

not adequately discuss. As for his case histories, they are sometimes rather inconsequential and he inserts too many comments about himself. Few readers will be fascinated by the news that he had to break off an interview to visit the lavatory.

Case histories can undoubtedly be a source of hypotheses, but to have validity the hypotheses need to be refined and tested by experiment. After all, Freud, relying on case histories, produced the most spectacularly wrong theory of the century; but then, although dealing with emotion, he never looked a patient in the face.

Cole is undoubtedly well-intentioned and has revealed an important and neglected problem. His book is worth reading for that, for the occasional insights his subjects provide and for the interesting but unproved theoretical hares that he raises, even if his prose does not match that of the master, who, incidentally, gives *About Face* his imprimatur. □
Stuart Sutherland is at the Laboratory of Experimental Psychology, University of Sussex, Falmer, Brighton BN1 9QG, UK.

Also of interest

The Psychology of Facial Expression edited by J. A. Russell and J. M. Fernández-Dols. Sixteen chapters offering broad and up-to-date coverage — ethological, neurobehavioural, developmental, dynamic systems and computational — of the role and function of human facial behaviour. Cambridge University Press, £55, \$74.95 (hbk), £19.95, \$29.95 (pbk).

The steeple people

Creating the Cold War University: The Transformation of Stanford

by Rebecca S. Lowen
University of California Press: 1997. Pp. 316. \$45, £35

David Ritson

The cover to this book shows a dramatic and glacial view of the Stanford University campus in California. Stanford has been a leader in changes that, over the past 50 years, have turned the old tranquil ivory towers of academia into the research powerhouses of today. For this reason, Rebecca S. Lowen, a graduate of the Stanford history department, chose Stanford as both a model and a case history to examine the mechanisms that drove this transformation. Today, of course, at the pinnacle of its dazzling rise, Stanford is home to the first daughter, Chelsea Clinton.

Lowen has done a heroic job of wading through old archives, minutes of university committees, papers amassed by former presidents of the university, records of trustee meetings and so on. In surgical detail she has exhumed old policies and exercises of power sometimes benevolent and amazingly far-

sighted and at other times vicious and destructive. Her objective is to understand, in so far as it is possible, today's universities. These are the universities with which we, faculty, students and general public, enjoy a love-hate relationship.

Change has resulted in unparalleled facilities, the brightest students, handsome salaries, light teaching loads and beautiful campuses. These changes have not come without a price. Faculty, even tenured members, are implicitly (or explicitly, as is made clear in the book) driven to publish or perish, and judged by how much money or prestige they add to the university, whereas the old humanistic disciplines are treated as poor cousins of engineering, computer science, law, medicine and the physical sciences.

The simplistic explanation is that the new patrons, the military-industrial complex, and a new breed of entrepreneurial academic scholars combined to produce this out-come. Lowen's underlying and well-documented thesis is to detail the extraordinary, and perhaps dominant, role of university administrations in this process.

The book starts in the 1930s and follows through to the late 1960s. Major change came in the wake of the Second World War. The university president in those days was the jovial and friendly J. Wallace Sterling. For most of these years he was teamed with the tough, far-sighted and sometimes abrasive provost Frederick Terman.

Together, Sterling and Terman successfully played 'fat man/thin man' roles. During the Second World War, Terman had directed the Harvard Radio Research Laboratory. After his return to Stanford he became dean of the school of engineering. From 1956 to the mid-1960s he was provost. He developed and labelled the strategy "steeples of excellence".

This was aimed at steering the university away from trying to be good at everything. Instead the goal was to exploit government and industrial sources for funding and to channel faculty and university resources into a few areas where the university could become a leader. Terman's policies also produced the strong synergy between industry and Stanford that spawned the rise of today's Silicon Valley. The methods used to accomplish these aims are detailed by Lowen in a chapter entitled, not unexpectedly, "Building steeples of excellence".

