

SYMPOSIUM IN MEMORIAM. ARTHUR C. AUFDERHEIDE
THE SCIENTIST, THE FRIEND (1922-2013)

“ART” AUFDERHEIDE: REMEMBERING A FRIEND, A SUPERB MENTOR AND SCHOLAR

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Abstract. This presentation honors Arthur Aufderheide (1922-2013), or “Art,” as he liked to be called. He was a full Professor at the University of Minnesota, Medical School for 31 years. His many contributions can be summarized in two lines of research: (a) soft and hard tissue mummy pathology and (b) biochemical analysis on prehistoric bodies. He found ancient Andean populations that had suffered from pneumonia and tuberculosis. His isotopic dietary reconstructions revealed that prehistoric populations of South America

relied heavily on maritime resources, supplemented with wild plants and land mammals. His research was synthesized in more than 100 articles and several books. Two of his most cited works were published in the PNAS journal “Identification of Mycobacterium tuberculosis DNA in a pre-Columbian Peruvian mummy,” 1994 and “A 9,000-year record of Chagas’ Disease,” 2003. Finally, he was the founding father of the World Congress on Mummy Studies. His commitment has certainly flourished.

Keywords. Paleopathology pioneer. Andean mummies. Mummy Congress.

I met Arthur Aufderheide (“Art”) in Arica, Chile during the 80’s at the Tarapacá University, San Miguel de Azapa Archaeology Museum. Back then he was invited by my former mentor Marvin Allison to engage in Paleopathology research collaboration. Art was a brilliant scholar and a down to earth type of person. As a pa-

leopathologist he carried out important investigations in many countries. Thus, in these lines I would like to highlight a few aspects of his life and particularly his scientific contributions to northern Chile bioarchaeology.

THE MAN BEHIND THE MUMMY

Arthur Aufderheide was an Emeritus Professor of the University of Minnesota, Duluth, and Director of the Paleobiology Laboratory of his University. He was born in New Ulm, Minnesota, United States, on September 9, 1922, and passed away in Duluth, Minnesota on August 9, 2013, at age 90. He studied medicine, graduating from the University of Minnesota, where he later remained as a professor at the Medical School, between 1978 and 2009.

His wife Mary was central to his research and life. Arthur was a very caring person and easy to get along with. I remembered an anecdote from when he invited me to visit him in Duluth, Minnesota. I stayed in a small cabin at Lake Superior, a few steps from an amazing frozen lake. That first day, when he came to pick me up, we were driving along the road, then he suddenly stopped at the edge of the lake. "What happened?" I asked worriedly, "This is more important," he replied... pointing to the lake as the golden rays mingling within the thick ice. We stopped to see a mesmerizing sunrise for a few minutes! I thanked him for the marvelous view and he answered, "you betcha!" His favorite slang. In spite of his hectic life, he will always manage to enjoy the simple things in life. He was a generous person and live a simple life.

THE MENTOR

He was a dedicated scholar and a superb mentor. One of the first things about him that called my attention was the time he dedicated to answering any questions you asked him. He would stop whatever work he was doing, sit down with you, and go step by step dissecting your question(s) while providing detailed answers. He would write in caps all the explanations and at the end of it hand a paper to you. He had much empathy, fantastic synthesis capability, and took great care to teach in any situation, be it a classroom, fieldwork, or at a conference. I remembered, decades ago, when I was a graduate student attending a Paleopathology Meeting where Art delivered a fantastic paper on Lead Contact and Poisoning in Barbados Slaves. I said to his beloved wife Mary who always accompanied him,

"He is a great lecturer" She answered me, "Every year Art is elected as the best professor of his Department... as long as he is teaching the other professors do not stand a chance!" He was a superb mentor, indeed.

THE RESEARCHER

His intellectual curiosity took him to Chile in 1983, when he visited Arica as part of a scientific tourism program organized by Marvin Allison. It was during this trip Art discovered the field of paleopathology, he was completely hooked (Standen *et al.* 2014). He began to systematically study mummies worldwide, applying his medical, molecular biology, and chemistry backgrounds among other techniques. He was interested in tracing the natural history of ancient diseases and human interplay.

