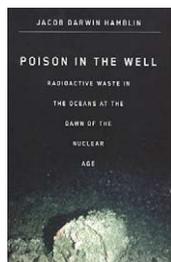


The glowing deep

Poison in the Well: Radioactive Waste in the Oceans at the Dawn of the Nuclear Age by Jacob Darwin Hamblin, Rutgers University Press (2008), 311 pp., \$49.95, ISBN 978-0-8135-4220-1

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It is a commonplace of environmentalism today that pollution, overfishing, coastal development and global warming have brought the world's oceans to the brink of collapse. Red tides, dead zones, the depletion of fish populations and the proliferation of invasive species in coastal waters are all ominous harbingers of coming catastrophe. A Code Blue has been called on the big blue. We now conceptualize the ocean as a fragile patient whose health cannot bear many more insults.

Jacob Darwin Hamblin's new book, *Poison in the Well*, reminds us that it was not always so. In the early Cold War, reputable oceanographers in Western, democratic, nuclear states thought of the bounding main as humankind's sewer – vast, inexhaustible and impassive. Perceived in this way, the ocean was in many ways an ideal site for the disposal of radioactive waste. Beginning in the 1940s, the United States and Britain packaged solid radioactive waste in drums, loaded it onto ships and dumped it into the ocean, believing that the vastness of the world's waters and the isolation of its deeps would protect and dilute the toxic packages.

But things did not always go according to plan. In 1957, the US Coast Guard spotted a rogue drum of radioactive sodium floating less than 320 km from shore. The explosives rigged to sink the canister had failed, and the Navy was obliged to shoot at it until it finally sunk. In the early 1960s, Britain faced its own series of unfortunate incidents. In one, French fishing trawlers near the coast in the Bay of Biscay netted drums of British radioactive refuse along with their daily catch. In another, shoddily constructed containers burst, and parcels of radioactive waste popped to the surface, as the horrified crew of the British ship *Halcience* scurried about to retrieve the toxic packages before they were noticed by nearby Spanish fishing vessels.

Even beyond such fiascos, additional complications loomed. As Hamblin astutely points out, the uncertainties involved in setting threshold values for radioactive waste disposal at sea and the many unknowns about the ocean environment itself opened the door to scientific turf wars and Cold War posturing. The practice of ocean disposal was an opportunity for Western oceanographers to stake their claim on the atom, particularly in the US, and grab some of the scientific authority and funding that went with it. By the

mid-1950s, the US Atomic Energy Commission (AEC) looked like a prime patron for oceanographic research: Eisenhower's Atoms for Peace program gave it a major policy mandate, radioactive waste was a major problem and it badly needed outside authorities to defend itself against critics. But the health physicists within the nuclear establishment, who had until then dominated scientific thought on the biological effects of radiation, took a dim view of the jockeying of oceanographers for funding and scientific cachet, characterizing them as opportunists who used scientific uncertainty as a crowbar to pry open the federal funding chest and in the process call into question AEC policies by pointing to areas that needed further study.

Nonetheless, the oceanographers' star ascended, culminating in the public imagination in the person of Jacques-Yves Cousteau, French oceanographer and popularizer of the deep, whose outspoken opposition to ocean dumping made him the "unofficial leader of the anti-dumping campaign". Yet many leading oceanographers were not against ocean disposal. Although none endorsed indiscriminate dumping of nuclear waste, for obvious reasons, many looked forward to "the happy exploitation of the oceans in the new atomic age." Here as elsewhere, Hamblin admirably resists populating this story with villains and heroes. Instead, he offers us a nuanced, textured look at genuine scientific disagreements, changing conceptions of the ocean environment, shifting professional identities and the troubling practical problem of what to do with nuclear wastes.

Unexpectedly, Western marine scientists had an unwitting ally in their campaign for further research support – the Soviet Union. As the official Soviet line *against* the practice hardened into a "propaganda campaign" by 1960, the US and Britain, as well as other marine disposers, faced a conundrum: how could they defend themselves against accusations of being "poisoners of wells" and masterminds of a "dirty and dangerous business" without giving away state secrets? Ultimately, the NATO countries agreed that the most productive tack was denounce the Soviets' position as propaganda while publicly, even noisily, supporting further scientific research on the ocean environment.

