BOOKS & ARTS

From rubber ducks to ocean gyres

The tale of Curtis Ebbesmeyer's use of beachcombing to reveal patterns of ocean circulation conveys the romance of early marine science, but his lessons for today are serious, finds **Simon Boxall**.

Flotsametrics and the Floating World: How One Man's Obsession with Runaway Sneakers and Rubber Ducks Revolutionized Ocean Science

by Curtis Ebbesmeyer and Eric Scigliano
HarperCollins: 2009. 304 pp. \$26.99,
£16.99

As I gaze down from the aeroplane window at the Arabian Sea, the irony that I'm flying around the world to talk about the impact of climate change and how to reduce carbon emissions is not lost on me. To get to my meeting without emitting any carbon, I could, like the ancient Norsemen, have ridden the ocean gyres to far-off lands. Although the excuse "Sorry I'm 3.4 years late but that's the Majid Gyre for you" would be original, it might not satisfy my audience. Yet it comes out of a new book on ocean currents by oceanographer Curtis Ebbesmeyer and journalist Eric Scigliano.

I say the Majid Gyre as this is what the authors unilaterally call the Indian Subtropical Gyre. And I say a precise 3.4 years because that is the period of a harmonic in the ocean's large-scale flow. *Flotsametrics and the Floating World* highlights that the 11 major gyres that determine the surface circulation of the oceans rotate with a fundamental tone of 13.4 years, with half, quarter (hence 3.4), eighth and sixteenth tones. The authors elegantly call this the 'music of the gyres'.

As I read on, however, my attention turns to my immediate surroundings. Plastic is everywhere: in the cabin lining, the chairs, the food trays and, let's face it, most of the airline food too. Virtually everything we use today is plastic, but our disposal of it is haphazard. As plastic objects break down into smaller and smaller particles, they disappear from view and from our minds but not from our environment. Most of this plastic will one day end up in the ocean.

Ebbesmeyer and Scigliano show — from journal papers, reports and their own observations — that the level of plastics building up in the sea, and particularly in the ocean gyres, is alarming. The North Pacific Subtropical Gyre has recently been dubbed the "Garbage Patch" by the media and by scientists; in places, plastic dust particles exceed phytoplankton in number.

Plastic bags are one source that has recently

Curtis Ebbesmeyer has raised concerns that our seas are being choked by rubbish and plastic debris spilt from ships' containers.

received a lot of attention. Some states in India have banned them, and even carrying one in the street incurs a penalty. This may be warranted. Although initial investigations of the environmental impact of ubiquitous microscopic plastic particles showed them to be benign roughage, recent research, covered in the book, flags up health issues. Chemicals from plastics can be carcinogens and 'endocrine disruptors' that mimic hormones such as oestrogen.

It is not only plastics that find their way into the ocean through landfill and dumping at sea. Flotsam and jetsam also get caught in its endless gyres. Ships are not always obliged to report the loss of containers at sea, nor their contents, and many do not because it looks bad on their records. In international waters the law against such pollution is inefficient or unenforceable.

Yet Ebbesmeyer has built much of his ocean-circulation research on the serendipitous finds of beachcombers and mariners — from container loads of plastic bath toys and trainers spilled from ships, to bodies and ghost vessels lost at sea.

Flotsametrics and the Floating World is a tale of climate change and its effect on ocean gyres, and of seas so choked with plastic that climate change may be the least of our problems. The book also touches on darker, intriguing issues, such as the fate of bodies in the marine environment. But there is good news here too, from the discovery of new drugs in marine organisms to how

A. SEALE/IMAGEQUEST/MARINECOM; D. INGRAMHAM

oceans have enabled the dispersal of human civilizations across Earth. Best of all, the book reads like a good story because of the autobiographical way in which Ebbesmeyer and Scigliano lead the reader through.

My own path through oceanography has been similar to Ebbesmeyer's. We both worked on similar problems; from slabs of water and their mixing to tracking spills, dead bodies and plastic ducks. In the 1970s and 1980s, oceanography involved more exploration and pure experimentation than is typical today — it was

romantic and fun. We get more out of marine science now, using technological tools such as satellites, supercomputers, robotic drifters and acoustic probes. But we have also inherited a bureaucracy of targets, cost allocations and concerns over health and safety, and this change in culture comes through in Ebbesmeyer's story. Concern for safety is no bad thing. But picture the scene if we were to start oceanography from scratch today — “Yes, we're going out in very deep water with 10-metre waves, in a small metal container while operating

high-voltage equipment and explosives.” We would be banned.

Whether you want to learn more about how the oceans tick or how we are affecting our environment, or to reminisce about science not being what it used to be, this is a very enjoyable, if at times dark, book. And I never did have to resort to the in-flight movie. ■

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Cooking debate goes off the boil

Catching Fire: How Cooking Made Us Human

by Richard Wrangham

Basic Books: 2009. 320 pp. \$26.95

Richard Wrangham's new book is an expansion of a provocative hypothesis about human history that he and his colleagues first published in 1999. Cleverly evoking anthropologist Claude Lévi-Strauss's work *The Raw and the Cooked*, the article was entitled ‘The Raw and the Stolen: Cooking and the Ecology of Human Origins.’ Wrangham restates his hypothesis concisely and elegantly at the outset of *Catching Fire*:

“I believe the transformative moment that gave rise to the genus *Homo*, one of the great transitions in the history of life, stemmed from the control of fire and the advent of cooked meals. Cooking increased the value of our food. It changed ... our social lives. It made us into consumers of external energy and thereby created an organism with a new relationship to nature, dependent on fuel.”

The primary criticism of the cooking hypothesis, as it was first published, centred on the lack of convincing evidence that cooking began about 2 million years ago in Africa. Wrangham, a biological anthropologist at Harvard University, attributes the origin of the large-brained *Homo erectus* and its geographic expansion out of Africa to the invention of a new mode of preparing tubers that greatly enhanced digestibility and nutritional benefits. The hypothesis was sceptically received in 1999; commentators used the phrases “half-baked” and “just-so story”. After an additional ten years of research, I hoped Wrangham would present a stronger argument. He does not.

The oldest credible evidence of controlled fire is around 790,000 years old, from a site at Gesher Benot Ya'aqov in Israel. Here, burned

flint fragments were clustered, suggesting the use of hearths. But burned seeds and wood, also present, were not clustered near the hearths or one another. So apart from the burned flint, the evidence for controlled fire at this site is equivocal, as is all such evidence before about 250,000 years ago.

The lack of evidence is daunting. If one individual and his descendants made a fire once a week for a million years, they should have left the remains of some 50,000,000 fires. “Evidence of humans controlling fire is hard to recover from early times,” Wrangham says.

The main ingredient of his hypothesis is, succinctly, potatoes. Early hominins used cooked tubers and underground storage

organs of plants as an important fall-back food. Tubers were underused by other species because they require digging and cooking for maximum benefit.

But Wrangham runs afoul of the evidence here too. Stone tool assemblages from before 2 million years ago include cores, small sharp flakes for cutting and hammer stones for producing flakes and for pounding. Overwhelming evidence shows that these stone tools were used to cut up dead animals. Cut marks and percussion marks from breaking open long bones to extract marrow occur on hundreds of fossils. In 2002, Eric Hoberg showed that human-specific tapeworms are most closely related to tapeworms that infest the carnivores with which early *Homo* competed for carcasses nearly 2 million years ago. There is much evidence that early hominins ate meat, but little to show that their tools

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Learning how to control fire for cooking might have helped early hominins develop bigger brains.