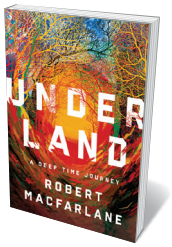
ENVIRONMENTAL HISTORY

Worlds beneath our feet

Huw Lewis-Jones relishes a scientific and poetic journey underground.

Eight years ago, I stood on the barren shore of an island at the edge of the Arctic Ocean, some 150 kilometres off Russia's north coast. I had joined a palaeontological expedition as an international observer — and I was about to see my first woolly mammoth, coming towards me at full speed on the back of a quad bike. The Russian field researcher driving it was shouting something I later understood meant 'buried treasure': giant bones like gathered driftwood, swaddled in muddied canvas; a huge, curved tusk.

Wrangel Island may have been the final refuge of *Mammuthus primigenius*, until the last died out some 3,700 years ago. Today, the permafrost is thawing and shorelines are eroding, causing tusks to re-emerge from the ground: a trove that speaks of multiple tragedy. But subterranean developments caused by the Arctic thaw — from methane explosions to rejuvenated anthrax spores in Siberia — are only part of climate change's disturbing chapter in Earth's restless story of emergence and extinction. In his formidable work *Underland*, landscape writer Robert Macfarlane explores the troubling, and uplifting, human and environmental histories beneath our feet.



Underland: A Deep Time Journey
ROBERT MACFARLANE
Hamish Hamilton (2019)

He leads us on an underground journey across cultures and epochs, to the very limits of the earthly map — and beyond, as new geographies of knowledge are configured. His is a story with a cast of subterranean scientists, poet-cavers, philosophizing urban explorers and arboreal linguists. It is also an investigation of knowledge as diverse as Indigenous belief systems and ground-breaking physics.

We begin with Britain: Neolithic burial chambers in the Mendip Hills of Somerset, and North Yorkshire's Boulby Underground Laboratory, where physicists such as Christopher Toth investigate dark matter a kilometre below the surface. From there, we ride shotgun to potash and rock-salt miners clawing their way out under the North Sea.

In northeast London's Epping Forest, girded by traffic, we learn from plant scientist Merlin Sheldrake of tree–fungus mutualism, the mycorrhizal networks that enable plants to communicate and transfer nutrients underground. When the pioneering research into these networks was first published in *Nature*, the whole shape of woodland ecology "shimmered and shifted", Macfarlane notes (S. W. Simard *et al. Nature* **388**, 579–582; 1997).

In Paris, we drop into — and crawl, climb,

The Škocjan Caves in Slovenia's Karst Plateau contain one of the world's largest known underground canyons.

JUAN CARLOS MUNOZ/NATURE PICTURE LIBRARY

slide, wade and wedge our way through — the gaps left by undercity quarries whose rock built the city. (Here, Macfarlane finds strange fellowship with explorers of ossuary and catacomb.) In northern Italy, we are drawn to the starless rivers and labyrinthine limestone uplands of the Karst Plateau, which straddles the Slovenian border. These hollow highlands, he shows, are not just a mine of geological wonders; they are a storied landscape riddled by death and persecution. Thousands of people died here on the First World War's Isonzo Front, and in the Foibe Massacres of the Second World War and afterwards; many of their corpses were thrown into sinkholes.

ENDS OF THE EARTH

Finally, in the 'Third Chamber' section, Macfarlane's curiosity draws him inexorably toward extremity. He visits the fringes of the melting Greenland Ice Sheet, and remote sea caves puncturing the storm-wracked western shores of Norway's Lofoten archipelago, where cod-rich waters are threatened by government plans for oil extraction. Finally, on Finland's Olkiluoto Island, Macfarlane explores a site soon to entomb spent nuclear fuel. Gouged, spiralling, half a kilometre into bedrock, it is a burial site for our entangled human history — and a metaphor for a planet abused.

As in previous books, including *Mountains of the Mind* (2003), *The Old Ways* (2012) and *Landmarks* (2015), Macfarlane's approach is holistic. He interleaves poetry and literature — the terrain of memory and myth — with modern geology, ecology and physics, and nature narrative. This is a mapping of "the relationships between landscape and the human heart". The writing is luminous, intense: at times, a wandering stream winding seawards; at others, precise and penetrating. It will take me months to fully process the maze of directions and storylines in these brilliant notes from underground.

> ***"There is dangerous comfort to be drawn from deep time."***

The day I finished reading it, reports were published on *Homo luzonensis* — an extinct species of hominin discovered deep underground on the island of Luzon in the Philippines (F. Détroit *Nature* **568**, 181–186; 2019). After a decade of excavation, there are now 7 teeth and 13 bones — part of a femur, the bones of feet and hands — from at least 3 individuals. Their lives ended some 67,000 years ago, when others in the genus *Homo*, including Neanderthals, walked the Earth. The find makes our understandings of human evolution "even messier, more complicated and a whole lot more interesting", as anthropologist Matthew Tocheri put it. The 'underland' still has much to reveal as we struggle to understand our past and find a way to a viable future.

But, as Macfarlane admits, "there is dangerous comfort to be drawn from deep time". That could undermine our determination to turn the tide on human-driven environmental change, he speculates, because "what does our behaviour matter, when *Homo sapiens* will have disappeared from the Earth in the blink of a geological eye?" What's needed to jar us out of such inertial thinking is a more thoughtful awareness of where we are now — the Anthropocene epoch, in which human activities are making their mark on the geological record. That might yet reawaken us to see ourselves as part of a much larger time frame: not just as traces in a landscape, but as inheritors of it.

We have been terrible custodians so far. As he comes up for air from the depths of planetary and human history, Macfarlane's core concern is one that many of us share: "Are we being good ancestors?" ■

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