Commission on the History, Philosophy, and Sociology of Soil Science
International Union of Soil Science
and
Council on the History, Philosophy, and Sociology of Soil Science
Soil Science Society of America

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NEWSLETTER

To Our Readers:

Though not succeeding as planned to produce a Newsletter every year, we apologize that this Newsletter number 9 comes to you only in 2001. It contains some important information on the relevant Symposium plans for the17th World Congress of Soil Science in 2002, convened by Benno Warkentin. Also included is a discussion of the plans for a book on the History of Soil Science, this time sponsored and supported by the SSSA, through the good offices of John Tandarich and colleagues. Please note the Council Meeting and Symposium during the SSSA Annual Meeting in Charlotte, NC.

Following the tradition of including short articles, we are especially pleased to include a short report by our Polish colleagues Kowalkowski and Jozwiak on the first professional chair in Soil Science in Pulawy (now in Poland) held by N.M. Sibirtzev from 1894. British colleagues M. Bridges and C.P. Burnham report on the early soil series mapping and pedology in Wales and Kent of the United Kingdom. We hope to include in the future more such historical reports and already have some additional ones for the next Newsletter.

The usual complement of some book reviews and a short list of recent publications are included. This section requires your cooperation. Any announcements of relevant new publication, with or without copies, will be appreciated by the undersigned.

Douglas Helms & Dan Yaalon

From Standing Committee CHP to Commission C4.5.

Following the newly revised scientific structure of the IUSS, we have now become a Commission on History, Philosophy and Sociology of Soil Science, within its Division 4. The aim and activity have not changed. We shall continue to sponsor meetings, newsletters, discussions and publications. But following the new IUSS bye laws we need to elect, at each IUSS World Congress, a Chairperson, a Vice-Chair and a Secretary of the Commission. The elections will be held during the 17th WCSS in Bangkok, August 2002. Nomination for these offices need to be submitted at least six months before the Congress to the Secretary General of the IUSS and be supported by 20 signatures of other members of the IUSS, with no more than 8 from any one country. Agreement in writing by the nominee must be secured. Since time is short, members are kindly requested to make suitable nominations. Supporting signatures can be obtained via fax or e-mail or at meetings, as the SSSA meeting in Charlotte.

Dan Yaalon

IUSS Symposium on "Changing Attitudes to Soil and Land Use"

The Committee on the History, Philosophy and Sociology of Soil Science (HPSSS) of the International Union of Soil Science, (now Commission C4.5 of Division D 4 in IUSS, entitled Soil Policies and Environmental Issues) is cooperating with Division D 4 to sponsor Symposium #31 – "Exploring the Attitude Towards Soil and Land Use" at the August 2002 IUSS World Congress in Bangkok.

A brief description of the intent of the symposium is as follows:

Symposium #31 will explore the different approaches to soil science, the different perceptions of land and attitudes toward land use in different cultures, as well as changes with time from early historical times to the present, and projecting into the future.

We are all familiar with the changes now occurring—prominence of soil science in ecology, global concerns for land degradation, prevention of soil loss through erosion, interest in the local knowledge of soils and land that farmers have accumulated over centuries in different countries, education about soils, principles of soil sustainability in different farming systems, and more.

What changes have occurred in the past, and how were they related to socio-economic conditions? What were the leading ideas that determined attitudes to soil and land? An analysis of such changes could help us identify future changes.

Papers have been published recently on how older agricultural practices were determined by soils, how landscape-level erosion influenced attitudes to land, and what knowledge of soils was available in previous societies. The increasing volume of papers on various aspects of the history of soil science indicate increasing interest, both among soil scientists and in related disciplines.

The symposium has been advertised to all the national soil science societies. Several scientists from around the world have expressed interest in presenting their studies in oral or poster format. This should be an excellent session.

Information on the meeting, the 17th World Congress of Soil Science (WCSS) can be found on their website:
http://www.17wcss.ku.ac.th

As convener of the symposium, I can also provide some information:

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Benno P. Warkentin
Oregon State University

Agenda and Invitation to Attend the Regular Meeting of S205.1 Council on History, Philosophy, & Sociology of Soil Science

Date: Sunday, October 21
Time: 5:00 – 7:00 pm
Place: Room 216A, Charlotte Convention Center

John Tandarich has provided the following agenda:

- Introduction
- Welcome new Council members
- Welcome guests – Lloyd Ackert, J.C.F. Tedrow, Benno Warkentin, among others
- Agenda additions
- IUSS Committee on History, Philosophy and Sociology of Soil Science: Benno Warkentin, nominee for this chairship
- International Congress 2002 - Thailand
- S392.20 Feasibility Committee for History of Soil Science Book
- Project approved by SSSA Executive Committee in July.
- *Special thanks to Benno Warkentin for his drafting of the final proposal with inputs from Dan Yaalon and John Tandarich*
- Next step is the organization of an editorial board to get the project accomplished
- Soil Survey Centennial publication
- History Symposium at this meeting on Monday night, 6:30-9:30, Convention Center, Room 203A, Upper Level
  Special thanks to Joseph Heckman for his notable assistance in program planning efforts.
- Potential oral history project
- Other business
- Adjourn

John Tandarich
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Symposium: Aspects of Soil Science History

Soil Science Society of America Annual Meeting
Charlotte Convention Center, Room 203A
October 22, 2001

John Tandarich and Joseph Heckman have organized another excellent symposium which the Council on History, Philosophy, & Sociology, DivisionS-3, Soil Microbiology and Biochemistry, and S-5, Pedology, will co-sponsor. The program is listed below:

PRESIDING: John P. Tandarich, Hey and Associates, Inc., Chicago, IL

6:30 **Introductory Remarks.**

6:35 **The Transcontinental Excursion of 1927.**
J.C.F. TEDROW, Rutgers University

7:00 **Sergei N. Vinogradsky: Nitrification, Chemosynthesis and the Cycle of Life, 1875-1905.**
L. ACKERT*, Johns Hopkins University

7:25 **Two Hundred Years of Nitrogen Use in Agronomy: A German Retrospect.**
R.R. VAN DER PLOEG, University of Hanover.

