BOOK REVIEWS

Hoyle on Copernicus

Nicolaus Copernicus: An Essay on his Life and Work. By Fred Hoyle. Pp. vii+94+6 plates. (Heinemann Educational: London, May 1973.) £1.50.

NEARLY everyone is ready to honour Copernicus, yet very few can explain exactly what he achieved. "His heliocentric picture of the solar system was the beginning of modern science" is the kind of cliché that hides several half-truths. The heliocentric picture was propounded by Aristarchus of Samos nearly 1,800 years earlier: does Copernicus deserve much credit for merely reviving it? Paradoxically he does, because he had to face a greater obstacle than Aristarchus, namely the entrenched dogma in favour of the geocentric theory, built up over many centuries. But even in ancient times the idea of planets elegantly circling the Sun was abandoned because it did not fit the facts well enough, and Ptolemy's inelegant but effective system of epicycles came to prevail. The achievement of Copernicus was to devise a heliocentric system that described the planetary motions as well as Ptolemy's (or almost as well), yet also held the potential for fruitful mathematical development in the hands of Kepler and Newton.

Fred Hoyle has now written an admirable little book clearly explaining the achievements of Copernicus for anyone who is prepared to follow some straightforward equations. The main difficulty in writing about Copernicus is to make a detailed comparison with Ptolemy, and Hoyle does so by expressing the radius vector of a planet as a complex number, expanding in powers of the orbital eccentricity e and (generally) neglecting terms in e^2 . Interpreted geometrically, the results show clearly the similarities and differences between the Copernican and Ptolemaic systems, but without the elaborate constructions which so often baffle modern readers. (Incidentally, Ptolemy comes out of the comparison very well.) Although this is the crux of the book, the earlier chapters usefully prepare the way by describing the Aristarchan heliocentric system. In addition there is a 23-page biographical chapter—not

just a re-hash of the standard biographies of Copernicus, but a fresh look. In Hoyle's view, the idea that the Earth rotated was accepted by Copernicus before he was 30, but he only began serious quantitative work on the solar system when he was 40, and the theory was fully developed in his fifties, between 1523 and 1533.

The book is attractively written and animated by a light personal touch, to remind us that

True ease in writing comes from art,
not chance,

—in this instance the novelist's art. I strongly recommend the book as a guide to Copernicus for any reader with a modicum of mathematics.

D. G. KING-HELE

What is Science?

What Is Science For? By Bernard Dixon. Pp. 255. (William Collins: London, July 1973.) £2.50.

THE avowed purpose of this book is to provide "an assessment of what science is and how scientists work". The author is a leading member of a profession that is bound to become more and more important as science becomes more and more complicated and scientific considerations weigh ever more heavily in political decisions. Although the passage is amusing and not unjust, the author is unwise to start off by describing characteristics he most dislikes in a reviewer, because this is asking for retaliatory comments. Perhaps the reviewer specially dislikes an author who chooses as the title of his book a question which (unlike, say, "*was Metternich a negro?*") hardly admits a straightforward answer. But, of course, if the answer had been straightforward there would have been little incentive to write a book.

Dixon starts with an account of the degree of esteem or disfavour in which science has been held from the 17th century to the present day, and he calls attention emphatically but temperately to the activities which have made people see an essential malignancy and have given them a "a new fear of positive evil" in the pursuit of science; he draws a parallel between the bewilderment of

modern scientists at their current revaluation by society and the doubts and bewilderment of the clergy at that reappraisal of their status for which science itself was responsible; but it was ill-judged to use the term "corporate menopause" to describe the condition of the scientific profession today, because there is no evidence that scientific productivity is declining or on the point of giving out. Next: "What is a Scientist?" ... and "is there indeed such a definable figure?" A number of witty case-histories make it clear that scientific activities and the people who carry them out are remarkably diverse. What Dixon says is always pointed and interesting, as a good journalist's writing ought to be, and in spite of occasional pinpricks most scientists will probably regard his account of the matter as a just one. The same goes for his account of what actually goes on in the mind when scientists practise what laymen obstinately believe to be "the" scientific method. So far from being the practitioner of one cut and dried method, he sees the scientist as the practitioner of a certain way of life—a man who by systematic research and occasional imaginative forays but above all by the habit of self-correction builds up interpretations of the world which are ever more trustworthy and reliable and come ever closer to what is called "the truth".

Dixon fully understands and gives due weight to the importance in scientific life of the scientific community, the *internationale* of fellow professionals who scrutinize each others' work, correct it and carry it on. "Scientists of the world unite," Henry Tizard, England's leading scientific administrator, was fond of saying at the end of the Second World War, when it looked as if national rivalry and political ambition between them would do us all in. Actually, we have an *internationale* already but it is a purely professional one and carries no political weight. Thus we shall have to take Lord Zuckerman's advice and become politicians ourselves if we are to influence policy in any effective way. Unfortunately, Dixon's badly overwritten section on research funding with special reference to the Rothschild report illustrates the worst of journalism as clearly as the rest of his book exem-