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BOOK REVIEW

Samantha Muka, *Oceans under Glass: Tank Craft and the Sciences of the Sea*

Chicago: University of Chicago Press, 2023. Pp. 240. ISBN 978-0-226-82413-0. $35.00 (cloth).

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Samantha Muka's *Oceans under Glass* examines aquaria, those man-made glass boxes, to uncover how people share and create knowledge about the ocean. It is Muka's first book and the first publication of the Oceans in Depth series from the University of Chicago Press. Aimed at historians of science and technology as well as scholars concerned with ocean history in general, this book examines how people conceive of the ocean, and the life within it, through studies in aquaria. Muka focuses on tanks, so often obscured by their own transparency, and reveals how tanks are both the interface for how we view, measure and sustain the ocean, and a place where humans create idealized simulations of marine spaces. Broad-reaching and thoroughly researched, *Oceans under Glass* is framed around tanks. Each of the five chapters begins with an ethnographic story before delving into the longer history of the development of ideas and processes for each tank type, which Muka calls 'tank craft'. Chapter 1 provides historical and theoretical context for studying tanks, and we are introduced to the main groups associated with tank craft, which include hobbyists, public aquarists and academic researchers. These groups have in common their interest in tinkering with tank systems to make them work, which in turn leads to a noticeable openness in knowledge sharing among networks. Despite this shared characteristic, Chapters 2 to 5 demonstrate how different each tank community is.

Chapter 2 examines the photographic tank, used to produce taxonomically accurate images of specimens. The historical arc of the photographic tank begins in the mid-1800s and is populated with familiar history-of-science types. French marine scientists such as Louis Boutan and Paul Louis Fabre-Domergue, who worked at marine stations in Arago and Concarneau, made important contributions to underwater photography and the use of a tank as the photographic frame. Americans were also tinkering with tanks: Captain R.W. Shufeldt at the US Fish Commission aquarium and William T. Innes in Philadelphia worked and published on their processes and methods for capturing images of fish in their culturally contingent representative nature. Compelling in its use of archival evidence, this chapter convincingly demonstrates how tanks have long been used to create simulations of nature and how images of the underwater world create our perceptions of what it is.

Chapter 3 is about the kreisel tank, which was developed to house and sustain floating organisms like jellyfish and plankton. Chapter 4 centres the reef tank, the only tank system aimed at housing whole ecosystems, and Chapter 5 investigates the development of breeding tanks. All of these tank systems have different timelines for development,

different actors and institutions, different technological complexities and different preferences for communication and credit. For instance, communication among jellyfish aquarists from the 1960s to the present has relied largely on in-person communication at conferences and meetings, and the aquarists at Ueno Aquarium in Japan taught their techniques to aquarists at the Düsseldorf Aquarium in Germany and at the Monterey Bay Aquarium in California. In contrast, 'reefers', people who kept tanks that housed coral reef microcosms, shared in hobbyist publications like *Tropical Fish Hobbyist*, or published technical manuals like *The Saltwater Aquarium for Marine Invertebrates*. Despite their connection with commercial enterprises, breeding-tank keepers also worked to make their knowledge available through both word of mouth (for example, aquarium and laboratory tours) and academic publications. Through these tank studies, Muka demonstrates the presence of far-reaching networks and of open communication, and how the unique complexities of each tank type produce these styles of knowledge production.

The focus on tank craft draws in many actors who have yet to be included in work on the history of science. Besides broadening the kind of person conceived of as doing ocean science, this focus includes people from around the world, from early modern Chinese goldfish breeders, to contemporary Arkansans in the inland United States, to Japanese public aquarists. As examples of individuals working within larger networks, their brief histories are compelling and demonstrate the importance of tacit knowledge sharing, and the diversity of people contributing to ocean knowledge. Muka introduces Mary Akers, the first person to raise land hermit crabs from eggs to adults, who blogs freely about her processes and sells hermit crab tank features on Etsy. In the chapter on reef systems, Muka highlights Lee Chin Eng, a Chinese Indonesian aquarist, who became the first person to successfully replicate a marine reef ecosystem in a live tank in the 1950s. Muka's tank communities are refreshing additions to the field of ocean science history and reflect wide-ranging participation beyond the typically present scientists from the coastal United States and Western Europe. As the first publication of the Oceans in Depth series, Muka's book stakes an important claim about what constitutes ocean science. In a continuation of work by series editors Helen Rozwadowski and Katharine Anderson, Muka's book highlights the importance of interrogating what constitutes the ocean in ocean science. Oceanographic voyages, the basis of much of the early generation of ocean science history, are absent from this work. The people populating each chapter are men and women, and the majority are not academic scientists. The ocean here is equally the 'out-there ocean', the contents of glass aquaria, and simulations of what people imagine the ocean to be. This makes Muka's book a novel and compelling contribution to the literature and will certainly need to be included on any undergraduate course covering environmental history, the history of biology or ocean history.

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