7:45 **Soil Structure: From Tilth to Habitat.**
B.P.WARKENTIN, Oregon State University

8:05 **Recess** (**Announcement of history book project: The Roots of Soil Science.**
B.P.WARKENTIN, Oregon State University)

8:20 **Nathaniel Southgate Shaler: Pioneer Soil Science Educator.**
J.P. TANDARICH*, Hey and Assoc., Chicago, IL.

8:40 **Collier Cobb's Soil Investigation Curriculum at UNC-Chapel Hill.**
D. HELMS, USDA-NRCS, Washington, DC.

9:00 **Ralph J. McCracken-Scholar, Teacher, Soil Scientis**t.
S.W. BUOL, North Carolina State University

9:20 **Closing Remarks.**

9:30 **Adjourn.**

The History of Soil Science Book

Recent papers and books on different aspects of the history of soil science indicate a growing interest in the development of our science. Professor Yaalon has been particularly active in stimulating and responding to this interest. The recent literature, however, shows that large parts of history have not been studied and documented. There is a need for, and interest in, additional books on the history of soil science.

Several national societies, including the Soil Science Society of America (SSSA), as well as the International Union of Soil Scientists (IUSS) are at different stages of planning for a written history.

The Committee on the History, Philosophy, and Sociology of Soil Science (HPSSS) of the IUSS, now commission C4.5 of Division D4-Soil Policies and Environmental Issues, discussed such a book at the 1998 meetings in Montpellier. In the SSSA, the Committee on the History Philosophy, and Sociology of Soil Science first suggested producing a history. The SSSA under the leadership of Past President Prof. D. L. Sparks is actively planning a book. A Feasibility Committee S392.20 met in Minneapolis in November 2000. They have reported favorably, and recommended formation of an Editorial Committee. This would be the next step in exploring how the book will develop.

At this early stage, suggestions and recommendations from all interested people are a critical need. Some of the questions and concerns that have been raised to date are:

1. A comprehensive history would be a daunting task, and the enthusiasm could collapse under such a weight. What parts of history should be written first? Should a multi-volume work be planned?

2. Who is the intended audience? As soil scientists, we have been effective in communicating with each other, but the need now appears to be communicating with other disciplines and with informed citizens? Is this our priority? If so, how can we organize the book to appeal to a wider audience? For example, can we contribute the soils knowledge now being sought by ecologists?

3. The traditional divisions of soil science based on the disciplines from which they drew their experimental techniques e.g. soil physics, soil biology, etc., are being replaced by different divisions. Those planned by the IUSS are an example. What divisions or chapters would be appropriate for a book?

The new major IUSS divisions are: Soil in Space and Time; Soil Properties and Processes; Soil Use and Management; The Role of Soils in Sustaining Society and the Environment.

4. The book likely needs to be written by a number of authors, each writing a section or chapter. How can gentle, yet effective, editorial control be established to avoid the weaknesses of multi-authored books?

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Professor Yaalon Keynoted History Session

AT THE 2000 SOIL SCIENCE SOCIETY OF AMERICA MEETINGS

In concert with the theme of the 2000 SSSA Annual Meetings "Agronomy, Crop, and Soil Sciences: Stars of the 20th Century - Beacons for the 21st", the history Special Session was entitled "Approaches, Methods, And Materials For Writing History Of Soil Science." The SSSA Council on the History, Philosophy and Sociology of Soil Science (S205.1) sponsored this session that featured both invited and volunteered papers.

The special guest and keynote speaker was emeritus professor Dan Yaalon of the Hebrew University in Jerusalem who discussed the major paradigms of soil science. Professor Yaalon is known for his work in both paleopedology and history of soil science. He has recently co-edited a special *Catena* volume on the latter topic. In addition, he is the chair of the IUSS Committee on the History, Philosophy and Sociology of Soil Science. Yaalon accepted the invitation to come to the meetings to discuss a cooperative history project involving the IUSS and SSSA that was addressed in the paper by Tandarich later in the session (and is the subject of an article elsewhere in this newsletter).

William Stolz of the University of Missouri - Columbia's Western Historical Manuscript Collection also spoke. (It is within this collection that the SSSA Archive of Soil Science is housed). Mr. Stolz discussed the use of archives in historical research and writing and brought the audience up-to-date on the holdings of the Archive. Following Stolz' presentation, John Tandarich of Hey and Associates and chair of the SSSA Council on History, Philosophy and Sociology of Soil Science, revealed the proposed scope and outline for an internationally-focused work on the history of soil science. This work would be a cooperative project between the IUSS and the SSSA.