By the early 1970s, however, the atomic establishments had run up against an intransigent and persuasive opponent, the environmental movement. Using powerful imagery to evoke a dying ocean filled with sewage, toxic waste, oil spills and other offal from industrial society, environmental activists fought to end marine dumping. They appeared to win the battle. A series of national and international agreements to halt radioactive waste dump-

ing in the ocean were signed over the next two decades, but in practice, little changed. By the time these agreements were signed, the US had already opted to dispose its radioactive waste underground, so the gesture was almost entirely symbolic. Britain and France, meanwhile, preserved the right to make bulk liquid discharges of radioactive waste in to the sea, a practice less dramatic and headline-grabbing than dumping drums of solid waste well off the coastline, but which in fact accounted for the preponderance of the radioactivity disposed into the seas. The Soviet Union, despite its howls of protest against NATO countries dumping during the height of the Cold War, simply ignored the bans of ocean dumping and continued its own operations until its dissolution.

The realization that the ocean, a delicate and threatened environment, is the final resting place for technological society's most abject waste produces a *frisson* of alarm that gives Hamblin's meticulous history of radioactive waste in

the oceans immediate claim on the reader's imagination as well as powerful contemporary relevance. The book might have capitalized more successfully on the interest it piques had Hamblin woven the Cold War context more thoroughly into his highly focused narrative, giving his reader a stronger sense throughout of how these events fit into broader political, social and scientific developments. But to Hamblin's immense credit, this book is neither an environmental jeremiad, nor an attempt to exculpate the nuclear establishment. This is not, he reminds us, a story of how the good guys finally won. Instead, this history is a complicated intersection of science, politics and activism, where professional agendas, Cold War animosities and environmental concerns alike motivated funding decisions, public policy, and – sometimes – purely symbolic gestures.

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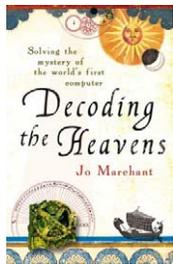
Book Review

Greek gears of time

Decoding the Heavens: Solving the Mystery of the World's First Computer by J. Marchant, Heinemann, 2008. £12.99 ISBN 978 0 434 01835 2

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In 1900, off the shores of Crete, Dimitrios Kontos and his crew on two sponge-fishing vessels discovered the remnants of an ancient shipwreck. Among the impressive statues and furniture was a strange device, made of elaborate gears and etched with inscriptions, nearly indecipherable as the result of centuries of corrosion. Since its discovery, this artifact, now called the Antikythera Mechanism,

has been the subject of intense inquiries into its provenance and functioning. *Decoding the Heavens*, by Jo Marchant, provides a highly readable narrative over these investigations, which have been replete with scholarly obsessions, contentious priority claims, and territorial protectiveness. The book should appeal to a broad popular audience. The diverse cast of characters, comprising ship captains, sponge divers, deep-sea explorers, archeologists, historians of science, museum curators, horologists and entrepreneurs of X-ray technology, amplifies the intrigue of what might be called a positivistic detective story. In addition to crafting the book's entertaining narrative, Marchant is at her best while sating the reader's curiosity by explaining all sorts of tangential matters, such as carbon dating, nitrogen narcosis, bronze production and the relative underwater capabilities of fin-de-siècle sponge

divers and twentieth-century scuba-equipped ichthyologists.

The Antikythera Mechanism is both a remarkable and unique device. It is the only extant geared mechanism that calculated time or astronomical positions from antiquity, although there are textual attestations to others. The most recent studies date the device to around the first century BC and conclude that the device's various dials and gears were designed to calculate the positions of the planets and track the lunar and solar calendars. While no one doubts the complexity and sophistication of this mechanism, because it is the only one of its kind that has survived antiquity and was not discovered until relatively recently, what it signifies about ancient thought and its influence is unclear. Marchant, somewhat problematically, takes the heroic approach.

Marchant uses the term "heroic" explicitly for Derek de Solla Price, one of the protagonists of the book, and the author of an authoritative, but now superseded, study on the Antikythera Mechanism. Heroism, however, could also be considered defining for much of her historical outlook. Accordingly, Marchant seems to follow Price's view that there is an inexorable growth of scientific knowledge, characterized by mathematical laws, as well as to adopt his position that the recognition that the device is a geared calculating mechanism must "entail a complete re-estimation of ancient technology". Thus Marchant, following Price, believes that the geared technology of this device shows that ancient Greek astronomers and technical

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