

## book reviews

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

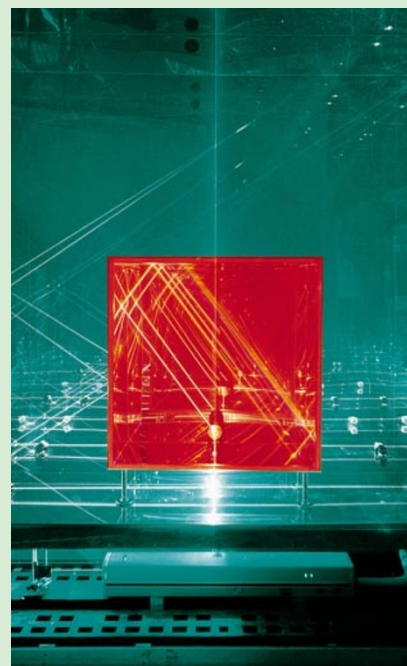
Since his explosion into the anarchic avant-garde of the Fluxus movement in Germany and New York during the early 1960s, no *enfant* has been more inventively *terrible* than the Korean master of electronic and performance art, Naim June Paik (born in 1932). Even his severe stroke in 1996 has not diminished 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



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

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.

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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