An important part of such a work would be the identification and use of primary published and unpublished sources. Therefore, compiling a comprehensive bibliography of soil science would be important, as Hari Eswaran of the USDA discussed in the next paper. However, it has become painfully clear, as we begin our serious historical researches, that many important primary sources on the history of soil science have been discarded. Darrell Schulze of Purdue University showed one effort to preserve primary sources there for the future. Ted Peck and Michelle Wander of the University of Illinois at Urbana-Champaign discussed efforts to save another primary historical source in danger of being discarded – archival soil samples. Douglas Helms, NRCS Historian, illustrated the intimate connections of the soil with life in the history of the southern US. Ed Landa of the US Geological Survey familiarized the audience with the life and work of pioneer soil physicist Lyman J. Briggs. Lastly, Paul Carter of Purdue

University acquainted us with the life and work of pioneering soil scientists William Maclure and David Dale Owen.

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News

Yaalon Honored

The Faculty of Agriculture and Applied Biological Arts at the University of Ghent, (Belgium) has awarded Dan H. Yaalon the Sarton Medial for his contributions to soil science and the history of soil science.

***History of the U. S. Soil Survey* to be published.**

Douglas Helms, Anne Effland and Patricia Durana have edited *Profiles in the History of the U. S. Soil Survey*, which is scheduled for publication, Fall 2002 by Iowa State University Press.

"Soil and Southern History" *Agricultural History 74* (Fall 2000): 723-758.

The above article was Douglas Helms' presidential address to the Agricultural History Society. He will provide a reprint upon request. The address is listed at the end of this newsletter.

Activities in New Zealand

The newsletter received a communication from Vaughn Wood, who writes, "I will be submitting my Ph.D. dissertation, entitled 'Soil fertility management in 19th century New Zealand agriculture', in December of this year. This involves a study of the transition from initial appraisal of soil fertility by European colonists through to the beginnings of a domestic fertilizer manufacturing industry. Some time next year, I will also be appearing as a co-author in the 'Environmental History of New Zealand' volume by Oxford University Press."
Vaughan Wood, Ph.D. student in history, University of Otago.
Home Address: 16A Hillcrest Place, Avonhead, Christchurch, 4, New Zealand.

BOOK REVIEWS

Patzel, N; H. Sticher and D. L. Karlen, 2000. Soil Fertility- Phenomenon and Concept. *J. Plant Nutr. Soil Sci.* 163: 129-143

This publication from the Institute of Terrestrial Ecology at the ETH in Zurich is a comprehensive analysis based on a form and content analysis, of the many different meanings that have been associated with the term "soil fertility."

The concepts, taken largely from the rich German literature, are sorted into four main themes: an ecological or life process in the soil, a resultant of properties or processes, yield, and food for the plant. Not all concepts fall easily into these categories, and the publication discusses a number of other definitions. A language analysis shows the difficulty in any definition of finding terms to describe adequately, while not circumscribing, our concepts of soil fertility.

The phenomenon of soil fertility, a concept arising from ancient fertility cults, modified as the social setting changed. Soil fertility is analyzed using methods from the logic and philosophy of languages. Soil fertility describes a concealed soil feature and, therefore, cannot be used as a technical term in the natural sciences, The authors recommend that soil quality be used for sets of desirable soil attributes and functionalities, ie the capacity of the soil to function, assigned on the basis of value judgments.

This analysis of the terms we use so often in soil science is useful as we think about how to use the concept of soil quality.
Reviewed by Benno P. Warkentin

Hartge, K. H. 1999. Vom Wissen ber die Bőden zur Wissenschaftlichen Bodenkunde (From knowledge of soils towards soil science) Mitt. Deutschen Bodenkundlichen Gesellschaft. 89: 39-60. In German with an abstract in English.

Professor Hartge traces the history of the two main ways in which knowledge about soils has accumulated from experiences resulting from the need to use soils to produce food, and from curiosity and desire to understand the natural world. The first has always been dominant, the need to solve the urgent problems of feeding ourselves. This need led to an emphasis on physical properties as the major constraints for choosing soils for cultivation.

Our strong dependence on production of plants on soil, along with a lack of understanding of the basis of soil productivity, led naturally to mystifying the unknown and overwhelming forces. Crop failures were due to the

displeasure of the gods, who had to the propitiated. Fertility cults developed. Until the Renaissance the dominance in Western Europe of Christianity kept attention directed away from seeking explanations for natural phenomena. Additional food production could be attained from using more land, clearing forests, or later draining soils, and using animal power to cultivate clay soils. So the physical properties remained the dominant constraints because they could not be altered. Fertilization was a secondary issue.

Increasing populations in the 18th century, lack of new land to cultivate, and increasing intensity of use led to "worn out" soils in areas of net leaching. This was not a concern in arid areas where cultivation began, and where water was always the limitation to crop production. Irrigation often added sediment, which helped in maintaining productivity. Worn out soils led to increasing use of fertilizing materials, and to the dominance of soil chemistry in the 19th century.

This accumulation of knowledge based on experiences, in the urgent need to produce food, resulted in soils knowledge that was empirical and, what is an even greater hindrance to a scientific understanding, site specific. Food needs could not wait for understanding of soil processes. The desire to understand and know was there, but always relegated to the background. This situation persists today, with public funding demanding immediate answers to technical problems.

