

▶ they were destroyed. The drones enabled Iconem's team to penetrate cities before they had been de-mined.

There are no physical objects in the exhibition. Through video documentaries and interviews, visitors learn that until very recently, several religious groups lived side by side in Mosul. One of the symbols of the city's multiculturalism was the tomb of Jonah — a prophet for Jews, Christians and Muslims — who was buried in the ancient Assyrian city of Nineveh, where Mosul now stands. After the city was liberated in 2017, Iraqi archaeologists discovered that ISIS had destroyed Jonah's tomb and dug a

network of tunnels beneath. Exploring these, they stumbled on the remains of an Assyrian palace.

Meanwhile, the previously hidden remains of a synagogue were discovered in the rubble of the Jewish Quarter.

Aleppo's story is different. The damage there was collateral, the fallout from fighting between the Syrian regime and rebel forces between 2012 and 2016. At the centre of old Aleppo lies a magnificent thirteenth-century citadel, itself built over remains from the Roman period or even earlier. Syrian troops made the citadel their base; from here they bombarded the rebels in the city beyond, so it came through relatively unscathed. The city's souks, on the other hand, were badly damaged. Commerce is Aleppo's beating heart, and the marketplaces are being rebuilt. Exhibition visitors can wander virtually through them as they once were.

The 3D reconstructions of Palmyra and Leptis Magna face each other across a room, because of what they have in common and what sets them apart. Both are purely archaeological sites, not embedded

“The decision to destroy and the decision to rebuild are political.”



ICONEW/DGAM

In a 3D reconstruction, a damaged souk in Aleppo, Syria, rises from its own rubble.

in modern cities; but ISIS destroyed 80% of Palmyra, although it mostly spared the site's Roman theatre, where the group staged its executions. The lesser-known Roman site of Leptis Magna — dubbed the Rome of Africa — has been looted and neglected, and is threatened by rising seas. The pairing makes a larger point: war isn't the only threat to our material heritage, nor the only one to which digital reconstructions provide at least a partial response. Donning a headset, visitors can become virtual-reality tourists and see that for themselves.

There is one glaring omission that makes

this poignant exhibition even more timely. No mention is made of the Yemeni sites damaged by Saudi bombs, such as the almost-4,000-year-old Marib Dam. The AWI is partly funded by Saudi Arabia. And the omission underlines the fact that both the decision to destroy and the decision to rebuild are political — as Warsaw, Coventry and Dresden, ravaged in the Second World War, know only too well. ■

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ENVIRONMENTAL RE-ENGINEERING

Lake Lazarus: rewilding the US west

Amy Maxmen lauds a study on a bold project to re-engineer a dry lake bed.

At the start of the twentieth century, Owens Lake in southern California was one of the largest inland bodies of water in the United States. By the mid-1920s, it was gone, drained to provide water to a mushrooming Los Angeles. Over the past 30 years, the city has spent around US\$2 billion to undo the damage. It has failed to restore the lake, but in *The Spoils*

The Spoils of Dust: Reinventing the Lake that Made Los Angeles

ALEXANDER ROBINSON
Applied Research & Design (2018)

of Dust, Alexander Robinson describes how the effort has succeeded in another way: by creating a landscape no less valuable ecologically. By documenting the transitions

the lake has undergone, he suggests a way forward for engineers, geologists, ecologists and landscape designers hoping to bring other environments back from the brink.

The despoiling of the lake (which was nearly the length of Manhattan, New York) began in 1913. Former president Theodore Roosevelt had ratified a plan for an aqueduct that would divert water from the

Sierra Nevada mountains to Los Angeles, instead of the lake. Within two decades, the city's population had more than quadrupled. By then, the lake bed was dry and the city sought supplies elsewhere. Winds cascading off the mountains swept up storms of dust from the barren land. Sulfate salts eroded clay soils, and toxic particulate matter, including arsenic and cadmium, wafted into the atmosphere. Scientific studies concluded that the dry lake bed was causing itchy throats, burning eyes, asthma and other respiratory problems in the surrounding communities.

