about the way Britain brings new entrants into employment: a dynamic conception of the industrial society must replace the static conception in the apprenticeship principle, in which the needs of the situation are first identified and then met by conscious and deliberate steps.

Two chapters of the book are given to a critical review of the apprenticeship system and of its historical development up to the issue of the White Paper in 1962, and he then outlines the proposals issued on September 26, 1961, by the Commission of the Common Market for a common policy on occupational training. This he regards as essentially a statement of the needs of any highly industrialized community in the second half of the twentieth century, and he claims that his proposals are designed to meet the new situation and its educational challenge. Like Dr. G. H. Bantock in his *Education in an Industrial Society*, he is critical of Britain's preoccupation with educational organization, though he does not minimize the importance either of organization or of new techniques and research in occupational training. What matters is that Britain should accept the need for total reform and reject piecemeal alternatives. A policy and a plan are needed, covering twenty-five years or more.

First, the training must be seen not as an end in itself, but as a part of a greater whole—the correct utilization of Britain's resources, and both the plan and its execution must be in the hands of experts, not of a consortium of employers and Trade Unions. The first step is the establishment of what he terms a "National Occupational Training Authority", to formulate and implement a national policy, to integrate all actions in this field, to co-ordinate the work of other bodies, to supervise and inspect the work of the training boards, and generally to provide a central focus for occupational training. This is far more important at this stage than the training boards themselves. Britain also needs the institutions which should be the focus of training in, and research into, occupational training, and Mr. Wellens refers particularly to the need of encouraging the study of occupational training within the universities, the colleges of advanced technology and the technical teacher training colleges, as well as for some central organization to investigate the figures collected by the Overseas Migration Board relating to the immigration and emigration of highly trained personnel.

The Authority visualized by Mr. Wellens is a small body of about nine members about half of whom would be experts in occupational training and covering all fields of training activity, and provided with a secretariat and experts in Trade Union practices and law, in education and in industrial organization, practice and law. It would not be a consultative body and would thus contrast sharply with the Government's present proposal under the Industrial Training Act for a Central Training Council, of which, as announced on March 16, Sir John Hunter is to be chairman.

In spite, therefore, of some progress in setting up Industrial Training Boards—the names of chairmen for these for construction, engineering, wool textile and iron and steel were announced by the Minister of Labour, Mr. J. Godber, on April 20—and of considerable support for some of Mr. Wellens's ideas evidenced in the debates in Parliament early this year, Britain has far to go before she has anything like the national system of occupational training urged by Mr. Wellens. Meanwhile, however, there are two implications in his proposals which call for close consideration. Fundamentally he proposes that the number of training places available should be related to industrial needs.

This in essence seeks at relating supply and training opportunities to demand in a way that has not been attempted before outside the U.S.S.R. It could be described as directed education, if not directed labour, and the implications of any such limitation of educational aspirations need to be weighed very carefully. Such a policy may indeed be inescapable if the emphasis on vocational education (if not training) which sometimes finds expression in present plans for university education is followed to its logical conclusion. Otherwise, excesses of trained man-power can scarcely be avoided in fields where demand is less than supply.

The alternative is a system of education and occupational training which is sufficiently broadly based to facilitate transfer or re-training in fresh occupational skills. To be fair to Mr. Wellens, this is what he has in mind, for he does not neglect the human aspects of the situation. The whole trend of his book in fact supports the arguments recently advanced by Dr. G. H. Bantock and others for much closer attention to the whole purpose and content of further education than has been manifest in the Robbins Report or in Prof. Sloman's Reith Lectures last winter. These are not questions lightly to be dismissed, and Britain should have at least some idea of the answers to them before she takes the further steps which Mr. Wellens desiderates as so urgent and imperative if she is to have a national policy for occupational training appropriate to industrial needs to-day.

R. BRIGHTMAN

VIEWS ON TEKTITES

Tektites

Edited by John A. O'Keefe. Pp. xii + 228. (Chicago and London: The University of Chicago Press, 1963.) 77*s*.

THEIR nature is still controversial: to one group they are certainly of cosmic, to the other surely of terrestrial origin. Both opinions are reflected in the representative volume, in which O'Keefe and nine collaborators have collected all available data to review the present state of our knowledge concerning these mysterious bodies of glass, which are called 'tektites'.

