Commission on the History, Philosophy, and Sociology of Soil Science
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# Newsletter

Contents



## Symposia at the European Geosciences Union Meeting

There are two sessions being organized for the European Geosciences Union meeting, which will take place 07 – 12 April 2013 in Vienna, Austria, that may be of direct interest to the readers of this newsletter. These sessions are "History and Achievements of National Soil Science Societies" and "Soils and Human Health". The abstract submission deadline is 09 January, 2013.

The "History and Achievements of National Soil Science Societies" session seeks to present the histories of national soil science societies from throughout Europe and around the world, including the contributions national societies have made to advancing soil science and its perception by society. All submissions that cover these areas are welcome. For more information or to ask questions about this session, please contact one of the session conveners, Eric Brevik (Eric.Brevik@dickinsonstate.edu), Andreas Baumgarten (andreas.baumgarten@ages.at), Cristine Muggler (cmuggler@ufv.br), Costanza Calzolari (mariacostanza.calzolari@cnr.it), or Nicolás Bellinfante (nicolas@us.es).

The "Soils and Human Health" session seeks to emphasize that there are many ties between soils and human health. Current research being conducted in soils and human health will be presented as well as presentations defining future research needs. These impacts of soils on human health can also include interactions between soils and other natural systems such as the hydrosphere, atmosphere, and biosphere. For more information on this session or to ask questions about it, contact the session organizers Eric Brevik (Eric.Brevik@dickinsonstate.edu) or Teodoro Miano (teodoro.miano@uniba.it).

## Soil History Newsletter Editor Needed

After six years of editing this newsletter and after picking up a number of other responsibilities at Dickinson State University and in the Soil Science Society of America and the European Geosciences Union, Eric has promised his wife he will step away from editing this newsletter. Therefore, it is time to give someone else the opportunity to reach out to the soil science history, philosophy, and sociology community each year. Eric is willing to help the new editor out next year as the new editor learns how the structuring of the newsletter works. Eric also has files to share that make the editing job easier. If you are interested in serving as the newsletter editor, please contact Jock Churchman at jock.churchman@adelaide.edu.au or Eric Brevik at Eric.Brevik@dickinsonstate.edu. I sent this request out last year and didn't get any takers, but I **really** need to step aside after this newsletter. If you enjoy this newsletter and think it serves an important purpose in our field, please consider stepping up and taking a turn as the editor.

## Photos Wanted for Soil Horizons Profiles in History

The Soil Science Society of America journal Soil Horizons is running a "Profiles in History" feature in each issue. The idea behind "Profiles in History" is to publish a photograph or figure that is significant in the history of soil science along with a short 2-4 sentence explanation of the picture or figure.

Submissions are welcomed from anyone with a relevant picture or figure. Soil Survey Horizons will publish color pictures or figures, and there is no cost for publication. Pictures do not have to be from the United States; international pictures are welcome. To submit a picture or figure, please send a high-quality jpeg or tiff file and a brief explanation of the figure to Tom Sauer at Tom.Sauer@ARS.USDA.GOV or Kerry Arroues at kerry.arroues@ca.usda.gov.

The following are examples of items that have recently been published in the "Profiles in History" feature:

Participants at the Sixth International Soil Classification Workshop to study Andisols (ICOMAND) relaxing on an evening cruise boat in Chile, 1984. People in photo (left to right) Unknown, Alfredo Alvarado, Costa Rica, Ahmed Osman, Syria, Rene Tavernier, Belgium, Unknown. Photo courtesy of Stan Buol.

Dr. F. DeConinck, retired from the Geological Institute in Ghent, Belgium, examines a soil profile at the July 2001 International Working Meeting on Micropedology in Belgium. Dr. DeConinck is world-renowned for his work on Spodosols.

# Articles

## A Brief History of Soil and Human Health Studies

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The idea that there are links between soils and human health is an ancient one. The Bible depicts Moses as understanding that fertile soil was essential to the well-being of his people in approximately 1400 B.C. as they entered Canaan: "See what the land is like and whether the people who live there are strong or weak, few or many. What kind of land do they live in? Is it good or bad?...How is the soil? Is it fertile or poor? Are there trees on it or not? Do your best to bring back some of the fruit of the land." (Numbers 13:18-20). Likewise, in 400 B.C. Hippocrates provided a list of things that should be considered in a proper medical evaluation. The list included the ground: "…whether it be naked and deficient in water, or wooded and well-watered, and whether it lies in a hollow, confined situation, or is elevated and cold…" (Hippocrates, 2010). Therefore, even though most in the ancient world viewed illness as punishment from the gods (Queijo, 2010), some were beginning to realize that the natural world, including soils, played a role in human health.

In the late 1700s in "Letters from an American Farmer", J. Hector St. John De Crèvecoeur (1792) wrote "Men are like plants; the goodness and flavor of the fruit proceeds from the peculiar soil and exposition in which they grow" (de Crevecoeur, 1904), and Stoll (2002) noted that in the early 1800s some North American farmers recognized a link between an enduring agriculture and an enduring society. Therefore, humans did recognize to at least some extent the importance of soils to overall human health before, and in some cases thousands of years before, the 20th Century. However, this recognition was based on casual observations leading to logical conclusions rather than scientific investigation.

In the 1900s the idea that soils influence human health gained considerable traction. At least three chapters in the 1938 USDA Yearbook of Agriculture included recognition of the importance of soil as the origin of many of the mineral elements necessary for human health (Browne, 1938; Kellogg, 1938; McMurtrey and Robinson, 1938). By 1957 USDA scientists had realized that soils were not only important in the supply of essential nutrients, but that they could also supply toxic levels of elements to the human diet (Bear, 1957). The U.S. Department of Agriculture established the Plant, Soil and Nutrition Research Unit (PSNRU) on the Cornell University campus in 1940. The PSNRU's original mission was to conduct research at the interface of human nutrition and agriculture to improve the nutritional quality and health-promoting properties of food crops. The PSNRU mission has expanded since its founding, but soils and human health is still a major research area (PSNRU, 2008).

Government agencies were not the only groups recognizing connections between soils and human health in the first half of the $20^{th}$ Century. A 1940 work written by R.A. Hayne and published by the International Harvester Company noted that poor soils lead to "stoop-shouldered, poverty-stricken people" and "If we feed the soil it will feed us". Hayne (1940) went on to note that "Only productive soil can support a prosperous people" and "To be properly and healthfully fed we must have food from soils containing the elements necessary to maintain good health". Hayne (1940) also noted the importance of nutrient transfer from soils to animals to humans.

A major human health breakthrough in 1940 was the isolation of antibiotic compounds from soil organisms by the research group at Rutgers University lead by Selman Waksman. Soil microorganisms create antibiotic compounds in an effort to gain a competitive advantage in the soil ecosystem. Humans have been able to isolate those compounds and use them advantageously in the fight against bacterial infections. Waksman was awarded the Nobel Prize in Physiology or Medicine in 1952, the only soil scientist to date to be awarded a Nobel Prize (Brevik, 2013).

In the 1940s and 50s William Albrecht of the University of Missouri became interested in links between soils and human health, an interest that lead to the publication of several papers. Albrecht's works focused on links between soil fertility and dental health, with a particular focus on the relationships between soil fertility and dental cavities (caries) (e.g., Albrecht, 1945; 1951). However, Albrecht did extend the relationships between soil fertility and human health out to broader, more general health issues in some of his writings as well (Albrecht, 1957). For example, Albrecht (1957) concluded that excessively weathered tropical soils led to "malignant nutrition", or a general breakdown of body functions, because these soils lacked the proper nutrients to allow for the appropriate synthesis of proteins in the local food supply. On the other hand, Albrecht (1957) concluded that the overall environmental conditions of locations such as the Midwestern United States allowed for fertile soils and proper protein production for good health. While Albrecht's conclusions were not all correct, he did recognize that links existed between the fertility of a soil and the nutritional value of the plants grown in that soil, and that this carried up the food chain to the animals, including humans, who depended on products grown in that soil.

J.I. Rodale's 1945 book "Pay Dirt: Farming and Gardening with Composts" devoted two chapters to human health as it relates to soil. Rodale stated that we have been mining our soil, and that the use of chemical fertilizers has led to a change in the nutrient value of crops raised for our food supply because typical chemical fertilizers do not return all of the nutrients removed by crops. As evidence, Rodale cited increases in heart disease in the parts of the United States that had been farmed the longest. He also speculated that increases in mental health problems could be related to nutrition deficiencies. Rodale (1945) concluded that the vitamin content of our food is dependent on the soils in which they are grown, and that many American health problems are related to the soils in which our food supply is grown.

In 1947 Sir Albert Howard published his landmark work “The Soil and Health: A Study of Organic Agriculture”. Although best known for its substantial influence on the organic agriculture movement, this work also includes a chapter on soil fertility and human health. In this chapter Howard begins by outlining the difficulties inherent in studying the links between soils and human health. He then reviews work done on the topic to that point, including Balfour (1943) and Rodale (1945). Howard also discussed the work of J.W. Scharff in Singapore, including a reprint of Scharff’s letter to the editor published in the *News-Letter on Compost* in October of 1942. Examples are given of various groups around the world renowned for good health, and how these groups related to the land was discussed. Howard’s conclusion was that the health of the soil that foods are grown in affects the health of the people who consume the foods.

André Voisin published “Soil, Grass, and Cancer” in 1959. This was an extensive work devoted to ties between soils and human health. Voisin began his book by noting that human cells are composed of mineral elements that originate in the soil, and that humans are a “biochemical photograph” of the soils in the environment in which we live. Voisin also noted that getting a clear picture of how a given soil influences human health was a difficult undertaking due to the international trade of food products, meaning any given person received nutrients from a wide geographic range of soils. Much of Voisin’s (1959) work focused on nutrient content in soils, including both nutrient deficiencies and imbalances, and how that influences nutrient status in plants and animals that are in turn consumed by humans. Several health problems are discussed, including but not limited to birth defects, goiter, mental illness, diabetes, and cancer. Voisin (1959) also points out ancient folk knowledge that indicates an understanding of soil-human health relationships by our ancestors in numerous places throughout the book. He concluded that the medical profession had largely ignored soils in their efforts to improve human health, but that soil science should be the foundation of preventative medicine.

