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TOWARDS A PUBLIC UNDERSTANDING OF SCIENCE

The Architecture of Molecules

By Prof. Linus Pauling and Roger Hayward. Pp. x + 117 (57 full-page drawings). (San Francisco and London: W. H. Freeman and Company, 1964.) 70s.; 10 dollars.

"WE are now living in an atomic age. In order to understand the world, every person needs to have some knowledge of atoms and molecules."

This is the beginning paragraph of a fascinating work of art: *The Architecture of Molecules*, by Linus Pauling and Roger Hayward. The question as to how some understanding of science, however superficial, can be brought to the man and woman in the street has exercised many organizations as well as individuals. At a practical level, of course, it is unnecessary to know anything about electric currents in order to turn a switch and bring on the light. Babies love to do it before they are one year old. But for all too many people science is still magic even when they are twenty-one. They eat their food and hope that it will be digested. They give their car petrol, oil and water and expect that it will go. They put their vote into a ballot-box and leave someone else to make all political decisions for them. Furthermore, so long as there is a doctor to write out a prescription, a garage hand to look at the motor when it stalls, a strike-leader to tell them when to stop work or a horoscope to tell them when to expect a change for the better, why worry?

Well, Linus Pauling worries. He thinks, quite rightly, that young people ought to want to know why the 'lead' of a pencil comes off on to the paper, what an atom of hydrogen or uranium 'looks like', how many different kinds of atoms there are and why a scientist refers to silver as Ag, why so many different models are used to represent molecules and what holds atoms together in molecules. He goes on to discuss the valencies, sizes and shapes of molecules, from H_2 to the antiviral aureomyein, $C_{22}H_{23}O_6N_3Cl$, and the even larger myoglobin and haemoglobin. He explains in terms of the strain of bent bonds and the eclipsed orientation of the hydrogen atoms why cyclopropane is a better fuel for rocket propulsion than cyclopentane or cyclohexane. He also shows how molecular shape may be responsible for disease and abnormality in human beings. Roger Hayward's drawings are superb. Every crystallographer will want to possess this book and to gloat over them. Undoubtedly many an arts sixth-former will pick the book off the school library shelf and will learn a great deal by browsing through it. So indeed will those science students who are bound to read anything that Linus Pauling writes. (Incidentally, it is a pity that in the definition of liganey, in section 29, the word is misprinted 'lignancy'.)

It will be interesting to see whether the book will appeal most to those who are already scientists or to the man-in-the-street for whom it seems to be intended. To an experienced reader this book tells a great deal about the interests of Linus Pauling himself. It is just a little difficult, otherwise, to explain the absence of benzene and the presence of $Pt_4(CH_3)_{16}$, or of the catenane ($C_{34}H_{66}O_2 + C_{34}H_{68}$). The linking of molecular structures and of crystals with the Platonic solids, and hence with the ancient symbols for earth, air, fire, water and the ether, is historically interesting, but one feels uneasily

that it could also be misleading. Nevertheless, it is difficult to be critical for long of a book with such unusual personality about it. It is too fascinating.

KATHLEEN LONSDALE

AFRICAN STUDENTS IN BRITAIN

New Commonwealth Students in Britain

With Special Reference to Students from East Africa. (A P.E.P. Publication.) Pp. 253. (London: George Allen and Unwin, Ltd., 1965.) 35s. net.

IN October 1964 there were 64,169 overseas students in the United Kingdom, of which 42,323 came from Commonwealth countries—the East African contingent numbering approximately 4,000. The figures for 1965 are not yet available but they are likely to show an increase. Moreover, there are probably as many again in other countries in Western Europe, the United States, India and in Communist countries. The magnitude of the problem does not seem to be appreciated by the general public, although it is a source of continuing anxiety to the authorities and organizations which have to deal with the students.

Political and Economic Planning has sponsored a study by a research team into the problems of East African students in Britain, financed by a generous grant from the Ford Foundation. The report which covers the thoroughgoing investigation is a valuable contribution to our understanding of the problem. It is not possible in a short review to cover the whole report and we must confine ourselves to a few salient points.

First we may enquire why there is an influx of East African students on this scale. The most obvious reason is that despite the considerable and costly expansion of post-secondary educational establishments in East Africa, it is quite insufficient to meet the demand. The newly independent countries are in a hurry to 'Africanize' and are doing everything possible to step up the output of secondary schools. In Kenya, for example, the Government plans to provide an additional 21,000 secondary school places by 1970, and Tanzania and Uganda are doing likewise. It seems most improbable that the University of East Africa and technical training establishments will expand sufficiently rapidly to meet the greatly increased demand for places. The inevitable answer is to seek places in educational establishments overseas. That this is recognized by the local governments is demonstrated by the fact that in Kenya the Ministry of Education's vote for post-secondary scholarships has been increased by £480,000 per annum. Another reason is that a number of students consider that an overseas qualification has a prestige value greater than one gained in their own country, although some suffer disillusionment when they return home and find that their degrees or diplomas are not of the standard required by their own Governments. This is not, however, the case with most qualifications gained in the United Kingdom, the standards of which are acceptable. Even so, in order to gain a professional qualification students sometimes have to learn subjects which are useless to them. For example, students training in England as accountants have to study the British income tax laws. But such anomalies do not deter those who are often more concerned with gaining an acceptable qualification than with what they have to learn.