

petals. The petals were about 3 cms. long and appeared to clasp the protruding stem. The internodes between the insertion of the pierced flower and the first node above being shorter in length than the petals, the three leaves arising at this node appeared to come out of the flower. One petal, however, had opened out. There was no trace of the presence of the essential organs.

The midrib, the veins and the margin of the leaves above the pierced flower had the same pink colour as the petals. Under reflected light the whole leaf gave the pink hue. This was not the case with the leaves below the pierced flower. The axis had continued its growth to produce the leaves and another flower."

\* \* \*

*Tetrahedrite as a Silver Enrichment Mineral*:—Mr. S. Krishnaswamy, University College, Rangoon, writes:—"From time to time many investigators scattered the world over, have shown that the silver-content in many ore-bodies have become appreciably augmented when some sulphides like the pyrites, tetrahedrite, etc., are found in association with the silver ore-minerals.

In 1931, while studying some Burma Argentiferous Galena ores under the Metallographic Microscope, by the polished Ore-methods it was noticed, that tetrahedrite was functioning in the case of the Burma ore as a silver-enricher. So to say, wherever the Argentiferous Galena Ore was found accompanied by tetrahedrite, the silver content of such ores were appreciably more than the average normal assay value for such ores occurring in the same lode but unaccompanied by the presence of tetrahedrite."

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We acknowledge with thanks the receipt of the following:—

"Nature," Vol. 133, Nos. 3367 to 3370.

"The Chemical Age," Vol. 30, Nos. 776 to 779.

- "Canadian Journal of Research," Vol. 10, No. 5.  
 "The Journal of Chemical Physics," Vol. 2, No. 5.  
 "The Biochemical Journal," Vol. 28, No. 2.  
 "Berichte Der Deutschen Chemischen Gesellschaft," Jhrg. 67, No. 5.  
 "Natural History," Vol. 34, No. 3.  
 "Journal of Agricultural Research," Vol. 48, Nos. 3 & 4.  
 "American Journal of Botany," Vol. 21, No. 5.  
 "Journal de Chemie Physique," Tome 31, No. 4.  
 "The Review of Scientific Instruments," Vol. 5, No. 5.  
 "The Mathematics Student," Vol. 2, No. 1.  
 "Scientific Indian," Vol. 11, No. 65.  
 "Indian Forester," Vol. 60, No. 6.  
 "Medico-Surgical Suggestions," Vol. 3, No. 5.  
 "The Quarterly Journal of the Geological, Mining and Metallurgical Society of India," Vol. 5, No. 3.  
 "Contributions from Boyce Thompson Institute," Vol. 6, No. 2.  
 "Forschungen und Fortschritte," Jahrgang 10, Nos. 15 & 16.  
 "The Indian Journal of Agricultural Science," Vol. 4, No. 2.  
 "Indian Forest Records," Vol. XX, Parts 1 to 5.  
 "The Nagpur Agricultural College Magazine," Vol. 8, No. 4.  
 "The Indian Trade Journal," Vol. CXIII, Nos. 1456 to 1461.  
 "The Journal of the Indian Mathematical Society," Vol. 13, No. 1.  
 "Department of Commercial Intelligence & Statistics in India—Monthly Statistics of the Production of Certain Selected Industries of India," March 1934.  
 "Journal of the Institute of Brewing," Vol. XL, No. 6.  
 Government Museum, Madras. Bulletin—New Series, Vol. 1. Part 3. "Tirupattikumram and Its Temples."

## Reviews.

FIRST OVER EVEREST—THE HOUSTON-MOUNT EVEREST EXPEDITION, 1933. By Air-Commodore P. F. M. Fellowes, D.S.O., L. V. Stewart Blacker, O.B.E., P.S.C., Colonel P. T. Etherton, and Squadron Leader the Marquess of Douglas and Clydesdale, M.P. (John Lane, The Bodley Head Limited, London.)

"First Over Everest" is the official account of the Houston-Mount Everest Expedition of 1933. The plan of an expedition by air against the mountain was submitted by Major Blacker of the Indian Army in March 1932 to the Royal Geographical Society of London and in April 1933, two Westland planes flew over Mts. Everest and Kanchenjunga at a height of 32,000 ft. The maturing of the plan, the development of the organisation, the preparation for the flight, and the actual carrying out of the

enterprise are fascinatingly told in this volume.

