, Montana, Nebraska, North Dakota, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, Virginia, Washington, and West Virginia. The bicentennial commemoration will be an expansive four-year grassroots observance, planned by local communities, tribes, states, federal agencies, non-government organizations, and individuals from Monticello in Charlottesville, Virginia, to the mouth of the Columbia River at the Washington-Oregon border.

The Soil Survey Division of the Natural Resources Conservation Service is developing a planner (calendar) to illustrate the emphasis that the Lewis and Clark Expedition gave to exploring and describing soils, vegetation, and landscapes in the West, and the soils' link to

the landscape and potential for the future. Throughout the Lewis and Clark Journals are descriptions of soils, vegetation, animals and their relationship to the land. With each site or quotation from the journals or letters to or from President Jefferson, there will be a picture of the present-day landscape, a soil profile and soil description, and a short explanation of historical context or modern use of the soil-vegetation-landscape relationship today.

Maxine Levin, Soil Survey Division, Natural Resources Conservation Service

◆

Tandarich Completes Ph.D. on Soil Science History

On 8 November 2001, John P. Tandarich, current chair of the Soil Science Society of America Council on the History, Philosophy and Sociology of Soil Science, defended his doctoral dissertation entitled "The Evolution of the Profile Paradigm in the History of Pedology and Quaternary Geology: Concepts and Applications." He received the Ph.D. in Natural Resources and Environmental Sciences in the Department of that name at the University of Illinois at Urbana-Champaign. Robert G. Darmody was his Advisor and Leon R. Follmer was his Director of Dissertation Research.

The first paragraph of dissertation abstract summarizes the study as follows:

"The soil profile concept in pedology and the weathering profile in Quaternary geology are essentially the same, but have been treated in ways to cause interdisciplinary conflict and confusion. The purposes of this study were to research the history of the conflict and confusion through elucidating the evolution of the soil profile and weathering profile concepts, and to propose a unifying profile concept, the pedo-weathering profile (PWP), that would attempt to resolve these interdisciplinary issues by facilitating the communication of soil information across disciplinary boundaries."

Chapter 3 of the dissertation was published in a revised version as "Tandarich, J.P., R.G. Darmody, L.R. Follmer, and D.L. Johnson. 2002. The historical development of soil and weathering profile concepts from Europe to the United States of America. *Soil Science Society of America Journal* 66(2):335-347." For a reprint you may contact John P. Tandarich, 312-922-0777, chicago@heyassoc.com

◆

Liebigiana

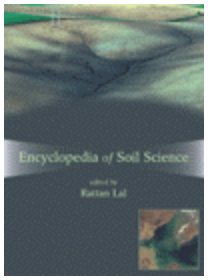
Next year is the 200th anniversary of the birth of Justus von Liebig (1803-1873), the influential founder of agricultural chemistry as a separate branch of science. The anniversary year will be celebrated in Germany by a number of public functions. In Giessen, where he was Professor of Chemistry at the university (1824-1852), which is now named after him, there will be several exhibitions commemorating his work and a symposium. His original Institute of Chemistry, which in 1920 was opened to the public as the *Liebig Museum*, was renovated in 1952 and again expanded in 2001, will contribute from its collections. Giessen is also the seat of the Justus Liebig Society which has recently republished many of Liebig's publications. This Society and the Society of Friends of the History of Natural Sciences in Ludwigshafen continue to promote his memory. There are many books and biographies on Liebig. William Brock, professor of history of science at the University of Leicester, England has published the best recent biography in English, *Justus von Liebig: the Chemical Gatekeeper* (1997, 374pp, Cambridge University Press, UK). It is now available from the same press in paperback. Since the broad outlines of Liebig's biography are well known, they need not be repeated here. Liebig's leading role in the establishment of agricultural chemistry as a separate branch of science and its foremost promoter and entrepreneur for the extension of chemistry to agronomy and other fields remains unchallenged. He was a true leader, garnering many honors. His role in formulating the Law of Minimum in soil chemistry is now shared with Carl Sprengler (1787-1859), who independently researched and formulated the significance of the mineral nutrition of plants, thus reversing the previous humus hypothesis (cf. R.R. van der Ploeg et al., SSSAJ 63: 1055-1062, 1999).

The IUSS will be voting at the 17th Bangkok World Soil Congress on the establishment of a Liebig Prize in Applied Soil Science [in addition to a Dokuchaev Prize in Basic Soil Science], which prompted me to prepare these brief notes. I wish to thank Dr. W. Ziehen, Giessen, and the late Ing. W. Lewicki, Ludwigshafen for the information supplied.

Dan Yaalon (Israel)

Book Notes & Reviews

Encyclopedia of Soil Science

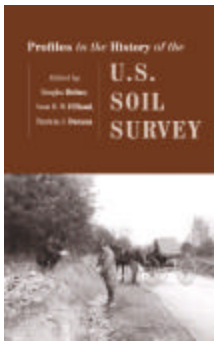


The *Encyclopedia of Soil Science* (2002), edited by Rattan Lal, is now available to subscribers to Marcel Dekker's publications online. The volume includes articles on historical topics.