Soils and human health studies continued in the later part of the 20$^{th}$ Century, with publications related to soils and human health being too numerous to list completely. Therefore, examples will be given. The health effects of exposures to radioactive elements in soils received considerable attention after the 1986 Chernobyl incident (e.g., Elstner et al., 1987; Wynne, 1989; Balonov et al., 1999; Dushenkov et al., 1999). However, even prior to Chernobyl radionuclides in the soil and how they may affect human health were receiving attention (e.g., Comar, 1960; Franca et al., 1965; Cohen and Jow, 1978; Adriano, 1979). Investigations into the effects of heavy metals in soils became a common theme (e.g., Walsh et al., 1977; Morgan and Simms, 1988; Strehlow and Barltrop, 1988; Fergusson, 1990; Alloway, 1995; Albering et al., 1999), as did organic chemicals in soils (e.g., Pettry et al., 1973; Calvet, 1989; Sedman, 1989; Chaudhry and Chapalamadugu, 1991; Pohl et al., 1995; Simcox et al., 1995). Geophagy, the practice of eating soil, has attracted the interest of anthropologists and geographers for many years (Laufer, 1930; Dickins and Ford, 1942; Hertz, 1947; Cooper, 1957; Anell and Lagercrantz, 1958; Halsted, 1968) and remained a subject of study (Vermeer and Frate, 1979; Danford, 1982; Frate, 1984; Abrahams and Parsons, 1996; Calabrese et al., 1997). The effects of trace elements on human health received attention (e.g., Underwood, 1956; Sorenson et al., 1974; Thomson and Robinson, 1980; Cakmak et al., 1996; Mills, 1996; Senesil et al., 1999). Following up on the discovery of antibiotics, soil organisms received increased attention as they related to human health (e.g., Rangaswami and Ethiraj, 1962; Lechevalier and Lechevalier, 1967; Bérdy, 1974). About 78% of antibacterial agents and 60% of new cancer drugs approved between 1983 and 1994 had their origins in the soil, as did about 60% of all newly approved drugs between 1989 and 1995 (Pepper et al., 2009). In addition to the medicines derived from soils and soil organisms, it was also recognized that soil organisms could cause illness (Bagdasaryan, 1964; Duboise et al., 1976; Brown et al., 1979; Rowbotham, 1980; Hagedorn et al., 1981; Waldron, 1985; Gilles and Ball, 1991).

By the end of the 1900s, M.A. Oliver (1997) noted that "… there is a dearth of quantitative information on the relations between elements in the soil and human health;…there is much speculation and anecdotal evidence." The idea that soils influence human health is not new, it has existed for thousands of years and gained considerable attention in the 20th Century. However, the scientific study of soils and human health is a recent undertaking.

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## Gunpowder and Fertilizer

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*[It took several hundred years to realize that the decisive component of gunpowder (nitrate) is a plant nutrient]*

**Gunpowder** (with nitrate or derivates)
Quickly burning black powder, producing fire and dark smoke, was invented in old China and came via Arabia to Europe. Improved versions consisted of potassium nitrate ($KNO_3$, about 70%) mixed with easily burning charcoal and yellow sulphur (15 % each). The nitrate had to be imported from small natural deposits in East India.

Black powder did burn intensely, but was of little use until Arabian experts invented the application of gas pressure for canons (about the year 1100). This technique of gunnery came to Europe by the Crusaders about 1300. The use of black powder changed warfare by multiplying the destructive power in all European wars from 1400–1850. The advantage of black powder as *gunpowder* is its moderate burning rate, whereas, in contrast, the later invented blasting powder, like dynamite, burns extremely quickly.

**Saltpeter nitrate**: The salt nitrate was quite scarce and expensive until vast natural deposits of sodium nitrate (saltpeter, $NaNO_3$) were found in deserts of South America (Chile, Peru). The export to Europe started from about 1825 by sailing boats around Cape Horn. The purified saltpeter, after separation from by-products, was mainly used for fertilizing crops. It was less suitable for gunpowder (attracting moisture from the air). A remarkable progress, therefore, was its conversion into the less hygroscopic potassium nitrate. From 1860 there was an abundant supply – at least in peace-times.

Even when from 1850 onwards, the black powder was replaced by the "smoke-less" nitrocellulose as gunpowder, the nitrate salt was still important for the production of nitric acid ($HNO_3$), used in combination with cellulose etc. A future problem, however, was the foreseeable exhaustion of natural nitrate deposits.

For the logistics of the German General Staff, mean-while, there remained the great problem that the import from Chile could be cut off by maritime powers. Therefore, it was even more important to have always reserves of gunpowder or nitrate in storage, depending on the forecast of how long a special campaign might last. When the First World War started (1914), there were just reserves of gunpowder for half a year. But unexpectedly, the course of war changed and much more powder was required.

**Synthetic nitrate**:
Fortunately (at least from the supply aspect), German chemistry had just invented the synthesis of ammonia ($NH_3$) from air and water. The principle was developed in 1913, followed by large production (Haber-Bosch synthesis). Since ammonia could be converted into nitrate by oxidation, there was now an almost unlimited supply of nitrate for fertilizers or for gunpowder like nitrocellulose.

**Fertilizer** (with nitrate et al.)
Whereas nitrate is valuable for gunpowder because of its high oxygen content, for plants, nitrate is useful because of its *nitrogen*, required for protein synthesis.

**Nitrate nitrogen**:
Under natural conditions, nitrate mainly is produced by microbes from the decomposition of organic waste materials. The amounts are relatively small, but sufficient for the slowly growing natural vegetation. If crops were grown on these soils, the yields were rather low, but considered as normal. This situation changed, however, with adding plant nutrients by mineral fertilizers. The first ones were guano from Peru (proposed in 1800 by the explorer A.V. Humboldt) and saltpeter from Chile.

Saltpeter, in early Chilean agriculture, was known to be somehow effective in increasing crop yields. This was scientifically proven by experiments (from 1835) in England (Lawes) and France (Boussingault) that were soon applied all over Europe. The export started from about 1825 and soon reached vast dimensions, in 1890 about 1 million metric tons; the import to Germany was 300,000 tons, mostly used for fertilizers.

**Plant nutrients**:
Even with some Chilean saltpeter applied, however, there was no real breakthrough in fertilization before Liebig (in Germany) published a scientific concept of mineral nutrition of plants. The new artificial fertilizers, however, only slowly supplemented the traditional sources like farm animal manure, compost etc.

According to the new Mineral Theory, plants required several mineral substances, i.e. salts, as essential plant constituents. Most important for practical fertilization are the nutrients required in largest amounts, namely: N = Nitrogen, P = Phosphorus, and K = Potasssium (Latin *Kalium*). For millions of years, plants found a certain supply of these nutrients in soils. For many centuries, the farmer's crops, too, grew on the natural nutrient supply, but soil productivity (crop yields) remained rather low. The average former production level was about 800 kilogram/hectare of cereals (varying from about 0.2 – 2 tons/ha).

Significant progress in yield increase seemed rather impossible – in spite of the ancient desire to "grow two cereal stems where there grew only one". The English professor Malthus correctly concluded (about 1800): "The population of a country will always increase much more rapidly than the food production, and hunger will be an eternal companion of humanity". Liebig later commented (1865): "With the progressive increase of people in Europe since 1800, within two generations there would have been terribly wretched conditions of food supply... which results in revolutions and wars."

There were repeatedly severe famines in Europe after unusually dry or wet summers which meant food shortage (hunger) and led to emigration and search for new "virgin" land or to fights for sparsely populated territory – the real cause of many wars in Europe. By about 1800, most European soils were quite impoverished. Nitrogen and phosphate deficiency was widespread in crops; many domestic animals had weak P-deficient bones.

**Fertilization and yield increase**:
The use of nitrate since 1835 led to somewhat higher yields which were still higher when phosphate was added. The production of phosphate fertilizers started with superphosphate in England in 1843 (from imported phosphate rock). Germany had large deposits of potash salts. By 1890, many fertilizers were available, but most were rather expensive for the farmer. With the new ammonia synthesis (1913/14), however, nitrogen fertilizers became cheaper and more widely used, e.g. ammonium nitrate ($NH_4NO_3$) and later-on urea. The new nutrient sources were known as NPK-fertilizers, partly supplemented by Mg (Magnesium), Ca (Calcium) and S (Sulfur as sulfate).

The actual start of mineral fertilization on a statistically relevant scale was about 1880. The result of (mineral) fertilizer application was enormous (data from Germany; fertilizer here means: sum of $N + P_2O_5 + K_2O$; yields in metric tons = 1000 kg).
# 1800: no mineral fertilizer – cereal yields less than 1ton/ha (~ 80 g per square-meter)
# 1900: with 15 kg/ha mineral fertilizer – wheat grain yield about 2 tons/ha
# 2000: with 160* kg/ha [*for wheat >200 kg] min. fertilizer – wheat grain yield 7-8 tons/ha.

Nowadays, due to large yield increases, most European countries have reached not only food self-sufficiency, but even food surpluses (which cause other problems).

**Fertilization, Food Quality and Human Health**:
Higher yield is the first goal, but food quality is equally important, i.e. the content of the 50 essential nutrients (about 25 organic nutrients like amino acids and vitamins, further about 25 mineral nutrients from sodium, magnesium to selenium and chromium) required by humans or domestic animals for good health. Here is just a typical example.

Lung tuberculosis was an epidemic in Europe for centuries, with only small prospects of recovery. In England in 1850, about 3000 people died per year and many more suffered from the symptoms. The responsible bacteria were detected in 1882, but no effective cure could be found until about 1940.

In the mean-time, however, the death rate of tuberculosis in England declined from 3000 to only 500 per year. Beyond better hygienic conditions, obviously, very important was the more abundant and better quality food supply, mainly due to mineral fertilization starting around 1850-1880. This resulted in an improved nutritional status in the population with more valuable essential nutrients (amino acids, vitamins and mineral nutrients). It appears to be highly plausible that this caused the remarkable decrease of tuberculosis, due to an improvement of the body's innate immune system. To sum up, the great tuberculosis epidemic was conquered much more by modern agriculture than by medicine, showing agriculture as a guardian of health.

**Summary**
Gunpowder and many nitrogen fertilizers contain nitrate (the anion $NO_3$). Black powder was used for gunning in Europe for 400 years. The essential constituent was potassium nitrate, first imported and later produced from Chilean saltpeter. Since 1914 nitrate could be synthesised and soon there was an abundant supply. For plants, nitrate is important for protein synthesis.