In 1990, this human-made dust bowl prompted the US Congress to amend the 1963 Clean Air Act to include land use, as well as industries, as sources of pollution. At times, the measure of particulate matter at Owens Lake was the highest in the country, at more than 120 times the Environmental Protection Agency's air-quality limit. The Los Angeles Department of Water and Power decided that the most expedient solution was to refill a large portion of the lake.

Unsurprisingly, the plan failed. The land has been altered irrevocably, and only shallow, temporary pools formed along the basin. However, the dust storms did die down, and the city avoided regulatory fines. So it continued to dampen the dust by flooding the area and adding gravel.

Initially, the authorities paid little attention to restoring local ecology, but the transformation of the dry lake bed into a heterogeneous expanse dotted with saline pools encouraged the return of wildlife. In 2010, nearly 40,000 native and

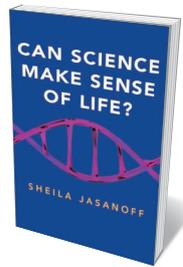
“Intermittent flooding created microhabitats for an enormous diversity of birds.”

migrating birds were counted in a single day, including rare western snowy plovers (*Charadrius nivosus nivosus*).

In 2011, the number was closer to 60,000; by 2013, it was up to 115,000. And nearly 5% of the world's population of American avocets (*Recurvirostra americana*) were seen at the lake in 2013.

The same year, the city proposed putting up to \$1 billion into the dust-control project, which now included habitat, cultural resources and economic development among its goals. The new iteration of the project prompted an unprecedented level of data collection. NASA satellites that measure short-wave infrared bands were calibrated with tap tests on the ground to track wetness across the expanse. Geographers used the Global Positioning System to map topographical features. And bird-watchers — professional and amateur — flocked to the site. Intermittent flooding created microhabitats for an enormous ▶

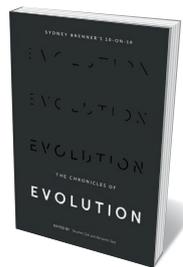
Books in brief



Can Science Make Sense of Life?

Sheila Jasanoff POLITY (2018)

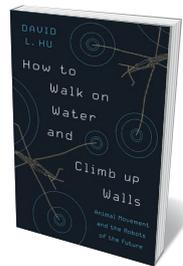
From gene drives to synthetic organoids, every rapid advance in the life sciences opens up a hot-button issue. This incisive study by sociologist of science Sheila Jasanoff examines ethics at that cutting edge. She argues that the view of the human genome as a ‘book of life’, read primarily by biologists, is partial; alongside it belong fields such as ecology, which explore what life is, rather than what it is for. Interweaving cultural touchstones, science history and trenchant insight, Jasanoff calls for a biology that reintegrates humanistic concerns to prevent a reductionist scientific hegemony.



Sydney Brenner's 10-on-10: The Chronicles of Evolution

Edited by Shuzhen Sim and Benjamin Seet WILDTYPE (2018)

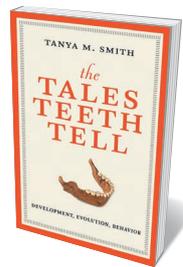
Spanning 14 billion years and 10 timescales, this scientific chronicle (brainchild of Nobel-prizewinning geneticist Sydney Brenner) addresses the monumental question of how humanity has come to dominate Earth. Among the 24 prominent scientists and thinkers who contribute are mathematician John Barrow on the habitable zone, biotechnologists Giulia Rancati and Norman Pavelka on cellular complexity, neuroscientist Atsushi Iriki on the evolution of human higher cognition and social scientist Helga Nowotny on our “radically open future”. A lavishly illustrated, thought-provoking ride.



How to Walk on Water and Climb Up Walls

David L. Hu PRINCETON UNIVERSITY PRESS (2018)

Animals are the ultimate movers and shakers, proves biomechanical engineer David Hu in this engrossing tour of faunal motion. Hu reveals propulsive genius in myriad beasts: a mako shark's 6-metre leap from the sea; a skink that swims in sand; the sinuous ‘flight’ of a *Chrysopelea* gliding snake. Even the *Periplaneta americana* cockroach does more than scuttle at lightning speed: its structural similarity to a stress ball allows it to withstand severe pressures. And the physical principles unveiled, Hu shows, offer as much to fluid dynamics and robotics as they do to evolution and zoology.



