Development and application of "non-CHON" isotopes for earth surface studies: The geochemical legacy of Tom Bullen

THOMAS M. JOHNSON[1]

[1]Dept. of Geology, University of Illinois at Urbana-Champaign; tmjohnsn@illinois.edu

Thomas Darwin Bullen provided many creative and seminal contributions to geochemistry and collaborated with a dizzying array of scientists around the world. He was an early pioneer in developing novel isotope methods for elements other than the traditional C, H, O, N and S group and applying them to enhance studies of groundwater sources and flow, critical zones processes, contaminant sourcing and fate, and a range of other phenomena. He was extraordinarily generous with his time, ideas, and instrumentation, and unselfishly contributed to the careers of many scientists. His scientific contributions span from important foundations in basic research to practical applications related to specific water resource questions.

After more than 20 years of work on the non-CHONS, the geochemical community is closing out the "gold rush" phase of initial studies across the entire periodic table. Measurement methods are in place and we have initial surveys of isotopic systematics for most elements. Application of these new tools has been successful in many cases, but nature is complex, and only rarely do the isotopes provide "magic bullet" answers to our questions.

Focusing on Se and Cr isotope work started by the "Tom-Tom club," and studies of other redox-active elements, this talk will summarize the current state of science with these isotopic approaches, provide a view of their unique strengths, identify some gaps in our understanding of them, and assess how well they are serving the scientific community and the broader society.