Environmental Science and Ecotechnology 18 (2024) 100331

Contents lists available at ScienceDirect

Environmental Science and Ecotechnology

journal homepage: www.journals.elsevier.com/environmental-science-and-ecotechnology/

Memorial

In memory of Robie W. Macdonald (1948–2022): A scientist and a friend

Robie W. Macdonald (right) and Yi-Fan Li at Rob's home on August 26, 2017, after the 37th annual International Symposium on Halogenated Persistent Organic Pollutants (POPs) (Dioxin 2017) held in Vancouver, Canada.

On February 17, 2022, I received an email from Julie Henderson, the life partner of Robie W. Macdonald. In her email, she conveyed the following message: "Hello Yifan, Rob asked me to especially let you know that when he had passed. He admired and enjoyed working with you." As I read those words, tears welled up in my eyes, overwhelmed by profound sadness. Rob was not only my scientific research colleague but also my closest friend. We had collaborated for more than two decades.

Rob was a distinguished research scientist affiliated with the Department of Fisheries and Ocean (DFO) of Canada. Even after his retirement in 2014, he contributed as an emeritus scientist with DFO and an adjunct professor at the University of Manitoba. Rob was an esteemed ocean geochemist specializing in studying aquatic pathways. His research primarily focused on the cycles of organic carbon, freshwater, and anthropogenic contaminants, particularly emphasizing how these processes were influenced by climate variability and change. His expertise extended to various regions, including the Eastern Pacific, the Arctic Ocean, adjoining seas, and the rivers and lakes of western and northern Canada.

Throughout his outstanding career spanning over 40 years, Rob authored or co-authored more than 260 papers in highly rated peer-reviewed journals, over 40 book chapters, numerous reports, and co-edited a comprehensive textbook titled “The Organic Carbon Cycle of the Arctic Ocean”. Rob was widely recognized as a leading expert and academic teacher in Arctic research. His contributions extended beyond academia, as he held significant roles, such as a three-year appointment to the US Polar Research Board, membership on the International Polar Year (IPY) Canadian National Committee, and co-chair of the Canadian IPY Science Review Panel for Climate and Adaptation. He also served as the Canadian Expert for the Arctic Monitoring and Assessment Programme (AMAP) for many years and contributed significantly to seven AMAP Assessment Reports.

Throughout his extraordinary career as an ocean scientist, Rob received numerous prestigious awards and accolades, a testament to his exceptional contributions to the field. His peers recognized his outstanding work with rewards and medals, such as the Miroslaw Romanowski Medal of the Royal Society of Canada in 2005, the Royal Canadian Geographical Society Gold Medal in 2010, the Northern Science Award and Centenary Medal of the Canadian Polar Commission in 2014, and the Polar Medal in 2016. These accolades celebrated his remarkable achievements and underscored

https://doi.org/10.1016/j.ese.2023.100331
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his significant impact on the scientific community. In addition to the well-earned rewards, Rob was honored with esteemed fellowships. He became a Fellow of the Chemical Institute of Canada in 1989, a Fellow of the Royal Society of Canada in 2004, a Fellow International of The Explorers Club in 2007, a Fellow of the American Geophysical Union in 2010, and a Fellow of the Royal Canadian Geographical Society in 2013. His numerous accolades (rewards and fellowships) are an impressive testimony of his exceptional contributions to his respective fields and demonstrate the high regard he held by his colleagues. In 2021, Rob received the Order of Canada, the highest recognition bestowed by the country. This prestigious honor served as a culmination of his lifelong dedication to advancing our understanding of the world's oceans and highlighted the profound impact he had made throughout his career.

Despite his numerous accomplishments, Rob remained a remarkably humble and supportive person. He continued to mentor and inspire others, generously sharing his expertise and contributing to the collective knowledge of the world's oceans. His unwavering commitment to scientific exploration and his selfless dedication to the advancement of ocean science will continue to inspire future scientists.

The shared passion for environmental research forged a close friendship between us, and whenever I encountered challenges in my studies, he was always there to offer his assistance. Our journey began with the study of two isomers of the organochlorine pesticide hexachlorocyclohexane (HCH), one of the persistent organic pollutants (POPs). The research with two of us as the main players had, for the first time, showing that while the atmosphere may be a preferred pathway for the long-range transport of most POPs, there are certain others (e.g., β-HCH) for which the ocean currents are the major vehicle for long-range transport [1]. Our research suggested that these two HCH isomers provided a compelling illustration of how hemispheric-scale solvent-switching processes rule pollutant partitions. Our research revealed air−water partitioning control processes and the transport pathway for HCH isomers entering the Arctic. Moreover, we jointly explored how the various pathways impact spatial and temporal trends of HCH residues in arctic animals feeding out of marine and terrestrial food webs [2]. This research endeavor spanned an extensive period of 20 years. In 2022, just before his passing, we continued our work with my team members on these two isomers using a modified model, leading to a paper featured in this special issue [3]. The findings of our study revealed intriguing differences in environmental fate between β-HCH and α-HCH, despite their nearly identical temporal and spatial primary emission patterns. These chemical "twins" exhibited distinctly different major pathways for entering the Arctic. β-HCH, with its considerably higher propensity for partitioning into the water, primarily due to its significantly lower Henry's Law Constant than α-HCH, displayed a pronounced preference for slow transport in the water while α-HCH favored rapid transport in air. This divergence in transport pathways highlighted the unique characteristics of each isomer [3]. The work on α-HCH and β-HCH was considered by Rob to be one of his favorite studies. Additionally, Rob made substantial contributions to the steady particle/gas partition theory for semi-volatile organic compounds (SVOCs), as evidenced by his co-authorship in several publications [3−16].

Despite bravely battling a terminal illness for an extended period, Rob's unwavering commitment to his research remained undiminished until the very end. Throughout the three years leading up to his passing, he demonstrated remarkable dedication by co-authoring 13 papers alongside us [3−15]. His involvement in the early stages of this Special Issue was instrumental, as he co-authored two papers [3,15] that are part of this distinguished collection.

On January 6, 2022, Rob conveyed his deep appreciation for our collaborative journey spanning two decades. He acknowledged the passage of time, expressing a mixture of astonishment and nostalgia, remarking, “Hard to believe it is over two decades past. But, Yi-Fan, I'm sorry to say that I've reached the end of my science trail. I'm at a palliative stage. Thanks for your collaborations - they've been fun.” Although I held onto hope for his recovery, fate dealt a different hand. Rob's prophetic words, unfortunately, came to fruition, and 42 days later, he peacefully and gracefully bid farewell, leaving behind a profound legacy of scientific research that he cherished deeply.

Rob's unwavering dedication, enjoyment of research until the end, and significant contributions to our collaborative efforts will forever be remembered. His passing has left a void, but his scientific endeavors and the knowledge he imparted will continue to inspire and influence the scientific community. We remain grateful for the privilege of having known and worked alongside him, and we honor his memory by carrying forward the torch of scientific exploration that he held so dear.

Reflecting on Rob's life and legacy, we are reminded of the importance of pursuing our passions and living our lives to the fullest. His example reminds us that we should never give up on our dreams, no matter how challenging they seem. Rob's life is a testament to the power of determination, courage, and resilience, and his memory will continue to inspire us all.

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