PEDOLOGUE

Volume 31, Issue 2, 2020

Newsletter of the Mid-Atlantic Association of Professional Soil Scientists
Editor: Del Fanning, DelvinDel@aol.com or dsf@umd.edu
Assistant Editor: Barret Wessel, bwessel@umd.edu

In spite of coronavirus pandemic, soil science zooms on and *Pedologue* Assistant Editor, now Dr. Wessel, is moving to Kentucky

Soil science, like most other scientific disciplines and other walks of life is experiencing challenging times unlike any others previously known. Most of us still have meetings, but we get to them virtually on our computer screens instead of in person. This can in some instances be advantageous, attendance at seminars is sometimes better with attendees from afar, and for folks with poor hearing, understanding what is being said is better via the written, in preference to the oral, word, maybe making *Pedologue* more valuable and necessary, than before; but will we be able to have soil judging contests if contestants are not able to touch the soil? It was amazing that the last few weeks of the 2020 Spring Semester were able to be completed at the University of Maryland and graduation took place even though most students went home for Spring Break without coming back to campus. Oral seminars and final exams for graduate students on their dissertations and theses took place with the help of computers and the internet by Zoom.

Among those finishing degree requirements was MAPSS member and *Pedologue* Assistant Editor Barret Wessel, now officially Dr. Wessel, congratulations Barret, a much deserved accomplishment. The reference for Barret's dissertation is: Wessel, B.M. (2020). *Subaqueous Soils of Chesapeake Bay: Distribution, Genesis, and the Pedological Impacts of Sea-Level Alternations*. (Doctoral dissertation). University of Maryland-College Park, MD. His dissertation should eventually be available on-line from Dissertation Abstracts International, but it is not yet available from that source. To give *Pedologue* readers a taste of what is in the dissertation, we hope to publish his dissertation abstract in the next issue. Among his findings that excite Fanning is the presence of jarosite in post-active acid sulfate soils beneath sea level and beneath current subaqueous soils of Rhode River at the Smithsonian Environmental Research Center (SERC) in Anne Arundel County, MD where sea level is currently rising at about 3.7 mm per annum. It would be wonderful to be able to purify some of this jarosite and date it as has been reported to be possible to do in some places in Australia where it has reportedly been found to date back to Tertiary, Miocene times. For this to happen the jarosite must have to remain under oxidizing conditions, reduction of Fe^{3+} in jarosite brings it into solution like it does with Fe oxides and oxyhydroxides.

Barret has now taken a new position as a postdoc Research Soil Scientist with the Agricultural Research Service (USDA-ARS) at the Food Animal Environmental Systems Research Unit in Bowling Green, KY. He is advised by Dr. Carl Bolster, and his work will focus on improving the Agricultural Phosphorus Loss Estimator (APLE), a computer model used to try to develop better goals and recommendations regarding agricultural phosphorus use and environmental protection. His work builds directly on the work of former UMD students, including Dr. Nicole Fiorellino and Ms. Emileigh Lucas. Dr. Josh McGrath, formerly with UMD and now with University of Kentucky, also worked on the model and continues to do so. Barret was hoping to find a position in Maryland or other nearby place so he could continue being an active MAPSS member to attend our meetings and continue working on *Pedologue*, but his move to Kentucky and his need to give his attention to his new duties, may require him to move on. We hope not right away for the good of MAPSS and *Pedologue*, he has done wonderful things for us. -Del Fanning

PEDOLOGUE (ISSN 2641-662X) is published approximately quarterly by the *Mid-Atlantic Association of Professional Soil Scientists* in College Park, Maryland, USA.
Issues are available online at www.midatlanticsoilscientists.org/pedologue

Editors' comments

Barret and I wish you all the best as life goes on. Stay healthy and take care of each other. See cover story. -Del and Barret

In this issue

Calendar of some coming events

- TBD next MAPSS meeting and election of officers.
- Nov. 7-11, 2020. Soil Science Society of America Annual Meeting, Phoenix, AZ. To now be an all virtual conference.
- Nov. 21-26, 2021. 9th International Acid Sulfate Soils Conference, University of Adelaide, Adelaide, Australia. https://biological.adelaide.edu.au/acid-sulfate-soil/iassc/

Future articles etc.

Pedologue needs articles, pictures, poems, cartoons, letters to the editor or other things soil scientists and/or other readers may be inspired to submit. Please submit such items to the editors (preferably to DelvinDel@aol.com, alternatively dsf@umd.edu, and bwessel@umd.edu). Be an author, support your newsletter! It's a way to promote your work, our community, and things we all need to know about soils and the environment.