Compared with the low yields obtained during previous centuries, the supplementary fertilization with mineral nitrogen and other nutrients since about 150 years ago achieved a 7-8-time increase in cereal yield level – with a better nutritional quality. Thus there was more and better food. This result not only alleviated hunger in Europe, but also had many other consequences such as reducing certain diseases as well as causes of poverty, despair etc. The world would be better off if nitrate was used less for gunpowder and waging war, and more for fertilizers and thus for more and better food.

## 2012 SSSA Symposium Abstracts

The Council on the History, Philosophy, and Sociology of Soil Science sponsored a session titled **"150th Year Anniversary of US Department of Agriculture-Celebration of Agricultural Research History"** at the 2012 Soil Science Society of America meeting in Cincinnati, Ohio. The session convened several historians from many of the USDA agencies as well as history buffs interested in the subject from within the Societies to cover the history of US Agricultural research associated with USDA and its applications to the US economy and the world.. The session was held on Sunday, October 21, 2012: 10:00 AM to 5:05 PM at the Duke Energy Convention Center in Room 233. The session was organized by Maxine Levin of the USDS-NRCS. Abstracts from those talks are given below:

**Overview of the History of the United States Department of Agriculture.**

***Susan H. Fugate****, USDA-National Agricultural Library, Beltsville, MD*

Susan H. Fugate will introduce the symposium by presenting a brief overview of the history of the United States Department of Agriculture as we commemorate the 150$^{th}$ anniversary of Abraham Lincoln's signing of the Act to establish the Department. Her overview will include images from the historic collections of the National Agricultural Library which was established by the 1862 Act as well. Susan will include information on how conference attendees can access the vast resources of the National Agricultural Library.

**Progress and Pestilence: Entomological Roots of the USDA.**

***Gary L. Miller****, Systematic Entomology Laboratory, USDA-ARS, Beltsville, MD*

Insects have always had a pronounced impact on agriculture. This talk concentrates on U.S. agriculture from colonial times through the 19th century by highlighting insects and the personalities who studied them. Great strides were made in agricultural entomology during this period. Publication of scientific research through journals, periodicals, and books went far in dispelling the myths that surrounded insect biology and enabled farmers to confront insect related issues. This presentation also gives a glimpse into agriculture during this period and underscores topics that are still relevant to agriculture today.

**Beginning of USDA-Division of Chemistry 1860-1890.**

*Richard Ferguson, Kellogg Soil Survey Laboratory, National Soil Survey Center, USDA-Natural Resources Conservation Service, Lincoln, NE and Larry West, USDA-NRCS, Lincoln, NE*

From 1860 – 1890, Congress pass Acts setting the stage for the Federal Government to have more influence in agriculture, animal husbandry, and medicine. Driving these changes was the manifest need for forward-thinking agricultural practices, increased food security, and increased oversight of pharmaceutical industry. The USDA was first established against the backdrop of the American Civil War (1861-1865), a great conflict and cultural identity crisis that provided an opportune time for the Federal Government to more easily assert necessary and required leadership for America's future. Factors leading to the inception and driving the early development of the USDA, including the Bureau of Chemistry, will be discussed. Early history of USDA Division of Chemistry and its major accomplishments will be highlighted.

**Beginning of USDA- Plant and Seed Propagation and Distribution 1825-1900.**

*Robert J. Griesbach, Office of Technology Transfer, USDA-ARS, Beltsville, MD*

The first formally collection of seed by the U.S. government began in 1825 when President John Quincy Adams directed U.S. Consuls to forward rare plants and seeds to the State Department for propagation and distribution. In 1838, Congress established the Agricultural Section within the Patent Office. One of the responsibilities of this section was to procure and distribute seeds and cuttings. By 1860, the Agricultural Section of the Patent Office was annually distributing over 2.4 million packages of seeds and plants. In 1862, Congress established the USDA from the Agricultural Section of the Patent Office. One of primary functions of the USDA was "*to procure, propagate, and distribute among the people new and valuable seeds and plants."* In 1897, the USDA distributed 20,368,724 packages of seeds and plants. Secretary James Wilson changed the USDA mission in 1900 from *"producing and distributing seed to producing & distributing knowledge."* By 1902, seed and plant distribution dropped to 376,759 packages.

**Harvey Wiley's Poison Squad: Food Additive Safety.**

*Suzanne W. Junod, History Office, U.S. Food and Drug Administration, Silver Spring, MD*

It took almost three decades to persuade Congress to pass, and the President to sign, the first federal food and drug statute, the 1906 Pure Food and Drugs Act. A key accomplishment of the Progressive era in U.S. politics, this act defined adulteration and misbranding and applied them to all food and drug products moving in interstate commerce. Beginning in the late 19th century, muckraking journalists began to condemn many of the excesses of the so-called "patent drug" industry exposing their high alcohol and opium content; their deceptive marketing practices; and their stranglehold on the politics of the period. It was only in 1902, however, when Congress appropriated a few thousand dollars to the Bureau of Chemistry to study the effects of commonly used food preservatives on human health, that the public began to take an interest in federal food regulation. Wiley referred to his human subject research as the "Hygienic Table Studies." The public, however, soon dubbed it the "Poison Squad" and the staid scientists in the Bureau of Chemistry were astonished at the publicity that their work received. Admittedly, the idea of feeding young men increasing doses of untested ingredients to determine their effect on health did hold a sort of macabre fascination with the public, but the young men themselves played up the pathos by adopting the slogan "Only the Brave Dare Eat the Fare." The Poison Squad studies were important for many reasons, but chief among them was the fact that they had a profound influence on early food safety policies under the 1906 statute. This paper will explore the social and scientific context in which the Poison Squad studies were conducted and their enduring thematic influence on federal food safety testing and regulation.

**Perceptions of Soil Erosion in the Early Soil Survey, 1899-1929.**

*Sam R. Stalcup, Earth Team Volunteer, Soil Science Division, USDA-Natural Resources Conservation Service, Oklahoma City, OK and Gregory Scott, USDA-NRCS, Tryon, OK*

When the U.S. Soil Survey was initiated in 1899, soil erosion, generally, was ignored by scientists and the public alike. By 1929, erosion and its prevention had become important national concerns. What explains the change in attitudes towards soil erosion over these three decades? This presentation seeks to answer this question with a discussion of some the important factors that influenced evolving perceptions of erosion during this period. These include recognition of erodibility as an important soil characteristic, increased knowledge about the distribution of soil types, the commercialization of synthetic fertilizers, and the onset of an agricultural depression in the United States. Each of these factors in turn helped to inform the development of concern for soil erosion and contributed to broad support for a national program of soil conservation after 1929.

**1862 – A Conversation with Congressman Justin Morrill (VT).**

*Jon D. Vrana, USDA Natural Resources Conservation Service, Fairfax, VA*

Set in the context of 1862 and the American Civil War, the speaker, dressed in period attire and speaking as Congressman Morrill, discusses the Morrill Act of 1862 and the influences in America and in his personal and professional life that culminated in drafting and passing national legislation that formalized education in the areas of agriculture and mechanical arts through Land Grant Colleges and successfully establishing the United States Department of Agriculture.

**United States Forest Service History in USDA-Gifford Pinchot.**

*Stephanie Connolly, USDA-NRCS, Elkins, WV*

The scientific inquiry into forestry by the federal government began in 1827 with a Treasury Department circular that instructed U.S. consuls to seek out "forest trees useful for timber." This simple directive on forestry research has grown into the world's premier forestry research organization housed within the Department of Agriculture. The first federally funded research efforts on the subject began in 1873 when Congress appropriated $2,000 to gather forestry information. The appropriation was directed towards the Department of Agriculture and established the genesis of forestry research in that agency. In 1886, Dr. Bernhard Fernow was appointed the first chief of the Division of Forestry in the Department of Agriculture. This division began as a research organization that distributed study materials but did not manage lands. In 1905 under Gifford Pinchot, the division was renamed the U.S. Forest Service as the forest reserves were transferred from the Department of the Interior to Agriculture. Now with hundreds of millions of acres of forests to manage, the Forest Service became a land management agency, but it never lost its research roots. The research and development branch was given primacy under Pinchot and continues as one of the core missions of the Forest Service. Today, the US Forest Service is still the world's leader in forestry research.

**Rural Life and Rural Development 1900-2000.**

*Gary Bojes, USDA-Rural Development, Wasington, DC*

Rural Development (RD) plays a large role in the USDA Secretary's Strategic Plan for 2010 to 2015 with strong support (almost all) of USDA Goal # 1 - *Assist rural communities to create prosperity so they are self-sustaining, re-populating, and economically thriving*. Rural Development invest to improve the economy and quality of life in all of rural America by providing financial programs to support essential public facilities and services as water and sewer systems, housing, health clinics, emergency service facilities, electric and telephone infrastructure & service. Rural Development promotes economic development by providing loans to businesses through banks and community-managed lending pools, while also assisting communities to participate in community empowerment programs. Rural Development serves as a catalyst to improve conditions in rural America by offering technical assistance and increasing the flow of capital through leveraged partnerships. Successful rural economic development requires cooperation and coordination with local leaders, public and private sector partners, and educational institutions. The History spans from development of Cooperative business models before the 20th century to legislative strategies recreated every five years through the Farm Bill legislative process. But with the advent of the New Deal under Pres. Franklin D. Roosevelt, the concept took hold that a partnership between the Federal government and rural America might be able to change the dynamics of both rural living and the rural economy. So, starting in 1935, a series of programs were started that was designed to help all Americans recover from the Depression and forge a comprehensive rural utility infrastructure.

**The USDA Yearbooks of Agriculture: Snapshots of 142 Years of USDA History.**

*Samuel J. Indorante, USDA-NRCS, Carbondale, IL, Gary Struben, USDA-NRCS, Champaign, IL and Susan H. Fugate, USDA-National Agricultural Library, Beltsville, MD*

The first Yearbook of Agriculture was published in 1849, 13 years before the Department of Agriculture was established in 1862 by Abraham Lincoln. The last Yearbook of Agriculture was published in 1991. The yearbooks represent snapshots of USDA's history. From 1849 until around 1935, the yearbooks primarily covered cattle and livestock and did not have specific topics for titles. The yearbooks presented brief summaries of miscellaneous new developments in agriculture. In 1936, under the leadership of Secretary of Agriculture Henry A. Wallace, the yearbooks were devoted to a single subject. The 1936 yearbook was entitled "Better Plants and Animals" and focused on the creative development of new forms of life through plant and animal breeding. From 1936 until 1991, yearbook titles included: "Soils and Men," "Farmers In a Changing World," "Climate and Man," "Keeping Livestock Healthy," "Grass," "Trees," "Insects," "Marketing," "Animal Diseases," "Living On a Few Acres," and "Will There Be Enough Food." This presentation will feature some highlights from the Yearbooks of Agriculture that cover 142 years of USDA history.

