BOOK REVIEWS

Man, Money and Mining

River of Tears: The Rise of the Rio Tinto Zinc Mining Corporation. By Richard West. Pp. 201. (Earth Island: London, 1972.) £1.95.

THIS book is not a work of science and a notice of it in *Nature* can only be justified for the interest it may have for some environmentalists. The title is based on an emotive phrase from a speech by President Kruger after the discovery of gold on the Witwatersrand: "Every ounce of gold taken from the bowels of our earth will have to be weighed against rivers of tears and the life blood of thousands of our comrades. . . ." It is a study of the international politics of mining today, as illustrated by the effect of Rio Tinto Zinc on countries in three of the five continents in which the company operates. The rise of RTZ is traced from early beginnings in the Huelva province of Spain, already desolated by centuries of pyrite and copper mining, to the amalgamation with the Zinc Corporation and the emergence of the company, under Sir Val Duncan, as what the author claims to be the world's largest mining concern. Whether this claim is right or not, the importance of RTZ as a British-based international enterprise is unquestionable. Its tendency to avoid the fierce glare of publicity is evidently deplored by Mr West, who has collected as much critical comment as he can from Africa, Australia, and the United Kingdom and gives the impression that he would genuinely have liked to have the opposing arguments. As it is, he endeavours to show that RTZ is bolstering up apartheid in South Africa by mining copper at Palabora, is supporting an illegal regime in South-West Africa by working uranium ore at Rossing and, by discovering nickel mines in Rhodesia, is ensuring the success of the Smith government. He further discerns a threat to the national sovereignty of the Commonwealth of Australia in the great RTZ bauxite operations at Weipa and the Japanese contracts for which RTZ (with other companies) have brought into production the huge iron ore workings of Hammersley Ranges. In Bougainville, he finds that the development of an open-pit copper

mine 3,000 feet long by 2,000 feet wide is destroying a demi-paradise. Finally, in Britain he seeks to show how the provision of new jobs by the erection of the lead-zinc smelter at Avonmouth and the aluminium smelter on Anglesey has been achieved at the expense of the environment, and he concludes with a review, commendably moderate in tone, of the conflicting views about the prospecting of the Mawddach Estuary and the mountainside at Coed-y-Brenin forest. There is much else besides, including a curious attempt to link RTZ, by way of the Concorde, with the old-time slave traders of Bristol.

It will be obvious by now that this is a book with a slant, but we are not given a clear statement of this until the end, when Mr West states his own position: "Wealth, or Mammon as it was once called, is worshipped still in the interests of 'growth' or greed, the metals are ripped from the earth to be used in motor cars, Concorde aeroplanes, beer cans, nuclear weapons and TV sets. Instead of conserving the world's dwindling natural resources, governments encourage the miners to still more frantic efforts. As a consequence of this mineral rush, farmers are thrown off their land, whole mountains are scooped away and their poisons dumped in the sea; industry invades the few last patches of natural beauty." If there is any constructive conclusion to this study, it is that we should seek to return to that blissful non-metallic state of early Neolithic time when the tool was made of flint or obsidian, the plough hacked from a dead tree, and untamed natural beauty was everywhere. How many, I wonder, of island earth's teeming millions could survive?

KINGSLEY DUNHAM

Cartesian Astronomy

The Vortex Theory of Planetary Motions. By E. J. Aiton. Pp. ix+282. (MacDonald: London; American Elsevier: New York, February 1972.) £6.

In 1644 the French philosopher René Descartes published the first full account of the system of natural law

that he had constructed in imagination during his earlier years. He conceived space to be everywhere occupied by matter. Hence, any motion of a body must be part of a closed system of displacements; and the Universe was to be conceived as an aggregation of revolving systems of particles, or vortices. The fiery centres of these vortices were the stars; the planets were defunct stars captured by adjacent vortices and thereafter carried round like straws in a whirlpool.

Historians of science commonly state that the vortex theory was eventually discredited by the gravitational synthesis of Newton, who, it is alleged, established that no vortex-borne planet could conform in its motion to Kepler's Laws. This, however, is to oversimplify a complex historical development; all the more welcome on that account is the authoritative re-assessment now presented by Dr Aiton.

After glancing at earlier, less precise vortical models, Dr Aiton traces the fortunes of the classic formulation by Descartes through what he distinguishes as its three historic phases. In the period ending with the publication of Newton's *Principia* in 1687, practical astronomers were content to base their work on Kepler's Laws, feeling no need of any facile physical theory to support them; while the Cartesians were equally satisfied with just such superficial explanations, taking no account of Kepler's Laws, with which, indeed, Descartes seems not to have been acquainted. The second phase, extending to about the time of Newton's death in 1727, was marked by Cartesian efforts to embrace the details of planetary motion in the vortical scheme while questioning the technical validity of Newton's criticisms of the Cartesian vortices. The third, post-Newtonian phase was marked by attempts to harmonize the essential principles of the two rival traditions; when this was found to be impracticable the Cartesian cause was lost.

Throughout the long debate the Cartesians enjoyed the advantage that they were referring the phenomena to known laws of impact, while the Newtonians appeared to be relying on