and it is clear which enterprise the author prefers.

Finally, Kolata brings us up to 1998, when a chicken virus of type H5N1 was recovered from human influenza patients in Hong Kong. The type had never been recovered from man before and thus was a potential pandemic strain. It turned out that there was an epidemic of the virus in the poultry markets in Hong Kong, fuelled by a constant influx of healthy birds from mainland China. The virus did not become established in humans and the outbreak was eliminated by slaughtering all the poultry in the territory. Possibly this action saved the world from another pandemic. But of course, successful public-health management, even on a world scale, gets little notice and less praise.

All in all, the book is a good read, but my advice would be to get a good textbook on influenza as well if you want the full picture. ■

David A. J. Tyrrell is at the Centre for Applied Microbiology and Research (CAMR), Porton Down, Salisbury SP4 0JG, UK.

Science in culture

The life of Paul Dirac

The Oracle of Delphi, a show performed at CERN, Geneva

Alison Abbott

Deep under the European Laboratory for Particle Physics — CERN — in the huge space provided by the cavernous loading bay that serves LEP (the Large Electron–Positron collider) and its associated DELPHI antimatter experiment, the life of Paul Dirac is being played out nightly in an impressionistic show of acrobatics, dancing and light effects.

Dirac, the Nobel prizewinning theoretical physicist who predicted the existence of antimatter in the 1930s, writes to Werner Heisenberg about his struggle to understand the nature of matter. His muse helps him untie the knots in his mind and derive his mathematical proof for antimatter. His dreams take him into space to search for the antimatter he believes must be there, as he finds no proof for it on Earth. His disappointment and self-doubt — "if only I could test antimatter close-by" — turn to wonder when, in the last of four scenes, the backdrop suddenly opens to reveal DELPHI, the experiment that allows experimental physicists to study the interactions of electrons and their antimatter counterparts, positrons.

The Oracle of Delphi was created as a CERN outreach activity and has been enormously successful. It is almost sold out to the end of its run, mostly with locals from Geneva. Before the performance, the audience is given a short lecture in particle physics, and then descends to the loading bay — 100 metres below the ground — for the show. Afterwards, they are taken around a LEP experiment. The show's artistic success, which is certainly helped by the drama of the space in which it is performed, is in part due to a concise script by Anne Gaud McKee, a molecular biologist from the University of Geneva, and the professional acrobats and mime artists who perform. ■

CERN

The Oracle of Delphi will run until 27 February 2000 (when LEP, currently switched off for winter maintainance, comes back into operation).

Alison Abbott is senior European correspondent for Nature.

Integrals of disease

Statistical Aspects of BSE and vCJD: Models for Epidemics

by Christl A. Donnelly & Neil M. Ferguson

Chapman & Hall: 1999. 229 pp. £39, $69.95

Graham F. Medley

How should infectious diseases be managed? Typical answers to this question will include medical, social, economic and legal frameworks. However, quantitative study of what is essentially an ecological problem should also be expected. Any management plan to conserve a population should include a mathematical description of the expected changes in population size. Control of pests and parasites is on the other side of the same coin, so shouldn't a plan to control an infectious agent include a quantitative model of expected impacts and effects? The field begun by Roy Anderson and Robert May (*Infectious Diseases of Humans: Dynamics and Control*; Oxford University Press, 1992) is heading towards a more 'engineered' approach to the management of infectious diseases. Building a road without predicting its effect on traffic flow is irresponsible, so why implement a control programme without calculating its expected effects?

The UK government was culpable for the lack of appropriate, published quantitative study in its handling of the BSE epidemic. Anderson and colleagues published the first detailed understanding of the infection process and intervention consequences in 1996 (see *Nature* **382,** 779–788; 1996). Until then, the impression, if not the reality, was of quantitative management guided by intuition, guesswork and, I suspect, hope.

This book adds to the quantitative methodology that should underpin the control of diseases that have a long and variable incubation period. These diseases can be especially problematic because of the need for accurate estimates of the distribution of the incubation period in order to infer the temporal pattern of infection from disease data (back-calculation) or to predict the future epidemic from a known infection dynamic. That we have no precise knowledge of either the infection process or the incubation-period distribution of new variant CJD is the principal reason why accurate predictions of the CJD epidemic will be impossible until the epidemic is almost over and the incubation-period distribution has been estimated.

Integrals, with dimensions of age, time and time since infection, abound in the book, and one of the most remarkable features is the lack of statistics. A slightly more appropriate title might have been *Integral equations for diseases with long incubation periods: application to BSE and vCJD*, but this would have been even less attractive than the given title. This slant is not surprising because, as the authors point out, the melding of statistical methods and nonlinear modelling requires considerable development generally, and the authors' rigorous contribution is to be welcomed.

The book provides a comprehensive view of BSE modelling as seen from the backroom. It pulls together the authors' published work, on back-calculation, maternal transmission and spatio-temporal clustering. However, there is little generalization beyond BSE and new variant CJD. And, disappointingly, the decision-making dimension is absent. Some discussion of the impact of this work would have broadened the book's potential audience to include those working in sectors that should actually be using mathematical modelling. ■

Graham F. Medley is in the Department of Biological Sciences, University of Warwick, Coventry CV4 7AL, UK.