► understood why we say something ‘dawns’ on us. The book is also peppered with gems of information, such as the origins of the expressions high noon, high seas and plain sailing.

Much is said about time-keeping, and how many dates owe their origins to the Sun’s movements: pagan festivals, Christian festivals, even the start of the UK tax year on 6 April. Cohen also goes into the dangers of sunlight; for example, he relates how, after the 1999 solar eclipse in England, doctors in a London hospital reported that they could pinpoint the precise phase at which a patient had stared at the Sun from the shape of the ‘sickle’ damage to his or her retina.

This book is no stolid scholarly treatise. Cohen is mainly a storyteller, who, after more than seven years of research, has amassed a prodigious amount of information and organized it into an entertaining narrative. However, in not wanting to detract from the main point of his tale, he occasionally oversimplifies matters — especially those scientific ones for which veracity is sometimes left behind. For example, at the start of the book the casual reader might be led falsely to believe that the Sun is now contracting, later to fade into a red giant. This is contradicted

“The Sun did contract from the gas and dust of the interstellar medium, but that took just 10 million years.”

nearly 600 pages later by a paragraph offering a more accurate view. The Sun did initially contract from the gas and dust of the interstellar medium, but that took just 10 million years.

Since then and for almost all of its existence — some 4.6 billion years so far — it has been expanding, and will continue to do so at a steadily accelerating pace for nearly 6 billion years more. It will then expand rapidly into a highly luminous red giant, albeit with a lower surface temperature, before finally condensing to a white dwarf.

Despite shortcomings such as these, *Chasing the Sun* is a marvellous read. ■

Douglas Gough is a Leverhulme Emeritus Fellow at the Institute of Astronomy, and professor emeritus of theoretical astrophysics in the University of Cambridge, Madingley Road, Cambridge CB3 0HA, UK. e-mail: douglas@ast.cam.ac.uk

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For a review of discoveries from solar eclipses, see: go.nature.com/ezzc5b

HWA JA GÖTZ, MfN BERLIN

SCULPTURE

Terrible wonder

Alfred Keller’s fastidious models of insects highlight his skill as an observer and a sculptor, finds **Martin Kemp**.

Venturing upstairs in Berlin’s Museum für Gegenwart (Museum for Contemporary Art), we enter a darkened space inhabited by alien creatures, eerily spotlighted in glass cases.

The specimens in the exhibition, *Die Sammlungen* (The Collections), exude an air of menace. As we look more carefully, we begin to recognize some of the monsters as familiar insects, most obviously *Musca domestica*, the common housefly, and *Pulex irritans*, the flea, immortalized in Robert Hooke’s *Micrographia* of 1665. The models, enlarged by a factor of 100, recall Hooke’s comment about the terrible wonder of such magnified insects. He described the flea he viewed down his microscope as “adorn’d with a curiously polish’d suit of sable Armour, neatly jointed, and beset with multitudes

Die Sammlungen (The Collections)
Hamburger Bahnhof
Museum für
Gegenwart, Berlin.
Until 6 February 2011.

of sharp pinns, shap’d almost like Porcupine’s Quills, or bright conical Steel-bodkins”.

One of the large models on display is as bizarre a creature as we might ever see. It looks like a cartoon beetle with some ultra-sensitive receiving device of spheres and tendrils mounted on a short mast protruding from its back. It is in fact *Bocydium globulare*, the most extravagant of the leaf hoppers (pictured). The hollow globes, like the remarkable excrescences exhibited by other leaf hoppers, probably deter predators.

This model is by the brilliant sculptor, Alfred Keller (1902–55). Keller was trained as a kunstschnied, an ‘art blacksmith’. From 1930 until his early death he was employed

by the Berlin Museum für Naturkunde (Museum of Natural History), painstakingly labouring over his recreations of insects and their larvae. Each took a year to complete.

Keller worked first in plasticine, from which he cast a model in plaster. This plaster reference model he then recast in papier maché. Some details he added, cast in wax, with wings and bristles in celluloid and galalith (an early plastic material used in jewellery). Finally he coloured the surfaces, sometimes with additional gilding. The levels of patience and manual control Keller exercised were incredible. His fly, for example, boasts 2,653 bristles.

It may surprise some to find that papier maché — a material now associated with messy child's play — was used in such a refined manner for scientific modelling. It was developed as a serious medium by the anatomist Louis Auzoux of Paris. He was looking for a cheap and portable alternative to the wax models that graced only the best funded schools of medicine. During the 1820s Auzoux perfected his technique, mixing powdered stone and flax fibres into his paper pulp. The resulting models of bodies, with removable parts, were light, strong and flexible, and could be coloured and labelled.

