

REVIEWS

Cattle Fodder and Human Nutrition. By Artturi, I. Virtanen. (Cambridge University Press, London), 1938. Price 7/6 net.

In a series of four informative and stimulating lectures delivered at the Universities of London and Reading, Professor Virtanen develops the theme that the biological fixation of nitrogen constitutes the fundamental basis on which rests the production of milk. Leguminous crops which derive their nitrogen from the atmosphere, through the agency of symbiotic bacteria, provide cattle with protein-rich nutriment thereby enabling them to yield milk. The culture of legumes has another important function; to enrich the soil by excreting nitrogenous materials which are utilised by the associated non-leguminous plants. Professor Virtanen has thrown new light on the mechanism of the biological fixation of nitrogen which forms the subject-matter of his first lecture which the reviewer had the pleasure of listening to at Cambridge. He has established the scientific rationale of an ancient, time-honoured and widely prevalent practice of raising cereals and legumes as a mixed crop.

In northern countries which are faced with long winters, the problem of milk production is one of vital importance. The cows have to be stall-fed during the greater part of the year and the question of providing them with a protein- and vitamin-rich fodder is one which has received the close attention of Prof. Virtanen and his co-workers. The A.I.V. process discovered by them has solved the fodder problem; this has enabled the Finnish farmers to produce in the winter months, milk of a quality and a vitaminic potency which is equivalent to that produced in summer. This is an achievement of which Prof. Virtanen may well be proud.

In India, the quality of milk with respect to its protein, fat and vitamin content, varies widely. In summer months, the problem of fodder is acute; Professor Virtanen's process of preserving fodder deserves to be widely investigated to suit local conditions.

The volume is one of topical interest, raising as it does the problem of human nutrition. It is a book which should be widely read not only by investigators but

also by administrators who are interested in planning a sound policy of national nutrition. M. S.

The Basic Mechanics of Human Vision By R. Brook Simpkins. (Chapman & Hall, Ltd., London), 1939. Pp. 228. Price 12/6.

This is an interesting book whose author takes the view that accommodation of the eye is brought about by an elongation of its axis effected through its extrinsic muscles. In this he admittedly follows von Arlt, and brings to the aid of the hypothesis a wealth of mechanical data. The reviewer believes, however, that the author has not sufficiently studied the evidence of fact evinced by Sanson's or Purkinje's images. Their observation demonstrates that the only structure which can be seen to change during accommodation is the anterior surface of the lens, the posterior surface and the cornea remaining fixed. Hence, admitting for argument that there is an elongation, it must be the posterior part of the eyeball that moves. If such were the case, Purkinje's figures should change position on accommodation, but the reviewer failed to find evidence of this. On the whole, then, the reviewer believes that accommodation in man is effected differently from that in certain fishes.

It is evident from the book that the author has not undergone any medical training. For, had he done so, he would have been more chary of introducing theories of plus and minus innervation of muscles. What the author is trying to get at here is not apparent to a medical man, but the latter would not describe the phenomena as is here done.

An absence of medical training also deprives the author of the opportunity to discuss those very interesting drugs, atropine and pilocarpine. The intrinsic and extrinsic muscles belong to two different classes of muscles which react differently to the actions of drugs, electrical stimulation, etc. *hoc genus omne*. It would be a most extraordinary phenomenon if atropine acted on the extrinsic muscles, and an equally extraordinary phenomenon if atropine acted on the

intrinsic ones. There is, moreover, a wealth of experimental evidence which demonstrates that the atropine and pilocarpine act only on the intrinsic muscles of the eye. Since also there is no doubt of the ability of atropine to paralyse accommodation, it should be accepted that the muscle which atropine paralyzes, the ciliary muscle, is the one concerned in accommodation.

As regards the instruments invented by the author for eye exercises, the reviewer may first be permitted to express a dislike for their hybrid names. But, putting that aside, while there is adequate evidence concerning the manner in which the instruments are intended to be used, there is a deplorable lack of evidence concerning their usefulness. An Appendix giving, say, a series of 200 cases with their original conditions, the nature and duration of the treatments and the results, would remedy this defect. The reviewer is quite prepared to believe that a mode of treatment based on erroneous hypotheses may yet be beneficial.

