

Q&A Peter Westwick

Surfing scientist

Historian Peter Westwick and his colleague Peter Neushul thought up their scientific history of surfing, *The World in the Curl* (Crown, 2013), on boards off the coast of California. As the winter surfing season gets into full swing, Westwick talks about warfare, wetsuits, climate change and forecasting surf.

ILLUSTRATION BY NICK HIGGINS

What does surfing reveal about our relationship with nature?

Surfing is often seen as a romantic retreat to the wild ocean among seals and dolphins — finding yourself no longer at the apex of the food chain. But in *The World in the Curl*, I and my co-author and fellow historian, Peter Neushul, are trying to show that surfing is caught up with industry, technology and commerce. In the morning I check conditions on my laptop, then paddle out in a neoprene wetsuit on an ultralight board. The technology connects us to nature but also changes our relationship with it.

How has science influenced the development of the sport?

The popularization of surfing over the past century is linked to the evolution of surfboard design. Early surfers in Hawaii used giant redwood planks. To drag a 50-kilogram chunk of wood across the beach, then wrestle it through walls of white water, you had to be a phenomenal athlete. These days you can get a 2.5-kg board made of polyurethane foam, fibreglass and resin. There was early experimentation with balsa wood, which is light until it absorbs water and sinks. In 1928, surfer Tom Blake devised a hollow wooden surfboard that was probably inspired by the wing of the Lockheed Vega aeroplane. But the real revolution came from synthetic materials made during wartime.

Who designed the modern surfboard?

Studying mechanical engineering at the California Institute of Technology [Caltech] in the early 1940s, Robert Simmons ran across polystyrene foam and polyester resin, then mass-produced for aviation. With his knowledge of water flow, connected to Caltech's work on air-dropped torpedoes, he designed streamlined boards. His 'hydrodynamic planing hull' soon became the standard. In the 1970s, aerospace engineer Tom Morey, who had worked on rocket nozzles, invented the boogie board, a simple foam panel that got millions of people riding waves. A recent backlash against new materials has seen some surfers return to solid wooden boards that promise an unmediated encounter with the wave.

How did the wetsuit come about?

During the Second World War, Allied divers who defused underwater mines wore drysuits for warmth, but air trapped inside the suits caused them to wrinkle and pinch. American physicist Hugh Bradner, who worked on the atomic bomb as part of the Manhattan Project, had a counter-intuitive insight: you don't have to stay dry to stay



warm. His suit of neoprene, a synthetic material that was developed by DuPont in the 1930s as a rubber substitute, insulated divers with a layer of trapped water. Neoprene is also a shock absorber and protected divers from underwater explosions. With a wetsuit you can surf in the winter off California — even off Alaska and Antarctica.

When did the modern age of surf forecasting begin?

Again, it began with the Second World War. Allied strategy involved moving armies from ship to shore. Landing craft capsizing in the surf zone could change the course of battles. Military planners realized that you can't launch an amphibious invasion when the waves are big, so the size of waves became an issue. In 1941, oceanographer Walter Munk began to work on the scientific problem of how to define and measure ocean waves. He found that by measuring the speed and direction of winds in the middle of ocean, you could predict how big waves would be on beaches thousands of miles away a few days later. His theory helped the Allies to land at Normandy on D-Day.

What tools are used to predict waves today?

The basic premise of surf forecasting has not changed much. But in recent decades there have been great advances in how we collect the data. Electronic buoys along the whole Pacific coast of the United States measure wind and swell height. Satellites can tell the speed, size and direction of storms in the vast expanse of the Pacific. Then supercomputers crunch the data and calculate the height, frequency and direction of waves resulting from the storm, so you can predict the surf on a given beach several days later.

Can waves be engineered?

On many beaches this happens already, if usually unintentionally, because harbours, piers and sea walls change wave patterns. There have been attempts to build artificial reefs for surfing in California, the United Kingdom, New Zealand and India. These have mostly failed. Engineers have tried to create surf outside the ocean, for instance with the FlowRider, which makes a small stationary wave by propelling water against a curved sheet of foam.

Will global warming change surfing?

Surfers are at the frontline of environmental change. More severe storms will make the surf more extreme and less consistent. Rising seas will change where people can surf. I'm not sure that the surfing community has entirely woken up to these facts yet. It's been a long struggle to convince surfers to work to preserve their own environment. ■

INTERVIEW BY JASCHA HOFFMAN

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