In the last decades of the 20th century new constraints to further intensification of food production have appeared. Increasing environmental degradation, such as water pollution, soil compaction, and erosion are now major issues. Furthermore, a new mystification about soil processes has resulted from the need to deal with uncertainties and unknown forces. Living attributes are ascribed to the soil--a soil ethic. Soil scientists have an obligation to provide a better understanding of soil processes, and to communicate to the public that understanding and the need for sustaining soil resources.

Reviewed by Benno P. Warkentin

The History of Pedology in Russia in XX Century

(Unknown and Forgotten Pages), Part I (In Russian]. S.V. Zonn, Institute of Geography, Russian Academy of Sciences, Moscow, 1999, 375pp. Softcover.

Beginning with the late 19th century, scientific expeditions to remote parts of Russia, to search for land suitable for settlement, introduced Dokuchaev's ideas as to many soil scientists, as depicted in the then new textbook of Sibirtzev. This book is a rambling account of the spread of Dokuchaev's idea in Russia during the first half the 20th century. It deals with many organizational events and their major 'actors,' without elucidating the details of their contributions. It mostly cites and refers to articles published in *Pochvovedenie*, founded in 1899, and from 1930 also relies of the author's memory of events.

At the beginning of the 20th century, Glinka was the eminent and most influential Russian pedologist. Some criticism of Dokuchaev's ideas, e.g. by Kostychev, Nabokikh and Kossovich, is also mentioned. After WW I, during the Soviet period, many new institutes and laboratories were founded.

Considerable space is devoted to preparations for the 1st International Congress of Soil Science (Washington, 1927) for which a large number of brochures was prepared in English. Though anticipating strong acclaim, the Russian pedologists were disappointed to find that Dokuchaev's notions did not dominate western pedology, which chose its own direction in soil science. Preparations for the 2nd International Congress (Leningrad-Moscow, 1930 started soon thereafter. According to S.V. Zonn it was the 2nd ISSS Congress which showed during field trips to world soil scientists (150 participants) the theoretical and 'practical' achievements and superiority of Dokuchaev's pedology. Russian pedologists demonstrated a better theoretical understanding of soil processes though they needed analytical data to support them. The Dokuchaev Soil Institute in Leningrad had the leading role. Several controversies among the renowned Russian pedologists are mentioned. When the Dokuchaev Soil Institute, after its transfer to Moscow, became part of the Academy

of Agriculture (where Lysenko dominated), its prestige suffered.

By the mid-30's politicization of science dominated its activity, repressing several leading pedologists (Tulaikov, Polynov, Sukachev), whereas the Williams school was promoted. Many scientific workers had to adjust in order to survive the ideological terror. Isolation from overseas countries was almost total. This continued in the early post World War II period. Then many Soviet pedologists started working in communist-dominated foreign countries, gaining valuable experience, e.g., with subtropical ferallitization. Regional, small-scale mapping, and soil classification occupied many.

First, the translation of Jenny's *Factors of Soil Formation*, and subsequently the gradual acquaintance with new approaches to soil materials (clay mineralogy) and soil processes (pseudogleying, clay illuviation, catenization and isotopic dating--all originating in the West) slowly penetrated in the 50's to the leading pedologists. The influence of and rivalry between Kovda (Moscow University) and Gerasimov (Institute of Geography, Academy of Science) in spreading these doctrines and sponsoring their own new ideas were strong.

This is an honest, most valuable account of pedological history in Russia until the late 50's, worthy of study by those interested in the history of soil science. Only 325 copies were printed. Part II (1999) brings the story to the end of the century.

Dan H. Yaalon and Alexander Tsatskin
(Jerusalem and Haifa, Israel)

Bibliographical Reference Book: Publications in "Pochvovedenie " Journal during 100 Years.
Compiled by I.V.Ivanov and T.S. Lukovskaya. Published under the auspices of Russian Academy of Science by "Nauka" Moscow. 1999, 670pp [In Russian].

To celebrate 100 years of publication of *Pochvovedenie* (except for the years 1917-1923), the first and still continuing specialized journal of soil science, the authors compiled the content of the over 13600 items in 834 journal issues, including a brief overview, an extensive subject index and an author index. The items listed include announcements and reports of conferences, congresses, special events and tributes or memorials of outstanding soil scientists. A separate index of such personal homages shows that there were 90 items of tribute to or on Dokuchaev. He was followed in number of articles on a soil scientist by Wiliams (44), who was followed by Gedroiz, Prasolov, Priashnikov, Rode, Sibirtzev and Zonn (23 to 18 items). The index is of great value for historians of soil science.

Based on this kind of study, the same authors published a broad historical overview of pedology in Russia (*Pochvovedenie*1999, No. 1:189-199, which was translated in the *Eurasian Soil Science* 32:355-363, 1999). Three stages in the development of Russian pedology are recognized.

In this connection it seems also worthwhile to mention that Gennadiev and Chernyanskii in *Pochvovedenie* 1999 (No1: 23-29, translated in *Eurasian Soil Science* 32:16-21, 1999) discuss and analyze statistically, by regions and topic, some 500 of the articles in *Pochvovedeni* devoted to soils and soil science of foreign countries. Of this five-percent sample, less than two percent of the publications were by non-Russian authors.

Dan Yaalon

Some Recent Publications

Demkin, V. A. 1999. Paleopedology - Buried Soils of defense Lines of Ancient Russia and the Problems of Ancient and Recent History of Soil Formation. *Eurasian Soil Science.* 32 No. 10:1094.

