way in which academics force their pet subjects into the syllabus.

It is easy to add material to a university curriculum but difficult to take it out on account of the internal pressures and interests alluded to above: thus, the chronic overloading. In my experience the only instrument that can overcome these pressures is factual information about the sciences and techniques which engineers are currently using; not the opinions of the professors, nor the opinions of employers (who sometimes do not know what their engineers are really doing), nor even the opinions of the engineering institutions, but objective first-hand data derived from a systematic survey. This has been done among chemical engineers and the two surveys conducted in 1960 and 1965 (refs. 5 and 6) provide quantitative data on the relative usage of different subjects. Professor S. P. Hutton has carried out a somewhat similar exercise among mechanical engineers[7].

When all these arguments are admitted, however, it may be found that 3 years is too short a period in which to give young engineers the minimum equipment they will need if these additional aspects are to be covered. The present conjunction of overloaded syllabuses at universities with further instruction in industry might seem to support this view. In fact, much of what has been advocated would involve changes in emphasis rather than added matter; nevertheless, the possibility must be faced that 3 years may simply not be long enough. It is then a straight choice between teaching the additional material in industry or extending the university course. At present there is no factual evidence on the efficiency of teaching in industry as compared with that in the universities. What is needed is an independent survey of existing graduate training schemes and an assessment of the quality of the teaching and the amount of knowledge gained by the trainee. I feel that a teaching institution is likely to teach more efficiently than an industrial organization: consequently everything that is teachable at the university should be taught there.

If university engineering courses are to move closer to engineering as it is actually practised, certain changes will be necessary in the make-up of the academic staff. It ought to contain a leavening of engineers with industrial experience at all levels of seniority. This is because it is not possible to practise engineering at a university in the sense that one can practise science. As the industrial experience of a university teacher recedes into the past he inevitably becomes less of an engineer and more of a scientist. Consulting work may delay but cannot arrest this gradual loss of touch. How to attract mature engineers of high calibre into university teaching is a problem which should not be insoluble. One way not to attract them is to insist that applicants for senior academic posts in engineering shall always be able to produce long lists of publications. It may be more relevant to enquire what plants they have designed, built and operated, and what projects they have carried through successfully.

This, then, is a plea for universities to pay greater attention to stages 1 and 3 of the engineer's task and provide a more adequate conceptual framework for the creative imagination of the designer, the diagnostic skill of the trouble-shooter, and the organizing ability of the managing engineer. The aim should be to produce a graduate who will be fit for responsible employment in a period of months rather than years.

[1] *Education and Training Requirements for the Electrical and Mechanical Manufacturing Industries*, Chairman, S. G. Bosworth, (H.M.S.O., 1966).
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BOOK REVIEWS

ALL ABOUT ALCOHOL

Alcoholism

Mechanism and Management. By Max Hayman. (A Monograph in the Bannerstone Division of American Lectures in Living Chemistry.) Pp. xv + 315. (Springfield, Ill.: Charles C. Thomas, 1966.) $10.50.

MODERN films tend to open with an arresting scene—a burglary or murder—with which the subsequent action deals in more conventional fashion. In much the same way this book begins with a staggering list of facts about alcoholism, which become the more impressive for their presentation in this way.

The state of California (population about 17,500,000) had 886,000 alcoholics in 1962: it runs a close second to New York with 8,170 alcoholics in every hundred thousand of population more than twenty years old. In hospital in the United States as a whole alcoholism ranks fourth in the list of public health problems. These are just a few of the facts recorded.

The book is addressed to medical men, whether general practitioners or specialists. In so far as several chapters deal with psychoanalytic theory and practice in relation to alcoholism, it is meant for American doctors, whose medical training and orientation are such that they would feel the need for some presentation in these terms. The author, who has unrivalled experience in all aspects of alcoholism, makes it clear, however, that very few alcoholics are suitable for, or receive, formal psychotherapy of this kind, and that eclectic methods involving a wide range of skills and professions suit the majority of the sufferers best.

Alcoholism is presented as a medico-social problem, affecting human life at very many points. Certain selected aspects, biochemical, psychological, legal, psychiatric, pharmacological and others, are chosen for succinct review in relatively short chapters, each of which is followed by an excellent list of the most relevant publications. This design precludes an evaluation in great depth in any area, but has the advantage of covering the whole field in readable fashion, while giving the more sophisticated reader plenty of leads for pursuing a particular interest.

D. L. DAVIES

PULMONARY CIRCULATION

Pulmonary and Bronchial Vascular Systems

Their Reactions under Controlled Conditions of Ventilation and Circulation. By I. de Burgh Daly and Catherine Hebb. (Monographs of the Physiological Society, Vol. 16.) Pp. xv + 432. (London: Edward Arnold (Publishers), Ltd., 1966.) 90*s*. net.

DR. I. DE B. DALY'S published contributions to the study of pulmonary circulation extend over forty years, and he and Dr. Hebb between them have used each one of the experimental approaches discussed in this book.

The book opens with an account of the functional anatomy of the lung, which lays the essential foundation for the evaluation of subsequent experimental results. Important quantitative data on lung architecture are assembled and species differences are illustrated by