**History of Food Safety (Meat and Poultry Inspection) in the US.**

*Philip Derfler, Office of the Administrator, Food Safety and Inspection Service, USDA, Washington, DC*

This presentation will provide a history of meat and poultry inspection in the United States. Beginning with the Meat Inspection Act of 1906, the presentation will review the events that led to the passage of this law, including the publication of Upton Sinclair's The Jungle, and will review how meat inspection has developed over the course of the 20th and into the 21st Centuries. It will consider the effects of the Jack-in-the-Box outbreak in 1993 and the significance of the adoption of the Pathogen Reduction/Hazard Analysis Critical Control Point (HACCP) rule in 1996. In addition, the talk will address the factors that led to the passage of the Poultry Products Inspection Act in 1957. Finally, the presentation will consider FSIS's recently published proposal to make the biggest change in poultry inspection since the Eisenhower Administration.

**Contributions of George Washington Carver and 1890 Schools to US Agriculture.**

*Lillian Woods, National Technology Support Team, USDA-Natural Resources Conservation Service, Washington, DC*

This presentation will highlight George Washington Carver and 1890 Universities partnership with USDA. George Washington Carver was a scientist, educator, and researcher at Tuskegee University over 47 years. The Historically Black Land-Grant Universities have developed teaching, research, and extension programs that reach historically underserved students and communities. The 1890 Land-Grant Universities were established by the Morrill Act of 1890. USDA partners with the 1890 Land-Grant Universities for assisting USDA in reaching the communities served by these Universities, with focus on the underserved, minority and limited resource producers.

**Historical International Contribution of USDA Soil Survey.**

*Thomas Reinsch, Soil Science Division, World Soil Resources, USDA-Natural Resources Conservation Service, Beltsville, MD*

This year USDA celebrates its 150 year anniversary. This celebration is an opportunity to reflect on the contribution of US soil scientists to the development of soil survey and classification in the world. Soil survey was officially recognized 40 years after USDA was created. Soil survey leaders realized the value of exchanging science and technology with the international community. Effort was made to examine soils across the globe and relate those observations to U.S. soils. Soil survey leaders also contributed to international meetings from the first international society of soil science meeting in 1927 in Washington, D.C. to the 19th World Congress of Soil Science in Australia.

## 2012 EGU Symposium

EGU sponsored a soil science history session for the first time in 2012. This session was open to all topics that address the history of soil science and impacts of soils on society. This included the history of soil science in various countries, the history of soil science societies, major ideas and advances in soil science, important international exchanges through history, and important individuals in the history of soil science. Both an oral and poster session were offered, and the session was organized by Eric Brevik of Dickinson State University and Alfred Hartemink of the University of Wisconsin. Abstracts from those talks are given below:

**Oral Session Abstracts:** Oral abstracts are also available in pdf form at http://meetingorganizer.copernicus.org/EGU2012/oral_programme/9877

**The Austrian Soil Science Society: History and Developments**

A. Baumgarten, Austria (andreas.baumgarten@ages.at)

Following activities within the International Soil Science Society, Austrian soil scientists have founded the Austrian Soil Science Society (ASSS) in 1954. From the beginning it was a declared aim to promote all aspects of soil science, but in particular applied soil science. Thus, the sustainable use of soil has been and is still a main focus of the society. During the history of the ASSS, different emphases have been set according to both national and international developments. The most important milestones will be highlighted and the actual trends and future activities will be described.

### An overview on the history of pedology and soil mapping in Italy

C. Calzolari, CNR-IRPI, Sesto Fiorentino, Italy (mariacostanza.calzolari@cnr.it)

In Italy, the word pedology (pedologia) was introduced in a text book as synonym of soil science for the first time in 1904 by Vinassa de Regny. In the literature, the term cohabitates with the words agrology (agrologia), agro-geology (agro-geologia), agricultural geognostic (geognostica agraria), geopedology (geo-pedologia) used in different historical moments by differently rooted soil scientists. When early pedologists started with systematic studies of soils, their characteristics and geography, they were strongly influenced by their cultural background, mainly geology and agro-chemistry. Along the time, the soil concept evolved, as did the concept of pedology, and this is somehow witnessed by the use of different Italian words with reference to soil: suolo, terreno, terra. Differently from agro-chemists, early pedologists based the soil study on the field description of soil profile. This was firstly based on the vertical differentiation between humus rich layers and "inactive" layers and later on, as long as the discipline evolved, on the presence of genetic horizons.

The first complete soil map of Italy is dated 1928. Its Author, the geologist De Angelis d'Ossat, was the president of the organising committee of the 1924 International Soil Conference of Rome, where the International Society of Soil Science was founded. The map was based on the geological map of Italy, drafted in scale 1:1,000,000 after the creation of the Kingdom of Italy in 1861. The internal disputes within the Geological Society, together with the scarce interest of most of geologists for soil, did not facilitate the birth of a central soil survey. Soil mapping was mainly conducted by universities and research institutes, and we had to wait until 1953 for a new soil map (scale 1:3,125,000) at national level to be realised by Paolo Principi, based on literature data. In 1966 a new 1:1,000,000 soil map of Italy was eventually published by a national committee, led by Fiorenzo Mancini. This was based on literature data and on field surveys, and the mapping units limits, based on geomorphology, are still the basis of the most updated European 1:1,000,000 soil map. At the end of the 80ies of the past century, soil survey and mapping were taken over by the Italian regional administrations, which set up regional soil surveys working in co-ordination among them and with the research institutions.

### A history of Soil Survey in England and Wales

S. Hallett and L. Deeks, Cranfield University, National Soil Resources Institute, Bedford, United Kingdom (s.hallett@cranfield.ac.uk)

Early soil mapping in Britain was dominated, as in the USA, by soil texture with maps dating back to the early 1900's identifying surface texture and parent rock materials. Only in the 1920's did Dokuchaev's work in Russia involving soil morphology and the development of the soil profile start to gain popularity, drawing in the influence of climate and topography on pedogenesis. Intentions to create a formal body at this time responsible for soil survey were not implemented and progress remained slow. However, in 1939 definite steps were taken to address this and the soil survey was created. In 1947, its activities were transferred from Bangor to the research branch of the Rothamsted experimental station in Hertfordshire under Professor G.W. Robinson. Soon after, a number of regional offices were also established to act as a link with the National Agricultural Advisory Service. At this time a Pedology Department was established at Rothamsted, focussing on petrological, X-ray, spectrographic and chemical analyses. Although not a Rothamsted Department itself, the Survey did fall under the 'Lawes Agricultural Trust'. A Soil Survey Research Advisory Board was also formed to act as a liaison with the Agricultural

Field Council. In Scotland by contrast, soil survey activities became centred on the Macaulay Institute in Aberdeen.

Developments in the survey of British soils were accompanied in parallel by the development of soil classification systems. In 1930 a Soils Correlation Committee had been formed to ensure consistency in methods and naming of soil series and to ensure the classification was applied uniformly. In England and Wales the zonal system adopted was similar to that used in the USA, where soil series were named after the location where they were first described. American soil scientists such as Veitch and Lee provided stimulus to the development
of mapping methods. In Scotland a differing classification was adopted, being similar to that used in Canada, recognising the importance of the soil drainage characteristics within areas of similar parent material. This led to the adoption of the soil catena approach and the usage of soil 'associations'.

With Britain entering the Second World War in 1939, there followed the almost complete cessation of survey activities and it was only in the aftermath of that war that recruitment of surveyors could re-commence. The first Soil Survey Field Handbook was published in 1940. Systematic and formal national soil survey activities across both England and Wales can be dated back to 1947 when work commenced to provide a complete picture of the soil resources of the two countries. Mapping at 1:25,000 scale, almost half the land was covered when, in 1979, the survey received instructions, together with the Scottish survey, to complete respective national maps at 1:250,000, which were published in the early 1980s. Attention then turned again to mapping lowland areas in more detail as well as specialised and thematic maps. However, in 1987 systematic survey was terminated and staff of the Soil Survey of England and Wales disbanded to form the Soil Survey and Land Research Centre (SSLRC) at what became Cranfield University - where its successor, the National Soil Resources Institute (NSRI) operates currently.

**100 years of mapping the Holocene Rhine-Meuse delta plain: combining research and teaching**

K.M. Cohen, E. Stouthamer, W.Z. Hoek, and H. Middelkoop, Dept. Physical Geography, Utrecht University, P.O. Box 80.115, 3508 TC Utrecht, NETHERLANDS

The history of modern soil, geomorphological and shallow geological mapping in the Holocene Rhine-Meuse delta plain goes back about 100 years. The delta plain is of very heterogeneous build up, with clayey and peaty flood basins, dissected by sandy fluvial distributary channel belts with fine textured levees grading into tidal-influenced rivers and estuaries. Several generations of precursor rivers occur as alluvial ridges and buried ribbon sands. They form an intricate network originating from repeated avulsions, back to 8000 years ago. Present rivers have been embanked since ca. 1250 AD and the delta plain (_ 3000 km2) has been reclaimed for agriculture. Soils are young and subject to oxidation and compaction.

The first detailed field map of channel belts and floodbasins was made in 1926 by Vink, a geography teacher from Amsterdam. Soil mapping and Holocene geology gained interest after WW-II, with Wageningen soil scientists Edelman, Hoeksema and Pons taking lead. Utrecht University started teaching and research on the subject in 1959, launching an undergraduate mapping field course based on hand augering and field observation. An archive of borehole logs and local maps started to build up. Initially focused on soil mapping, from 1973 the course shifted to a geomorphological-geological focus. Berendsen took over supervision, introduced standard description protocols and legends and increased coring depth. This resulted in 1982 in his influential PhD thesis on the Rhine delta's genesis. New coring and sampling methods came and extensive 14C dating campaigns began. With steadily increasing numbers of students, accumulation of data speeded up, and increasingly larger parts of the delta were mapped. The academic mapping ran in parallel with soil survey and geological survey mapping campaigns. The computer was introduced in the field course and digital data archiving began in 1989. A series of PhD studies on thematic aspects of delta evolution and an increasing number of scientific papers since 1990s made the Rhine-Meuse delta mapping internationally known. In 2001, Berendsen and Stouthamer published the first overview on the palaeo-geographical development of the whole delta. In the decade that followed mapping continued as part of staff and PhD research and undergraduate teaching activities, as well as large applied-mapping projects. Since 2008 the activities are synchronised with those at the geological survey in the Netherlands. The database now comprises over 200,000 borehole descriptions of which the majority is digital, a well as different series of digital palaeo-geographical and lithological maps.