W. BURRIDGE.

The Evolution of Genetic Systems. By C. D. Darlington. (Cambridge University Press, London), 1939. Pp. 149, text-figs. 26. Price 10/6 net.

The title of this book was the title of the last chapter in the first edition of Dr. Darlington's text-book *Recent Advances in Cytology*. That chapter was omitted from the second edition. It has now been expanded and the cytological facts which account for the phenomena of genetics are simply and concisely expounded in a handy volume.

This is a lucid and readable resumé of much that is set forth in the author's longer work, set down briefly and unhampered by exhaustive series of examples and references.

Genetics is concerned with reproduction. This book contains a clear account of the behaviour and evolution of the visible determinants of heredity in the cell nucleus, i.e., the chromosomes. There are concise descriptions of meiosis, chromosome mechanics and the mechanism of genetic crossing-over according to the latest discoveries and system of nomenclature. The evolution of polyploidy, of differential chromosomal complements by structural changes, of permanent hybrids, of sex inheritance, of sterility and apomixis are traced. The penultimate chapter deals with the manner in which the units of heredity, the genes, act upon the

nucleus, cytoplasm and body as a whole. The final chapter surveys the evolution of reproductive systems from the naked gene and also the broader implications with reference to the evolution of species and to the classical theories of Lamarck and Darwin.

There is a bibliography of ninety-one titles and an excellent index. This little book by the world's foremost cytologist will be welcomed by everyone interested in the mechanism of heredity; not only cytologists and geneticists but teachers, medical men, professional breeders and all members of the public who wish for reliable, up-to-the-minute information on modern "natural philosophy".

EILEEN W. ERLANSON.

Cotton Breeding and Seed Supply. (Published by the International Institute of Agriculture, Rome), 1938. Pp. 71. Price 15 lire, post free.

This is a companion volume to the monograph on *World Cotton Production and Trade* published by the above Institute in 1936. It is, as stated by the Secretary-General of the Institute, compiled from information given in books, reviews and from answers furnished to a questionnaire, by institutions and workers engaged in cotton research.

Although breeding in cotton has been practised for a long time in a number of countries both by private breeders as well as by staff employed in Government institutions, there are few publications giving a connected account of the methods adopted and of the results obtained therein. This volume will, therefore, be welcomed by all cotton workers as one supplying a long-felt want.

The first chapter is devoted to the description of the objectives in cotton breeding where, rightly enough, prominence is given to improvement of yield; and valuable information is supplied under the improvement of quality. It is felt, however, that sufficient stress has not been laid on the interrelation between quantity and quality and on their combined effect on the economics of the grower. The presentation of Harland's schematic analysis of yield and the statement that "selection work has to reckon with all those characters when looking out for mother plants" leave an impression that isolation of types possessing such

characters will automatically result in increased yields. But actually it is well known amongst all cotton breeders that it is only the final weight of lint obtained per unit area that counts, owing to many unknown physiological limitations set up in the plant during growth. For instance, increase in the number of locks per boll results in a reduction of the number of seeds per lock which, in its turn, affects the weight of individual seeds, although all these form components of yield according to Harland's scheme.

In the next chapter, the classification of the cotton varieties is dealt with. The grouping adopted by Harland has been reproduced in detail; but the nomenclature used by Watt, Gammie, Hutchinson and Ghose has also been used in addition, which will cause some confusion in the minds of the casual reader in the identification of cottons referred to in the monograph.

The third chapter describes the breeding methods. It is refreshing to note that emphasis has correctly been laid on the importance of acclimatisation and also on the causes that lead to failures. One wishes, however, that information given under selection is made more complete and up-to-date. Undue importance is given to the method of type selection which is now being superseded by methods which will enable to distinguish genetic variance from that caused by environment. The main objectives in breeding, *viz.*, yield and quality, being quantitative in performance, description of methods useful in the evolution of stability in such characters will prove profitable to the workers. It is now recognised that methods like the replicated family block method, dealt by Hutchinson and Panse, will reduce much of the personal element generally associated with the type selection method.