2019 MAPSS Officers (continuing in 2020, elections pending?)	**Board of Directors**
President Annie Rossi	Barry Glotfelty to serve 1 year
Past President Bruce Bagley	Jim Chaconas to serve 2 years
President Elect Susan Lamb	John Wah to serve 3 years
Vice President Ben Marshall	**Chairs of Standing Committees**
Treasurer Sarah Roberts	**Finance** Vacant
Secretary Jenwai Tsai	**Constitution and By-Laws** Gary Jellick
Member at Large to serve 2 years Bill Effland	**Membership and Ethics** Susan Lamb
Member at Large to serve 1 year Josh Stallings	**Nominations** Bruce Bagley
Ex officio Member Phil King	**Education and Public Relations** Delvin Fanning
	Certification Vacant

WHIFFING HYDROGEN SULFIDE

By Del (Delvin S.) Fanning[1] and Bob (Robert G.) Darmody[2]

[1] Emeritus Professor, Dept. of Environmental Science and Technology, Univ. of Maryland, College Park, MD 20742-5825, corresponding author at DelvinDel@aol.com or dsf@umd.edu

[2] Emeritus Professor of Pedology, Department of Natural Resources and Environmental Sciences, University of Illinois, Urbana, IL 61820 rdarmody@illinois.edu

The so-called rotten egg odor of hydrogen sulfide is known and recognized by almost everyone and people commonly encounter it in their everyday lives, e.g. when a person flatulates (we introduce this word as a polite word instead of the better understood word farts, which our Webster's International Dictionary indicates is considered a vulgar word, but doesn't suggest a polite alternative) after earlier eating beans or other sulfur containing foods. We sometimes joke about this and have even proposed that those who flatulate should wear odor absorbing diapers, perhaps constructed from iron oxides bearing soil material, to prevent H_2S odor from reaching our noses when we travel on airplanes or on other modes of transportation or gather in other places where we are tightly cramped in seats close to each other, not practicing social distancing. Too much breathing of hydrogen sulfide can be hazardous to our health, even leading to death in instances mentioned later in this article. The generation of hydrogen sulfide can induced by anaerobic soil conditions where sulfate is present in woil water and an odor of H_2S emanating from a soil can be an indicator of a hydric soil. Bob Darmody, the individual in the first two pictures of this article (Figs. 1 and 2), was the first UM soil science graduate student to study Maryland's TM (tidal marsh) soils. He developed a classification system to grade the intensity of the H_2S odor emanating from soils or soil materials (Darmody, 1975). From a bulletin on Tidal Marsh Soils of Maryland (Darmody and Foss, 1978, p. 4), "The odor of H_2S was ranked on a 0-3 scale. A marsh was given a 0 rank when no sulfur odor was detected. A ranking of 1 indicated that the odor was detectable only if the soil was held close to the nose (Fig. 1). When the H_2S odor was noted as soon as the sampling process began, the ranking was 2. In marshes where the presence of H_2S was noted when simply walking across the marsh, the ranking was 3. Half values were used in intermediate situations."

Fig. 1

In Fig. 1, at left, Bob during research for his M.S. degree (Darmody, 1975; Darmody et al., 1977; Darmody and Fanning, 1977), demonstrated a situation where the Whiff test value was 1. The photo here is also in the Bulletin by Darmody and Foss (1978, Fig. 4, p. 7) as a black and white image. The photographer was Bob's field assistant at the time, an undergraduate student Warren Beers.

From what was written on 2x2 slide, scanned for digital image, the photo was taken in Wicomico County, MD, to demonstrate the Whiff Test of Pikes Peat, a *Sulfihemist*. The soil material being whiffed was a "biscuit" cut out of the peat with a tiling spade from a submerged upland TM.

Another 2x2 slide was scanned to provide the digital image shown in Figure 2.

Fig. 2. At left, Bob standing by a *panne* on shallow Pikes Peat in submerged upland TM in Wicomico Co. MD. One explanation for the occurrence of these open water areas in TM is that they are places where muskrats have cleared away the vegetation and peat by digging and eating the roots of the plants etc. The vegetation here was probably *Spartina alterniflora*, smooth cordgrass, and/or *Juncus roemerianus*, needlegrass rush. Original photo probably again taken by Warren Beers

For his own information, Fanning keeps his original 2x2 photographic image of this slide, together with others, some also gifted to him by Bob, to illustrate the gross soil-forming process of sulfidization as described in Fanning and Fanning (1989, Chapter 10) and in other publications.

Sometimes soil materials do not emanate H_2S until they are subjected to the addition of acid (e.g. 10% HCl). This can be the case with soil materials containing iron monosulfides, FeS, that commonly occur in DM (dredged materials) like shown in Figure 3: $FeS + 2\ HCl \rightarrow H_2S + Fe^{2+} + 2Cl^-$.