As time proceeded, methods and approaches have changed. The introduction of high-resolution Lidar elevation data allowed to re-evaluate earlier collected borehole data and to develop more efficient field data collection strategies. While in the 1960-1990s we taught students 'how to map a data-sparse area', we now train students 'to critically evaluate heaps of existing data and maps to improve mapping'. This also raises the awareness of the distinction between observation and interpretation, when different types of information are combined in mapping. This attitude change and maturity also echoes through current research in soil, geomorphology and geology in the delta.

**Victor Kovda, Soil Science and Biosphere**

I. Kovda, Institute of Geography, Moscow, Russia (ikovda@mail.ru)

Victor Kovda (1904-1991) was one of the most famous soil scientists at the national and international soil science community. He published more than 500 scientific works including about 400 papers, 17 collective monographs, 30 personal monographs, and more than 200 interviews and popular papers describing the role of soils not only for food production, but for the functioning of the biosphere.

Victor Kovda was a talented organizer, who founded the new Institute of Soil Science and Agrochemistry (known at the present time as the Institute of physico-chemical and biological problems of soil science in Pushchino, Russia). During six years from 1959 to 1964 he was the head of Science Department in UNESCO, where he initiated a set of international projects (ex. Soil World Map of FAO-UNESCO, Source-book on irrigation and drainage). He continued his international activity after UNESCO as a President of the International Soil Science Society (1968-1974), organizer of the X international Soil Science Congress in Moscow (1974), president of SCOPE (1973-1976), working for ICSU.

The last three decades of his national and international activities Victor Kovda initiated and was strongly involved in the popularization of biosphere role and functions of soils and soil cover. The start point for this activity was his special talk "Biosphere and man" presented during the intergovernmental conference in the framework of the international program "Man and

Biosphere" organized by UNESCO in 1968 in Paris. The next key presentation "Soil as a component of biosphere" Victor Kovda gave as a plenary lecture during the X International congress of soil scientists. This presentation determined the focus of soil science for the next decades: at least Russian soil science became oriented towards the investigation of biosphere functions and role of soils. Soils science was accepted not only for agriculture and food production, but also as a fundamental science with a large environmental application.

**On Russian concepts of Soil Memory – expansion of Dokuchaev's pedological paradigm**

A. Tsatskin, Zinman Institute of Archaeology, University of Haifa, Haifa, Israel (tsatskin@research.haifa.ac.il)

Having developed from Dokuchaev's research on chernosem soils on loess, the Russian school of pedology traditionally focused on soils as essential component of landscape. Dokuchaev's soil-landscape paradigm (SLP) was later considerably advanced and expanded to include surface soils on other continents by Hans Jenny. In the 1970s Sokolov and Targulian in Russia introduced the new term of soil memory as an inherent ability of soils to memorize in its morphology and properties the processes of earlier stages of development. This understanding was built upon ideas of soil organizational hierarchy and different rates of specific soil processes as proposed by Yaalon. Soil memory terminology became particularly popular in Russia which is expressed in the 2008 multi-author monograph on soil memory. The Soil Memory book edited by Targulian and Goryachkin and written by 34 authors touches upon the following themes: General approaches (Section 1), Mineral carriers of soil memory (Section 2), Biological carriers of soil memory (section 3) and Anthropogenic soil memory (section 4). The book presents an original account on different new interdisciplinary projects on Russian soils and represents an important contribution into the classical Dokuchaev-Jenny SL paradigm.

There is still a controversy as to in what way the Russian term soil memory is related to western terms of soil as a record or archive of earlier events and processes during the time of soil formation. Targulian and Goryachkin agree that all of the terms are close, albeit not entirely interchangeable. They insist that soil memory may have a more comprehensive meaning, e.g. applicable to such complex cases when certain soil properties whose origin is currently ambiguous cannot provide valid environmental reconstructions or dated by available dating techniques. Anyway, not terminology is the main issue. The Russian soil memory concept advances the frontiers of pedology by deepening the time-related soil functions and encouraging closer cooperation with isotope dating experts. This approach will hopefully help us all in better understanding, management and protection of the Earth's critical zone.

**Poster Session Abstracts:** Poster abstracts are also available in pdf form at http://meetingorganizer.copernicus.org/EGU2012/poster_programme/9877

**50 Years of Soil Survey Horizons**

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Soil Survey Horizons (SSH) started in 1960 as the newsletter of the North Central Soil Survey, United States, with an editorial board consisting of Francis D. Hole, O.C. Rogers, and Donald F. Post. SSH was started to provide an outlet for field observations of soils because the founders of

SSH felt that other outlets for such communications were disappearing. Francis Hole's office at the University of Wisconsin served as the point of publication for SSH through its first 15 years, but in 1975 the Soil Science Society of America (SSSA) began handling its publication. Initially SSSA published SSH but did not assume ownership or editorial control of the publication until 2005. Over the years there has been a steady increase in the amount of material published in each volume of SSH. Significant improvements to Soil Survey Horizons over the years have included a move to full 8.5" x 11" pages and publication in color. Future improvements will include online publication and expansion to an international audience, including recruitment of international members for the editorial board.

**A short history of the soil science discipline**

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Since people have cultivated the land they have generated and created knowledge about its soil. By the 4th century most civilizations around had various levels of soil knowledge and that includes irrigation, the use of terraces to control soil erosion, methods to maintain and improve soil fertility. The early soil knowledge was largely empirical and based on observations. Many famous scientists, for example, Francis Bacon, Robert Boyle, Charles Darwin, and Leonardo da Vinci worked on soil issues. Soil science became a true science in the 19th century with the development of genetic soil science, led by the Russian Vasilii V. Dokuchaev. In the beginning soil science had strong ties to both geology and agriculture but in the 20th century, soil science is now being applied in residential development, the planning of highways, building foundations, septic systems, wildlife management, environmental management, and many other applications. The discipline is maturing and soil science plays a crucial role in many of the current issues that confront the world like climate change, water scarcity, biodiversity and environmental degradation.

**Historical Highlights From 75 Years of the Soil Science Society of America**

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From its official founding on November 18, 1936 to the present day, the Soil Science Society of America (SSSA) has developed a rich and diverse history. SSSA began with 190 members grouped into six sections: 1) physics, 2) chemistry, 3) microbiology, 4) fertility, 5) morphology, and 6) technology. Today SSSA has over 6,000 members who can choose from any of 11 divisions, S1 Soil Physics, S2 Soil Chemistry, S3 Soil Biology and Biochemistry, S4 Soil Fertility and Plant Nutrition, S5 Pedology, S6 Soil and Water Management and Conservation, S7 Forest, Range, and Wildland Soils, S8 Nutrient Management and Soil and Plant Analysis, S9 Soil Mineralogy, S10Wetland Soils, and S11 Soils and Environmental Quality to represent their primary area(s) of interest. The Society has also gone from being largely agriculturally focused to an eclectic mix of individuals with interests in agriculture, the environment, earth sciences, human interactions, and other diverse areas. At its founding, SSSA sponsored one publication, the Soil Science Society of America Proceedings. Today, SSSA sponsors its descendent, the Soil Science Society of America Journal, as well as Vadose Zone Journal, the Journal of Environmental Quality, Soil Survey Horizons, and the Journal of Natural Resources and Life

Science Education. In short, SSSA's history has been one of continued growth over the last 75 years. The future holds many challenges for SSSA and the field of soil science. There are increasing calls to meet with groups other than or in addition to the American Society of Agronomy and the Crop Science Society of America, groups like the Geological Society of America and the Ecological Society of America. Members in SSSA now work in university departments, government agencies, and businesses representing the fields of biology, geology, geography, and archeology, among others, in addition to the traditional agricultural sector. How SSSA handles this diversification of the field and its membership will influence the future of the Society.

**Collier Cobb and Allen D. Hole: Geologic Mentors to Early American Soil Scientists**
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Many influential individuals involved in the early United States soil survey program were trained as geologists rather than as agronomists or soil scientists. Several geology departments served as pipelines for students interested in a career in soil survey. This presentation looks at the professional history of two early mentors of these geologists turned soil surveyors and some of the students they sent on to the U.S. soil survey and other soil science careers. Collier Cobb (University of North Carolina) sent over 10 students to the soil survey starting in 1900 when U.S. soil survey was in its infancy, including individuals of note such as Hugh H. Bennett, George N. Coffey, Williamson E. Hearn, and Thomas D. Rice. Allen D. Hole (Earlham College, Indiana) worked on soil surveys for the state of Indiana and sent over a dozen students on to U.S. soil survey careers between 1911 and 1937, including Mark Baldwin and James Thorp. Francis Hole and Ralph McCracken, other students of Allen Hole, also went on to have distinguished soil science careers. These mentors and students clearly show the close ties that existed between soil science and geology in the United States during the early 1900s.

**The History of Soil Science in Mexico**
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There is a lack of information concerning the history of soil science in developing countries such as Mexico. Soil knowledge in the pre-Colombian era was a notable attribute of indigenous people in Mexico. Mayas and Aztecs classified soils based on properties and land use and developed a terminology still used by locals. International organizations and institutions advocating modern agricultural practices have played an important role in the development of soil science in Mexico, in conjunction with the Green Revolution in which the use of fertilizers for crop production was implemented. Soil fertility, as an area of study, has developed significantly in the country. One of the most significant impacts of the Green Revolution on the development of soil science in Mexico was through academic exchange, in which Mexican soil scientists obtained graduate-level degrees in the United States and later returned to Mexico to conduct research programs. Although Mexico has a long history of soil knowledge, soil scientists are facing several challenges today, including a lack of communication between farmers and

scientists, soil erosion, soil contamination, and water usage. Some researchers have suggested that ethnopedological knowledge should be incorporated into modern Mexican soil science.

