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Predictions of Stable Cu Isotope Partitioning in Biological Systems ALEXANDER TENNANT, MICHAEL WIESER, University of Calgary — Copper (Cu) is a essential trace metal in biological systems, and has been implicated in many neurodegenerative diseases. The exact cause, and the role of Cu, in many of these diseases remains unclear, and are currently the subjects of extensive study. Often overlooked, is that there exist two stable isotopes of Cu, ^{63}Cu and ^{65}Cu, meaning the stable isotope analysis of Cu in these systems has the potential to reveal unique insights regarding processes involved in Cu transport and retention. We present the first results of a study characterizing predictions from density functional theory of the scale of potential isotope effects resultant from interactions between select Cu binding sites of important proteins related to Cu transport and and disease. This study will help establish the potential range and extent of stable Cu isotopic variations as a result of interactions between complex biomolecules from a perspective seldom explored for transition metals. Using these results, it may also be possible to establish and distinguish the Cu isotopic signature of individual proteins and processes. Information such as this may prove invaluable in determining Cu sources and processes related to biologic function and disease.

Alexander Tennant
University of Calgary

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