

in determining batch distillation performance but, more vitally, in the calculation of equilibration time for different types of column.

This aspect is extended to a general investigation of the effects of process variables in batch distillation and the recommendation of optimum operating conditions. It also covers the use of digital computers in calculating the separation of multicomponent mixtures. Typical of the thoroughness of this section is the comparison of the Lewis, Chilton and Colburn, Westhaven and Kuhn, the Cohen, Marshall-Pigford and Bowman equations governing the approach to equilibrium. The section concludes with an extensive bibliography.

The treatment by Deal of vapour-liquid equilibria is concise and yet contains a valuable survey of the relation between molecular structure and activity coefficients. The treatment of experimental techniques and the design of the equilibrium is still perhaps excessively brief, as is the coverage of consistency tests, which are so important in the assessment of the reliability of experimental data. Williams on the other hand gives a wealth of detail on the performance and construction of both wetted-wall, packed and plate columns and ancillary apparatus such as temperature controllers, pressure controllers and reflux dividers. The operating procedure is also covered in detail.

The section on extractive and azeotropic distillation by Carlson and Steward might have suffered from the problem inevitable in a book of this type, namely the duplication of material covered by other contributors. However, the treatment of equilibrium is still so much more comprehensive than Deal's that all one can do is to criticize the editor for the allocation of section headings. The actual techniques of extractive and azeotropic distillation are well covered, although one would like to see a more extensive list of specific solvents and entrainers and a more detailed analysis of the relative merits of the two separation systems.

The section by Tipson on vacuum distillation gives much useful information on column design and vacuum techniques including the application of mechanical stills. Perry provides a detailed account of molecular distillation which is complemented by Hecker's contribution on all aspects of the performance of the distillation apparatus and ancillaries under vacuum.

The three new sections in this edition provide a valuable extension to the literature of laboratory distillation. Continuous laboratory distillation is treated somewhat briefly by Williams but is particularly interesting despite the lack of details on reboilers, feed pumps and flow meters. Orgen's treatment of pilot plant distillation covers the sizing of plant and ancillaries and is therefore valuable in itself and also serves as an introduction to the engineering of distillation plant and thus serves as a useful bridge between chemists and chemical engineers. This is particularly important at the present time when the control of full-scale plants is changing from that of the simple physical parameters of temperature, pressure and flow to the more elaborate and challenging idea of direct control of product composition by means of chromatography, mass spectrometry and infra-red and ultra-violet spectrometry. In this area the chemists become directly involved in commercial scale processing techniques.

The final section by Williams on automation and control in distillation therefore serves as a fitting conclusion. The chemist should find the coverage of these control techniques of both interest and use. Fundamental to control is the phenomenon of the dynamic responses in fractionation columns which is also covered and is a much-needed reminder to all those involved in distillation that the operation of fractionating plant is essentially an unsteady state in stable equilibrium on which are superimposed transient responses to external conditions.

This book covers a very wide range of topics of interest and value to the worker in the field, and will certainly earn a place on his bookshelf. M. G. ROYSTRON

THE BALD FACTS

Die Menschliche Glatze im Altersformwandel der Behaarten Kopfhaut

Morphologische Studie. Von Klaus Goerttler. Unter Mitarbeit von Peter Gördel. (Zwanglose Abhandlungen aus dem Gebiet der Normalen und Pathologischen Anatomie, Heft 17.) Pp. viii+48. (Stuttgart: Georg Thieme Verlag, 1965.) 23 D.M.

THIS short monograph, an account of the way the "glatze" or bald pate develops during ageing, is based on a pathological investigation of 118 scalps of both sexes, classed by decade of life and ranging from birth to old age. The material was taken from several regions—top, sides and in-between—and examined not only by traditional histological methods but also by the preparation of epidermal sheets.

In the newly-born, it seems that the dermo-epidermal junction is uncorrugated, but as the lanugo is replaced by terminal hair, the interface becomes crenulated to form the pattern of the rete-pegs. This development reaches a maximum in the second and third decades, when even the hair follicles become involved in the interdigitation of dermis and epidermis. By the fourth decade there are already signs of decline in those regions which were previously most active; the hair bulbs still appear relatively strong, but the hair shafts become feeble. From the fifth decade onwards, first at the side and crown, later in the intermediate regions, the dermo-epidermal junction flattens and the hair follicles diminish and shorten. For a time the sebaceous glands resist change, or even enlarge, but ultimately they, too, succumb to ageing; only the sweat glands remain unaffected and continue to function in old age.

This work is beautifully illustrated with photographs and constitutes a classic anatomical description of the relentless ageing of the scalp, a field in which surmise has often been a substitute for evidence. A full understanding of the process in dynamic terms awaits other investigators. The prognosis may appear somewhat depressing, but a faint optimism may be engendered by the reports of Drs. Papa and Kligman of Philadelphia that, in spite of the undoubted implication of male hormones in the development of hereditary baldness, the process can sometimes be mysteriously reversed by the local application of androgens. And if the hair follicle of the scalp, of all human organs, appears to be the one least well designed for a lifetime of service, one can at least take comfort from the thought that this is but a recognition by natural selection of its vital redundancy.

R. E. CHURCH
F. J. EBLING

Forest and Savanna

An Introduction to Tropical Plant Ecology with Special Reference to West Africa. By Brian Hopkins. Pp. xii+100+5 plates. (London: Heinemann Educational Books, Ltd., 1965.) 18s. net.

DR. HOPKINS devotes the first few pages of *Forest and Savanna* to an explanation of what is meant by ecology and he then gives background information about West African population, geology, soil and climate. This information is clearly set out at an elementary level and it would serve beginners at college, as well as the interested layman or others unfamiliar with the West African scene. The real meat is to be found in Chapters 3 and 4, which deal with forest and savanna respectively from an ecological point of view. They provide sufficient detail to instruct without overloading the beginner. On the other hand, as the author points out in his preface, he has in some sections reached the limit of our knowledge simply because the study of tropical ecology is still relatively neglected. Things are changing in this respect,