**Historical Soil Maps of Wisconsin, USA**
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The mapping of soils has been one of the most challenging and thought-provoking aspects of the soil science discipline. It has contributed to the fundamental understanding of soils, how they were formed, occur across the landscape and globe, and how they respond to use and management. Soil mapping has also shown the deficiencies in our understanding of soil properties and processes – both in time and space. The lands of the state of Wisconsin had been occupied by humans for thousands of years when the first French explorers arrived in 1634. Agricultural development in Wisconsin was much slower compared to states to the west that had less forest. The interest in soils initially came from geologists and from F.H. King, who became the first professor of agricultural physics. The first soil map in Wisconsin was prepared as part of a statewide geologic survey conducted in the 1870s. Because agricultural development was relatively slow, the need for soil mapping was not emphasized until the early 1900s. Since then, all counties have been mapped in detail and several statewide soil maps have been produced. In this paper we trace the development of soil mapping in Wisconsin, including the development of reconnaissance maps between 1882 and 1993.

**Landmarks of History of Soil Science in Sri Lanka**
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Sri Lanka is a tropical Island in the Southern tip of Indian subcontinent positioned at 50 55’ to 90 50’ N latitude and 790 42’ to 810 53’ E longitude surrounded by the Indian Ocean. It is an island 435 km in length and 224 km width consisting of a land are of 6.56 million ha with a population of 20 million. In area wise it is ranked as 118th in the world, where at present ranked as 47 in population wise and ranked 19th in population density. The country was under colonial rule under Portuguese, Dutch and British from 1505 to 1948. The majority of the people in the past and present earn their living from activities based on land, which indicates the important of the soil resource. The objective of this paper is to describe the landmarks of the history of Soil Science to highlight the achievements and failures, which is useful to enrich our present understanding of Sri Lankan soils.

The landmarks of the history of Soil Science in Sri Lanka can be divided to three phases namely, the early period (prior to 1956), the middle period (1956 to 1972) and the present period (from 1972 onwards). During the early period, detailed analytical studies of coffee and tea soils were compiled, and these gave mainly information on up-country soils which led to fertilizer recommendations based on field trials. In addition, rice and forest soils were also studied in less detail. The first classification of Sri Lankan soils and a provisional soil map based on parent material was published by Joachim in 1945 which is a major landmark of history of Soil Science in Sri Lanka. In 1959 Ponnamperuma proposed a soil classification system for wetland rice soils. From 1963 to 1968 valuable information on the land resource was collected and documented by aerial resource surveys funded by Canada-Ceylon Colombo plan aid project. This covered 18 major river basins and about 1/4th of Sri Lanka, which resulted in producing excellent soil maps and information of the areas called the Kelani Aruvi Ara and Walawe basins. The provisional soil map was updated by many other workers as Moorman and Panabokke in 1961 and 1972 using this information. The soil map produced by De Alwis and Panabokke in 1972 at a scale of 1:500,000 was the soil maps mostly used during the past years.

During the present era, the need for classification of Soils of Sri Lanka according to international methods was felt. A major leap forward in Soil Survey, Classification leading to development of a soil data base was initiated in 1995 with the commencement of the "SRICANSOL" project which was a twining project between the Soil Science Societies of Sri Lanka and Canada. This project is now completed with detail soil maps at a scale of 1:250,000 and soil classified according to international methods for the Wet, Intermediate and Dry zones of Sri Lanka. A digital database consisting of soil profile description and physical and chemical data is under preparation for 28, 40 and 51 benchmark sites of the Wet, Intermediate and Dry zones respectively. The emphases on studies on Soil Science in the country at present is more towards environmental conservation related to soil erosion control, reducing of pollution of soil and water bodies from nitrates, pesticide residues and heavy metal accumulation.

**The rise of adjusted fertilizer recommendations and the 1946 establishment of the Soil Service of Belgium**

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The scientific branch of soil science was worldwide firmly established at the beginning of the 20th century. In this period, it developed strongly in various countries. During the thirties, interest in soil science and its subfields (plant nutrition, soil hydrology, soil microbiology,...) grew even more strongly, which can be demonstrated by the rapid growth of 'soil research institutions' all over the world.

In Belgium, it was professor priest Joseph Baeyens (1885-1990) who established the first chair of 'Soil Science' in 1935 at the Catholic University of Leuven. He can be considered as a Belgian pioneer in soil fertility research. After having done prospective soil research in the Belgian Congo, the Belgium government supported him to start the same study for Belgian soils.

This innovative soil fertility research was done at the Soil Science Institute of the University of Leuven, which was established and lead by Joseph Baeyens himself. His goal was to determine the fertility norms of the Belgian farmlands. After this large-scale study was done, the fertility norms and associated fertilizer needs could be presented to farmers all over the country. The overall goal was to increase crop production and to minimize fertilizer costs. When Baeyens started to spread his knowledge to the farmers, it would not take long before the demand for his knowledge grew significantly. This lead in 1946 to the erection of the Soil Service of Belgium: an independent laboratory and research institution, analyzing soil samples in order to customize fertilizer recommendations for farmers.

This paper discusses the establishment and-development of the SSB. It covers the period between 1930 and 1950. Following questions will be addressed: How unique was the development of SSB on a national and international level? How did research take shape at the SSB? How did the SSB obtain its place in the Belgian agricultural network? What was the role of the government? And finally, how did the institution generate and disperse scientific knowledge to the farmers?

**The Glinka Memorial Soil Monolith Collection: a treasure of Soil Science**

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The first World Congress of Soil Science, held in 1927 in Washington DC, USA, had as one of its highlights the exposition of soils from all over the world. The Russian delegation had planned the presentation of 50 soil monoliths. The soil profiles were collected under the supervision of Konstantin D. Glinka, then director of the Leningrad Agricultural Institute. The soil profiles included a geographical sequence form St Petersburg to the Caucasus and soils from Georgia, Azerbaijan, Kazakhstan, the Amu Darya region and the Siberian Far East. Due to shipping problems they did not arrive on time for the congress, and ended up in an USDA storage facility, where they remained untouched in their original wooden boxes. At first congress Glinka gave a lecture on Dokuchaev's ideas and the Russian developments on soil science, and joined the transcontinental field trip of 30 days that followed the congress. At that congress, Glinka was elected president of the International Soil Science Society, and was in charge to organize the next congress in Russia. However, he passed away a few months after the congress. In the 1970s, after a consultation with Wim Sombroek, then director of the International Soil Museum (ISM) in the Netherlands, the collection was donated to ISRIC by the US Soil Conservation Service. The soil profiles were shipped over in 1980 to become part of the collection of the Museum. The collection was named as "Glinka Memorial Collection" in agreement with the Dokuchaev Soil Institute, Moscow and the U.S. Soil Conservation Service, Washington. The monoliths were treated with a sugar solution by the Russians before shipment to the USA, this way keeping a good preservation quality. They were aimed for a single exhibition and for that they were poorly documented and lacked additional samples. In the early 1990s a project for revisit the sites was set up and six sites around St Petersburg were sampled for a comparative study of the soils within a time span of 70 years of great environmental change. The Glinka Memorial Collection is a special collection of the World Soil Museum, a scientific and historical treasure that offers possibilities to dig into the history of soil science and the history of the soils themselves.

**Stepwise climate change recorded in Plio/Pleistocene paleosols from Hungary**

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Paleosols and Pleistocene loess–paleosol sequences preserve important information on landscape stability and soil formation, paleoclimate, and paleoenvironment. The nature of clay mineral assemblages (mineral composition of the clay fraction, <2 _m) is primarily a function of climate.

Therefore, clay mineralogy is considered to be a powerful tool for interpreting weathering conditions and paleoclimate. Interpretation of the time sequence of climate/environmental change however requires careful determination of pedogenic mineral phases from phases altered by later diagenesis. Red clays and paleosols in Hungary overlain by loess–paleosol sequences were studied. Elemental oxide analyses of red clays and paleosols were determined by X-ray florescence (XRF), and X-ray powder diffraction (XRD) was used for mineral identification and oriented specimens for clay mineral analyses. In this study, we aim to determine the temporal changes of clay minerals due to chemical weathering and time. Upper Pliocene red kaolinitic clay contains typically disordered kaolinite, mixed-layer smectite/kaolinite, smectite and little gibbsite. It could be formed in the local subaerial weathering crust in warm, humid, subtropical or monsoon climate (Köppen climate classification Cfa) which is a climate zone characterized by hot, humid summers and generally mild to cool winters. Kaolinite together with gibbsite in this type of the studied red clays can be inherited from pre-Pliocene lateritic soils, potentially formed during the Eocene–Middle Miocene. A temperate wet condition can be suggested for the Late Pliocene. Lower Pleistocene red (or "reddish") clay contains relatively fresh material (illite, chlorite), the weathering products are predominantly smectite and goethite formed under warm-summer Mediterranean climate (Csb). This subtype of the Mediterranean climate experiences warm (but not hot) and dry summers, winters are rainy and can be mild to chilly. Mid-Pleistocene paleosols of the loess–paleosol sequences and red clays contain similar material as the underlying red clays belonging to the Lower Pleistocene unit. The slightly but significantly lesser degree of weathering (more illite and chlorite, less smectite) indicates cooling of the climate. Based on the results, the climatic conditions were similar to the previously discussed. It was also Csb, but cooler with less precipitation. Results from geochemical climofunctions applied to Upper Pliocene–Lower Pleistocene red clays and paleosols located in the Carpathian Basin, and clay mineralogy, indicate that the paleoclimate was considerably more humid and warmer during the Late Pliocene–Early Pleistocene, in comparison to modern values.