Lowen has clearly tried hard to keep the book objective, and she generally succeeds. As a 'modern' historian she primarily relies on the written contemporaneous records. These have their limitations. Nobody, even in private letters and memos, is going to admit to anything but the loftiest motives in pursuing their aims. She, as do we all, obviously has a nostalgic hankering for a Camelot when scholars really lived in ivory towers and thought great thoughts. In this sense she has

New in paperback

Camping With the Prince and Other Tales of Science in Africa

by Thomas A. Bass
Moyer Bell, \$13.95
 "Bass's stories highlight the often disastrous effects of ignoring local knowledge and practices", Len Goodwin, *Nature* 344, 901 (1990)

Life's Grandeur: The Spread of Excellence from Plato to Darwin

by Stephen Jay Gould
Vintage, £7.99
 Published in the United States as *Full House*. "Gould presents his ideological views in characteristic evangelical style", Christian de Duve, *Nature* 383, 771 (1996)

Yellow Fever, Black Goddess: The Coevolution of People and Plagues

by Christopher Wills
Helix, \$13
 "To the point, scholarly, disinterested and rich in technical detail... provides pleasure and stimulation", V. Geist, *Nature* 386, 236 (1997)

Dinosaurs of the Flaming Cliffs

by Michael Novacek
Anchor, \$14.95
 "A thoroughly absorbing adventure story... This eloquent and accessible blend of science and discovery should appeal to a wide readership... and may well inspire the next generation of palaeontologists", Angela Milner, *Nature* 384, 426 (1996)

The Logic of Failure: Why Things Go Wrong and What We Can Do to Make Them Right

by Dietrich Dörner
Addison-Wesley, \$15
 "A lively treatise, accessible to the lay reader [which] capitalizes on real-life cases and refined *ad hoc* experiments", M. Piattelli-Palmarini, *Nature* 382, 505 (1996)

One River: Explorations and Discoveries in the Amazon Rain Forest

by Wade Davis
Simon and Schuster, \$16
 "The author has woven a biographical tapestry rich in history, adventure, intrigue and scholarship... an engaging and provocative read", Michael J. Balick, *Nature* 384, 229 (1996)

The Clock of Ages

by John J. Medina
Cambridge University Press, £9.95, \$15.95
 "A tour of human ageing that aims to educate and entertain.... The science is adequate but too often fails to do justice to this complex and challenging topic", Tom Kirkwood, *Nature* 382, 506 (1996)

been, perhaps, less than fair to university administrations who have a duty to encourage and open up new directions in scholarship.

Disappointingly, the book stops before the start of the Vietnam war and the 1960s' 'student revolt'. It also fails adequately to emphasize the role of university 'overhead' charges on contracts, an important financial support mechanism. The last chapter on undergraduate teaching is the weakest. Lowen has documented well the then administration's disregard for undergraduate teaching, but her treatment is confined to a short chapter and seems to be coloured by her own Stanford experiences.

Who should read this book? Certainly Stanford faculty members, if only to satisfy their voyeurism. Certainly all university faculty and administrators who wish to understand the nuts and bolts of wielding power. More generally, it is a provocative and literate book of interest to anybody who wants to understand the strengths and weaknesses of our modern higher-education systems. □

David Ritson is in the Department of Physics, Stanford University, Stanford, California 94305-4060, USA.

ADVERTISEMENT

"Beside good science, there is much humour and much of interest outside the field of science. ... In my case, it kept me awake and delighted until the small hours"

Keith J. Laidler, Professor Emeritus of Chemistry, Ottawa University

**The Bedside Book
Genius and Eccentricity
in Science 1869–1953**

Edited by Walter
Gratzer, with a
foreword by Stephen
Jay Gould

A fascinating selection of articles from *Nature*, offering a panorama of science seen against the background of 19th and 20th century history.



Price: £19.95/US\$29.95 + postage
Discount rate available for current subscribers.
To order, or for more information,
contact: Nature Marketing
Tel. +44 (0) 171 843 4985
Fax. +44 (0) 171 843 4998
E-mail: subscriptions@nature.com

In retrospect chosen by Kevin Padian

Tess of the D'Urbervilles

by Thomas Hardy
(1891)

Thomas Hardy was 19 when Charles Darwin published *On the Origin of Species* in 1859, and it profoundly affected his view of the relationship of humans to nature. He endured criticism throughout his life for his fatalistic plots and the tragic ends of his characters. But these devices didn't reflect Darwin's influence. Like Darwin, Hardy saw nature as morally neutral, despite its constant destruction of life. Only humans, with their heartless social systems, can show malice and hurt others wantonly. And as Darwin taught us, sexual selection, more than natural selection, drives human evolution.

