## March of the maladies



Changing Planet, Changing Health: How the Climate Crisis Threatens Our Health and What We Can Do about It

by Paul R. Epstein and Dan Ferber

UNIV. CALIFORNIA PRESS: 2011. 368 PP. \$29.95

s the Holocene ends and a new warming period begins, climate instability is likely to produce major threats to human health. Increased transmission of vector-borne diseases, food and water insecurity, heat stress, allergy, and population migration could each create epidemic health crises. But which of these maladies might trigger the catastrophic scenarios envisaged by James Lovelock, and others, who believe that the Earth's carrying capacity will be only 1–2 billion humans within a century?

A new book by Paul R. Epstein and Dan Ferber offers insights into the most likely contenders. Epstein, Associate Director of the Centre for Health and Global Environment at Harvard Medical School, is one of a small band of physicians who, since the 1980s, has been concerned about the health threat from climate change. Ferber is a distinguished scientific journalist. In *Changing Planet, Changing Health*, together they have produced a fascinating and readable account of the evolving debates on health and climate, enriched by Epstein's own stories and scientific encounters from 40 years experience in tropical medicine.

Will it be mosquitoes that ultimately test human fitness? Epstein and Ferber recount the combative debates that have raged for the past two decades around the evidence for a link between the spread of malaria and rising temperatures. The most dangerous malaria parasite, *Plasmodium falciparum*, takes 56 days to mature inside the mosquito at 18 °C, 19 days at 22 °C, and just 8 days at 30 °C. But the female *Anopheles* mosquito that transmits the parasite lives only 2–3 weeks, so at 18 °C it will probably die and take the immature parasite with it.

Researchers such as Andrew Githeko, who directs a climate and human health research unit in Kenya, and Mercedes Pascual at the University of Michigan, have shown that warming of the western Kenyan highlands in recent decades has boosted malaria transmission rates. However, those sceptical of the link, such as Simon Hay's research group at the University of Oxford, argue that despite recent warming the disease is on the decline in many parts of the world, including in Africa. Human interventions such as insecticide-treated bed nets and use of anti-malarials can override climate effects. So no convincing Armageddon from malaria.

A more compelling argument for catastrophists comes from the potential effects of climate change on plant–pest interactions. Early work on plant exposure to carbon dioxide levels higher than 550 ppm suggested that faster photosynthesis would produce 30% more biomass and higher yields for farmers, thus helping to feed the world. But Epstein and Ferber reveal more recent evidence that suggests, under real-world conditions, the carbon dioxide productivity effect is an illusion. Indeed climate change might tip the plant–insect power struggle in favour of insects, with potentially catastrophic effects on food production.

Studies on soybean, for example, show that beetles fed on leaves grown in high carbon dioxide environments fare better because they live longer and lay more eggs. Why? Many plants produce chemicals that poison or repel herbivores. Cassava produces cyanide, willow plants produce salicylic acid, and some emit pheromones to bring friendly predators to the rescue, such as parasitic wasps that lay eggs inside gluttonous caterpillars. Soybean plants, which, when chewed on, normally produce jasmonic acid to ramp-up production of insect-killing poisons, can manage only diminished production under high carbon dioxide conditions. Indeed fossil records



## The Failure of Environmental Education (And How We Can Fix It)

by Charles Saylan and Daniel T. Blumstein UNIV. CALIFORNIA PRESS: 2011. 256 PP. £16.95

It is well recognized that environmental education has fundamentally failed to fulfil its vital role in helping to prevent climate change, biodiversity loss and degradation of the natural world. By way of a solution, Charles Saylan and Daniel T. Blumstein advocate a paradigm shift in the way we view education as a whole, so that we can create new levels of awareness and work towards a sustainable future. Their vision, outlined in this new book, includes practical measures such as the greening of school-yards and curricula that are specifically adapted to the locality.

## Deep Future: The Next 100,000 Years of Life on Earth

by Curt Stager

MACMILLAN US: 2011. 304 PP. \$25.99

What does global warming mean for humans beyond the next century? In *Deep Future*, author and scientist Curt Stager draws on the planet's geological history to provide a view of where we might be heading. Stager highlights some of the events that our descendents are likely to experience, emphasizing how unusual these are in a historical context. Ultimately, Stager shows the crucial role of the choices we make today in steering that future.

DEEP

UTURE

Years of

Life on Earth