Father of the illustrated materia medica

As a surgeon to the Roman legions of Emperor Claudius in the first century, the author Dioscorides had plenty of opportunity to travel and catalogue substances used in treating illnesses and wounds. His text *De materia medica* looks at the medical uses of more than 1,000 plant and animal products, wines and minerals. He rejected alphabetical ordering and chose to classify the material as animal, vegetable and mineral. This picture of Dioscorides comes from the facsimile edition of the superbly illustrated medieval text *Medicina Antiqua* (Harvey Miller, £48, $75). As Peter Murray Jones points out in his introduction to this edition, Dioscorides was credited in medieval times as the innovator of illustrated materia medica.

been translated from the original Latin in its entirety, so that English-speaking scientists, and historians and philosophers of science, can judge for themselves the quality and substance of his scientific thought. The treatise is part commentary on Aristotle's works on the life sciences (Books I–XIX), part compendium from Thomas of Cantimpré's slightly earlier work *On the Nature of Things* (*De naturalis rerum*; XXII–XXVI), and part Albert himself (XX–XXI).

This fairly literal English translation will clearly become the standard, precisely because it is complete (Books XXII–XXVI were translated in 1987 by James Scanlan). It will allow easier access to the Latin text in Hermann Stadler's 1916–20 edition, as William Wallace notes in his rich foreword. While proofreading is sometimes lax, the translation will allow easier access to the Latin text.

The translators' Introduction reviews Albert's place in medieval science and makes a starting point for the study of his works on natural philosophy — the medieval category that included what we now call 'natural science'. The interested reader may also wish to consult the excellent collection of articles edited by James Weisheipl (Pontifical Institute, 1980). There, and in Edward Grant's 1974 *Source Book in Medieval Science* (Harvard University Press), we can assess the extent to which Albert's work measures up to present-day standards, in fields ranging from cosmology to the life sciences.

Albert exercised his significant critical judgement of sources even when commenting on 'the philosopher', the term used in the Middle Ages to refer to Aristotle. It is important to realize, however, that although the modern reader may be struck by the breadth of what appears to be Albert's first-hand experience, this is more often a profound first- or second-hand experience of learned texts. Albert may not have done as much direct descriptive or experimental work as is sometimes claimed, even by the translators of these volumes. His reading and evaluation of the evidence, however, were careful and exceptionally critical for his time.

Albert's knowledge of hunting techniques was obtained partly from the hunters and gamekeepers he spoke to or read about (such as parts of the contemporary work on accipiters by Frederick II Hohenstaufen), and partly from from his own experience as a boy. It is highly unlikely, however, that he observed the crocodiles or ostriches he describes, since his travels (undertaken on foot, according to his vows), while extensive, were mainly in northern Europe and took him only as far south as Italy. Similarly, his detailed discussion of the anatomy of the human brain comes from Galen (whose work he knew from Avicenna's Latin translation), among other sources.

Albert's approach to the natural world shows some characteristics of a 'scientific' approach, but statements by the translators and others attributing his inability to advance beyond what he did to "historical accidents" seem like wishful thinking. A thinker must be judged in context, and Albert's powerful mind, like all minds, was subject to the intellectual norms of his time and calling. Although certainly a great and critical observer of natural diversity, he was more concerned with the central interests of natural philosophy — the overview of 'causes' and the scheme of nature as understood in the context of the medieval Latin tradition.

We can be grateful for the enormous labour expended on this full version of a difficult, historically important text by a medieval thinker of vast knowledge and unquestionable intellectual power and dedication. ■

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Something for everyone

An Illustrated Guide to Theoretical Ecology
by Ted J. Case
Oxford University Press: 1999. 464 pp. £22.50, $49.95

Joan Roughgarden

Thirty years ago, the phrase theoretical ecology seemed a contradiction in terms. Today, though, theoretical ecology has matured, and is now represented by a curriculum shared by most courses in the subject at universities throughout the world.

Ted Case, a distinguished theoretical ecologist and professor of biology at the University of California at San Diego, has written the most recent textbook to serve this market. It is by far the most attractive book yet, and readily earns its title of being an 'Illustrated Guide'.

But the book is not only replete with pictures. It offers rigorous derivations of the models and theorems in theoretical ecol-

ogy, using all the usual mathematics from calculus, linear algebra and differential equations. But it stands out because of the completeness of its graphical illustrations, which are so extensive that a reader may follow the derivations solely from the graphs with little reference to the mathematical formulae.

The topics covered are those found in most courses on theoretical ecology: density-independent and density-dependent population dynamics, age-structured population dynamics, life-history theory, species interactions, multi-species communities, and island biogeography. Spatial population processes are nicely worked in throughout all the chapters. Practical data, too, are frequently mentioned, and used for illustrative calculations.

Students in theoretical ecology typically come to the subject with a diversity of mathematical backgrounds. Some may have had only one, dimly remembered, course in college calculus. Others may be math whizzes in linear algebra, differential equations or computer programming. All will find this book helpful and relevant. The material is divided into normal and advanced sections, so both the undergraduate and graduate student will find it of value.

Instructors may wish to supplement this book with more specialized material on optimal foraging theory, kin selection, game theory, the trophic cascade, symbiosis/mutualism interactions, landscape and ecosystem ecology, and Earth-systems models of coupled physical/biological processes. I personally also like the Gaia models, which, though speculative, emphasize the importance of the biosphere in planetary dynamics. This is not to suggest that these topics should have been included in the book. It already has 449 full-size pages, and could not be much bigger without becoming unwieldy.