◆

Profiles in the History of U.S. Soil Survey

(Ames: Iowa State Press, 2002). 331 pages.



Iowa State Press has published this volume edited by Douglas Helms, Anne B. W. Efland, and Patricia J. Durana. The soil survey program began field operations in 1899. The volume offers a broad-ranging collection of essays chronicling the development of the U. S. Soil Survey and its influence on the history of soil survey as a scientific discipline that focuses on the mapping, analysis, and description of soils.

Information about purchasing this volume can be found at http://www.isupress.edu/

Douglas Helms
Natural Resources
Conservation Service

◆

L'Odyssée Des Agronomes De Montpellier, 1848-1998: Fresque d'une Grande Ecole de la Méditerranée ouverte sur le monde

(Montpellier, France: Ecole Nationale Supérieure Agronomique).
Jean-Paul Legros

Professor Legros has forwarded to the Newsletter a copy of this volume on the history of the agronomy program at Montpellier. For additional information please contact Professor Legros at:

legros@ensam.inra.fr

Dr. Jean-Paul Legros
Unité de science du sol, INRA
2, place Viala – 34060
Montpellier Cedex 2
France

◆

Soil Science in Argentina. Evolution and Prospects.

ABSTRACT of paper presented by Hector Morras at 18th Congress of Argentine Society of Soil Science, April 2002. The full paper, in Spanish, is available on CD from the Argentine Soil Science Society.

In Argentina, soil science has evolved in similar stages as in other countries, though somewhat later. In accordance with the development of the nation, a historical analysis enables one to differentiate three main epochs of doctrine and institutional arrangements. The conflict between the conception of soil science as a basic and autonomous science and the "agronomical paradigm" prevailed. The latter, reductionist models of research are now being replaced by a new "environmental paradigm," implying a greater involvement with problems of the environment and the society. The growth of soil science in Argentina at present is influenced by both institutional and political decision makers, as well as by internal determinants for which the researchers themselves are responsible. Future priority themes, among other aspects, will need to intensify the study of the soils' spatial and temporal multidimensionality, to increase the knowledge of properties and to processes, and to advance towards the integration of basic knowledge with agronomical practices and environmental problems.

◆

Research Progress in the USA for More and Better Food Production: Alexander von Humboldt Awards, 1975-1999

Arnold Finck. 1999. (New York: Alexander von Humboldt Foundation). 146 pages. ISBN 3-00-005191-0

Professor Emeritus Dr Arnold Finck, University of Kiel, is the author of a small book on the Humboldt Awards to US scientists contributing to food production. There is background on the founder of the awards, Alfred Toepfer, a grain merchant, and on Alexander von Humboldt, explorer and universal scientist. Humboldt's influence on agriculture included introduction of guano to Europe as a fertilizer. He promoted Justus von Liebig's career in plant and soil chemistry. Liebig's ideas in turn had the major influence on the beginnings of agricultural chemistry in the eastern USA. The book then presents some biographical background on the twenty-eight US award recipients, and an analysis of the importance of their work in increasing food production. Professor Finck also includes several chapters of his own work on climate effects on food production, soil fertility, questions related to world food supply, and the historical fight against hunger. This is a useful contribution to a major concern of soil scientists—alleviating hunger in the world.

Benno Warkentin
Oregon State University

◆

Ethnopedology in a Worldwide Perspective: An Annotated Bibliography

Narciso Barrera-Bassols and J.Alfred Zinck. 2000. **(**Enschede, the Netherlands: R International Institute for Aerospace Survey and Earth Science (ITC) 636 pages. ISBN 90-6164-1722

The authors have compiled an impressive bibliography of more than 900 references with abstracts and key words on indigenous environmental knowledge. The references, classified by country, contain information for about 200 ethnic groups on their understanding of soils and soil management. The geographical and thematic indexes make this book a ready source of references and research ideas. The book also contains a worldwide review of ethnopedology papers classified by authors, and a background paper on the scope of ethnopedology. The history of soil science community owes a debt to the authors and their collaborators for their compendium on a

topic of increasing interest and value in the study of soil science.

Benno Warkentin
Oregon State University

◆

Sols et Sociétés – Regards Pluriculturels. (Soils and Societies- Pluricultural Comparison)

Rabah Lahmar and Jean-Pierre Ribaut. 2001
Editions Charles Mayer ISBN 2-84377-053-X. (English edition in preparation).

This contribution to the philosophy and sociology of soil science contains the papers presented at a workshop held in France in 1998. One section deals with the perceptions of, attitudes toward, and understanding of soils in seven chosen regions of the world: India, Rumania, Malaysia etc. In a second section, the authors examine approaches of the major religions and beliefs toward soil. In general their mission statements have a strong conservation ethic, which tends to be lost in practice: some of the eastern beliefs with a larger mystical component have reverence for soil. The organizers are to be congratulated for approaching a topic that will be of increased interest to soil scientists as we explore aspects of soil beyond its economic uses.

