

The Clay Minerals Society

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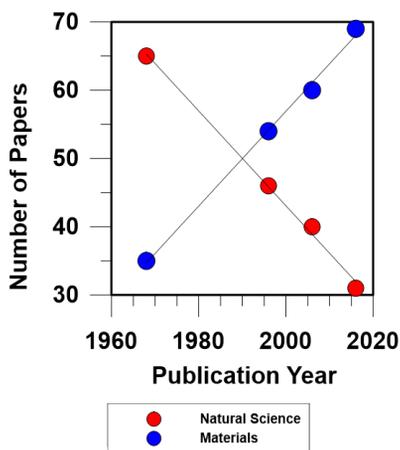
THE PRESIDENT'S CORNER



Douglas K. McCarty

The 54th Annual Clay Meeting was held 2–8 June 2017 in Edmonton (Alberta, Canada), at the close of which I began my turn as the 57th Society President for the traditional one-year term. My predecessor, Professor Jan Środoń, from the Polish Academy of Science, could not have said it better in his most recent President's Corner: "The annual conference is the very essence of The Clay Minerals Society [CMS] activity and is its principal goal. Without exaggeration, we may say that the society exists to organize conferences for its members."

In addition to periodic publications in the society's journal, *Clays and Clay Minerals*, over the years there have been a number of published peer-reviewed proceedings from annual meetings that record technical developments in interpretive analytical methods and significant scholarly research contributions in the broad categories of natural, applied, and materials science. We can lump all of these into the term 'clay science'. There is an interesting trend to note, however, about the changing sectors where clay science publications are concerned. In his presidential address at the Edmonton meeting, Professor Środoń presented research he had conducted on papers published in 'clay science' in the journals *Applied Clay Science*, *Clay Minerals*, and *Clays and Clay Minerals* over the last 50 years, from the 'natural' and 'materials science' sectors. There is a perfectly linear inverse correlation as shown on the graph below:



The increase in the number of papers published in the 'materials science' sector has been mirrored by an equal decrease in the number from the 'natural science' sector. A recent count suggests that the number of materials science papers is more than double that from the natural science sector. Is this something clay scientists and society members should be concerned about? In my opinion, it depends.

The importance and social relevance of clay mineralogy and clay science cannot be

overstated. Clay mineral surfaces are the most reactive mineral surfaces in the geosphere and contribute, almost exclusively, to bulk-rock specific surface area (Środoń and McCarty, 2008). Illite and illite-smectite are major constituents of mudstone, making up ~40%, and they form at least 10% of other sedimentary rock types (Środoń 2009). Shales and mudstones make up to 70% of Earth's sedimentary record (Garrels and Mackenzie 1971). A rigorous understanding of the structural and compositional relationships of the wide variety of clay species, especially mixed-layered types, is absolutely critical for understanding near-surface processes, including those in the 'critical zone', conventional soil science, environmental remediation, and hydrocarbon exploration and development. Geological hazards from swelling clays cause more economic loss than earthquakes, floods, and volcanos combined. Those who study the fundamental structure and composition of clay minerals – factors that control the clay's physical properties – are still hugely important in terms of the future of our science. In addition, clays are a major material in industrial manufacturing and value-added

products, such as food additives, cosmetics, cat litter, drilling fluids, catalysts, and many more. And no wonder! Clay particles are often at the nanometer-scale, with large basal surface to edge aspect ratios, large specific surface areas, and large cation exchange capacities. Clay science continues to serve an enormously important role in the broader science horizon and should be taken into consideration in large-scale research projects where clays are encountered.

The field of clay mineralogy is actually a subdivision of clay science. Rigorous methods of teaching clay mineralogy include education in systematic categories of the various clay species, methods of sample preparation, data collection by X-ray diffraction (structure), and supporting spectroscopic methods (composition). Modern methods of analysis, including computer simulation of diffraction data, are generally taught in the natural science sector in geology departments in US universities. The top professors in such departments don't last forever. They retire, they die, or they may change disciplines. But universities do not seem to replace such clay mineralogists. Do the authors in the materials science sector have appropriate levels of fundamental clay science education? I suspect many are self-taught in this respect. If not, and self-teaching becomes what must be done to complete materials science goals and projects, is there enough access to quality references, guidelines, and 'how-to' modules so that the materials scientists can be sure they are using the most modern and effective methods? Probably not.

In addition to the resources already offered by The Clay Minerals Society, there is a website created by Professor Dave Mogk of Montana State University (http://serc.carleton.edu/NAGTWorkshops/mineralogy/clay_mineralogy.html). Dave works in high-temperature granulite metamorphism mineralogy/petrology and says that he lacks a formal education in systematic clay mineralogy but recognizes the extreme importance of the field. Dave worked to create the aforementioned website where students and other scientists can find systematic information on how to deal with characterization and understanding of the materials themselves and the analytical methods that are needed to determine accurate structure and compositional relationships in clay-bearing materials. Dave and the host organization of the National Association of Geological Teachers (NAGT) welcome input from any and all knowledgeable clay scientists on how to improve this site with the most relevant information. In particular, we would like to see a 'How-To' best practices section that systematically takes the reader through sample preparation, data collection, and analysis and that can be a repository of relevant references. My hope is that The Clay Minerals Society can partner with NAGT and other professional societies who have a vested interest in the field and in doing this right. Please contact me (mccardog@gmail.com) or Mary Gray at The Clay Minerals Society office (cms@clays.org) with any suggestions. Let's make sure that up-to-date resources are available and easy to find for this important field of science.

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REFERENCES

- Garrels RM Mackenzie FT (1971) *Evolution of Sedimentary Rocks*. WW Norton & Co, New York, 397 pp.
- Środoń J, McCarty DK (2008) Surface area and layer charge of smectite from CEC and EGME/ H₂O retention measurements. *Clays and Clay Minerals* 56: 155-174.
- Środoń J. (2009) Quantification of illite and smectite and their layer charges in sandstones and shales from shallow burial depth. *Clay Minerals* 44: 421-434.

NOTE Please find a detailed report about the 54th Annual Clay Minerals Society Conference that was held in conjunction with the Oil Sands Clay Conference on 5–8 June 2017 in Edmonton, Alberta in the Meeting Report section of this issue.