Evdokimova, T.L. 1999. On the 100th Birthday of Nil Petrovich Remezov. *Eurasian Soil Science.* 32 No.7:829.

Helms, Douglas. 2000. Soil and Southern History. *Agricultural History* 74 (Fall) 723-758.

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Krasil 'nikov, R.V. 1999. Early Studies on Folk Soil Terminology. *Eurasian Soil Science.* 32 No. 10: 1147.

Mermut, A. R. and H. Eswaran. 2001. Some major developments in soil science since the mid-1960s. *Geoderma* 100: 403-426.

Orlov, D.S. 1999. Discussions - Soil Fulvic Acids: History of Study, Importance, and Reality. *Eurasian Soil Science.* 32 No. 9: 1044.

Ploeg, R. R. van der; Bohm, W.; Kirkham, M. B. 1999. On the Origin of the Theory of Mineral Nutrition of Plants and the Law of the Minimum. *Soil Science Society of America Journal.* 63 No. 5: 1055

Targulian, V.O.; Goryachkin, S. V. 1999. History of Science - the 16th World of Congress of Soil Science. *Eurasian Soil Science.* 32 No. 11: 1251.

Yaalon, Dan H. and Richard W. Arnold. 2000. Attitudes Toward Soils And Their Societal Relevance: Then And Now. *Soil Science* 165 (1): 5-12.

Yaalon, Dan H. 2000. Soil Care Attitudes And Strategies Of Land Use Through Human History *Sartoniana* 13: 147-159.

ARTICLES

Wales: a 'cradle' of Soil Survey and Pedology in the United Kingdom

E.M. Bridges

The small country of Wales is frequently overshadowed by its larger neighbor, England, and indeed since the union of the two countries in 1535, they are usually spoken of together as England and Wales. However, when considering the history of pedology, Wales has played a significant role in the early development of soil survey and soil science in the United Kingdom.

Although there were earlier descriptions of Welsh soils, survey of soils by modem methods did not begin until 1912, when G.W. Robinson was appointed as an advisory agricultural chemist attached to the University College of North Wales at Bangor in North Wales. Almost immediately, he commenced a survey of the soils of the nearby island of Anglesey. His first descriptions of the soils of North Wales were largely based on soil texture and geological formation (Robinson, 1917). However, he realized that the ubiquitous presence of glacial deposits had great bearing upon the nature of soil present. He differentiated between 'sedentary' soils on the solid rock strata and 'drift' soils on the mixed glacial deposits. Extension of Robinson's survey work was made possible by the appointment of D.O. Hughes and J.O. Jones as full-time surveyors in 1924. By this time British soil survey began to be influenced by ideas from the United States and Russia. Robinson adopted the American system of mapping by soil series in 1929, following a demonstration of the methodology in Shropshire, England, in 1926. Also in 1929, a Soils Correlation Committee was set up with Robinson as chairman. Tours by this committee in 1930 and 1935 in England and Wales standardized soil survey methods and led to the first Soil Survey of Great Britain Handbook in 1941.

Robinson was appointed professor of agricultural chemistry in the University of Wales in 1926 and under his supervision, soil mapping was undertaken at several locations in Wales at a scale of 1:10560. In addition to the continuing work on Anglesey, surveys were initiated in South Wales on the Gower Peninsula of Glamorganshire, on the Wentloog Flats of Monmouthshire, and near Carmarthen. Other surveys took place at Llandinarn in Montgomeryshire and around Bangor in North Wales (Robinson *et al* 1930). In these surveys, soil series, based on the soil profile, were grouped together in 'suites' comprising soils derived from the same or similar geological material. These suites, similar in many ways to catenas, took the name of the freely drained soil series, but also contained imperfectly drained and poorly drained soils (Bridges, 1971). Other surveyors who participated in this formative phase of soil survey in Wales were G.H. Gethin Jones, Brynmor Jones, W.G.D. Walters and Evan Roberts. The map of Anglesey was completed by 1935 but a monograph did not follow until 1958 (Roberts, 1958). Mapping was extended to the Lleyn peninsula and eastwards to Denbigh along the North Wales coast during the period following the Second World War, and the maps eventually published at a scale of 1: 63360 between 1960 and 1963.

G.W. Robinson recognized that podzols and rendzinas occurred in Wales and argued that soils on steep slopes with bright brown B horizons and no bleached horizon were truncated (eroded) podzols. He proposed a classification of Welsh soils (Robinson, 1935) for a tour of

Wales by the 3rd International Congress of Soil Science. Robinson's technique of particle size analysis is still the basis of present methods, and he was interested in clay mineralogy. His book, *Soils, their origin, constitution and classification,* (Robinson, 1932), has been the introductory soil science textbook for generations of British students. Recognition of Robinson's pioneering work resulted in his being made the first director of the Soil Survey of England and Wales in 1939. Initially he had a staff of six surveyors, two of whom were working in Wales. During the 1939-45 War, soil survey work was suspended and surveyors were diverted on to advisory work with the War Agricultural Executive Committees. The usefulness of soil survey work was recognized in the post-war period of reconstruction when soil information was incorporated into proposals for post-war reconstruction. Robinson relinquished his post in 1946, when the Soil Survey of England and Wales was moved to Rothamsted and Dr Alex Muir succeeded him as its director. His last two publications were an article on "Soil Surveys in Great Britain" in the first Report of the Soil Survey Research Board to the Agricultural Research Council (Robinson, 1950) and as senior author of "Podzolic soils of Wales" in the first volume of the *Journal of Soil Science* (Robinson *et al* 1950).