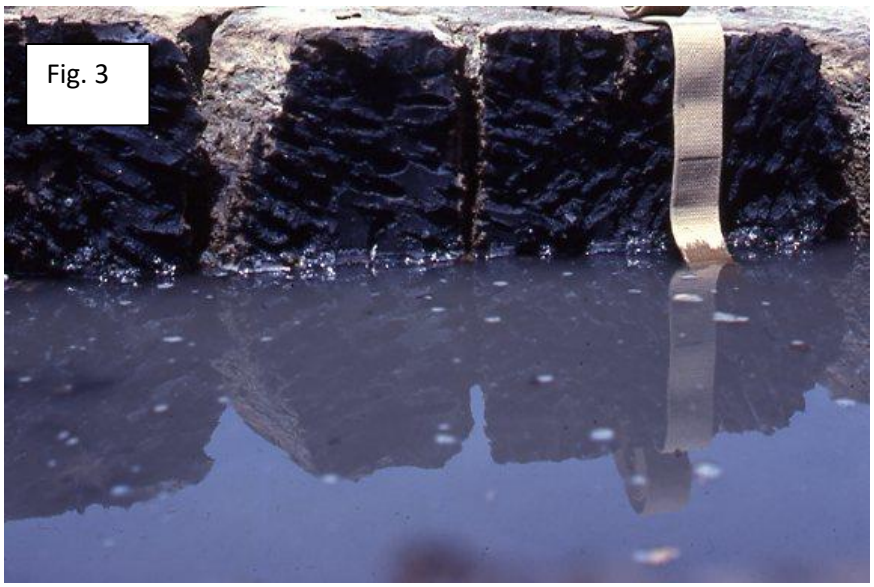


Figure 3. This photo is of recent (<1 year following deposition) DM from Baltimore Harbor at the Masonville deposition site, near the Harbor Tunnel, that contained black FeS. When initially deposited the DM were soft, high *n*-value (squishy, low physical-bearing capacity) soil materials by *Soil Taxonomy* that following deposition dried and cracked, see lateral view of surface of this soil in Fanning and Fanning (1989, Fig. 1.4, page 7) to form prismatic structure, but, as typical for such soil materials, the cracks did not close when the water table, at 14 cm depth in photo, rose again. Fresh vertical surfaces in a newly dug pit were black, but color changed upon longer exposure to gray color shown on walls of the prism faces out of water. The black material evolved H_2S as detected by odor when treated with drops of 10% HCl, whereas gray material did not. The soil was a *Typic Sulfaquent* by *Soil Taxonomy*. The photo here is a digital image made by scanning a Fanning 1980's 2x2 Kodachrome slide.

Whiff Test vs Total S content in Tidal Marsh Soils

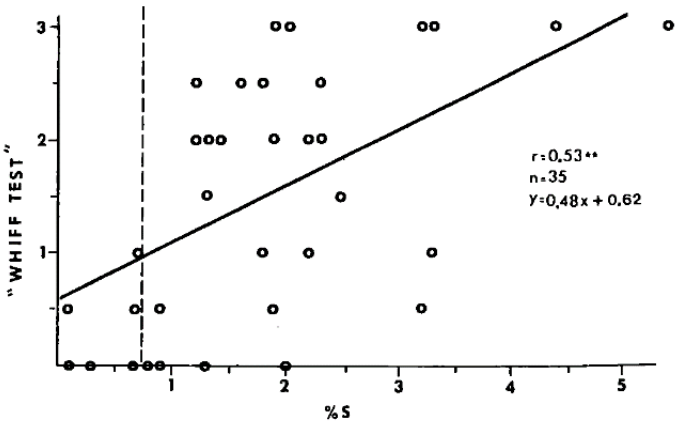


Fig. 4—Correlation of the field "whiff test" value for sulfur with total analysis values by X-ray additions method. Soil materials with sulfur content in excess of the dashed line (0.75%) with no carbonates would be considered sulfidic materials (Soil Survey Staff, 1975).