The scientific object of the expedition "consisted in a demonstration of mapping by air survey methods, of the inaccessible cliffs, glaciers and valleys of the southern side of Mount Everest. The aim was not so much to produce an extensive map of any immediate practical utility, as to demonstrate to the world, especially to the non-technical portion of it, the relative quickness with which such a map might be made of a region forbidden to ground methods not only by policy, but also by the physical obstacles of the country." To take good survey photographs from the air in a clear atmosphere over a level country is a comparatively simple matter, but over mountainous country with varying distances of the earth's

surface from the plane and with the possibility of unexpected bumps that might make it impossible for the pilot to keep the plane on a level keel is much more difficult. In the present instance, owing to the exceptional height and steepness of much of the ground, the vertical photographs had to be supplemented by a series of oblique photographs with known tilts of the camera both vertically and horizontally.

Because of this difficulty, the photographs obtained in the first flight were, from the survey point of view, so unsatisfactory that a second attempt had to be made. To add to the difficulties, the atmosphere of North India in April and May is often covered with thick dust-haze to a height of about 19,000 ft. which makes it difficult even with modern infra-red films to get good pictures of known ground features which would serve as reference marks.

The expedition fully realised that the success of the enterprise depended mainly on the favourableness of two meteorological factors—clouds and haze over the terrain and the force of the wind. During the month of April in which the flights were carried out, North India is periodically traversed by a more or less regular series of atmospheric disturbances travelling from West to East which cause cloudy weather and exceptionally strong winds at different stages of their passage over a place. It was also known from previous studies of winds over North India that the most frequent wind speeds over Everest would be as high as 60 to 80 miles per hour and that they would often exceed 150 miles per hour.

To meet the special requirements of the flight, the India Meteorological Department set up two pilot balloon stations at Darjeeling and Purnea (the base of the expedition) and arranged to send special forecasts of general weather and strength of upper winds from their office at Calcutta.

With regard to the information supplied by the India Meteorological Department, the authors write: "In addition, every evening the weather bureau at Calcutta telegraphed us at 21-30 hours, giving information of the general weather condition along the Himalayas and a forecast of what might be expected in the Mt. Everest region, especially as regards clouds and haze, and finally an estimate of the direction and velocity of the wind current to be expected at various heights up to 10 km.

"The accuracy of the information contain-

ed in these telegrams was remarkable and made it possible to plan the flying operations the next day, after they had been studied in conjunction with the balloon observations taken locally by Mr. Gupta (Upper Air Observer at Purnea). The flight to Mt. Everest was carried out with this information and the results of it, particularly the drift and measurement on the drift sights, confirmed to a remarkable degree both the observations and forecasts of the meteorologists."

I am tempted to add two more meteorological quotations, one on the 'plume' of Mount Everest and another on the experience of some of the fliers in a North Indian dust-storm.

"From the Moths we had seen what previous explorers had called the 'plume' of Mount Everest and had somewhat readily taken it for granted that it was merely a cloud, of which the component particles would naturally be frozen, and similar to that one usually sees in the vicinity of high mountains.

Kanchenjunga, for instance, was seldom without such a cloud wreath throughout April.

When, however, the machines actually went into it, we realised that it was something quite different to what we had conceived. Here was no drifting cloud wisp, but a prodigious jet of rushing winds flinging a veritable barrage of ice fragments for several miles to leeward of the peak.

The force of the *rafale* was indeed so great as to crack the celastroid windows of the Houston-Westland's rear cock-pit. We soon realised, too, that this 'plume' could not be composed of frozen matter carried over by the blizzard from the windward face, for the reason that the windward faces, that is, the western side, were practically bare, as may be seen from the photographs." The authors suggest that the phenomenon is due to an overfall of the winds over the crest of the mountain, giving rise to a zone of reduced pressure on the leeward side tending to draw up the air from the Tibetan side and with it great masses of old snow and fragments of ice.

Here is a description of the fliers' experience of a dust-storm. "We had risen high above the Agra plain and were some 70 miles on our way (to Jodhpur) when in the far distance a mighty wall seemed to rise sheer out of the earth, a barrier that mounted higher and higher and became

ever more thick and menacing, as though it would say 'thou shalt not pass'. We pressed on to meet the challenge, rising still higher until the altimeter registered 12,000 feet; but we might as well have risen to the stratosphere in the effort to get clear of the enemy, for the dark brown wall rose higher than we did, its vanguard was already in touch with us, whistling and howling around our tiny aircraft like a legion of devils.

"It was getting black as night, nothing was visible but the rampart of dark brown dust . . . . McIntyre never hesitated; he knew that the sane thing to do was to turn, and flying before the storm, make for the landing ground at Agra.

"We swirled along, slap-dash we burst into the very thick of the pursuing storm; gusts of the typhoon seemed to leap over us like harlequins in a pantomime . . . . On we went gaining on our pursuers and getting into a clearer atmosphere, but always with the storm close behind us, its force mobilised and trying once for all if it could not, by a tremendous effort, drive us from the air and sweep us off the face of creation. It very nearly succeeded; only the skill of the pilot saved us. . . . .