The chapter on propagation and conservation of cotton varieties gives a complete and lucid picture of the steps taken in Egypt and U.S.A. to maintain pure seed supply and will, therefore, prove very instructive to all interested in cotton improvement. This is followed by an interesting contribution on the trends of improvement in the chief cotton-growing countries of the world. Too much space is, however, devoted to the enumeration of the various commercial varieties found in India which is not completely relevant to indicate the trend of improvement.

A fairly good list of literature is appended at the end, although a few recent publications like those on plant breeding technique by J. B. Hutchinson and his collaborators, are being missed.

On the whole, this booklet will form a useful addition to the list of references on cotton breeding.

V. R.

A Text-Book of Thermodynamics. By F. E. Hoare. II Edition. (Edward Arnold & Co., London), 1938. Pp. 307 + xii. Price 15sh.

"There appear to be, however, few books showing the variety of subjects to which thermodynamics can be applied, and it was in the hope of remedying this deficiency that this book was written." In the second edition, certain portions of the book have been revised; the notation has been altered in accordance with the recommendations made by the Joint Committee of the Chemical, Faraday and Physical Societies; a collection of examples with answers has been added. These changes have considerably enhanced the usefulness of the book. Exposition is generally clear. One exception, however, is to be found in the treatment of ionic migration (p. 207) which has been discussed without introducing the term "transference number". An introduction to non-ideal solutions with a brief discussion of the modern views regarding strong electrolytes would have been highly useful. Notwithstanding these minor shortcomings, the book serves well as a general introductory treatise on thermodynamics, especially to the physics students.

K. S. G. D.

Problems of Power Supply in India. Symposium held under the auspices of the National Academy of Sciences, India. (*Proc. National Academy of Sciences, Special Number*), 1938. Pp. 100. Price Rs. 2 (India), Rs. 2/8 (Foreign).

The desire for self-determination in India has coincided with intense ferment in the minds of the intelligentsia in various directions. No nation can achieve and maintain its freedom without being strong in the sciences of the day—agriculture, industry and defence. In a word, power is the *sine qua non* of Indian freedom. The National Academy of Sciences has drawn attention to

the need of properly harnessing our electrical power resources in its illustrated booklet.

Lenin wrote, in 1920, "without electrification, progress in industry is impossible" and directed two hundred scientists and engineers to plan the restoration of Russian national economy. G. R. Toshniwal describes how this Goelro-plan, in ten years, reconstructed industry with the result that "the Russians are no longer a half-clad and starved nation". Prof. M. N. Saha startles the reader saying that "in the scale of civilization, India comes as low as China or Abyssinia". Consumption of electrical energy *per capita* is 7 units in India as compared with 1,800 units in advanced Western lands. The reason is not that India has no resources but that its governments have not cared enough to investigate or develop them in the interests of the people. A. N. Tandon discloses the unsatisfactory condition of supply of power in the United Provinces. B. P. Adarkar, agreeing with the other writers, stresses the need for beneficent legislation in India to exploit the power resources for the nation's benefit and not for that of foreign monopolists. Prof. Saha points out that the price of power is artificially maintained in India at four times the price in other countries with consequent retardation of industrial development. N. N. Godbole describes how Japan by organisation increased production eightfold in twenty years and by supplying power very cheaply, at one pie per unit, gives an enormous impetus to her industry and trade. Her electrical industry has gradually come under State control, thus co-ordinating her resources just as the Grid-system existing in England and Russia and advocated in India.

N. G. Chatterji has shown that alcohol from molasses of the sugar industry is a cheap and satisfactory fuel for power supply for agricultural purposes.

The general reader will find Appendix A an easy introduction to the discussions and the several interesting tables and data are valuable to the administrator. At the suggestion of the President, Pandit Jawaharlal Nehru, the Academy has passed resolutions asking the State to undertake a vigorous policy for an accurate survey of our power resources, to provide for the training abroad of a number of Indian engineers who are to develop power in India and to pass necessary legislation,

According to Sir M. Visvesvaraya, hardly the fringe of India's Power has been developed and if the national governments plan a bold outline of a unified attempt after the Russian model, there is no reason to doubt that India will rank, in ten years, with the most advanced countries.