All in all, the *Illustrated Guide* is an accessible and thorough text. It is a welcome addition to the book list for theoretical ecology, and I recommend it to advanced undergraduate students, graduate students and professionals in ecology, conservation biology and resource management. ■

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More on ecology and the environment

Dynamics of Coral Communities
by Ronald H. Karlson
Kluwer Academic, £88, $150

The Effects of UV Radiation in the Marine Environment
edited by Stephen de Mora, Serge Demers & Maria Vernet
Cambridge University Press, £50, $80

Science in culture

Lancing lasers

Nam June Paik at the Guggenheim Museum.
Martin Kemp

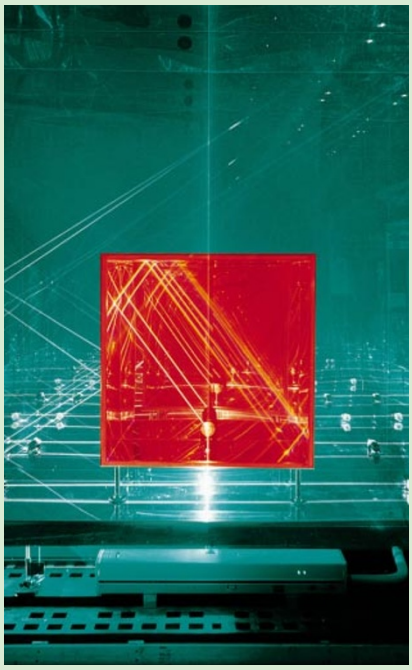
Since his explosion into the anarchic avant-garde of the Fluxus movement in Germany and New York during the early 1960s, no *enfant* has been more inventively *terrible* than the Korean master of electronic and performance art, Naim June Paik (born in 1932). Even his severe stroke in 1996 has not diminished his creative energies and desire to push new media to their technological limits. For his current show at the Solomon R. Guggenheim Museum in New York (until 26 April), he has activated the dynamically challenging space of Frank Lloyd Wright's helical gallery with spectacular laser installations, alongside his more familiar compositions of multiple television monitors.

Strongly associated with the leading musical experimentalists of the late 1950s, Karlheinz Stockhausen and John Cage, Paik became centrally involved in a series of iconoclastic performances that assaulted audiences' comfortable expectations about music, art, dance and theatre. Pianos and violins were shockingly smashed as spectators winced. In 1971 the cellist Charlotte Moorman performed provocatively topless, apart from Paik's brassiere of two small TV screens. It was in the more technological dimensions embodied in the bra that Paik's future was to lie.

By 1963 Paik had already decided to dedicate his prodigious talents to "the spartan life of physics and electronics". The cathode-ray tube, which was becoming unthinkingly naturalized in popular culture, was chosen as his primary medium. By turns he subverted the TV set, satirizing its dehumanizing technology, and exulted in its potential as the true medium for the late-twentieth-century creator. Why, he asked, should the artist not be able to "shape the TV screen canvas, as precisely as Leonardo, as freely as Picasso, as colourfully as Renoir, as profoundly as Mondrian, as violently as Jackson Pollock, as lyrically as Jasper Johns".

In collaboration with the Japanese electronics pioneer Shuya Abe, he developed increasingly sophisticated versions of the 'Paik Abe video synthesizer', which allowed video images to be manipulated, formed into collages and simultaneously displayed on multiple monitors, or composed symphonically into restless kaleidoscopes of electronic imagery, both abstract and figurative. Alongside such images transmitted through TV sets, he also worked directly on the cathode-ray tube itself, using magnets to contort the configurations of rays on the screens into strange geometries, akin to the wave motions of an oscilloscope.

The laser-works that he has recently undertaken in collaboration with Norman Ballard, most notably the triptych of the *Three Elements* — in the form of a triangle, circle and square — are a natural continuation of such compositions as his *Magnet TV* of 1965. Within the shallow, mirrored cabinets of *Three Elements*, triangular and square prisms rotating in different phases stab thin laser beams into an ether of pale vapour. Penetrating tracers of arrowed light criss-cross the elemental figures. Scintillating points oscillate along defined tracks at the edges of each shape and at the intersections of the dancing beams. The razor-sharp geometries, refracted through the prisms and reflected off the containing mirrors at ever-changing angles in endless variations, are etched across an apparently unconfined space, as a result of internal reflections off the two-way (50%) mirror at the front of each cabinet.



DAVID HEALD/GUGGENHEIM FOUNDATION

Detail of *Three Elements* by Naim June Paik with Norman Ballard — lasers, mirrored chambers, prisms, motors and smoke.

In the modernist museum to cap all modernist museums, the basic geometries pay open homage to the canonical simplicities of minimalist abstraction, not least Josef Albers's series on "Homage to the Square" (see *Nature* **390,** 451; 1997). But, as might be expected of an artist of such global experience and concerns, the resonances are much more extensive than an incestuous reference to earlier art. As alert to Platonic idealism as is Zen Buddhist meditation to eternal simplicities, Paik uses a technology perfected by late-twentieth-century physics to transform ancient archetypes into a vision of mathematical energies transmitted across infinite space. It is a vision worthy of our entry into the new millennium. ■

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