So, while the various properties of tektites are dealt with by a number of collaborators, each a specialist in his own field, there is no general agreement as to their origin. I found that the most difficult to understand was Barnes's explanation for the strewn-fields in Cambodia and Laos, which "may be the result of impact of a diffuse object such as a comet or it may be the result of some nuclear or electrical phenomenon not yet fully understood" (p. 49).

Baker's chapter on form and sculpture is based on an intimate knowledge of the Australian tektites (australites). They form a unique assemblage of regular bodies, where all kind of dates can be calculated and the degree of ablation can be measured. Baker distinguishes three different phases: a primary at time of origin; a secondary where the tektites have been shaped by aerodynamical forces during their supersonic flight through the Earth's atmosphere; and a tertiary phase of terrestrial erosion. All australites (including the curious 'button-types' with typical flanges and flow ridges) are products of the secondary phase; also many (not: "perhaps a few" (p. 2)) javanites show clear signs of ablation. The degree and intensity of ablation depend, as we think, entirely on the angle of entry into the atmosphere and the original shape of the tektite.

Barnes deals with the strewn-fields. Darwin glass and Lybian Desert glass (I would agree with Baker (p. 1)) should no longer be regarded as true tektites and would best be omitted. Australites, indomalayasianites, indochinites and philippinites are described as different entities. While they all form a closed strewn-field, reaching from Thailand to Tasmania, Barnes believes that even in the Malaysian region "it is unsafe to assume that they all belong to the same shower". A glance at Zähringer's Table 2 concerning the potassium/argon content (p. 142) reveals that all the indoaustralian tektites have the same absolute age and therefore represent one event.

Chao on the petrography concludes that tektites are bodies of glass, distinguished from all other natural glasses by: (*a*) the universal presence of flow structure accompanied by strain birefringence; (*b*) the general presence of siliceous glass inclusions; (*c*) the complete absence of microlites. He is in favour of the terrestrial hypothesis for the origin of tektites (p. 91) and so also are Schnetzler and Pinson (p. 126), who deal with chemical composition. The question as to whether the parent material for tektites could be igneous, or sedimentary rocks, has not been solved. The extremely low water content (for other reasons for extra terrestrial origin) "even lower than in atomic-bomb-produced glasses" is regarded as a sign of an "extremely high-temperature fusion process".

A chapter is provided on "Physical Properties and Gas Content", by Friedman, and one on "Isotopes", by Zähringer. Most important are the potassium/argon ages, where three large units of different age can be distinguished: North America, 34 million years; Czechoslovakia, 14·8 million years; Indo-China–Australia, 0·63 million years. The Ivory Coast tektites probably represent a fourth independent strewn-field.

Adams and Cohen deal especially with the origin of tektites. Adams explains tektites as "released as liquid fragments from the ablating surface of a hypothetical parent body in hypersonic flight in the Earth's atmosphere" (p. 161), while Cohen advocates an "Asteroid- or Comet-Impact Hypothesis". He tries to link the moldavites with the Ries and the Ivory Coast tektites with the Bosumtwi Crater; here I would comment that only the Indo-China strewn-fields clearly show no connexion with any crater (Barnes)—a phenomenon which does not occur in any other Far Eastern and Australian strewn-fields.

I found the most interesting chapter to be that by the editor, who gives a well-balanced discussion on the origin of tektites. His conclusion is that tektites are of lunar origin, and, at the same time, he furnishes important data on the history of the Earth–Moon system.

I myself share O'Keefe's opinions. The two periods of melting and the immense size of the indoaustralian tektite field can only be explained by a cosmical event; it might be added that the geologically older strewn-fields were perhaps inferior in size, but probably have suffered so much from erosion that only remnants of the original fields are preserved.

This book on tektites contains the most complete information so far available, and reflects, at the same time, the different opinions expressed by various authorities on the difficulties encountered in such a complex and fascinating problem, which cannot be solved by direct observation.

G. H. R. von Koenigswald

A GREAT GEOLOGICAL HOAX

The Lying Stones of Dr. Johann Bartholomew Adam Beringer, being his "Lithographiae Wirceburgensis"

Translated and annotated by Melvin E. Jahn and Daniel J. Woolf. Pp. xiv+221+14 plates. (Berkeley and Los Angeles: University of California Press; London: Cambridge University Press, 1963.) 6.50 dollars; 52*s*. net.