"We stayed the night at Agra, leaving again the next morning in a glowing light, an atmosphere of calm beatitude, without the faintest indication of the scenes that had been enacted the previous day."

The expedition successfully accomplished its task. It obtained all the photographs it wanted, and demonstrated to the world what modern aircraft, when used with understanding and pluck, could achieve. In addition to the geographical, meteorological, photographic and general aviation information set out in the book in a most interesting manner, there are interspersed throughout the book many shrewd remarks about the habits and customs of the people in India and other countries through which the planes flew. The book is illustrated with a large number of maps and beautiful photographs of Himalayan scenery.

K. R. R.

CHEMICAL ENGINEERS' HAND-BOOK. Editor-in-Chief, John H. Perry, assisted by 60 specialists. *Chemical Engineering Series*. 30 sections, 2600 pages,  $4\frac{1}{2} \times 7$ , semi-flexible, thumb-indexed. (McGraw-Hill, 1934.) \$9.00.

The volume is produced on the same lines as Mark's *Mechanical Engineers' Handbook* and Fowle's *Standard Handbook for Electrical Engineers*, and embodies all the features, such as specialist contributors, concise presentation, attractive get-up, etc., that have contributed to the success of these Handbooks. The chemical engineer can at last find in this work a reliable source of information where a mass of theoretical and operating data representative of present-day practice is ably collated and presented under conveniently divided sections. The sections are well planned, comprehensive and readable, so that a perusal of the relevant section would be one of the best shortcuts for the busy engineer desiring an authoritative survey of information concerning any of the unit operations. While the allotment of space for the various sections is generally satisfactory, one would desire the sections on Evaporation, Materials of Construction and perhaps also Drying enlarged to roughly twice their present bulk so as to include the Hausbrand type of calculated data as also operating data of the kind found in the section on Crushing, Grinding, and Pulverising. If curtailment in other directions is essential, some of the larger sections (those on Physical and Chemical Data and Refrigeration may be mentioned) could be reconsidered with a view to abridgement. In Physical and Chemical Data one is apt to look for particulars of technical chemicals as to, say, availability, commercial grades, methods of purification, principal uses, etc. Flow sheets of important industries would form a highly useful addition to the section on Physical and Chemical Principles. The utility of the entropy charts found in the latter section would be much enhanced if these were reproduced to larger scale and collected at the end of the volume together with other charts of general interest, such as Grosvenor and Mollier psychrometric charts dealing with the principal industrial gases. Information concerning protective coatings is lacking. An entire section dealing with high temperature operations is *missing*, as it were; at any rate the sub-section on Radiant Heat Transmission could be expanded to comprise furnaces and kilns, refractories, thermal insulation, etc. Probably as a result of the rational classification employed, overlapping of subject-matter is negligible for a work of this nature. Electrometric pH measurement described in the section on

Electrochemistry ought to find its appropriate place, together with an account of the colorimetric methods and automatic control devices, in the section on Measurement and Control of Process Variables.

It would serve no useful purpose to compliment in any detail the editor and collaborators for the remarkable book they have offered the profession at the first attempt. Particular credit is due for the masterly presentation of data collected from diverse fields of knowledge, for a casual glance at the pages is sufficient to indicate the great number of fundamental sciences that the chemical engineer has to keep in touch with unlike the case of other engineering professions. Chemical engineering need no longer be regarded as has been done till recently even in advanced countries like Germany as *Maschinenkunde für Chemiker*. In several sections there are evidences of the authors having waded through a mass of available data or scores of commercial types of equipment before presenting the basic principles in a convenient form. We shall confidently expect to find the Handbook in the possession of every engineer, every executive and, particularly, every student no matter however remote his connection with chemical or physico-chemical technical operations.

L. G. RAO.

AN INTRODUCTION TO THE BIOCHEMISTRY OF NITROGEN CONSERVATION. By Gilbert J. Fowler, D.Sc., F.I.C., pp. vi+280. (London, Edward Arnold & Co., 1934.) Price 12s. 6d. net.

The monographs appearing in recent years can be classed under two main heads: (1) those which are of the nature of compilations dealing with vast amounts of matter and ending with extensive bibliography, and (2) those which relate, almost exclusively, to the author's work and those of his associates. In the former, the individuality of the author is practically lost while, in the latter, the reader is constantly reminded of the fact that the author is largely responsible for the development of the subject with which he deals. Dr. Fowler's monograph modestly titled "An Introduction", belongs definitely to the latter class.