The "Whiff Test" for H_2S in TM soils as done in the field is subject to some uncontrollable variables. Among these are: 1. Soil temperature - warm soils emit more of the gas than cold; 2. Windy days disperse the gas, resulting in lower breathing zone concentrations than on calm days; 3. Being an organoleptic test, it is subject to operator bias, as when the "whiffer" has nasal congestion. Nevertheless, by an X-ray spectroscopic method to determine total S in tidal marsh soils we developed (Darmody et al., 1977), we found that while there is considerable variability, the Whiff Test was statistically significantly correlated with the total S content of the soil materials as determined by the X-ray spectrographic method (Fig. 4). This graph figure has been published in various places, including in Darmody and Foss (1978, Fig. 4, page 9). We give ourselves permission to publish it again here. Note that in some instances a soil material could qualify as sulfidic even with a Whiff value of 0 or 0.5 by the definition based on total S content, assuming no calcium carbonate equivalent present. This work was done and published before the incubation way of determining *sulfidic materials* was developed and defined, leaving the method based on total S and $CaCO_3$ equivalent content as an alternative method.

Poisonous Nature of Hydrogen Sulfide

That hydrogen sulfide in air can be poisonous to humans and other animals has been known for a long time. Geo-microbiologist David Rickard at Cardiff University in the UK has written about this in his books (e.g. Rickard, 2015, pages 154-156). For example, it was found to be responsible for deaths of humans in the sewers of Paris in the early 19th century. Rickard has also written about the association of H_2S with certain limestones, referred to as stinkstones, and about well diggers in these rocks dying from H_2S inhalation while digging the wells. The following quote from page 156 is inserted here to provide further information as well as a warning. Here Rickard is writing about himself:

> "I have worked with H_2S for many years and so have had the opportunity to study the effects of H_2S poisoning firsthand. The first thing you notice is the smell. In low concentrations, H_2S smells like rotten eggs. As the concentration increases the smell changes. It becomes sweeter and rather sickly. Interestingly, at higher concentrations you cannot smell it at all. This is a symptom I recommend you take particular notice of since, shortly after that happens, you drop down dead. I kept an oxygen cylinder at hand in the lab for emergency use in this case. Breathing pure oxygen oxidizes the H_2S."

We think it is likely that the odor disappearance mentioned by Rickard above likely applies with a given high concentration, one may smell it at first, but odor may disappear with time. Fanning also has noticed that his odor recognizing abilities, seem to have lessened, like his vision and hearing, as he has gotten older.

In February 2020, Del was corresponding with David Dent in Great Britain by e-mail. He had learned some time ago from another colleague, Rob Fitzpatrick in Australia, that Dent had told him of an incident where Leen Pons, of acid sulfate soils fame for starting the International Acid Sulfate Soils Symposia/Conferences in the early 1970's etc., was overcome by breathing hydrogen sulfide in the air of a soil pit that he and Dent were examining together, so in a message Del asked Dent about the incident. A short time later he received the following reply:

2/26/2020

Dear Del

Leen and I were in a deep wet pit in a stinking, half ripe acid sulphate clay. I think it was in an oil palm plantation in Malaya. The acid layer was quite shallow, the sulphidic subsoil thick and black. Being us, we had been in for quite some time poking and prodding when Leen did, indeed, keel over. Fortunately, I could get my shoulder under him and heave him out. And being Leen, he soon came round. Worse fates have come upon digger operators working alone.

Best David

For those who don't know, David Dent is an acid sulfate (he would spell it sulphate) soils expert who has studied these soils in many parts of the world, and he has authored a book on Acid Sulfate Soils (Dent, 1986).

In subsequent e-mail dialogue with Dent, June, 2020, David has pointed out that he thinks a reason that Pons was overcome from breathing H_2S, in the deep pit they were in, whereas he was not, was that he was considerably taller than Pons, such that his head was above the top of the pit, where he breathed more uncontaminated air. Also he said that at the time he was strong, a former discus thrower, such that he could lift and throw Leen out of the pit. Good soil science hazard story. David also pointed out that he and Leen later (1995) wrote a well-cited article: A world perspective on acid sulphate soils, *Geoderma* 67 3-4 263-276. Del thinks this is the article in which they called acid sulphate soils "the nastiest soils in the world". One of the sides of the nastiness is that, if you aren't careful, they can kill you, if you whiff in too much of the H_2S that some of them generate.

Del has thought, and apparently Rickard has as well, that the poisonous effects of H_2S are likely because the sulfide attaches to the hemoglobin of blood and prevents it from carrying oxygen, thus causing suffocation. However, Rickard points out, another quote from page 156 of Rickard (2015) as follows:

> "…it has become apparent that the causes of H_2S toxicity in humans and other organisms are complicated and still not entirely understood. Rather the effects seem to be targeted on the enzyme cytochrome oxidase. Additional effects are due to sulfide attacks on brainstem respiratory nuclei and irritation of the lungs leading to pulmonary edema."