Also of interest in this regard is the Fall 1998 issue of Earth Ethics on "Religions of the World and Ecology: Discovering the Common Ground" (Published by the Center for Respect of Life and Environment, 2100 L St. NW, Washington D.C. 20037, USA).

Benno Warkentin
Oregon State University

◆

Publishing in Soil Science: Historical Developments and Current Trends

Alfred E. Hartemink. 2002. (Vienna: International Union of Soil Sciences). 268 pp. ISBN 90-6672-075-1. Euro 20.00

This is a most welcome compilation of A. Hartemink's (ISRIC, Wageningen) six recently published articles on Publishing in Soil Science from the Bulletin of the IUSS, together with four other recently published articles (with additional authors): on the history of the International Society of Soil Science, on the content of 100 volumes of *Geoderma*, on comparison of tropical and temperate soil science, and on publishing in science.

Winfried Blum, the current Secretary General of the IUSS, rightly points out in the Foreword that currently soil science activity and hence the growing publication rate is undergoing a reorientation from mainly agricultural productivity to environmental issues. At the same time there is continuous strong activity in the major goal of pedology, in elucidating the nature and genesis of soils as a natural resource which contributes to sustaining the planet. The biogeochemical carbon dynamics and aspects of the water cycle continue to be focal points. New directions, like pedometrics and pedotransfer functions are evident, which have contributed to the diminishing attention to field work and integrative accounts. Commercial enterprises have now taken over the majority of the publication activity and considerably enhanced the spread of electronic publishing. This is to the disadvantage of developing countries, which still contribute only a minor portion of quality publications.

Though the overall picture which emerges from these articles is a healthy state of publishing activities in soil science, no doubt others who have had difficulties in getting their work published will disagree and suggest different needs for the future. It is important to read the trend data carefully and form one's own opinion.

Dan H. Yaalon
Hebrew University

◆

Enriching the Earth: Fritz Haber, Carl Bosch, and the Transformation of World Food Production

Vaclav Smil. 2001 (Cambridge: Massachusetts: The MIT Press). $34.95

Soil scientists, whether they use their skills on managed agroecosystems or in understanding natural systems, will find much of value in this book. The synthesis of ammonia from nitrogen and hydrogen had been sought for one hundred years before Fritz Haber accomplished the task

in 1909. Carl Bosch shepherded development of the industrial processes for commercial production.

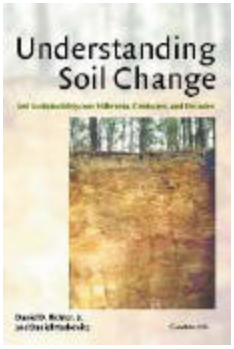
An ammonia converter 23 meters high installed at the Aonla plant in India by Haldor Topsøe. From *Enriching the Earth.*

The ramifications of this development can hardly be exaggerated. Of the world's six billion people, the author estimates "nearly 2.5 billion are here because proteins in their bodies are built of amino acids whose nitrogen came--via plant and animal foods—from Haber-Bosch synthesis" (Page 221). Smil's command of the sources and his ability to explain the technical and scientific aspects are indeed impressive. His goal was to make the survey comprehensive and interdisciplinary--understanding that some specialists may read only parts of the book. Smil explains the flows and sources of nitrogen in traditional and pre-industrial agriculture. Mining of guano and Chilean nitrate is also explored. The history of science and technology emphasis is to be found in the discussion of the Haber-Bosch process and its improvement. Agriculturalists and soil scientists will enjoy the exposition of how synthetic fertilizers have transformed agriculture. The increase in the quantity and quality of food and improvement in human diets has not come without a price. Smil examines the consequences of reactive nitrogen in the system—a condition which has been much overshadowed by the focus on carbon dioxide. Smil's book deserves a place on the bookshelf not only of scholars of the history of agriculture and science, but also of policy makers.

Douglas Helms
Natural Resources
Conservation Service

◆

Understanding Soil Change: Soil Sustainability over Millennia, Centuries, and Decades.



Daniel D. Richter and Daniel Markewitz, 2001. Cambridge University Press, UK, 270 pp., $ 70.00.

This review will be published in the journal *Soil Science* Vol. 167 (2002).

This book deals in a highly appealing way with the shift from nature-dominated soil genesis to human-induced soil changes. How are geo-ecosystems of Ultisols carrying mature hardwood in a humid climate changed after 200 years of cultivation? And how are cotton-growing soils then changed in 40 years of reforestation with pines? These are the major questions asked in this excellent book. The text is divided into five main parts, with Part I providing a general background of pedogenetic processes and soil management.