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**Selenium in Paleozoic stone coal (carbonaceous shale) as a significant source of environmental contamination in rural southern China**

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Selenium occurs in high concentrations (typically > 10 and up to 700 ppm) in organic-rich Paleozoic shales and cherts (called "stone coal" - shíméi), in southern China. Stone coals are black shales that formed in anoxic to euxinic environments and typically contain high concentrations of organic carbon, are enriched in various metals such as V, Mo, Pb, As, Cr, Ni, Se, etc., and are distinguished from "humic" coal in the Chinese literature. We have examined stone coal from Shaanxi, Hubei, and Guizhou Provinces, People's Republic of China and have focused our study on the mode of occurrence of Se and other elements (e.g. As, Pb, etc.) hazardous to human health. Scanning electron microscope, energy-dispersive analysis and electron microprobe wave-length dispersive spectroscopy were used to identify and determine the composition of host phases observed in the stone coals. Native selenium, Se-bearing pyrite and other sulfides are the hosts for Se, although we cannot preclude an organic or clay-mineral association. Stone coals are an important source of fuel (reserves over 1 billion tonnes), both domestically and in small industry, in some rural parts of southern China and present significant environmental problems for the indigenous population. The stone coals create three main environmental problems related to Se pollution. First, the residual soils formed on stone coal are enriched in Se and other metals contained in the stone coals and, depending on the speciation and bioavailability of the metals, may enrich crops and vegetation grown on them. Second, weathering and leaching of the stone coal contaminates the local ground water and/or surface waters with Se and other metals. Third, the local population uses the stone coal as a source of fuel, which releases the more volatile elements (Se and As) into the atmosphere in the homes. The ash will be extremely enriched with the balance of the heavy metal suite. Disposal of the ash on agricultural lands or near water supplies will contaminate both. Human and animal selenosis has been observed in economically and geographically isolated rural communities in areas underlain by stone coal. However, local Public Health officials have adequately dealt with these cases of local selenium poisoning. In Enshi, Hubei Province, Se-contaminated farmland has been replanted with tea and the Se-enriched tea has been marketed nationally.

**Indicators for drought characterization of soils in different soil types, Hungary**

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Nowadays climate change is relevant problem even from the viewpoint of soil science since it exerts significant effect on most of the physical, chemical and biochemical processes within soils. During our study, after survey of the available data for several climatic parameters (annual average precipitation, aridity indices by Pálfai etc.) as well as reference data (Kreybig soil map), the study areas optimal from the viewpoint of the drought influence on soils could be delineated: in Danube-Tisza Interfluve, Bugaci Sand Ringe (around Kecel town) and Bácskai Loess Plain (around Jánoshalma) in order to detect the effects of drought and the groundwater sinking in the last 50 years on these areas' soils. 62 samples were taken from the horizons of three profiles and one core by in summer, 2011 and measured for several properties (mechanical soil type, humus, carbonate, pH($H_2O$), total salt, $Na_2CO_3$). In addition to results of soil properties, other influencing parameters (change in land use, sinking groundwater level, cultivation etc.) were paid heed to differentiate the best soil indicators reflecting of the drought effects. Compared reference data in the 1950's and our data of the study area, it can be established that significant change in land use and soil properties can be observed. According to the results of basic properties, pH($H_2O$), total salt, $Na_2CO_3$ can be considered to be the best markers of drought. Distinct ways and strength of their indication can be differed. The way can be seen either in a change in their recorded concentration values or the alteration of their vertical distribution in the profiles. Based on the strength of indication for soil parameters, strong, moderate, weak categories could be determined.

## EGU History and Society of Soil Science committee

At its 2012 meeting, the Soil System Sciences Division of the European Geosciences Union (EGU) voted to add a History and Society of Soil Science subdivision. This subdivision is chaired by Eric Brevik and includes Alfred Hartemink, Artemi Cedà, Jessica A. Drake, Juan José Ibáñez, Nicolás Bellinfante, Nikolaus Khun, Peter Burauel, and Wolfgang Fister. If you are a member of EGU you are encouraged to join the History and Society of Soil Science subdivision. This can be accomplished by contacting Eric Brevik (Eric.Brevik@dickinsonstate.edu) or Artemi Cedà (artemio.cerda@uv.es) with a request to be added to the EGU History and Society of Soil Science subdivision.

## Soil Science Society of Sri Lanka

The Soil Science Society of Sri Lanka published their most recent newsletter in September 2012. Highlights include news on the most recent Society meeting and field trip, new officers, award notifications, announcements of upcoming meetings, and Society publications. The Soil Science Society of Sri Lanka newsletters can be accessed at http://www.ssssl.org/newsletter.htm.

## German History of Soil Science Working Group

The 2012 volume 3 (edited by H.-P. Blume and R. Horn) of publications of the *History of German Soil Science Working Group* includes several more fairly detailed biographies of leading soil scientists including the German microbiologist Christian G. Ehrenberg (1795 – 1877), the Russian pedologist Vasilii V. Dokučaev (1846 - 1903), the German pedologist Emil Ramann (1851 - 1926), the American microbiologist and Nobel Prize winner Selman A. Waksman (1888 - 1973), the German creator of soil taxonomy for agricultural use Walter Rothkegel (1874 - 1959), the German colloid chemist Heinrich Thiele (1902 - 1990), the German pedologist Dietrich Kopp (1921 - 2008) and the German soil physicist Karl Heinrich Hartge (1926 – 2009).
The 2012 volume 4 includes a reprint of the Ph.D. work of Hans – Peter Blume (1961): *The clay migration as soil forming process in soils of Weichselian till.*

Orders can be sent to hblume@soils.uni-kiel.de: 15 €
Hans-Peter Blume, Kiel

## Journal News

**New journal – History of Geo- and Space Sciences** by Copernicus Publications
www.history-of-geo-and-space-sciences.net

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Indexed in Scopus and ADS . Included in the Directory of Open Access Journals (DOAJ) as well as in the Bodleian Library (UK) , Deutsche Digitale Bibliothek (D) and Library of Congress (USA) . Long-term e-archived in Portico and CLOCKSS .

Science is very much a logical progression through time. Advances are frequently built upon and underpinned by ideas and understandings developed in the past, sometimes under circumstances which may no longer hold the same degree of validity. Each scientist works within a conceptual framework and can benefit and perhaps make advances by understanding the historical basis of that framework. Moreover, research in geosciences is often based on long-term observations (and collecting of data). It is therefore necessary to learn about the origin of these data and the way they have been passed on to us, as well as about the authors, their instruments, institutions and field studies. It is also important to understand development of the ideas, the research process and the institutions in which former scientists in the field worked, in order to understand the scientific development of the subject area, and also its importance in a societal context.

These reflections led to the desire to establish a special journal for contributions of historical questions and aspects of geosciences which should cover all related fields from the Earth core over the lithosphere, the ocean, the cryosphere into the atmosphere and near-Earth space (including geology, geodesy, hydrology, marine science, meteorology, seismology as well). History of astronomy is not a topic of the journal.

The journal History of Geo- and Space Sciences (HGSS) should be a platform for original research articles, review papers, and short notices, as well as book reviews and conference reports. The journal's remit is the publishing of original historical research, including new interpretations of historical material, facts and established knowledge. The journal should also improve and accelerate communication between scientists working in and interested in historical aspects of the above fields.

The journal's scope is to document historical facts and knowledge, and to improve awareness of the history of geoscience. The knowledge of the development of geosciences and their experimental methods and theories in the past can improve our current understanding and may stimulate current research. It can be encouraging for young scientists to read biographical material of historical figures in their research area. It is important as well to learn that history of science is an integrated part of the on going research in their research area. Another important aim of the journal is the association of historical retrospective and current research.
All manuscripts will be peer-reviewed by two referees.

**Soil Horizons** – A Reformatted Journal of the Soil Science Society of America
https://www.soils.org/publications/sh
Editor’s note: Soil Horizons accepts research articles on the field study of soils, including historical articles. Soil Horizons also publishes the “Profiles in History” feature noted on page 2 of this newsletter.

I am writing with exciting news concerning the journal Soil Survey Horizons, published by the Soil Science Society of America. Soil Survey Horizons was established in 1960 as a medium for expressing ideas, problems, and philosophies concerning the study of soils in the field. Content includes research updates, soil news, history of soil survey, and personal essays from the lives of soil scientists. Contributors and readers include soil survey personnel, private consultants, soils educators, researchers, and students. Topics covered include soil survey problems, innovative methods and equipment, landscape and soil research studies, and case studies from consulting work. The journal is quite unique and fills an important niche not covered many other soils journals.

While the content and readership of Soil Survey Horizons has remained strong, the journal was faced with several limitations: 1) it was not available online, 2) it was not indexed by on-line services, and 3) it was mainly focused on work within the United States.

Careful consideration of these limitations by the SSH board and Soil Science Society of America have led the journal to evolve; an evolution that began January 1, 2012. The Soil Science Society of America Board approved a host of changes related to SSH; changes that have improved the scientific rigor and readership of the journal, while recognizing the historical charge and focus of the journal. Specifically, the following changes were enacted:

1) The journal has been renamed "Soil Horizons" (SH) so as to broaden the focus and readership
2) Application has been made to have the journal indexed by ISI and Elsevier Scopus (acceptance is not guaranteed and will take time, but this is clearly a direction we want to move toward)
3) The journal has moved to online (electronic) dissemination of its content and is now available automatically to all members of the Soil Science Society of America as a part of their membership dues
4) The manuscript submission/review process is now administered via Manuscript Central
5) Strong efforts have been made to broaden the journal to include substantial international content, including the appointment of new associate editors from different continents
6) The journal has transitioned from a strictly editor reviewed content system to a joint editor/external peer review system
7) All historical content of SSH will be captured, digitized, and will become fully web searchable
8) The journal has been expanded to include a section on the professional practice of soil science, including columns on timely issues, two-sides of contentious questions, feature articles on soils accessible to those new to soil science, photos/video/dynamic content of field excursions, and announcements for the readership (upcoming meetings, summer internships, etc.).

Despite these changes, some things have not changed. Publication of accepted submissions do not have any page charges, including the free publication of color figures. The journal has continued its highly acclaimed graduate and undergraduate student essay contest for original research articles. The focus of the journal has remained true to its original mission. Illustrative photos and ancillary content are always encouraged. With the new move to online publishing, we even have the ability to link slide shows, panoramic photos, video, and other dynamic content as part of published articles.

In addition to research articles and original manuscripts, the new SH features invited original essays from some of the world's leading soil scientists, giving their perspective and thought to issues of relevance. The table of contents for the past year's volume of SH is available at https://www.soils.org/publications/sh.

As a final note, please give strong consideration to submitting an article, announcement, or discussion point for inclusion in the new Soil Horizons. Our dynamic editorial team looks forward to the opportunity to work with authors to get their work in print.