Del has sometimes tried to purchase a cylinder of H_2S for experimental purposes in the lab, but has found that suppliers of chemicals are reluctant to supply H_2S. This is probably because of its known poisonous nature and that there are individuals who have acquired or have wanted to acquire H_2S for committing suicide. Del thinks back to when he was an undergraduate student at Cornell and was required to take Qualitative Analytical Chemistry, a course that apparently is no longer taught at Maryland and other universities. In the lab part of the course at Cornell, students used to be supplied with certain heavy metals in solution in a test tube and were required to employ a hydrogen sulfide generator in a room off the side of the main lab to bubble H_2S thru the solution to cause the metal element to precipitate as the sulfide of the element. Essentially all metal sulfides are insoluble and precipitate as metal sulfides, but different metal sulfides have different colors and that was how students were supposed to identify the element. Presumably FeS was black. One reason that this kind of qualitative chemical analysis was discontinued was likely because of the awareness that H_2S is poisonous. Del remembers the stinky odor of the room at Cornell, Baker Lab Building, where the H_2S was employed. He sometimes wonders if exposure to H_2S at Cornell, probably in 1952-53 school year, had anything to do with his development of strong interest in acid sulfate soils later in life. Del still hasn't been able to acquire a tank of H_2S. To expose an iron "oxide" coated object to H_2S to see if it turns from red to black as mentioned in an article in the last Pedologue issue (Fanning et al., 2020) Del plans to insert it into a tidal marsh with a high H_2S odor, 2 and/or 3 intensity level.

Among other reasons for writing this article, one is to warn fellow soil scientists and others to be careful if/when you whiff hydrogen sulfide, ideally don't do it alone. Dent being with Pons when Pons was overcome, probably saved Pons' life. And don't forget to take "Beano" before you have an S rich meal while on a date, if ever the social distancing rules permit such to happen.

References:

Darmody, R. G. 1975. Reconnaissance survey of the tidal marsh soils of Maryland. M.S. thesis. University of Maryland. College Park, MD.

Darmody, Robert G., and John E. Foss. 1978. Tidal marsh soils of Maryland. Maryland Agricultural Experiment Station Miscellaneous Publication (MP) 930, University of Maryland, College Park, MD 20742. 69 pages.

Darmody, R.G., D.S. Fanning, W.J. Drummond, Jr., and J.E. Foss. 1977. Determination of total sulfur in tidal marsh soils by X-ray spectroscopy. Soil Sci. Soc. Am. J. 41:761-765.

Darmody, R.G., and D.S. Fanning. 1977. Whiffing sulfur levels of tidal marsh soils. Soil Survey Horizons 18. No. 4:16-17.

Dent, David. 1986. Acid Sulphate Soils: A Baseline for Research and Development. International Land Reclamation Institute Publication 39. Wageningen, The Netherlands.

Dent, D. L. and L. J. Pons. 1995. A world perspective on acid sulphate soils. Geoderma: 67: 263-276.

Fanning, D. S., and M. C. B. Fanning. 1989. Soil: Morphology, Genesis and Classification. John Wiley & Sons. New York. 395 pages.

Fanning, Delvin S., Lowery, Derrin L., and Wagner, Daniel P. 2020. Sea shells colored by acid sulfate soil processes. Pedologue 31, Issue 1: 5-8.

Rickard, David. 2015. Pyrite. A Natural History of Fool's Gold. Oxford University Press. New York. 297 pages.

Additional Readings for your entertainment:

Does Beano prevent gas? A double-blind crossover study of oral alpha-galactosidase to treat dietary oligosaccharide intolerance:

Michele Di Stefano, Emanuela Miceli, Samantha Gotti, Antonio Missanelli, Samanta Mazzocchi, and Gino Roberto Corazza 2007, The Effect of Oral α-Galactosidase on Intestinal Gas Production and Gas-Related Symptoms, Digestive Diseases and Sciences 52: 78–83.

Beano on Wikipedia: https://en.wikipedia.org/wiki/Beano_(dietary_supplement)

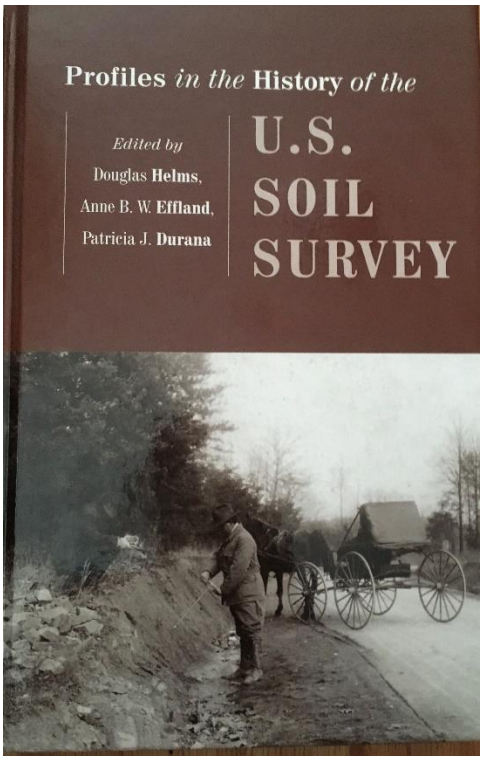
J. Douglas Helms (1945-2018): A guiding light in the history of soil science community