The core story of soil change is based on the alterations in the deep (~5 m) mature soil profile developed over millennia on gradually uplifted granitic gneisses of the southern Piedmont of the USA, described in Part II. Now in isostatic equilibrium, both with geomorphic and environmental forces, the dominant soils on gently sloping pedomorphic surfaces were previously called Red Yellow Podzolic and are now classified as "clayey, kaolinitic, thermic Typic Kanhapludult" (Cecil or Appling soil series on granitic gneiss). These are widespread in southeastern USA and hence also of wider interest for similar humid areas with advanced weathering. The Calhoun (South Carolina) forest soil profile and its chemical data are presented in detail. For the weathering process the authors concentrate on the process of acid hydrolysis and speculate on the source of the protons, whether from biogenic or carbonic acids. The soil hydrology is described in less detail. With an estimated 400 mm rainfall in excess of evapotranspiration (how much of this is surficial or lateral runoff?) the weathering rate at depth is considerable, but only the figures obtained by Pavich for the Virginia Piedmont (7 to 40 mm per thousand years) are

quoted. Some more analyses of the soil solution and ground water would have been helpful to validate these rates.

Though alluvial bottomland Inceptisols were cultivated for maize by Native Americans for centuries, deforestation of the upland interfluves started only in the late 18th century for growing cotton and spread rapidly in the 19th century. When liming and nitrogen fertilization were introduced on these acid and nitrogen-poor soils, productivity improved, accompanied by profound changes in the soils, as described in detail in Part III. Acidity was partly neutralized but organic carbon content decreased by at least 40%. Gullies, created by accelerated soil erosion became a problem. The soil management details are valuable for a better understanding of the region and can be supplemented further by the recent account of Helms on *Soil and Southern History* (2000), though it deals more with the base-rich Alfisols.

Part IV, based on 40 years of pine reforestation at the Calhoun Soil-Ecosystem Experiment facility, deals with changes in these cultivated soils when abandonment of these Piedmont farms began in the 1930s. Dynamics of carbon, nitrogen, exchangeable cations and phosphorus were measured periodically though only to 60 centimeters depth. Soil re-acidification progressed rapidly, while soil carbon changes were limited to the top few centimeters only. For a better understanding of these processes, long-term monitoring is needed.

Understanding Soil Change is a pioneering book worthy of follow-ups. Part V ends with a strong appeal to establish in several critical regions similar long-term monitoring and research experiments of soil-forest-ecosystems, a program which hopefully will be taken up by the relevant institutions. The problems in evaluating historic trends in properties relevant to soil development and of understanding soil changes leading to sustainability in management would indeed be best served by such permanent or long-term networks. In each case a broad holistic approach, though costly, is needed. By comparison, selected, incomplete, or partly misguided data can lead to unconvincing conclusions about soil change as in the recent book of Lindert (2000) on arable soils in China and Indonesia, essentially aiming at a similar understanding as for the Piedmont Ultisols. We need to learn from both efforts.

The book is clearly written and well illustrated. It is used as a graduate text and is highly recommended to all soil scientists and their students--a fine example of a broad study of major soil changes and their relation to management. It should be no less relevant to ecologists, biologists and geographers, who too frequently, when describing or studying ecosystems, disregard the importance of soil characteristics, their dynamics and human impacts on soils.

References

Helms, D. 2000. Soil and Southern History. *Agricultural History* 74: 723-758.

Lindert, P.H. 2000. *Shifting Ground: The Changing Agricultural Soils of China and Indonesia*. XII + 351 pp. MIT Press, Cambridge, MA.

Dan H. Yaalon
Institute of Earth Sciences
Hebrew University

◆

ARTICLES

On the Dokuchaev Legacy

Vasili Vasilievich Dokuchaev (1846-1903) commenced the recognition of soils as a separate body of nature following the publication of a widely known and classical book *Russian Chernozem* (1883) as a Report to the Free Imperial Economic Society (FES) in St. Petersburg. He became known as the main founder of what is now known as pedology--the science of soils as a natural resource, dealing with their origin, nature, distribution and classification. It is an interesting example of a distinct science where the term pedology was coined (by Fallou in 1862) before the science as such was characterized. Dokuchaev died at a relatively young age and his bearded picture became a familiar addition to numerous memorials, celebratory anniversaries and reviews. He became a prominent figure of the pioneers of Russian science, honored by a large fine bust in the gallery of selected scientists at the prestigious Moscow State University and having a leading research institute and a museum named after him. At least two full-length biographies of

Dokuchaev were published in Moscow, by I.A. and L. Krupenikov in 1950 and by S.V. Zonn in 1991.