When Robinson died in 1950, he had been selected as a Fellow of the Royal Society and as a Commander of the Order of the British Empire. A highly respected figure, he was a founding father of British pedology. He had been president of Commission 1 of the International Society of Soil Science and was a consulting editor of Soil *Science* (Anon, 1951; Muir, 1950). It was undoubtedly his genius and foresight that made Wales the 'cradle' of British soil survey and pedology during its formative period in the early years of the 20th century.

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Wye College and the Origin of Soil Series Mapping in England

C.P. BURNHAM AND H.F. COOK

Introduction:

The merger of Wye College (University of London) with the Imperial College of Science, Technology and Medicine in August 2000 makes it timely to assess the part played by Wye College in the introduction of soil series mapping to England, at about the same time as G.W. Robinson independently introduced it to Wales (Bridges 2OOO). It is believed that the first soil series map published for any area in England was of Wye College Farm, and that the first soil auger used in England was made up by Gillingham's, then the chief blacksmiths in Wye, at the forge adjacent to the College.

Wye College, which is near Canterbury in Kent, began as a grammar school in 1447. The most eminent

scientist to be a pupil there was Robert Plot (1640-96), the first keeper of the Ashmolean Museum and Professor of Chemistry at Oxford, who published works on *The Natural History of Oxfordshire (1677)* and *The Natural History of Staffordshire(1686).* These works included remarks about geology and soils, including the observation that the earth's surface tends to be 'layered like the skins of an onion.' Unfortunately it is not clear whether this referred to sedimentary rocks or soil profiles, or both. The College was refounded in 1894 as the South Eastern Agricultural College. An association with the University of London was agreed to in 1898, and teaching for degrees in agriculture started in 1902. Soil science formed part of the curriculum from the beginning, within the courses in geology and agricultural chemistry. Indeed the first principal, A. Daniel Hall, was a soil scientist, and published a version of his Wye lectures as a textbook, *The Soil* (1903). He was soon joined on the staff by E. John Russell. Each man later became Director of Rothamsted Experimental Station.

Hall and Russell (1911) published an account of the soils of Kent, Surrey, and Sussex (1911). Generally they presumed that the examination and analysis of topsoil and subsoil samples from a range of sites on each geological formation would enable geological maps to be used as a guide to soil distribution. However, they were aware that geological map might not suffice for the soils of alluvial areas, such as Romney Marsh. On alluvial areas they recognized that soil development was influenced by their occurrence around a particular place, such as Midley or Lydd; therefore, they characterized the soils by analyzing samples from one-foot (0.3m) thick layers down to six or seven feet. Although Hall and Russell did not use the term soil series, their methods opened the way to pioneer studies of the relationship of soil profiles to named soil series to which could be attributed distinctive land capability (Brade-Birks 1932, Cole and Dubey 1932).

The Reverend S. Graham Brade-Birks was already a clergyman of the Church of England when he joined the staff of Wye College as Lecturer in Zoology and Geology in 1919. His early research concerned the taxonomy of millipedes, for which he was awarded a D.Sc. of the University of London, but his geology lectures always contained a large element of soil science. He was an inspiring teacher, as can be judged from his textbook *Good Soil* (1944).

Early soil series mapping from Wye College:

Brade-Birks had begun studying soil profiles in the field by 1927, prompted by contacts with the United States (Brade-Birks and Furneaux 1928a). He was handicapped by being color blind, but, aided by his assistant, Basil Sydney Furneaux, Brade-Birks published descriptions of soil profiles and discussed their classification as podzols, *braunerde* etc (Brade-Birks and Furneaux 1928b, 1929). In a 1929 paper they published a very early color illustration (reproduced from a hand-colored black and white photograph) of a podzol profile from a gravel pit at Willesborough, near Wye.

About the same time, Brade-Birks and Furneaux attempted to map soils, using series in the manner of contemporary USDA surveys, but soon realized a need for guidance. Brade-Birks invited Professor Linwood L. Lee, of New Jersey for two extended visits in 1929. Lee (1930) described American methods, including the use of a soil auger 3.5 - 4.0 feet long and land capability interpretations, such as estimates of crop yield by series. The three initiated a detailed soil series map of Wye College Farm, and made a reconnaissance of an area of over 2,000 square kilometers of East Kent and part of East Sussex, placing the soils they encountered in soil series and making brief descriptions of them. With Brade-Birks' encouragement, Linwood Lee (1931) submitted 'The possibilities of an International System for the classification of soils' as a thesis for the D.Sc. from the University of London. Morley Davies (1954) paid tribute to Linwood Lee as instrumental, alongside his colleague, Veitch, in the adoption of the soil series as a mapping unit in Britain, and noted that mapping in Shopshire between 1926 and 1930 was on the basis of texture. A report by Gethin Jones (1930) showed that one of G.W. Robinson's team in North Wales was not using soil series at this period either. Brade-Birks' publications (1931, 1933) reveal him to be a very active advocate of the use of soil series in mapping. A student of his, A.J. Low (1931), was already using series (and an auger 4.5-ft. long!) to map soils in Somerset by 1930.