POOR Beringer! He acquired a place in the history of science not for any valuable contribution he made to science but because of a long-accepted story which pictures him as the victim of a nasty hoax, played on him by his students who cleverly planted artificial fossils in his favourite 'real' fossil locality. Beringer, it appears, was so fascinated by this remarkable collection that he published in 1726 a book entitled *Lithographiae Wirceburgensis*, containing 21 plates with more than 200 drawings of these objects. The story goes on to say that after publication he found his own name among these alleged fossils and, presumably as a consequence of this, impoverished himself in the effort to buy up the book and died shortly afterwards.

So much for the old story. What is definitely known is that Johann Bartholomew Adam Beringer (1667–1740), senior professor and dean of the faculty of medicine in the University of Würzburg, adviser and chief physician to the Prince-Bishop of Würzburg and to a hospital, was, like so many medical men of his time, fascinated by fossils. With the help of three obliging young men he collected fossils from the well-known limestone called in Germany 'Muschelkalk', which belongs to the Middle Triassic system. In 1725, however, strange new limestone specimens began to appear in his collection—queer figures of insects, spiders spinning their webs, slugs, snails, lizards, frogs, fish, birds and other peculiar creatures, as well as plants. Even 'curiouser', slabs of limestone began to be unearthed bearing Hebrew letters, some even spelling "the unutterable name of the Almighty". Out of these strange finds emerged the book published in 1726.

The book by Melvin E. Jahn and Daniel J. Woolf, now under review, contains the following items: (1) Pp. 11–109—the first English translation from the Latin of Beringer's book (14 chapters) together with the original 21 plates and two additional plates giving photographs of some of the objects which are preserved in the Museum of the University of Würzburg. (2) Four appendixes: *A*, bibliographical citation from Chapter 1 (pp. 111–125) which is most valuable as giving a bibliography of books dealing with fossils published before 1726; *B*, an account of the Beringer hoax and the subsequent trials (pp. 125–141); *C*, Lhwyd's letter to John Ray (pp. 142–153); *D*, Hueber's medical corollaries (pp. 154–158). (3) Notice to the translation and appendixes (pp. 159–202)—a most valuable part of the work. (4) Bibliography (pp. 203–209). (5) Index (pp. 211–221).

Clearly one of the most fascinating parts of the book is Appendix *B*, which unfolds the true story of the famous hoax. In the first place Beringer, while writing his book, knew all about the plot against him by 'The Pair', who actually sent him 'figured stones' manufactured by themselves. Without actually naming them, Beringer makes reference to these malefactors in his introduction (pp. 21–37) and in Chapters 1, 2, 12 and 14. This discovery of 'The Two' and of a mysterious third was made in 1935 by Heinrich Kirchner, who published an article in the *Journal of the German Geological Society* (*Z. Deutsche Geologische Gesellschaft*, **87**, 607; 1935) on his discovery of documents in the Würzburg Archives, relating to the judicial proceedings against the three youths who supplied Beringer with 'fossils'. From these documents, it appears that the 'figured stones' were carved by J. Ignatz Roderick, professor of geography, algebra and analysis at the University of Würzburg, assisted by the Hon. Georg von Eckhart, privy councillor and librarian to the Court and to the University. Behind the 'Two' lurks the shadowy figure of Baron von Hof. The whole intrigue is both complex and undignified. One is appalled by the meanness and nastiness of the plotters and by the stupidity of the victim. But the victim was not quite as green as the original story painted him. Apparently he never identified the manufactured 'figured stones' with real fossils, although he regarded them as natural or supernatural phenomena.

He discussed at length all the hypotheses proposed to explain the origin of fossils—astral, aura seminalis, formative force of light, panspermia and lusus naturæ, but he failed to see and to include the natural explanation, suggested by Steno, Palissy and Hall, that fossils are relics of former animals and plants.

Apart from the melodrama of the scandal in academic circles revealed in Appendix *B*, the book by Jahn and Woolf, full of meticulous erudition, is of great value to the historian of science as giving a cross-section of learned