With very best regards,
David C. Weindorf, Editor

## New Historical, Philosophical, or Sociological Articles and Book Chapters

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Burras, C.L., M. Nyasimi, and L. Butler. 2013. Soils, Human Health, and Wealth: A Complicated Relationship. In: E.C. Brevik and L.C. Burgess (Eds). Soils and Human Health. CRC Press, Boca Raton, FL. p. 215-226.

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## Book Reviews

***The Volga-Don steppes in Ancient time and Middle Ages*, by Demkin, V.A., Borisov, A.V., Demkina, T.S., Khomutova, T.A., Zolotareva, B.N., Kashirskaya, N.N., Udal'tsov, S.N., El'tsov, M.V. Russian Academy of Science, Institute of Physico-chemical and Biological Issues of Soil Science, Pushchino, SYNCHROBOOK, 2010. 120 p., ISBN 5-91874-030-9 (in Russian, with English summary)**

The book provides an expanded overview of the long-term soil-archaeological investigations conducted in the southern semi-arid part of the East-European plain and was written in celebration of the 40 year anniversary of the Soil Institute in Pushchino. The authors are all with the Archaeological Soil Science Department headed by Prof. Vitali A. Demkin of the Institute. The book contains the following six chapters: 1 Materials and methods of soil-archaeological studies, 2 Eneolithic and Bronze Age (IV-II ka BC), 3 Early Iron Age (VI c BC – IV c AD), 4 The Middle Ages (VIII-XIV c AD), 5 Changes of organic matter of paleosols in space-time, and 6 Soil evolution and climate dynamics in Ancient time and Middle Ages. The bibliography includes 89 titles and the appendix contains numerous personal and lovely photos taken during the 1976-2009 expeditions.

Soil investigations as part of integrated archaeological excavations of steppe burial mounds (*kurgan*, in Russian) were started by Demkin and colleagues in the 1970s under Prof. Igor V. Ivanov. During 40 years of committed research, Demkin and his current team were able to obtain new data on Kastanosem (WRB soil classification) chronosequences and in this way provided reconstructions of the Holocene evolution of semi-arid steppe soils and climate fluctuations during the last 6,000 years. A sequence of different paleosols in the chronological range since the IV millennium BC through the 1$^{st}$ millennium AD was discovered beneath *kurgans* constructed by various nomadic populations, called in classical Antiquity Sarmathians and Scythians and viewed by Romans as ferocious warriors. The older *kurgan* cultures of the Bronze and pre-Bronze Age are credited with domestication of the horse, but archaeologists are still unclear about the reality and causes of chariot invasions from the east and hence about the origin of Indo-European languages.

In light of archaeological uncertainties paleopedological studies on *kurgan* sites seem of particular relevance. The authors provide reconstructions for different archaeological periods based on characterization of paleosols buried by *kurgan* mounds. These include paleosol morphology, concentration of humus, soluble salts, alkalinity, and magnetic susceptibility. The set of paleosol properties is further compared with surface undisturbed soils around *kurgan* sites. Applying the principle of climatic dependence of pedogenic properties in soils of South Russia along a N-S gradient, the authors propose reconstructions of annual precipitation. Significantly, the authors are probably the first to employ microbiology and molecular genetics for Holocene paleosols buried by *kurgan* materials. These studies were recently reviewed in English (Mitusov et al., 2009), with the conclusion that application of microbiology to paleosols is too costly to be used worldwide. My question in addition addresses the consistency of extracted communities of microorganisms with pristine microenvironments provided they were implicitly disturbed by humans at least at the time of burial and mound construction. Because of controversies expressed in the geological literature about relating microbiological communities to either the surficial or deep biospheres, in-depth paleopedological/microbiological research seems critical to avoid far-fetched deductions.

One of the most significant paleopedological inferences in the book is that by the second half of the III millennium BC the area began to experience increased aridity, soils accumulated salts and partly deflated. This aridity crisis roughly coincides with other areas of the world (Dalfes et al., 1997), and hence the authors' view fits well into the mainstream opinion. In addition, the authors propose the sequence of arid/humid episodes in the Russian Kastanosem and Cambic-Solonets area on purportedly a centenary scale. I have some misgivings about the validity of such a refined time resolution from paleopedological datasets. Probably, this question should be solved through multidisciplinary research involving palynologists, isotopic experts and, in the first place, archaeologists. The humanities seem to bring a more balanced approach to a discussion as to what extent social and cultural factors of human transmigrations in North Eurasian steppes could outweigh an annual precipitation change of ±50-70 mm.

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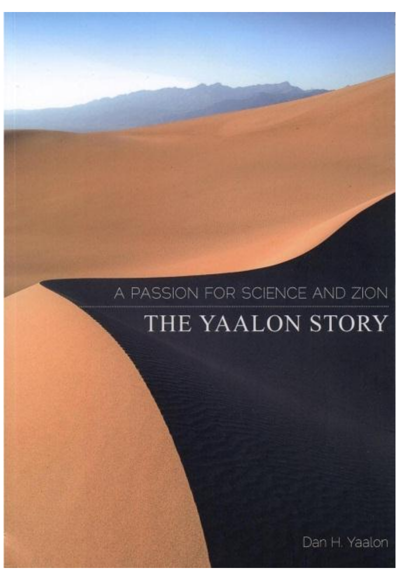
***A Passion for Science and Zion: The Yaalon Story*** **by Dan H. Yaalon. Maor Wallach Press, Jerusalem. 2012. 234 p. ISBN: 978-965-91979-0-3.**




Dan H. Yaalon is one of the leading soil scientists of the second half of the 20th Century. *A Passion for Science and Zion* tells his life story largely from his perspective, with some input from his two sons. The book does spend some time on Yaalon's professional career, but focuses much more on his family life from his earliest memories as a child to the present. There are numerous pictures of family moments presented throughout the book, with the highlight possibly being three pages (pgs 8, 96, and 208) containing collages of black and white photographs, each collage covering a wide range of years and subjects.

Dan Yaalon, 1945.

The book begins with Yaalon sitting in his home, reminiscing about his life. Over the space of four pages Yaalon basically gives an expanded abstract of the book, hitting on highlights that are further explained later in the book. From there, the next 37 pages are spent discussing Yaalon's youth in Czechoslovakia, including introductions to the town he grew up in, his parents, his two sisters, and various other family members as well as information about the activities and interests of a young Yaalon. This is followed by a discussion of life as a Jew in Europe during World War II, and steps taken to protect some of the Czech Jewish youth from the Nazis. This lead to Yaalon leaving home, embarking on travel to several other European countries between 1939 and 1945. Upon returning to Czechoslovakia Yaalon discovered his mother had perished in Auschwitz. Coupled with the death of his father before the war and the fact that his sisters and their families had left Czechoslovakia, Yaalon had little family left in Czechoslovakia and decided to move on. This initially meant returning to Denmark to finish his undergraduate education before heading to Israel in 1948. In 1950 Yaalon began his doctoral program at Hebrew University, an institution he is associated with to this day as a Professor Emeritus. Yaalon discusses this association from page 97 to 122. While a recounting of his professional life is an important part of the book, it is not the primary focus. The remainder of *A Passion for Science and Zion* is devoted to a recounting of Yaalon's family life with his wife and children, both from Yaalon's perspective and the perspectives of his two sons. A particularly interesting perspective from his sons include their knowledge from an early age that their father was a researcher, as he did a considerable amount of work from home. One son noted that the click-clack of the typewriter was such a staple part of his youth that he kept his father's typewriter when Yaalon moved to a computer. Another was that Yaalon did not pressure his children to follow in his footsteps, but supported them fully in finding their own way in life. One son notes that his father never worked, but rather engaged in what he most loved doing, and that he wanted the same for his children.

The Yaalon family in 2009, including Dan Yaalon, his wife Rita, sons David and Uri, and his grandchildren.

There are some aspects of the book that have the potential to make it a bit difficult to follow, depending on the background of the reader. In some placed Hebrew words are used (e.g., "Aliyah", "olim") that may be unfamiliar to people who do not speak Hebrew; however, these words are easily looked up online for those who do not know them. Likewise, neighborhoods of Jerusalem are frequently referred to; a map of Jerusalem with the locations of these neighborhoods would have been helpful for those who do not have in-depth knowledge of Jerusalem. There are several references to "Hardy" in picture captions through the first approximately 50 pages of the book with no explanation as to who "Hardy" is. After a short time I concluded that Hardy must have been what Yaalon was called as a child, but the fact that

Yaalon's given name was Hardy isn't explained in the book until page 74, before which point picture captions of the author have already switched to referring to him as Dan. Yaalon also changed his surname from Berger to Yaalon in 1950 as explained on page 84. While I had surmised long before that point in the book that he must have changed his name at some date, it was surprising to note in the early pages of *A Passion for Science and Zion* that his father's surname was not Yaalon. For those in the world of soils who have always known Hardy Berger as Dan Yaalon an earlier explanation of this name change would have helped to clarify some things in the early pages of the book. There is mention of the cities of Davis and Tucson in the book with no mention of state or nation. While the identification of these mid-sized cities will be readily apparent to people familiar with the United States, they are not major cities that will necessarily be readily apparent to people in other parts of the world. These are all minor issues and on the whole do not detract from the overall value of the book.

*A Passion for Science and Zion* is a work that gives insight into the life and times of Dan Yaalon. Given that all of us are shaped by the people we encounter and the experiences we have over the course of our lives, this book is important to historians of soil science in that it provides many of these insights about Yaalon. Therefore, I recommend this book to anyone with an interest in soil science history.

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## Anthropocene Soils and Stratigraphy

Daniel deB Richter is currently working on a paper focused on our move from the Holocene to Anthropocene epoch. There is a lot of history in this discussion including environmental history, geo-history, history of science, etc. Dan is interested in receiving suggestions from the Newsletter readership in regards to this topic, looking at Anthropocene signals in soils and paleosols from the context of litho-, chemo-, and bio-stratigraphic records in soils and paleosols. If you would like to discuss this topic with Dan, please email him at drichter@duke.edu.

## News Items Wanted

Relevant news items, articles, etc. are always welcomed for publication in the History, Philosophy, and Sociology of Soil Science Newsletter. This includes history, philosophy, or sociology sessions held at meetings of any of the various national soil science societies, new articles or books published in these areas, or anything else you feel might be appropriate. Please send submissions to the newsletter editor, Eric Brevik, at Eric.Brevik@dickinsonstate.edu.

Items are welcomed throughout the year. Anything submitted will be filed for use in the next newsletter.

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