V.V. Dokuchaev

He was a prolific writer. A list of his works published in 1903 in *Pochvovedenie* No 4 (N. Krishtafovich, p. 431-441) includes 137 items from 1871 to 1902, including voluminous expedition reports and popular articles, all in Russian, except for six items in French or English, much less known. Judging by the collected papers republished 1949-61 in nine volumes in Moscow, even this list is incomplete. Besides the 1883 *Russian Chernozem*, translated into English in 1964, the most influential among his publications is the 1892 discussion and interpretation of "Russian Steppes in the Past and in the Present" (also translated by the Israel Program for Scientific Translations in 1967, 67 pp).

It is interesting to look closer at the few publications originally printed in French or English. They include an 1879 preliminary report in French (70 pp) to the St. Petersburg Free Economic Society (FES) of the subsequent *Russian Chernozem* book. It was the custom of the FES, which acted as a kind of Science Academy (cf. Prescott, 1965, 1967, 1977) to publish both in French and Russian. In 1890 Dokuchaev became a foreign member of the Belgian Geological Society and submitted translated papers reporting the methodology of his soil mapping work in the Nizhni Novgorod region, suggesting that in detailed agro-geological mapping pedological properties should be taken into account. The papers were not printed in the proceedings, but the chairman of the Belgian Geological Society reviewed them and showed the maps at a session, followed by a discussion and a presentation by another Russian soil-geologist, Loewinson-Lessing, of his soil classification (Bull. Soc. Geol .Bel. 4:113-116, 1890). Subsequently Dokuchaev presented to the Belgian Geological Society another paper, *Note sur le loess* (Bull. Soc. Geol. 6:97-101, 1892) pointing out its glaciogenic source, opposed by two Belgian discussants recognizing the eolian origin of loess.

A more detailed and better known paper including a discussion of soils on the "Russian Steppes in the Past and in the Present" was presented in French to the 1892 International Archaeological Congress in Moscow and in English to the 1893 World Columbian Exposition in Chicago, where a collection of soils was exhibited. It was accompanied by an explanatory text of properties and classification, prepared by Dokuchaev and Sibirtzev (cf. R.W. Simonson, Soil Survey Hor. 30 41-42, 1989). The next and final French publication was an 1895 summary report of the 1894 Forestry Department Expedition (28 pp).

When *Pochvovedenie* was founded in 1899, Dokuchaev published in this journal just two articles. One is a new soil classification table and one is on the soils of Bessarabia [now Moldova], which he had visited with expeditions several times since 1877 (cf. I.A. Krupenikov, *V.V. Dokuchaev on Bessarabia*, Chisinau [Kishinev], 1996). These had no foreign language abstracts. The extent of his publications in non-Russian languages was thus very limited, no doubt contributing to the slow spread of his ideas. His most celebrated pupil, N. Sibirtzev presented in French a long paper at the 7th International Geological Congress in St Petersburg, 1897. This paper was published in the *Proc*eedings in 1897 (pp. 73-125) and subsequently in a much shortened translation titled "Russian Soil Investigations" in English (Experimental Station Record 12: 704-712 and 807-818, 2901). Even though Sibirtzev duly stressed that this paper was based on the pioneering investigations of Dokuchaev, it was little noticed in the West. An exception is its impact on G.N. Coffey of the USDA Bureau of Soils. (Proc.Amer.Soc.Agr. 3:115-129, 1911), who obtained it from his thesis adviser G.P. Merrill (Brevik, 1999, 2001). Hilgard, who, according to Jenny (1961), knew of Dokuchaev's work on humus and climate effects, does not cite him at all, no doubt because of his inability to read Russian papers..

Though some critical comments on Dokuchaev appeared in the Russian literature, he became there a true cult figure, with hardly any pedological publication failing to mention his name. The first 100 volumes of *Pochvovedenie* have 90 articles on Dokuchaev and his work (Ivanov and Lukovskaya, 1999). The Russian Soil Science Society is now the Dokuchaev Soil Science Society and it awards a highly respected commemorative medal. The broad outlines of his biography are thus well known. The IUSS will be voting during the 17th Bangkok World Soil Congress on the establishment of a Dokuchaev Prize in Basic Soil Science (Pedology) [in addition to a Liebig Prize in Applied Soil Science], which prompted me to prepare these notes on some less known aspects. Dr. Rudi Dudal provided information on the Belgian membership.

Dan H. Yaalon
Hebrew University

◆

Soil Science and Soil Scientists in Switzerland (1855 – 1962).

By Hans Sticher

Early references to scientific investigations of soils in Switzerland go back to the first half of the 18th century (Johann Jakob Scheuchzer: Itinera alpina, 1708). "The Alps," a poem written by the Bernese physician and natural scientist Albrecht von Haller in 1728, inspired a wave of enthusiasm for the mountains and nature in general in Switzerland and many other parts of Europe. Cultured travelers began to explore and describe Switzerland and its hitherto dreaded mountains (Caspar Wolf, Horace-Bénédict de Saussure, Johann Wolfgang Goethe, and many others). Influenced by English examples, well-educated landowners did their own field experiments and proposed improvements on farming and land utilization (Nicolas de Saussure, Charles Pictet de Rochemont, Philipp Emanuel von Fellenberg). Nature loving academics such as theologians, physicians and botanists began experimenting with soil and measuring soil characteristics such as temperature or humus content (Johann Jakob Ott, Nicolas Théodore de Saussure, Jean Elie Bertrand, and others).