Edward R. Landa, Department of Environmental Science and Technology, H.J. Patterson Hall,
University of Maryland, College Park, MD 20742, erlanda@umd.edu

The life and legacy of U.S. Department of Agriculture (USDA) / Natural Resources and Conservation Service (NRCS) historian Doug Helms, who passed away in September 2018, has been celebrated and memorialized within the agricultural history community. But Doug also rubbed elbows with, and ably offered support to, the soil scientist community in general. That presence, and outstretched hand of help, was particularly appreciated by the soil science practitioners who joined him in delving into the fascinating history of our field.

The use of archival materials, the concept of historical context, and other fundamentals of historical research and scholarship are typically uncharted territory for most of us. But Doug was always available with invaluable tips, contacts, etc.

Doug was the go-to guy.



He knew the USDA collections at the National Archives and the USDA National Agricultural Library like the back of his hand. His book (with USDA colleagues Anne Effland and Patricia Durana, image of cover shown here) on the history of the U.S. Soil Survey remains as a living legacy (Helms et al. 2002), and has been a springboard for much of the recent historical work by American soil science practitioners.

Additionally, and indeed sometimes monthly, his historical contributions to the NRCS Soils Planners have enriched all of our lives (Levin et al. 2010).

In life, we tend to seek out the unique—in people, places, food, teams, leaders, and thoughts. This is especially true in times of physical and intellectual challenge.

We bake sourdough, not white bread. Doug was sourdough with a side of grits—a truly unique, Southern gentleman.

I visited his office, overlooking Independence Avenue in Washington DC, just one time. The volume of paper, and Doug's ability to sort through it and come up with gems, was simply amazing.

On another occasion, I ran into Doug at the USDA National Agricultural Library in Beltsville, Maryland — a must-see on any trip to the Washington DC metropolitan area. He was researching the history of the use of aerial photography in soil survey. Doug explained the pioneering work of Tom Bushnell of Purdue University—it was a vivid image that stuck with me, and later clicked, when I was doing my own work on Bushnell's contemporary on the Indiana soil survey, William Edgar Tharp of the USDA Bureau of Soils (Landa 2010).

Colleague, teacher, guide, friend …

Historian Sam Walker said of Doug:

Doug Helms and I shared an interest in agricultural history, and specifically on career of Henry A. Wallace. He was a superb practitioner of the craft of history, as even a passing glance at his collected writings, published in 2012, reveals. Of somewhat less importance, except on game day, he was also my teammate and a stalwart member, despite a gimpy knee, of our championship softball squad.

Pedologist Eric Brevik noted:

I first met Doug at the 2001 Soil Science Society of America (SSSA) meetings. I was a young scientist just really getting started, but I had published a historical paper on George Nelson Coffey. Coffey, like Doug, was a North Carolina native. I know it was soil history in general, and not just because Coffey was from North Carolina, but Doug was very excited about the paper and encouraged me to continue working on soil science history. A presentation he gave at SSSA led to a later paper of mine, exploring how two geologists, Collier Cobb and Alan Hole, mentored many of the early US soil surveyors. Doug was very helpful and encouraging as I sought information on that project. That was Doug, and so many of us benefitted from his knowledge and willingness to help and encourage anyone seeking to understand the history of soil science.

For biographical details on Doug, and remembrances from the agricultural history community, please see:

{**1**} https://networks.h-net.org/node/16806/discussions/2733668/remembering-douglas-helms

Remembering Douglas Helms

Discussion published by Mark Hersey on Thursday, October 11, 2018

John Douglas Helms, PhD, expert on the history of United States agriculture and resource conservation, died on September 5, 2018. After earning a Doctorate in American history from Florida State University in 1977, he became the Historian of the Natural Resources Conservation Service (then called the Soil Conservation Service), part of the Department of Agriculture. His work for the government built upon his dissertation, which examined efforts to eradicate the boll weevil in the South. More than a historian of government policy, he wrote about how the personalities of scientists and bureaucrats shaped their missions—whether to help poor farmers in the South or to protect the environment. He introduced readers to two leaders in America's tradition of environmental protection: Hugh Hammond Bennett and Walter Lowdermilk. Like Helms, both came from North Carolina. Bennett led Federal efforts to help farmers fight soil erosion; Lowdermilk inspired conservation efforts by writing about the plight of farmers around the world. Helms tacked a wide variety of other topics, including how women and African-Americans struggled to obtain services from the Federal Government. He also brought together scholars for edited volumes including The History of Agriculture and the Environment and The History of Soil and Water Conservation (both published by the Agricultural History Society). His thoroughly researched and clearly written books and articles will help scholars and the public for years to come.