The Academy has to be congratulated on its contribution to the National Planning at such an opportune moment. However, reflecting on man's glorious achievements, would one agree with the statement that "man regarded as an animal producing work is rather a poor specimen" (p. 83).

The booklet is neatly printed except for some typographical and idiomatic errors, e.g., on pp. 57, 69, 84, 87 and 90.

Y. K. RAGHUNATHA RAO.

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- (1) Milk Records of Cattle in Approved Dairy Farms in India. (Bulletin No. 18), 1938. Pp. 175. Price Rs. 2-12-0 or 4sh. 6d. (2) Report on a Village Enquiry Regarding Cattle and the Production and Consumption of Milk in Seven Breeding Tracts of India. (Bulletin No. 22), 1938. Pp. 127. Price Rs. 3-8-0 or 5sh. 6d. (3) The Nutritive Values of Indian Cattle Foods and the Feeding of Animals. (Bulletin No. 25), 1938. Pp. 39. Price Annas 7 or 8d. (Imperial Council of Agricultural Research—Manager of Publications, New Delhi.)

(1) An exceedingly useful publication covering 170 pages, all of which but for the first four pages, is devoted to data running into several tabular forms, has recently been issued. This publication has appeared not a day too soon. Information received from 36 farms is incorporated in these pages.

Short notes on the "conditions of climate, feeding and management" in the various centres mentioned would be a useful addition. To secure uniformity, all dates and years could be according to the British calendar (p. 58, 120). Inclusion of more 'fat tests' by which expression is probably meant fat per cent. would have been welcome.

(2) Another Bulletin (No. 22) also issued by the Imperial Council of Agricultural Research, brings together the most reliable information relating to cattle, and the production and consumption of dairy produce in

the seven breeding tracts of India, comprising 7,600 agricultural holdings. Judging from the quality and the quantity of data presented in this report all of which was collected in a short span of five months, it is an unprecedented success.

Unfortunately it bears the mark of hurried printing. It is surprising that the seven tracts have not been properly indicated in the map and the use of names of provinces in their place in the tables, causes confusion. Such expressions as 'female buffaloes', 'buffalo cows' and 'cow buffaloes' in place of the more usual 'she-buffalo' could have been avoided. The same remark applies to the use of the word 'sweet-meats' to imply 'sweets'. There are a number of other errors which would have been avoided.

(3) Bulletin No. 25 dealing with data relating to results of chemical analysis, digestibility coefficients and the nutritive values of Indian cattle foods with a 14 page introductory note on the scientific principles of feeding of farm animals in general, and of cows in particular is of the nature of a rough and ready guide for the planning of suitable rations for the farm animals. The subject is dealt with in an easily understandable manner and the Bulletin fulfils a real want.

G. N.

Theorie et Technique du Bruit de Fond (Effets Schottky et thermique). By F. Bedeau. (Actualites Scientifiques et Industrielles, No. 574). Hermann et Cie, Paris), 1937. Pp. 95. Price 25 fr.

This is a clear exposition of the theoretical and practical aspects of two of the phenomena which give rise to the background noise in a radio receiver. One of these is the fact that the number of electrons emitted from the filament of a valve in short equal intervals of time fluctuates (Schottky effect). The other is the fluctuations in the velocity of the conduction electrons in any resistance due to thermal agitation, giving rise to fluctuating voltages at its ends (thermal effect). These effects play an important part in the performance of a wireless receiver and the book is worth perusing by any one interested in the working of an apparatus which has nowadays become a common article of household furniture.

T. S. S.

Travaux Pratiques de Physique—1. Mesures, Chaleur. Par Maurice Prost. (Actualités Scientifiques et Industrielles, No. 628. Hermann et Cie, Paris), 1938. Pp. 93. Price 25 fr.

The volume gives in clear and concise language, the practical methods in a few select elementary problems in metrology and heat. The subjects dealt with are the precision balance, calipers, screw gauge and spherometer, densities of liquids and solids, simple and torsional pendulums, barometry, thermometry and calorimetry, pressure and density of vapours, and cryoscopy, viscometry and capillarity.

C. S. V.

Intermediate Physics, Part I (Mechanics). By Prof. D. S. Jog, M.Sc. (Karnataka Publishing House, Bombay), 1938. Pp. xi + 334.