In Switzerland no higher education in soil science was possible until the establishment of the Federal Polytechnic in Zurich in 1855 (today: Swiss Federal Institute of Technology, ETH). In order to complete university courses in agronomy and forestry (including pedology) Swiss students had to go abroad, e.g. to Stuttgart-Hohenheim, Göttingen, or Dresden-Tharandt in Germany. At the School of Forestry, which was a part of the polytechnic from its beginning, pedology was a compulsory subject, although without any accompanying research. In 1871 the School of Forestry was expanded to the School of Agronomy and Forestry. Three new professors were hired for the agricultural section, including Anton Nowacki (1839 – 1907), professor of plant science and pedology. Nowacki was the author of the first Swiss textbook of pedology,[1] which appeared in 1884 and attained a large circulation in all German-speaking countries. Even though the book became outdated with time, six further editions were necessary until 1920. Max Düggeli (1878 – 1946), a microbiologist in charge of the pedological education of the rural engineers at ETH, revised and updated the text completely, but his edition of 1932 was the last one to appear.

Upon the suggestion of the Swiss Agricultural Society, an Agricultural Experimentation and Examination Laboratory was founded at the school of agronomy in 1878. Due to the rapid expansion of this laboratory, it was moved to new buildings in Zurich-Oerlikon in 1914. On the initiative of Prof. Anton Bühler (1848 – 1920), a similar station was established in 1885 within the school of forestry. From the beginning, soils were examined at both stations even though with different objectives. In the agricultural laboratory soils were mainly analyzed for their fertilizer requirement, whereas the program of the Central Institute of Forestry included a wider diversity of interests and included investigations on rock samples, weathering processes, texture, physical properties, influence of the vegetation cover on the soil, influence of soil tillage, measurement of soil temperature, precipitation and evaporation. Thanks to Bühler's engagement initiated over 100 years ago, the foundation was laid for a remarkable development of soil physics in Switzerland,

[1] A. Nowacki: Praktische Bodenkunde

which led through the contributions of Anton Bühler, Arnold Engler (1869 – 1923), Hans Burger (1889 – 1973), and Felix Richard (1915 – 1984), directly to the contemporary soil physics program at the Institute of Terrestrial Ecology at ETH Zurich.

Toward the end of the nineteenth century, agricultural experimentation and examination stations including soil laboratories were also established in Berne and in Lausanne. The main purpose of these stations was the same as in Zurich, i.e. the examination of fertilizers and the assessment of fertilizer needs of soils. Outstanding scientists, who besides their routine work found enough time to perform original research and to publish the results in scientific journals, marked the history of all three establishments. The most important we have to recognize are Ernest Louis Chuard (1857 – 1942) and Charles Dusserre (1860 – 1934) in Lausanne; Ernst August Grete (1848 – 1919), Alois Stöckli (1893 – 1970) and Erwin Frei (*1914) in Zürich-Oerlikon; and especially Paul Robert Liechti (1866 – 1927) in Bern-Liebefeld.

An important break in the history of Swiss soil science occurred in 1913, when Georg Wiegner (1883-1936), a colloid chemist from Göttingen (Germany) was appointed to the chair of agricultural chemistry at ETH. Wiegner replaced the previously separate pedology courses for agronomists and foresters with a lecture, which was strongly based on physico-chemical and colloid chemical principles. His sound knowledge of the fundamental principles of colloid chemistry also led him to numerous fresh and path-breaking discoveries in the fields of coagulation and ion exchange – his main interests. In spite of this preference for basic research, Wiegner was also aware of the great importance of ecological pedology. Not being a practical pedologist himself, he was looking for excellent collaborators whose holistic understanding of the correlations within the soil-plant ecosystem influenced the thinking of soil scientists in Switzerland to the present time. The most important were Hermann Gessner (1897 – 1981), Hans Jenny (1899 – 1992) and Hans Pallmann (1903 – 1965), who all made brilliant academic careers later on. In order to understand the soil as a whole, Wiegner's group worked together with some colleagues in related fields, such as botanists, microbiologists and zoologists. One of them, Max Düggeli, was investigating soil bacteria and was influenced himself by the ecological view of Wiegner's group. Together with his student Alois Stöckli (see above), Düggeli laid the foundations of soil biology in Switzerland.