Steven Phillips

Professor, History Department

Towson University

{**2**} Effland, A. (2019) In Memoriam: J. Douglas Helms, June 29, 1945 - September 5, 2018. *Agricultural History*, v. 93 (no. 1; Winter 2019) 173-178. stable URL: https://www.jstor.org/stable/10.3098/ah.2019.093.1.173

References

Helms, D., A. B. W. Effland, and P. J. Durana. 2002. Profiles in the history of the U.S. Soil Survey. Iowa State Press, Ames. Iowa.

Landa, E. R. 2010. The ties that bind: Soil surveyor William Edgar Tharp and oceanographic cartographer Marie Tharp. Physics and Chemistry of the Earth, v. 35, p. 868-880 {in special issue *Studies from the History of Soil Science and Geology*, E. R. Landa and B. R. Cohen, eds.}.

Levin, M. J., S. Stalcup, J. D. Helms, P. Reich, H. Eswaran, C. Olson, and B. Gresh. 2010. 2010 soils planner: development of the US soil survey. 19th World Congress of Soil Science, *Soil Solutions for a Changing World*, August 1-6, 2010, Brisbane, Australia {published on DVD}.

Dana Rushovich, M.S Environmental Science and Technology, Graduation Announcement

Concentration: Soil and Watershed Science

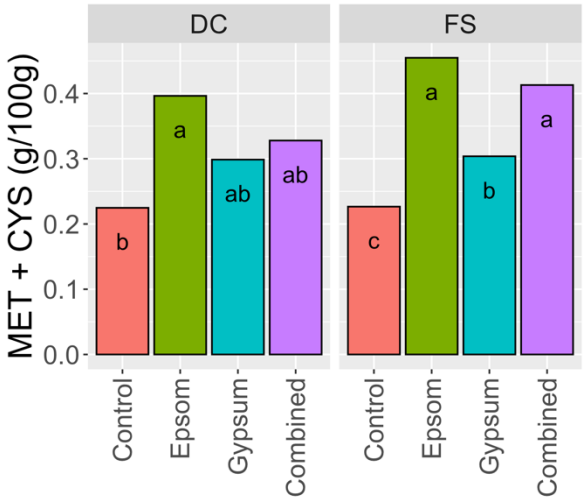
Thesis Title: *Sulfur Management to Enhance Yield and Protein Quality of Grain Legumes*

Advisor: Dr. Ray Weil

Project Goals:

1. Evaluate the effect of applied S on the yield, seed S content, and seed methionine and cysteine content of soybeans (*Glycine Max*)
2. Evaluate the effect of applied S on the yield, seed S content, and seed methionine and cysteine content of common dry beans (*Phaseolus Vulgaris*)
3. Evaluate the effectiveness of four soil extractions at predicting crop response to S

Effect of Sulfur on Seed Methionine and Cysteine Concentration



Main Conclusions:

- **Yields-**On S deficient fields yields were increased by about 15-20%
- **Amino Acids-** S application almost doubled the MET + CYS concentration of soybean samples
- **Soil Tests-** Calcium Phosphate extractions were better able to correctly identify responsive or unresponsive sites than Mehlich3 or Calcium Chloride
- **Depth of Sampling-** Including the subsoil did not improve the ability of the soil test to correctly identify the sites as responsive or unresponsive
- --With column heading in graph, DC stands for double cropping soybeans, FS for full season soybeans.

Editors' Comments: Thanks Dana for this informative summary of your M.S. Thesis.

Days Gone By…

Soil scientists and others gathered for picture above for the transplanting of the First Living U.S. National Christmas Tree on Oct. 11, 1973, Individuals identified (correctly??) in the picture by Del Fanning on June 20, 2020 are from left, Si Weaver, UM Botany professor, Fred Miller, Del Fanning with hat, poorly visible, Carl Robinette, Jim Patterson, John Sencindiver, John Foss, in rear poorly visible behind Foss (unknown), by tree, head only visible, possibly Ed Strickling, in front with blue jacket and stripped necktie -- unknown, part of head only – Richard Merriweather Smith, front with brown jacket – Bob Shields MD state soil scientist, next – probably John Witty, probably Al Froelich of USGS, rightmost person – John Hack USGS.