A study of fruit soils in various parts of England had been initiated in 1922, but no use had been made of soil

series. In 1929, a study of the fruit soils of Kent and East Sussex, was being started jointly by Wye College and East Malling Research Station. At Brade-Birks' suggestion, the objective 'to establish a limited number of soil types, or series, which are reasonably definite' was included. The study of the soil series on the 'Lower Greensand' formations was completed by Bane and Gethin Jones (1934), while the fruit soils on the Hastings Beds were studied by Furneaux (1932). Only soils under orchards were mapped, but this mapping was accompanied by careful observations of the growth of various kinds of fruit on the different soil series, some of which were published much later (Bagenal and Furneaux 1949).

During 1929, Brade-Birks and Furneaux (1930) carried out a systematic soil survey of Wye College Farm. Seven criteria were used to distinguish soil series: geological origin; mode of deposition (alluvial, colluvial or sedentary); topsoil color; topography; natural drainage; soil profile; and reaction (a pH meter was used, an early instance). Soil series were divided into types according to the texture class of the topsoil, and into phases on depth (stoniness was also used). The map showed eleven series by colors, shallow phases by hatching and topsoil textures by numbers printed at the points where observations had been made. No boundaries of texture types were shown. 'The system of employing numbers to indicate soil texture was found preferable, owing to the variability of soil texture within certain series. The description of the series is very brief, and is structured by the seven criteria. A modal profile is described, sometimes with an indication of ranges of depth, but boundary criteria are not specified.

Three students assisted by surveying two fields (Buckle, Knight and Webster 1930), and their brief separate report is the first publication to indicate that the 'auger method' was being used. Lee (1931) praised the 'accurate boundaries' of the College Farm soil map, and stated, "This is the first published detailed soil map in England, in the construction of which an American system of soil classification has been used." He stated that "all soils having identical characteristics belong to the same soil series. However, he did not mention how unusual two soils with identical characteristics would be!

In contrast, a very enlightening account of survey methods by Furneaux (1931) admits 'the difficulty in obtaining a really representative sample of an established soil series covering a wide area. He observed that "Every soil surveyor knows it is hard to find any specimen of which he can say that it is typical, so many are the slight variations that are found in one direction or another." If the surveyor gets bogged down with these small variations, no map can be completed: "The surveyor must always have his eyes open for any possible time economy. -The use of a soil auger is essential for this reason", even though it prevents the use of structure as a discriminating feature.

Later soil mapping of the Wye College Estate:

Brade-Birks (1931b) strongly advocated a priority rule for soil series names, but this rule was disregarded in later years, when, for example, Wye series soils were included in Charity series. Charity was one of the series used in producing a 1:25,000 map of the 10 km. square indexed TR04 (Green & Fordham 1973), from which a new soil map of Wye College Farm at 1:10,000 was abstracted. A subsequent comprehensive redefinition of soil series (Clayden & Hollis 1984), based on a new taxonomy of the soils of England and Wales (Avery 1980), means that the 1973 map is now outdated. Some soil series names survive, but in many cases the definition has been changed so that the previous boundaries are positively misleading. For example, through the Charity series still exists it has been redefined so that the soils around Wye College are now Carstens series. As soils are now defined solely by their properties, with no regard for the geological age of parent materials, some series names defined elsewhere have become applicable to the Wye area. For example, certain soils on the Gault clay that resemble others on Lower Lias Clay now fall into the Evesham series. Before 1984, England and Wales had over a thousand soil series defined piecemeal on a local basis. Now there are about 630, defined nationally, and of these 17 cover significant areas on the Wye College Estate, representing five of the ten major groups of the Avery classification.

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General information about the mapping units has been based on Jarvis et. al. (1983), and a specific account by Burnham (1994).

Burnham's account is based on sampling at the intersections of a 100m. grid by Totolo (1995), which has enabled information about the soils of the College Estate to be entered into a Geographic Information System. Although a new soil series map was made, a more flexible approach to soil mapping is likely to characterize the 21st Century.

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Brief History of the First World Chair of Soil Science in Pulawy, Poland

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In 1862, the Technology and Agriculture-Forestry Institute came into being and was housed in the previous residence of the Czartoryski Family in Pulawy, Poland. The Institute was transferred to Novo-Alexandriysk by the authority of the Tsar of Russia in 1864. The Chair of Mineralogy and Geology was established in the Institute in 1862 by Jan Trejdosiewicz, who was the Head of the Institute as well as a lecturer on soils. As a result of the Polish January Upheaval in 1863, the Institute ceased its study activity until 1869. During the six years that the Institute was inactive, the scientific staff continued their personal academic development. Professor Trejdosiewicz received his Ph.D. in 1867 from Heidelberg University and visited institutes and universities in Germany, France, and Great Britain. In 1874, he published his Geology Handbook for Farmers, which identified the main soil elements of importance for farmers and foresters. Also at this time, the Pulawy Chemical-Agricultural Station was established on November 30, 1867. The Station charged farmers for analytical services.