Hardy recognized intuitively that Darwin's *magnum opus* was not only about the population processes of heredity and selection, but about evolutionary legacy and deep time. From the opening page of *Tess* to its closing paragraph, evolution is the breath of the novel.

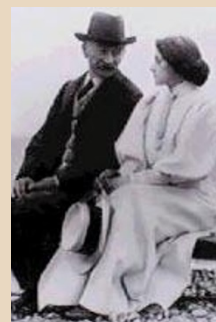
It begins as Tess's father, the labourer, John Durbeyfield, is informed by the parson, an amateur genealogist, that he is descended from noble blood (the ancient D'Urbervilles). Tess is sent to the local manor to see her 'cousins' in the hope of a handout, but the true D'Urbervilles are long extinct; the ancient title has been purchased by a parvenu tycoon, and Tess's false cousin ultimately rapes her.

As the novel develops, we find that Tess's perseverance comes not only from her peasant strength but also from an atavistic ferocity inherited from her remote ancestors, knavish, pugnacious aristocrats who mistreated the local girls in their own times. By contrast, Tess's false 'cousin' Alec fails at everything in life partly because he has no genetic reserves to draw upon.

Evolutionary scales in *Tess* run from the genetic to the geological. Fertility, the basis of genetic change, permeates the novel; it is, after all, the business of rural communities. The fields and glens that Hardy describes are always buzzing with bees and butterflies, exploding with pollen- and nectar-laced flowers, vitalized by rains and streams:

"The season developed and matured. Another year's instalment of flowers, leaves, nightingales, thrushes, finches, and such ephemeral creatures took up their positions where only a year ago others had stood in their place when these were nothing more than germs and inorganic particles. Rays from the sunrise drew forth the buds and stretched them into long stalks, lifted up sap in noiseless streams, opened petals, and sucked out scents in invisible jets and breathings."

Traditions of fertility also extend to cultural legacy. When we first meet Tess, she is participating in the annual May Day walk of the last women's club in England to preserve the tradition (note the harbinger of extinction). The women wear virginal white gowns, but the traditions, like the whiteness of their dresses, have degenerated to the point that



aged matrons long past their fertile years walk with the young girls. They carry a willow wand in one hand and flowers in the other, dual symbols of male and female fertility on a day celebrating fertility itself. But the women have no

consciousness of the irony of these symbols because their associations have been forgotten.

Time — in the sense of John MacPhee's 'deep time', numberless, incomprehensible eons — shapes everything in the present, at one scale or another. Hardy is constantly moving among these scales, here pointing out a Gothic church, there reminding us of the ancient age of the stones used to build it.

Hardy often begins his stories with a road, along which travellers are making their way. But before the story proceeds, the road is transformed into a Roman way, or a far more ancient path or track, or it passes a pre-Christian burial mound, or cuts through Palaeozoic strata that impressively regard the traveller's progress. These forms are ancient, traditional and beyond human memory. Hardy reminds us that we are individually ephemeral; yet the actions of groups of humans, like geological processes, gradually shape the landscape, construct farms, fields, towns, cultures, laws, history itself. It is as if Hardy were tending a cosmic ant-farm.

Tess, however, is no ordinary ant, but a heroine of grand and tragic dimensions rooted in evolutionary constraint and genetic possibility. Her ancestors are buried like fossils in Kingsbere-sub-Greenhill (King's-bier-below-green-hill), as fitting a locality for a crypt as one could ask. Yet Tess carries the D'Urberville legacy in her flashing temper, her determination and her unwavering devotion to a middle-class husband.

In the end, Tess mortally wounds her false cousin Alec for his deceits, and flees with her husband Angel across the moor until they wind up, exhausted, at Stonehenge (where else?). The ancient geological sarsens stand over her like sentinels, as she sleeps like a Druid priestess on an altar-like stone until the police arrive.

The novel closes as an offstage bell tolls notice of Tess's hanging. There is one final evolutionary irony as Angel walks off with Tess's sister, who of course carries more genetic similarity to Tess than anyone in the world. Victorian laws would have prevented their union; but if we know one thing about Hardy's characters, it is that they seldom applied the wisdom of the animal husbandry they knew so well to their own breeding habits.

Kevin Padian is in the Department of Integrative Biology, University of California, Berkeley, California, 94720-3140, USA.