element was regarded as a minor point of drafting, although it turned out to be a prescient one. Whether it was intended that research be limited to tuberculosis is not now clear, although Bryder thinks it was. Whether it was or not, pressure was immediately applied to enlarge its scope.

Today, the notion of objectively assessing new forms of treatment to see whether they achieve anything or nothing through controlled clinical trials is commonplace, if not always uncontroversial. In Britain this can be traced back to the MRC's therapeutic trials committee which, among other things, tested calceferol, testosterone and the supphanilamides. Interestingly, the committee had no statistician: even though R. A. Fisher pioneered the idea of randomization in agricultural experiments and worked with the MRC in several research arenas, he apparently had no links with it. Possibly because of this, the idea of the randomized controlled clinical trial had to wait until 1946 when Bradford Hill used such a design to test streptomycin as a treatment for tuberculosis. The results left little doubt about the benefits of the drug. But much more important, they ushered in a new era of medicine.

Just as innovative but, with the benefit of hindsight, rather more suspect results had been the work of the committee of quantitative problems in human nutrition, first convened in 1922. The committee analysed working-class spending on food and found that the working classes were "ignorant and inefficient". In fact, as Celia Petty points out in her essay on the relationships between research and public health, the data the committee collected "actually demonstrates that working class wives already made extremely efficient use of inadequate resources and had a better grasp of economic realities than their academic critics".

Lessons can be learned from this particular piece of history. The first is that those doing the study in the years between the two world wars presumably found what they expected to find (as Thomas Kuhn had told us they would). What was expected here was the view of one class of society about another. Nevertheless, the work was a novel attempt to "apply modern scientific methods to improve the well-being of an economically disadvantaged group". However, the fact that the wrong conclusion was drawn probably had far-reaching consequences as it supported the idea that the lower paid did not need more money, but more 'education' (this view seems to have resurfaced recently). In fact, they were simply underfed.

How difficult it is to apply science successfully to social problems. The irony revealed by Petty's essay is that the nutritional research did not directly alleviate the social problems which were its motivation, but rather led to better understand-

ing of physiology and biochemistry. In the short term, it was science not society that benefited. The late Derek de Solla Price made much the same general point about science and technology. I think that if there is one thing that the research community should heed in this day and age, it is that particular lesson.

Our research institutions play large, though for most of us largely unknown, parts in our lives. We owe it to ourselves, as well as the institutions themselves, to try to understand them. There is a school of thought that understanding an institution or an activity requires knowing its history. This is not a notion to which scientists themselves often seem to subscribe, perhaps with good reason as I suggested above. It seems to me, however, that we fail at our peril to understand science and particularly how research can be harnessed to social change through political will and legislation or 'market forces'. We are not short of accounts of science as threads in the history of ideas. But this is the age of science by government, and anything that provides even a glimpse of how science drives social engineering through the interlocking committees that are the cogs of government machinery is profoundly to be welcomed.

These are essays academic in tone, and this is their strength and their weakness. They are well-documented and well-argued, but they are also rather circumscribed and tend to leave the reader slightly dissatisfied. Bryder's judgement on the MRC's contribution to the decline of tuberculosis is hardly rhadamanthine in its severity. Nevertheless, she does say that the reduction of the disease occurred largely independently of "medical intervention". But to find out what did cause its reduction, she refers the reader to two other books (neither of which I could find in a library). Booth's history of clinical research stops at the point the story starts to get interesting — the opening of the Clinical Research Centre. It is that institute's closure 20 years on that has been arousing passions recently. We really do need to know why this enterprise failed.

A final word of warning. This is administrative history — it depends for its raw material on official documentation. One does not have to sit through many committees, research or otherwise, to appreciate that what is written in the minutes bears only a limited resemblance to what has been said. I sometimes think historians should be more like the psychiatrists who believe nothing their patients tell them rather than like those who believe everything. □

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Darwin's legacy

Philip Kitcher

The Metaphysics of Evolution. By David L. Hull. *State University of New York Press*: 1989. Pp. 331. Hbk \$73.50, pbk \$24.95.

MANY practicing scientists have a stereotype of the philosopher of science which can be condensed into three characteristics: ignorant, interfering and insular. That stereotype derives from the suspicion that the philosopher of science is primarily in the business of telling the practitioners what they ought to be doing, and that this unwanted advice is given

Darwin — not preferring the status quo.

from an olympian perspective.

Work in the philosophy of physics since the 1940s and in the philosophy of psychology since the 1960s has belied the stereotype, for philosophers in these subdisciplines have demonstrated their ability to draw on the substance of the sciences and to contribute to the clarification of theoretical disputes. During the past two decades, however, biology — particularly evolutionary biology — has been the most exciting area for exchange of ideas between philosophers and scientists. David Hull is one of those most responsible for this dialogue, and many of his contributions to it are brought together in this volume.