Del's story below in bold print is of his memory of this day when the first living National Christmas Tree was transplanted into the soil on the Ellipse outside of the fence surrounding the White House on October 11, 1973 (thanks to Wikipedia for supplying this date) when Richard M. Nixon was President of the U.S.

This event happened at a time that a field review was taking place of the on-going DC soil survey that was taking place at the time. Apparently we had Dr. Richard Merriweather Smith and John Sencindiver, who was at the time working on his Ph.D. dissertation, with us from West Virginia University. We at UM were interested in developing special classes in *Soil Taxonomy* for soils in human-deposited soil materials, they were proposing a Spolents suborder for soils in mine spoils. We were proposing Urbents and Garbents (for sanitary landfill soils) etc. We at UM, were working closely with Jim Patterson and others of the National Park Service at the time and we had USGS geomorphologists Al Froelich and John Hack working with us on the DC survey. Some of us were involved, on a previous day, in describing and sampling the profile of the soil exposed in the pit into which the tree was to be planted. Some of us, from examining the root ball of the tree, thought that it was probably from a soil (maybe Morris soil series) with a fragipans, from northeastern PA. The height of the ceremony took place at noon on October 11 and we had the opportunity to have our picture taken by the tree before the transplanting took place. As scheduled, the U.S. Secretary of the Interior, Rogers Morton, was the main speaker to make comments to those gathered for the event, before the tree was to be lowered into the ground. After his speech was delivered, it was time to plant the tree.

Whoever the Master of Ceremonies was, called out
"Lower the tree", but after a couple of minutes, nothing happened, he called again
"Lower the tree", but still nothing happened, so still another call,
"Lower the tree", this time a call came back, "We can't", "Why", "The truck driver went to lunch".

So it happened that the tree never got planted as part of the ceremony that day. It was announced or otherwise let to be known that the ceremony was over and that the actual planting would take place later in the day. It was demonstrated that a really important person this day was the unidentified truck driver, an essential worker.

I, Del, have shown the slide of this picture, and told this story several different times to classes at the University and to others over the years. Now it finally appears in print. As a Wikipedia story of the National Christmas Tree tells, it has been very difficult to get a transplanted National Christmas tree to keep living after it has been transplanted. The trees have died and had to be replaced. Unless the fifth one, transplanted in 2012, has died since it was transplanted (the Wikipedia story has not been updated since 2015) the U.S. is presently on its fifth living national Christmas tree at the site where the first living tree was transplanted in 1973.

Soil scientists, (Del was involved) described the soil profile of the soil pit made for the transplanting of the tree. The description of that soil may be found in the Soil Survey of District of Columbia (Smith, 1976, page 74, Profile S73-DC-1-4. Lab data appear on pages 89 and 91). The profile contained ashes that we speculated might have been from the burning of the White House during the War of 1812 by the British following the Battle of Bladensburg. The following was copied from the Web regarding that burning.

> On August 24, 1814, during the War of 1812 between the United States and England, British troops enter Washington, D.C. and burn the White House in retaliation for the American attack on the city of York in Ontario, Canada, in June 1813.

The British won the Battle of Bladensburg and went into Washington that day and did other destruction beyond the burning of the White House. Later that year the Americans won the War and Francis Scott Key wrote the words to the Star Spangled Banner during the Battle of Baltimore.

Reference

Smith, H. 1976. Soil survey of District of Columbia. U.S. Dept. Agric., Soil Conservation Service, in cooperation with U.S. Dept. Interior National Park Service, U.S. Government Printing Office, Washington, DC.

Readers: Go to next page for last article in this issue.

HORIZONATE THAT PROFILE.

The picture below of a soil, note that it qualifies as soil if we define soil as something that supports the growth of higher plants out-of-doors, plants here perhaps of the same species of plants that constitutes the soil, was published in the previous issue of *Pedologue* and readers were challenged to submit suggested names of the horizons of the soil, which occurred on the lawn on the west side of H. J. Patterson Hall on the UM campus. We got only two responses from readers that are published below the picture.

"Haylic baleosol" from Brian Scott, UMD PhD student

"^Oi1, ^Oi2, 2M horizonation" from Jaclyn Fiola, Virginia Tech PhD student

Editors recognize Jaclyn's answer as best, she suggested good horizon names. Brian suggests a new class, apparently for *Soil Taxonomy*. We don't think a new class is needed. The soil is a *Histosol, Fibrists* suborder. If you disagree, we will be happy to publish your letter to the editor in the next issue!

CHECK OUT THE MAPSS WEBSITE: http://www.midatlanticsoilscientists.org/