Auzoux set up a factory and shop to manufacture and distribute his models worldwide, progressively extending his production to zoological and botanical examples. His large-scale insects proved especially popular. His shop in the Rue du Medecine in Paris survived into the 1990s; its remaining specimens were auctioned in 1998.

Although they used similar media and sometimes the same insect subjects, Keller and Auzoux stood at different ends of the modelling business. Auzoux produced on a commercial scale; Keller was a sculptor of monumental one-off portraits. Each model is a masterpiece, with no effort spared. It is difficult to see how such a skilled artisan could survive in today's museums, with their emphasis on cost analysis. Keller's exacting models may be things of the past, yet they are far from obsolete. Like the great habitat dioramas, they exercise a magnetic attraction.

Are Keller's models art or science? They are truly both. In the Museum für Gegenwart we tend to see their artistry; in the Museum für Naturkunde their scientific dimension. But Keller's artistry is always apparent in his observations of nature — and his scientific observations are central to his art. ■

Martin Kemp is emeritus professor of art history at the University of Oxford, UK.

INNOVATION

The ideas lab

Jascha Hoffman reads about some creative research environments that led to unexpected discoveries.

Biomedical engineer David Edwards is regarded as an innovation guru. His various achievements include bringing to the market new ways to deliver drugs to the lungs, as well as setting up Le Laboratoire, a forward-looking institution in Paris that seeks to harness the creativity of science and art (see *Nature* 449, 789; 2007). His growing empire of labs, galleries and non-profit organizations stretches from Paris to Cape Town to Cambridge, Massachusetts, where he lectures at Harvard University.

His latest book, *The Lab*, calls for a new breed of small, flexible institutions to support interdisciplinary researchers whom Edwards calls “artsScientists”. Motivated by curiosity and passion, such researchers make unexpected discoveries that blur the conventional lines between science, business and art. Rather than prescribing the details of how such a lab should function, Edwards offers examples from his own experience: ingenious humanitarian projects, culinary novelties and science-based art installations.

Edwards's ideal laboratory requires large doses of supervision from experienced innovators. At Harvard, he has mentored undergraduates during their pursuit of ambitious humanitarian projects, including the development of soil-powered lighting for African villages using microbial fuel cells; the invention of a sleek water vessel whose collapsible skin was inspired by the design of living cells; and the creation of a soccer ball that generates electricity when you kick it. He is also on the board of Medicine in Need, an international non-profit organization that is pursuing an inhalable vaccine for tuberculosis.

One can sense the creative zeal when Edwards turns to his work on culinary technology. He describes a series of inventive soirées in Paris where guests were treated to caviar-like ‘flavour beads’ encapsulated in calcium alginate, or martinis that were turned to mist by ultrasound waves from piezoelectric crystals. The most popular of his foodstuff experiments is Le Whif, a form of breathable chocolate developed

with French chef Thierry Marx, inspired by Edwards's earlier research on inhalable drugs. Delayed by faulty inhalers that spewed cough-inducing clouds of cocoa powder, a working version of Le Whif went on sale this year.

As the curator of Le Laboratoire, Edwards also pairs conceptual artists with open-minded scientists. The results, displayed at his galleries in Paris and Cambridge, Massachusetts, are well intentioned but often incoherent. He describes in the book how he led Indian artist Shilpa Gupta to collaborate with Harvard psychologist and neuroscientist Mahzarin Banaji on an investigation of the biology of fear, resulting in an installation that required thousands of microphones to be strung from the ceiling. The puzzling opacity of such works brings to

The Lab: Creativity and Culture
DAVID EDWARDS
Harvard University
Press: 2010. 224 pp.
\$22.95

mind the comment of Swiss art curator Hans Ulrich Obrist: “Bringing art to science gives you a good chance of having neither.”

Edwards's prose can be heavy with jargon and self-promotion. Whereas his previous book *Artscience* (Harvard University Press, 2008; see *Nature* 451, 246; 2008) presented a series of vignettes of researchers working at the edges of their disciplines, the focus on Edwards's own endeavours in *The Lab* can feel narrow. Yet his enthusiasm is infectious. He comes across as a free-spirited inventor and educator. He is also a pragmatist, conceding that an emphasis on the creative process, and a high tolerance for failure, may make it harder for inventive researchers to achieve financial autonomy.

In these austere times, Edwards takes a firm stance on the importance of the imagination: “If the lab sacrifices the playful, contemplative, daring, irreverent atmosphere of the creative band in order to gain sustainability,” he writes, “the organization may survive, but the lab will cease to exist.” ■

Jascha Hoffman is a writer based in San Francisco, California.
e-mail: jascha@jaschahoffman.com

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