Pallmann, who followed Wiegner as chair of agricultural chemistry at ETH, continued the classical work of Wiegner, at the same time turning his interest more and more to the classification of soils and the co-operation between pedology and plant sociology. Together with Josias Braun-Blanquet (1884-1980) and his school, Pallmann developed a comprehensive classification system, on which soil taxonomy in Switzerland is still based. Hans Deuel (1916 – 1962), who followed Pallmann, continued the work of his predecessors on ion exchange and soil humic substances. His experiments with preliminary stages and model substances of humics (e.g. pectin, galactomannnan) led him to the center of food chemistry, a field that has been substantially enhanced by his successor Hans Neukom (*1921), a former student of Pallmann. In fact, the old chair of agricultural chemistry was split into two new professorships: Neukom became a professor of food chemistry within the institute of agricultural chemistry and Roman Bach (1921 – 1981), a student of Pallmann as well, was appointed to the newly established chair of soil science.

The era of Wiegner, Pallmann, and Deuel was without any doubt the first summit of soil science in Switzerland. The remarkable reputation of all three attracted researchers from all over the world to work for a shorter or longer time in the institute of agricultural chemistry at ETH, but the agricultural era ended abruptly with the early death of Deuel in 1962. With the year 1962 ends also the present historical review. The assessment of the period after 1962 will be left to a future historian; nevertheless, some highlights may be mentioned to conclude this review.

The establishment of an independent chair of pedology was coincident with the growing awareness of environmental problems with respect to water, air and finally also to soils. It was realized that soil science could become a crucial field for the solution of the new problems. At short

intervals new chairs and research groups of diverse fields of soil sciences were established, not only at ETH Zurich but also at ETH Lausanne and at the universities of Basle, Berne, Neuchâtel and Zurich. The chairs of soil biology, soil chemistry, soil physics and soil protection at ETH Zurich were combined to form an Institute of Terrestrial Ecology in 1990, which was integrated into the newly established Department of Environmental Sciences.

A Swiss Soil Science Society was founded in 1975. Starting with two dozen pedologists, it presently includes more than 400 members. From 1985 to 1991 a national research program termed “Utilization of Soil in Switzerland” was carried out under the patronage of the Swiss National Science Foundation. Within this program more than 60 research groups from natural, social, and economical sciences were investigating specific aspects of land utilization such as prevention of soil loss and soil pollution and soil and land conservation, etc. In a transdisciplinary synthesis[2], proposals were made for the economical use of soil in densely populated Switzerland.

(The above text is the translated Summary of the book including the addition of the last paragraph by the author). Published by Juris Verlag Dietikon. 2001. Soil Science Society of Switzerland, Document No. 11, ISBN 3 260 05452 9, 122 pp. (In German, with a French Summary)

[2] R. Häberli, C. Lüscher, B. Praplan and C. Wyss (1991): Bodenkultur – Kulturboden. vdf Zurich, 192 pp.

◆

Art and Soil

Gerd Wessolek
Technical University Berlin, Institute of Soil Science, Salzufer 12, 10587 Berlin, Germany, Email: gerd.wessolek@tu-berlin.de

Introduction

This article takes up two questions. Has the topic "soil" already been dealt with in interpretative arts and could interpretative arts help to make an approach to soil science easier?

The first part of the article gives a short survey of "art-pedology." This paper does not claim to cover the topic completely and extensively. The second objective is to investigate if soil science in general and particularly the issues of soil protection can reach a greater social relevance through the "vehicle" art. The starting point for these considerations was the fact that considerably more people and social groups are interested in arts than have access to topics of soil science. We have to take note that even though the German Association of Soil Science integrates about 2500 (mainly scientifically oriented) members, a public interest in our subjects is limited.

Please open the Technical University homepage http://www.tu-berlin.de and thereafter kunst.bodenkunde.info for illustrations to this article. Enjoy the pictures!

Soil in interpretative arts

All of us are familiar with the fact that man has always had an interest in the artistic representation of his life, i.e. his environment. Examples for this are more or less all forms of cave paintings. The subject of soil has been treated independently in the interpretative arts for only the past 25 years, even though many artists have worked thematically on the portrayal of nature and on landscape paintings. The first picture in this series shows the work of Pieter Breughel with the title "The Conversion of Paul" from 1567. In this era painting focused on biblical subjects, portraits of the clergy or members of the royal dynasty, the aristocracy, historical documentation, scenes from rural life or parables. It is typical that the landscape itself remains in the background and is a more or less accompanying motive. The actual beginning of German landscape painting is often seen in Altdorfer's painting "Landscape of the Danube with the castle Wörth and the Scheuchenberg"; it is the first time that the landscape itself, inspired by lyrical perceptions, moves into the center of interest. Toward the end of the sixteenth century landscapes and presentations of nature in painting were in some sense discovered as an independent motive. Typical representatives are Dürer, Cranach, Burgkmair, Bosch and Poussin. Incidentally, this development coincides with the emergence of the French model of horticulture (Andre Lenotre, Parl Versailles).

It is a long time leap from this point to the styles of realism, impressionism and

expressionism. Strictly speaking, the styles of the "idealism," which take up motives of the ancient world and Greek mythology (e.g. Böcklin), as well as historical paintings (e.g. Rethel) that take historical events as an occasion to reproduce realistic scenes effectively belong in this period.