Hull is a vigorous campaigner against what he calls "intellectual territoriality", and his essays range over issues in metaphysics, history of science, general history, systematics, evolutionary theory and sociology. He offers insights into the reception of darwinism, and uses a study

of reactions to *The Origin of Species* to argue cogently against the popular idea that older scientists prefer the *status quo* whereas their younger colleagues are more innovative. He provides illuminating discussions of trends within contemporary systematics, taking those trends to illustrate some general processes that occur in the growth of science. This collection also includes an address "on human nature", celebrating the variability of species in general and our own species in particular; three defences of the thesis that species are individuals (of which Hull and Michael Ghiselin are the principal advocates); some essays on sociobiology which hew a characteristically ecumenical line; and some articles about the practice of the history of science.

Although his studies take him into numerous specialized fields, Hull's essays reveal a thorough command of his material. His writing is direct and clear, and he presents interesting and original ideas on a variety of topics. In some instances, he gives us refreshing doses of common sense. "In Defense of Presentism", for example, is a penetrating critique of some fashionable suggestions about the history of science. Recognizing the dangers of distorting the thought of earlier investigators, historians of science sometimes inveigh against any forms of "presentism" or "Whiggism", insisting that historical studies must eschew any categories that would not have been accepted by the historical actors. Hull argues forcefully that this position is both unmotivated and absurd. We can appreciate the danger that our current beliefs might distort historical understanding without yearning for histories that uncritically accept the beliefs of earlier generations. As Hull points out, the historian "has every right to believe that virgin births were no more common two thousand years ago than they are today" (page 217).

Not all of Hull's essays are equally successful. His central argument for the view that species are individuals rather than classes seems to depend on misunderstandings of the notion of a class. Classes (sets) are atemporal entities that do not change over time. How then, Hull asks rhetorically, could a species be a class? The answer is simple: we think of the evolution of species in terms of the differences in the distributions of properties at different temporal cross-sections. The atemporality of classes generates no sound argument for Hull's favoured conclusion, and, in consequence, no rationale for the views about the character of macroevolution that he and others have defended by appealing simply to metaphysics. Many practicing biologists, as well as philosophers, have found inspiration in the idea of the individuality of species. Other biologists and philosophers (including myself) see it as much ado

about very little.

The last two essays in the volume, reflections on human sociobiology and on the sociobiology debate, also seem less well argued. When first published, they struck an admirable tone of mediation: criticisms of sociobiology were to be elaborated, but they should not be allowed to throttle a research programme in its infancy. More than a decade later, the dialectic has unfolded and, in the absence of some rethinking and rewriting, Hull's irenicism is bound to seem flabby and dated.

In the end, however, it is churlish to

complain about a collection offering so many provocative and well-defended ideas about so many topics. Biologists, historians, sociologists and philosophers should be glad to have this convenient synopsis of the ideas of an influential thinker. Hull has done more than his bit to fashion a new stereotype of the philosopher of science, founded on a different trinity of traits: informed, incisive and interesting. □

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Watch the birdie

John R. Krebs

Ornithology. By Frank Gill. *Freeman*: 1990. Pp. 660. £29.95, \$49.95.

BIRDS impinge on our lives in many and diverse ways. Some people see them as a symbol of the beauty of nature, to be observed and conserved in their natural habitats (the Royal Society for Protection of Birds, I am told, has more paid-up members than either of the main political parties in Britain). Others enjoy their company as talking or singing household pets; as agile quarry viewed down the barrel of a shotgun; or as a convenient snack purveyed by Colonel Saunders. This last group will find little to interest

Kingdom), will find it contains much to inform and enjoy.

Roughly three-quarters of the book is about ecology and behaviour of birds, the rest being concerned with morphology, physiology and evolution. To test the book as a source of ornithological knowledge for students, I looked up the answers to four questions which I have been asked by students in the last year or so. I also compared Gill's answers with those given by the main rival texts: J. Faaborg's *Ornithology: an Ecological Approach* (Prentice Hall, 1988), and the fourth edition of J. C. Welty's and L. Baptista's *The Life of Birds* (Saunders College Publications, 1988).

Here are the questions and answers. (1) How do birds produce sounds? Greenewalt's (1968) theory of the internal tympaniform membranes as the sound source is

Nesting Boobies — a love affair in the Galapagos.

them in Gill's book, but others, as well as the undergraduates for whom it is primarily written (ornithology is still taught as a separate subject in North America although not in the United

Kingdom), will find it contains much to inform and enjoy. simply but accurately summarized by Gill, although Nowicki's important (1987) result showing the effect of helium on the harmonic structure of sounds is not mentioned. Neither of the other two texts get

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