This book has been written to cover the latest syllabi in Mechanics of the I.Sc. standard. Portions above this standard have been included, these being differentiated from the rest by printing them in small type. The fundamentals of the subject are carefully developed and well expounded.

Although one may deviate from the usual methods of treatment, the reviewer cannot see eye to eye with the author in the intermingling of the two parts Dynamics and Statics, as has been done by him. The experimental aspects of the subjects could have been more profitably enlarged by cutting out short portions not required for the I.Sc. course. Topics like comparison of Masses with the Hick's Ballistic Balance, experiments with the inclined plane and the use of steel yards have not been mentioned at all. On page 39, under measurement of Mass, the reader is referred to Chapter XIV for the theory of the balance. In Chapter XIV, the theory of the balance has been dealt with, while the student is asked to refer to some text-book of Practical Physics for full details for the method of determining the mass of a body by the method of oscillations.

One important and welcome feature of the book is the inclusion of some biographical notes on prominent physicists with their portraits. The book will be of very great use to every serious student and teacher of Physics.

K. SRINIVASA RAGHAVAN,

Laboratory Experiments in Elementary Physics. By Newton Henry Black. (Macmillan & Co., New York), 1938. Pp. 263. Price 5/6.

This book is offered as a guide to both student and instructor in the Laboratory work. Sixty-two experiments have been dealt with on various branches of Physics. Descriptions of apparatus to be used have been avoided by introducing photographs of the apparatus themselves. The Introduction, covering about seven pages, contains suggestions to teachers and directions to students, particularly with regard to the latter's record note-books, percentage of error, the care of the apparatus and the like.

One important feature of the book is the fact that a number of questions have been given under each experiment by answering which students could draw conclusions from their own experimental data. The Appendix contains a tabulated statement of a number of physical constants with necessary mathematical formulas and with hints about graphical representation of the results of experiments.

The book can be advantageously recommended as a good guide to accompany Black & Davis' *Elementary Practical Physics*.
K. SRINIVASA RAGHAVAN.

Adhunika Vignanam (Modern Science). By M. Venkata Rao, Vizianagaram. (Sarada & Co., Vizianagaram), 1938, Pp. 50. Price 6 annas.

This is a pamphlet containing a reprint of three popular Science articles in Telugu, first published by the author in some Telugu journals. The first article on 'The Mystery of the Creation' deals with the constitution of the planets and the stars and gives a side-talk on the theory of light, the wireless, radio-activity, television and the airship. The second article is on 'Mantras' in which the author tries to explain their efficacy scientifically in an ingenious manner taking for his help, gravitation, magnetic action, ultra-violet rays and ultra-sonics. The third article is on 'Voyage to the Moon' in which the author describes the phases of the moon, its constitution, the nature of its atmosphere, its gravitational attraction, etc.

The mode of presentation of each of these subjects is very attractive. It is in the form of dialogue between a student of Modern

Science, not altogether an unbeliever in the old orthodoxy and an out and out orthodox person who believes that there is nothing new beyond what is contained in the Vedas, the Sastras and the Puranas, and who has little respect for Modern Science.

The language is completely non-technical and colloquial and the style very elegant. Tracts like these dealing with the various scientific subjects ought to be published throughout India in the several languages, in hundreds, solely with a view to create an interest in the people for Modern Science, and as a preliminary to the spread of scientific education.
B. V.

Philosophic Activity in the West.

- (1) *Actualités Scientifiques et Industrielles*, No. 575, 1937. Pp. 21. Price 5 fr.;
- (2) No. 527, 1937. Pp. 54. Price 12 fr.;
- (3) No. 572, 1937. Pp. 53. Price 15 fr.;
- (4) No. 573, 1937. Pp. 62. Price 18 fr.;
- (5) No. 546, 1937. Pp. 35. Price 10 fr.;
- (6) No. 592, 1938. Pp. 88. Price 20 fr.