As a result of reorganization in 1869, the Pulawy Technical Institute was transformed into the Rural Economy and Forestry Institute. The new institute included the Agricultural and Forestry Faculties and provided a three-year study course. The Chair of Mineralogy and Geology was held by Prof. Konstanty Malewski (1840-1903), an alumnus of the Nature Section of the Physical-Mathematical Faculty of St. Wladimir University in Kijow between 1858 and 1862. Professor Malewski carried out the Institute's soil science program, conducted soil research, and completed an excellent collection of minerals and rocks used for educational and scientific research purposes. The lectures in soil science were connected with Chair of Soil and Plant Cultivation, the heads of which were Tadeusz Kowalski (1869-1972), Nikolaj Gudkov (1871-1874), Alexander Shishkin (1876-1877) and Gregory Rudzifiski (1877-1882). The professors, except for Rudzifiski, did not lecture on soil science, assigning this responsibility to Professor Malewski. Between 1880-1881 Malewski and Rudzifiski set up for agricultural experiments seven plots with various typical soils from the Pulawy surroundings.

By the late 1870s it had become clear that there was an increased need for greater knowledge about soils and establishment of soil laboratories. The Council of the Rural Economy and Forestry Institute in Pulawy differentiated the study of soils as an independent discipline in 1878. The responsibility for lecturing was assigned to Konstanty Malewski. Thus, the Council clarified that the study of soil science was to be a separate discipline. This decision was further reflected in the name of Chair of Mineralogy, Geology and Soil Science. In 1888, the first volume of the Handbook on Soil Science was completed. Written by Malewski, the Handbook contained the original system of soil classification.

In 1890, a new epoch of soil science development was initiated in Pulawy. The effort was led by.Vasyli Dokuchaev, a recognized professor of St. Petersburg University, and since 1892 the director of the Rural Economy and Forestry Institute, reorganized on the recommendation of the Tsar's authorities. The new Novo-Alexandriysk Institute, introduced by Dokuchaev in 1892, extended the period of studies to four years, which made it equal to all Russian universities. The reorganization, completed in 1893 by means of the act dated on April 17, 1893, created the special Chair of Soil Science. This was the first independent chair of soil science in the world and the first separate Chair of Soil Science in the Russian academic structure. Dokuchaev thought that the establishment of chairs of soil science at the universities would secure the development of the theoretical foundation for soils study.

The Chair of Soil Science in Pulawy started functioning in January 1894. Mikolaj Sibirtzev (1860-1900), an alumnus of St. Petersburg University (1878-1882) was one of the most talented followers of V. Dokuchaev,

holding positions of great responsibility in Russia. Beginning in 1892 Sibirtzev was an active participant of the Special Expedition of Forestry Department for forestry and water industry to the Russian steppe. The expedition, organized by Dokuchaev, was to study the reasons for drought that frequently troubled the steppe and to develop methods to help prevent its occurrence. Sibirtzev and Dokuchaev delivered lectures on soil science in Pulawy, and organized the soil laboratory and a "cabinet" in which the materials and soil objects were collected from all over the world. In 1894, following the pattern of Novo-Alexandriysk Institute, a Moscow Agricultural Institute was organized by Dokuchaev.

At the end of the Novo-Alexandriysk Institute reform in 1895, Dokuchaev and his wife went to Crimea to recover his health after which he returned to St. Petersburg University. In 1896, Sibirtzev received his Master's Degree in mineralogy and geology at St. Petersburg University. He started lecturing and conducting practical classes in the field of soil science, gaining the recognition of the scientific world. Sibirtzev increased by two the experimental plots set up by Konstanty Malewski. The heads of the chairs of soil science and the subsequent professors of soil and plants cultivation carried out their experiments on these plots established by Malewski and Sibirtzev. In the last years of his life, Sibirtzev, suffering from pneumonia, wrote a three-volume soil science handbook published between 1900 and 1901. The handbook included the soil classification first published by Sibirtzev in 1895, which exerted a considerable influence upon Dokuchaev's future publications.

After the death of Sibirtzev, the Chair of Soil Science of Novo-Alexandriysk Institute was filled by Konstanty Glinka, also an alumnus of St. Petersburg University (1886 to 1889). Glinka was an assistant to Dokuchaev at St. Petersburg University and in 1894 an assistant to Professor Konstanty Malewski in the Chair of Mineralogy Geology and Soil Science in Pulawy. When Malewski retired in 1895, Glinka conducted all lectures of this chair. In 1896, Glinka received his Masters Degree in mineralogy and geology at St. Petersburg University, a degree which made it possible for him to hold the position of Professor of Mineralogy and Geology at Novo-Alexandriysk Institute. Glinka lectured on soil science and carried out soils research in the Polish Kingdom Regions, as well as Poltava, Pskov, Smolensk and other Russian provinces, beginning in 1899. In 1902 he resigned as the Chair of Mineralogy and Geology and joined the Chair of Soil Science, where he was nominated to be a soil science professor. Until 1912, as Chair of Soil Science, Glinka developed the soils analytical laboratory, enhancing it to handle large numbers of grain size and chemical and petrography analyses. He also was instrumental in developing the "Soil Exhibition," which included 800 to 4,000 exhibits of soil materials from Russia, Brasil, Australia, New Zealand, India, Ceylon and other countries and islands. By 1911, twenty-four lysimeters, some originally established by Sibirtzev, had been arranged for vegetation experiments.

In the period between 1893-1915 in the Novo-Alexandriysk Institute there were many other famous soil scientists such as: Alexander Nabokich (1901-1905), Sergiush Kravkov (1901-1904), Peter Burakov (1894-1915). At the outbreak of World War I, the Institute of Rural Economy and Forestry was evacuated from Pulawy to Kharkov, and became the foundation of the Agricultural Institute there.

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