

good deal of information on dams), and a fairly full index.

Taken as a whole, the work undoubtedly maintains its high reputation as a standard authority on the subject of reservoir dam construction, and its wealth of diagrammatic profiles from existing examples will cause it to be of great value to the practising engineer, as well as to the student who is seeking to acquire a knowledge of first principles.

BRYSSON CUNNINGHAM.

Science and Progress.

Progress and Science: Essays in Criticism. By Robert Shafer. Pp. xii+243. (New Haven: Yale University Press; London: Oxford University Press, 1922.) 12s. net.

THIS volume is almost entirely critical, mainly of the doctrine that science has contributed to a more rapid "progress" of the human race as a whole, and that we may expect this progress to continue. Much of the criticism is acute and many other writers are cited—Prof. Bury, Mr. G. D. H. Cole, Mr. Tawney, and Miss Follett; but the main attack falls upon Mr. F. S. Marvin, whose books, "The Living Past" and "The Century of Hope," are largely quoted in the initial chapter, which gives its title to the whole; he is dismissed in the concluding sentence thus: "It follows that men such as Mr. Marvin are hardly doing us any good, are promoting rather beliefs and hopes which may in the end work an intolerable mischief in the world."

It is a challenge to optimism, or rather to meliorism, based on science, and would have more justification if the author could find any passage either in Mr. Marvin's writings, or in any sympathiser's, indicating a belief either that this progress was complete, or that it could be expected to continue without the strenuous efforts of mankind to carry it further and remedy its defects. This Mr. Shafer does not attempt to do. We are, therefore, reduced to asking him one or two quite simple and direct questions as to his judgment of facts.

1. Is it not a fact that the advance of science in the last three or four centuries has, on the whole, led to an enormous alleviation of human suffering and an increase in the capacity and the facilities for happiness?

2. Has not this advance been accompanied by a growth in the collective consciousness of mankind, quite unparalleled in history? And is not this growth in the sense of "humanity" due, partly to the knitting up of the world by the mechanical application of science, partly to the fact that science is in itself a

social thing and that its growth involves the co-operation of multitudes of minds bent on the whole—poison gas and weapons of war notwithstanding—towards increasing human welfare?

3. If this is so, is it an evil or mischievous thing to try to realise these forces in the world and to feel that they are with us in our individual efforts to promote the same great ends?

It should be noticed that Mr. Shafer in his criticism of Mr. Marvin quotes exclusively from the two books mentioned above, which are rather popular summaries of great epochs of history, and does not refer to the more philosophic treatment of the same topics in the various volumes of the "Unity" series published by the Oxford University Press.

Our Bookshelf.

The Union of South Africa. Department of Mines and Industries. The Geology of the Country around Heidelberg; Geological Map of the Country around Heidelberg. By Dr. A. W. Rogers. Pp. 84. (Pretoria: The Government Printing and Stationery Office.) 8s. 6d. net, including map.

THE publication of the official description of the geology of the Heidelberg district has been anticipated with much interest by South African geologists. The main features of the area have long been known on account of the economic importance of the Nigel Reef. Mainly owing to the pioneer work of Dr. Hatch, it was recognised more than twenty years ago that the Heidelberg district forms the south-eastern limb of the great pitching syncline, on the northern limb of which lies the Rand, and it may at once be said that the result of the detailed survey fully confirms the accuracy of Dr. Hatch's general conclusions. The gradual extension of mining towards the East Rand and the sinking of many bore-holes, some of great depth, have clearly shown that the Nigel Reef belongs to the Main Reef series of the Witwatersrand; it is also shown that the whole Witwatersrand system decreases regularly in thickness towards the south and east, from about 25,000 feet near Johannesburg to 15,000 feet at Heidelberg. This is quite in consonance with the theory of its formation as the delta of rivers coming from an old land to the north-west.

In this memoir the structure of the district is lucidly described. The most remarkable feature is the great Sugarbush fault, so called from its relation to the Zuikerboschrand. This is a new discovery of great importance. The fault is apparently nearly vertical, with a down-throw to the south; at one point in its course, where it brings the Ventersdorp Amygdaloid against the Hospital Hill Series, the throw must be at least 16,000 feet. It therefore ranks as one of the world's greatest dislocations. The fault is certainly of pre-Karoo date, but its relation to the Pretoria Series has not been made out. Probably, however, it was later in date than the deposition of the whole of the Transvaal system, and therefore possibly of early or middle Palæozoic age.

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