The Pamphlets issued under the general series "Actualites Scientifiques et Industrielles" heading bear eloquent testimony to the intensity of the philosophic activity in the West directed to the interpretation of theoretical patterns of thought in relation to practical concerns of life to the extent to which such correlation may at all be possible. The *first* pamphlet deals with the "Actuality of the Platovian Problems", and as some other studies in the series unmistakably indicate, it is obvious that Plato and Aristotle continue to inspire quite a large number of philosophical and critical studies. The *second* has for its subject-matter the "Critique of Measure", and the author discusses the antinomy about Measure. The *third* contains a discussion of the problem of knowledge with reference to Empiricism and Greek Rationalism. The *fourth* is devoted to a study of "Plato and Aristotle". The *fifth* has an "Essay on Two Hypotheses of Parmenides". The *sixth* examines the nature of the "Language of Sciences".

I do not believe it would be possible, within the limits of this notice, to do justice to the contributions made by different authors to specific branches of knowledge, but, some general observations may be quite in order. The pamphlets embody results of investigations pursued from time to time,

and though the results achieved cannot claim permanent and universal validity, they serve to stimulate thought and kindle critical investigation.

Plato and Aristotle still continue to offer the modern world, as it were, many persistent problems of philosophy and it is here just where philosophic speculation or system-building gives rise to more problems than it ever finds itself able to solve, there is the battleground of fight between laboratory science, with its apotheosis of quantitative precision and verification, and metaphysics proper, the concepts of which elude the grasp of laboratory methodology.

The pamphlet on "Parmenides" discusses a highly significant problem of ancient Greek speculation, and though no final solution is ever possible in the nature of the case, the author has focussed attention on the basic concept of the Eleatic system systematized by Parmenides. In Indian Philosophy of course, the problem of the One-and-the-many is as alive and dynamic to-day as it must have been centuries ago when Sri Sankara sternly and courageously championed his monistic interpretation of the Vedanta.

The pamphlet on "The Language of the Sciences" raises important questions concerning the terminology adopted by different sciences, and it must, however, be emphasized that the nature of the reality or subject-matter dealt with largely determines the language used. Certain familiar concepts of religion, philosophy and theology do not lend themselves to be translated into the language of the laboratory sciences.

The pamphlets on Plato and Aristotle and the specific Platovian problem consider what I have described permanent problem of Greek Thought which has moulded and directed European Thought at its best. The comment that European Philosophy largely consists in a periodical (conscious or unconscious) forgetting of the conclusions of Plato and Aristotle and their subsequent discovery or re-discovery, may or may not be quite just, but, it represents pretty fairly a true state of affairs. If we keep aside those systems of philosophy which have agreed readily to embark on a career of self-repudiation or self-stultification in order

to come to terms with laboratory sciences, others even to-day are obliged to discuss the problems of Plato and Aristotle. Such a state, however, does not detract from modern philosophic endeavour. It only demonstrates the fact that masterminds like Plato and Aristotle had been blessed with the uncanny gift of a correct perception of the basic problems of philosophy every attempted solution of which only acts as a sharp stimulus to further problems.

The pamphlet on "Theory of Knowledge" in reference to the Empiricism and Rationalism of Greek Thought again in its methodology and attempted solution would remind one only of old wine in new bottles, notwithstanding any Governmental or mental campaign in the direction of fractional or total prohibition. In making this remark, however, I do not mean any disparagement to the excellent effort of the author. The problem of knowledge is also the problem of ignorance. Therein lies the rationale of the fruit of the forbidden tree!

The six pamphlets briefly noticed here, dealing with a variety of subjects indicate how intense and sustained are philosophic activity and metaphysical endeavour in the West. Whether or not one agrees with the conclusions arrived at by different writers, it is impossible to withhold tribute and gratitude to them for the systematic manner in which they pursue philosophic quest—a quest which is not in most cases accompanied by quick-returns in the shape of the currency of the land.

R. NAGA RAJA SARMA.

Publications du Laboratoire D'Essais
XXIX. Les Cristaux Mixtes et Leur
Structure. Par Pieere Dubois. (Actualités Scientifiques et Industrielles, No. 627. Hermann et Cie, Paris), 1938. Pp. 42. Price 12 fr.

A brief resumé of the formation of mixed crystals of insertion and of substitution having the same lattice as one of the constituents, as well as those having a lattice different from those of either of the constituents is given. Their significance in relation to the problem of isomorphism is discussed.

C. S. V.