Van Gogh, 1888

In Germany, the paintings during the Biedermeier period showed (regardless of the romantic transfiguration of their motives) realistic features and attached great importance to very exact studies of nature (e.g. Leibl, Spitzweg, Schleich). In France, the artist Gustave Courbet (1819-1877) included for the first time political and social aspects of life in art as well. Completely new ways of expressing landscape, light, water and vegetation (but not soil!) in the sense of nature portrayals can be observed especially in the paintings of the impressionists and expressionists, which also show the changes in the art scene and the styles. Germany played only a minor role in this development. Not until the beginning of the twentieth century was the expressionistic style taken up in Germany (Beckmann, Macke, Marc). In the following you will find a selection of paintings from this period that are typical for the prevailing motives and for the individual styles (e.g. Pointillism). Typical representatives of these schools are Troyen, Segattini, Turner, van Gogh, and Monet. This list has to remain incomplete as well and should give encouragement for individual discovery voyages. However, it has to be made clear that soil as an independent subject was not dealt with during this time period. A survey of soil in landscape art is given in the essay by Jenny, 1968.

The subject of "soil" or of "earth," which is a term commonly used by artists, was taken up increasingly since about 25 years ago. However, there are no indications so far that "soil scientists" in the true sense of the word were involved in this development. I have assembled a number of objects installations and sculptures that represent this work. They were taken from the books "Erde-Zeichen-Erde" (earth-sign-earth) and the special issue "Natur-Kunst" (nature-arts, land art) listed in the references. Of course, each of the listed works of art has its own "message," which, unfortunately, cannot be explained here. All in all, the observer realizes that the soil can tell a story that it is composed of layers, belongs to nature, is connected with mankind, is more than just a surface and, most of all, is a living part of nature.

At the end of this series there is a satellite picture of the Andes to demonstrate on behalf of many of these rather scientific pictures, that they, too, regardless of their spatial scale, have a high aesthetic "value."
Three personal works can be seen subsequently. The first, developed for the occasion of the completion of a DFG-project (German Research Foundation) with the title "Consequences of lowering the groundwater level and of grassland conversion," has a more illustrative character and, strictly speaking, takes up the presentation of complex connections. Until 20 years ago this type of picture was common for illustrations of textbooks in the form of idealized soil profiles (Mückenhausen). The second figure shows a varnished profile of a pelosol (digitally doubled), which I developed further using acrylic paints in order to illustrate the effect of flow-paths and to take up the problems of soil physics. The last one shows a numerical bromide leaching experiment of Klaus Hammel and me, which was transformed by some drawing.

Conclusions

As "soil scientists," we like to perceive the aesthetic elements of the soil, but we do not convey them to the public. So far, the interpretative arts have also hardly taken up the subject "soil." When thinking of the beauty of many soil profiles, the colours of the ferric oxides in mineralogy or the rather abstract forms of the (so far only for us) fascinating thin-layer cuttings, we observe that unfortunately little of this has been incorporated into interpretative arts. Soil scientists are called upon to bring this aesthetic aspect to public knowledge. We should not rely on the laborious discovery of our subjects by the artists. An especially effective way could be incorporating artists into our studies and winning their support for the subject of soil. An appreciation of "soil through art" (as a vehicle)

should, therefore, absolutely be encouraged (in art classes and at universities). It is my personal concern to encourage the foundation of a new art style, perhaps named "Soil Art."

References

Hans Jenny, 1968. The Image of Soil in Landscape Art, old and new, University of California, Berkeley, California and in Pontifical Academy of Science, Scripta Varia 32, pp. 947-979.

Heinz Thiel, 1982. Natur und Kunst, Kunstforum.

H. Braun, 1968. Erde Zeichen Erde: Dokumentation einer Ausschreibung der Internationalen Gesellschaft der Bildenden Künste, Sektion Deutschland, 1991 Formen der Kunst, Verlag Martin Lurz.

◆

For Further Information:

Please submit any questions, comments, notices, or articles for publication to one of the following:

Dan H. Yaalon
Professor of Pedology and Chair, IUSS Committee on the History, Philosophy, and Sociology of Soil Science
Institute of Earth Sciences
Hebrew University, Gicat Ram Campus
Jerusalem 91904, Israel

Fax 972-2-570 44 11 or –566 25 81
E-Mail yaalon@vms.huji.ac.il

J. Douglas Helms
Senior Historian
Natural Resources Conservation Service
Room 6141-S
Washington, D.C. 20250
U.S.A.

Tel. (202) 690-4627
Fax (202) 720-6473
E-Mail Douglas.Helms@usda.gov

Committee on the History, Philosophy, and Sociology of Soil Science
International Union of Soil Sciences
And
Council on the History, Philosophy, and Sociology of Soil Science
Soil Science Society of America