The introductory chapter opens rather dramatically with some of the author's earlier experiences with the highly explosive nitride of silver and then leads on to the quieter activities of nitrogen with which the author has been associated in the later

years. After this, the reader is acquainted with the principles of biochemical technique and then taken, through easy stages, to a detailed study of the various nitrogen transformations in the soil, the manure heap, the sewage tank and the filter bed. This is followed by a brief chapter touching on certain aspects of nitrogen assimilation by plants and then by a large section dealing, in detail, with the practical applications of scientific research to the making of compost, purification of sewage and increased crop production. The importance of nitrogen is stressed at each stage and various suggestions made for the conservation of that element under different conditions. The text is followed by appendices providing useful data relating to human physiological wastes and to nitrogen production and consumption with special reference to India.

The most interesting portions of the book are those which relate to the author's own contributions to the development of the Activated Sludge Process of sewage purification and to the disposal of various forms of solid wastes. These sections have been presented in a highly lucid, and at the same time, quietly confident strain which is invariably associated with thorough mastery of the subject. The related chapters are well worth the study of not only those who wish to be introduced to that subject, but also those who wish to specialise in it. A number of practical suggestions based on the author's experience have also been given which are well worth extensive adoption.

No human performance can ever claim to be perfect and Dr. Fowler's monograph is no exception to the rule. Some of the sections of the book, particularly those relating to the chemistry of the various processes, have not been presented with that intimacy of knowledge which characterises the other portions. The chapter relating to assimilation of nitrogen by plants is not so complete as one would wish. The section relating to chemical principles and bacteriological methods is too elementary for those who know something of those subjects and too technical for those who seek initiation into them through the medium of this book so that those pages would possess practically no interest to a large section of readers. References to literature are incomplete and in some cases a little far-fetched. In many cases, old researches have been cited while more accurate later work receives no mention. In certain lines, the references have

been largely confined to those of the author and his associates while similar and even more exhaustive researches conducted in other parts of the world are not cited. This is probably due to the natural desire of the author to refer only to those pieces of work with which he is intimately acquainted, but it is hardly likely that such a view will be shared by a large section of readers—especially those residing outside India. It is hoped that these defects would be attended to when the second edition is prepared.

The book is written in excellent style and, as distinct from many other monographs of the present day, is eminently readable. The printing and the binding leave nothing to be desired. The publishers deserve to be congratulated on their excellent production.

AN INTRODUCTION TO BIOLOGY. By Elbert C. Cole, Ph.D. (John Wiley & Sons, New York, Inc., Chapman & Hall, Ltd., 11, Henrietta Street, Covent Gardens, London. xiii+496 pp. 1933.) Price 11s. net.

This is one of the finest text-books on the subject of biology and we have pleasure in recommending its use in all schools and colleges where biology forms an integral part of the curriculum of studies. The book, according to the author, is intended to provide material for a full year's course; but under the conditions prevailing in the Indian Schools and Colleges, where hardly two hours in the week are devoted in the Time Table to the teaching of the subject, we should regard it safe that the topics dealt with in the book, had best be treated as a two years' course. Almost all the Indian Universities have included biology in their syllabuses—though the University of Delhi

thinks that the subject is in the nature of a luxury,—and we can hardly think of a better book for the Intermediate course at which stage, the pupils establish specific interests in their academic career. No educational programme can be sound which omits biology from its purview and both for information and discipline, it is inferior to none of the other scientific subjects. We would go a step further and stress the point that every citizen needs training in biological subjects for the proper and efficient discharge of his duties and responsibilities as a municipal member.

Among other interesting topics dealt with in the book, the author gives prominence to the similarities of organisms in structure and function, the dependence of the organisms upon one another and upon the inorganic world, their economic importance, and the phylogenetic relationship. The section on the control and improvement of organisms, contains a great mass of information of intimate practical interest both to the Government and to the people and in these days of unemployment among the educated communities, a knowledge of the improvement of organisms might offer avenues of fruitful occupation, provided the young men have sufficient enterprise and willingness to work in other than routine fields.

The book provides practical guidance to teachers of biology and every chapter closes with a beautiful summary of the subject. Students are given projects and also references to other works for additional studies. All technical terms are defined correctly and briefly in simple terms. The illustrations are sumptuous. The book is typical in every respect. It provides sufficient material for selection suitable to Indian conditions.

### Forthcoming Events.

*The Bangalore Educational Association.*—The Educational Week Celebrations, 1934, including the Educational Exhibition, will commence on the 11th August 1934. Amin-ul-Mulk Sir Mirza M. Ismail, Kt., O.B.E., will inaugurate the Week.

*Lectures on Theory of Electronic Valency.*—Dr. T. S. Wheeler will deliver a series of lectures at the Royal Institute of Science, Bombay, on every Saturday during the current term.