He conducted seminal bio-anthropological research that contributed to a better understanding of which diseases affected Andean pre-Hispanic populations, particularly in northern Chile and southern Peru. He wrote more than 100 papers published in some highly rated journals. In addition, he wrote several books such as: *"The Cambridge Encyclopedia of Human Paleopathology"* (Cambridge University Press, 1998), with Conrado Rodríguez-Martín, a superb source of the history of diseases and paleopathology where he summarized his international research. He also wrote, *"The Scientific Study of Mummies"* (Cambridge University Press, 2003), a book that shows all the potential of interdisciplinary mummy research.

The exceptional preservation of Arica mummies, thanks to the arid environment of the Atacama Desert allowed Art to gain a deep insight into the health conditions of the ancient Andean past. Mummies were a library of knowledge waiting to be read. He then systematically applied epidemiological and hi-tech lab techniques to study these mummy collections to shed light on the diseases that affected ancient Andean populations. As a paleopathologist, he tackled the mysteries of ancient deaths, just as a modern coroner might try to determine the cause of a fatality today.

In the following lines, I highlight a few of his vast contributions to Andean paleopathology. He was a pioneer in applying archaeometric studies in diet reconstruction. These results were reflected in an edited volume publication focusing on the first populations that settled in northern Chile (*Acha-2 and the Origins of the Human Population of Arica* (Muñoz, Arriaza and Aufderheide, 1993). This site was dated 7000 years B.C. and corresponds to one of the earliest bioarchaeological

evidence along the South Central Andes, along the Pacific coast, containing skeletal and mummified human remains. Through the study of isotopes proportions of ^{13}C : ^{12}C , ^{15}N : ^{14}N , ^{34}S : ^{32}S , ^{87}Sr : ^{86}Sr , he reconstructed the diet of these ancient populations. He found that the Acha people had a diet composed basically of marine resources (fish, mollusks, and marine mammals), supplemented with minor consumption of plants and land mammals. In addition, he also carried out several isotope studies on northern Chile's populations showing the importance that coastal resources had in antiquity. These studies were published in the prestigious Journal of Physical Anthropology (Aufderheide *et al.* 1993; Aufderheide *et al.* 1994). His archaeometric work laid the foundations for posterior isotopic analyses in the region. He always encouraged scientific collaboration and publications of mummy findings.

In addition to dietary analyses, he was a pioneer in testing ancient drug consumption on ancient hair threads. Hair is like a library that contains daily information about past events. Together with Larry Cartmell and collaborators, they applied radioimmunoassay techniques to mummy hair, detecting the presence of benzoylecgonine metabolites of coca leaves (*Erythroxylum* spp.), (Cartmell *et al.* 1991). Continuous consumption of coca leaves left a chemical signal in the hair of the pre-Hispanic mummies of northern Chile. As such, Art and his team scientifically demonstrated that in this region the coca leaf consumption began in the Formative period (ca. 1000 B.C.) and was common in later agro pastoral populations. Therefore, they did not find evidence of coca leaf consumption in archaic Chinchorro fishing populations.

Undoubtedly one of his most relevant works was on the presence of infectious diseases in Antiquity. The biocultural history of the *Trypanosoma cruzi* parasite published in PNAS stands out. It is probably one of his most cited works. Here Art and collaborators, debated the 9,000 years of Chagas disease and its evolutionary history in South (Aufderheide *et al.* 2004).

In addition to the previous study utilizing histological and molecular biological techniques, he and his collaborators determined the presence of *Mycobacterium tuberculosis* and pneumonia in Andean antiquity (Arriaza *et al.* 1995; Aufderheide, Wittmers, and Arriaza 2008).

In summary, thanks to the pioneer studies of Arthur Aufderheide and Marvin Allison, among other researchers, we now know that ancient Americans suffered from various infectious and parasitic diseases before the arrival of the Spaniards. Art's interdisciplinary work significantly complemented bioarchaeological studies,



Fig. 1. Top row: Carlos García and Conrado Rodríguez; Bottom row: Arthur Aufderheide and Bernardo Arriaza. *International Mummy Symposium*. University of Innsbruck. Austria. September 15-17, 1993.

allowing a better understanding of how ancient disease affected the quality of life of ancient Andean people that settled along the Atacama Desert. His systematic work is an excellent approach to understand that the American continent was not free of diseases and that ancient health conditions varied according to geography, cultural practices, and time. Finally, Arthur Aufderheide's legacy lives on as his initiative to create *The World Congress on Mummy Studies*, gathering people all over the World to share scientific collaboration is growing (Fig. 1). His commitment has certainly flourished.

Art is the main reason we are all part of this international meeting. I feel honored to have had known him and have him as a mentor.

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