The Tales Teeth Tell

Tanya M. Smith MIT PRESS (2018)

Biological anthropologist Tanya Smith drills into what disinterred teeth, as “sophisticated time machines”, can tell us about individuals, our species and the deep past. Her study — technically chewy yet thoroughly engaging — examines the human story through dental development, evolution and related behaviour, interlacing vivid anecdotes from her scientific career. The result is a mix of fascinating findings at all scales, from scanning electron microscopy displaying the exquisite geometry of enamel prisms, to toothpick use among hominins some 2 million years ago.



The Continent of Antarctica

Julian Dowdeswell and Michael Hambrey PAPADAKIS (2018)

Part-paeon, part-study, this many-faceted portrait of Antarctica meshes crisp scientific writing with luminous images. Julian Dowdeswell — director of the Scott Polar Research Institute in Cambridge, UK — and glaciologist Michael Hambrey examine the continent through lenses from the geographical to the biological, touching, too, on its role as home to a shifting population of researchers. Drawn from years of fieldwork, this is a book sparking renewed awe over this stupendous landmass, outpost of the climate system and — with the sea bed — Earth's final frontier. [Barbara Kiser](#)



WITOLD SKRYPCZAK/ALAMY

California's Owens Lake, once one of the largest inland bodies of water in the United States, shrank to nearly nothing in the early twentieth century.

▶ diversity of birds: shorebirds, divers and migratory fowl were drawn to various salinities, depths and the particular vegetation or invertebrates in each niche.

Throughout *The Spoils of Dust*, Robinson, a landscape architect at the University of Southern California in Los Angeles, points out that lakes need not be appreciated only as static bodies of water — a dictionary definition. Owens Lake no longer fits that definition; but nor did it 4,000 years ago, when the area was an arid expanse. By revealing the return of life to the site, Robinson invites the reader to appreciate this landscape as a phase in the lake's progression, rather than see it as a wasteland. After all, to embrace this new environment, the public has to like it.

The Los Angeles city government has come around to this view. In the past few years, it has included artists and landscape architects in the restorations of Owens Lake. For example, an open plaza on one side of the expanse is meant to resemble birds' wings; etchings in a dust-control zone read "Tweet, Tweet" when viewed from above. But Robinson says that this municipal effort, although moving in the right direction,

misses the mark. Instead, designers might work with features of the dry lake bed itself in the future — creating visual prompts that help people take pleasure in a huge, managed landscape that comprises pools, sand and mudflats as well as dust-control gravel raked into sinuous curves. To many, it will be much less familiar than, say, a white-sand beach or lake front.

"Massive human developments need not always result in decimation."

And Robinson concedes that amplifying the beauty of such a landscape will not be simple. Unlike people working on many environmental design projects, architects and artists at Owens Lake must balance the aesthetics of the landscape with the need to conserve wildlife and water, and stave off further toxic dust storms.

Robinson ends the book with tools that might help landscape architects — and the public — to see the future of Owens Lake as an amenity. Beyond making it non-toxic and ecologically sound, the city could call the project a success if the public champions

this reinvented land. To this end, one of the tools Robinson introduces is a robot that rakes sandpits with various designs and connects with 3D-modelling software that renders how the lake bed might look in various scenarios. These parameters can be drawn through the reams of data already collected on factors such as water flow, ecology and cost. To encourage public participation, Robinson has created an arcade-style game in which users explore how changes in design alter dust, water and habitat on the basis of computer models. They then print a postcard from their imagined territory.

At times, *The Spoils of Dust* is a dense read. But its gorgeous maps, graphs and photographs celebrate a landscape that others might dismiss as post-apocalyptic. Robinson makes a convincing case that massive human developments need not always result in decimation. "Even more improbable than the control of the lake's fearsome dust storms," he writes, "is the fact of its strange rebirth." ■

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