In the family Saturniidae, the chromo some number ranges from n 13 in *Philosamia cynthia* to $n = 49$ in *Antheraea permi*. From the meagre cytological data available so far, the chromosome number appears to have been conserved in the genus *Platysamia* because in all four species of this genus so far studied, the number is $n = 31$ (Robinson[3]). The same chromosome number has also been reported in at least one species of the following genera: *Automeris, Dictyoploca* (Robinson[3]), *Actias* (Deodikar *et al.*[4]) and *Cricula* (present paper). Interspecific variation in chromosome number has been observed in *Philosamia* (n = 13–14) and *Antheraea* (n = 15–49), in the latter, 4 species out of 8, have $n = 31$ (Jolly *et al.*[5–6]). From the above cytological data it seems probable that the modal number for the genera *Platysamia, Dictyoploca, Automeris, Actias, Antheraea* and *Cricula* is $n = 31$. The karyotype of *Philosamia* (n = 13–14) should be compared with those of the above genera to ascertain whether its karyotype could have been derived from one with a modal number of thirty-one.

The authors are grateful to Prof. S. D. Misra, Head of the Department, for providing facilities, to Sri. S. Sircar, Naturalist, Meghalaya, for his valuable help in the collection and identification of the material.

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R. C. NARANG.
M. L. GUPTA.

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REVIEWS

The Indian Astronomical Ephemeris for the year 1979. (The Controller of Publications, Civil Lines, Delhi 110 054). Pp. xviii + 476. Price : Inland Rs. 30–00, Foreign £ 3·50 or $ 10·80.

"Indian Astronomical Ephemeris for the year 1979", does not show any welcome change from the earlier publications except in its title. The printing and get up continues to be of poor quality, and numerous mistakes are seen as one glances through the pages. No signs of implementation of the suggestions of the special committee appointed by the Indian National Science Academy for improvement of the publication are noticed in this issue.

One glaring example of the carelessness may be seen on page 309 giving local circumstances of the lunar occultation events of Aldebaran. Besides being incomplete, the tables contain several values of moon's age, moon-rise and moon-set times which are obviously wrong. A little care in checking the final tables would have avoided this type of errors.

On pages 388–389 are listed the co-ordinates of important places in India. It is to be expected that the list should contain details about the places where active astronomical observational work is conducted in India. No attempt has been made to update this list by addition of details of new places where such work is being done. Kavalur, Ootacamund, Gauribidanur, Mount Abu, Udaipur are some of the places which should have been included in the list.

It is high time that the concerned authorities pay more attention to remove persistent defects and shortcomings of this publication to bring it up to the standard expected of a national effort of this kind.

J. C. BHATTACHARYYA.

Biochemistry. By S. K. Dasgupta. (The Macmillan Company of India Limited, 4, Community Centre, Naraina Industrial Area Phase I, New Delhi 110 028); Volume 1—1977, Pp. viii + 443, Price : Rs. 25·75; Volume 2—1977, Pp. viii + 312, Price : Rs. 17·25; Volume 3—1978, Pp. viii + 276, Price : Rs. 16·00. (Low Cost University Editions).

Biochemistry by S. K. Dasgupta in 3 volumes is a comprehensive text with emphasis on clinical aspects of biochemistry. The author has purportedly designed the book to serve the students of medicine majoring in biochemistry. This is evident from the large coverage given to topics such as body fluids, tissues and organs, and digestion and absorption (volume 2). Volume 1 deals primarily with the chemistry of the biological compounds—carbohydrates, lipids, proteins, 'nuoleoproteins'; enzymes, vitamins and hormones. Volume 3 deals with the metabolic aspects. In addition,

topics like 'cell and organism', 'organisation of the human body' and 'origin of life : genetics and evolution' have also been included. In a book of this nature, one would expect to find a chapter on 'neurochemistry', which is missing. Membrane biochemistry is another aspect which is not dealt with by the author.

Students and teachers of clinical biochemistry will find this book to be quite useful. It may also serve as a text-book of general biochemistry but for the fact that the treatment of the structural and conformational aspects of macromolecules is rather superficial. The recent concepts of the structure and function of the macromolecules and biochemistry of genetics have been treated in an ill-organised manner. The successful text-books of biochemistry place considerable emphasis on the three-dimensional structure of the biological compounds and the relationship between structure and function. In this context, it is surprising to read the contention of the author, "Practically nothing is known regarding the nature of the group or radical in the molecule where the enzyme activity resides except in the case of some oxidases" (vol. 1, ch. 7, p. 156). On the contrary, a good deal is known on the nature of the active sites of several enzymes.

The author states in the preface that "The basic sequence of topics in the book has been followed with the objective in view, broadly pertaining to the organization and operation of living matter". Even so, it is difficult to justify the organization of the material in the three volumes of the book, which is unorthodox. For example, the different levels of structural organization of proteins (primary, secondary, etc.) are dealt with in volume 1, under 'proteins' and again under 'Blood, Lymph and other Body Fluids' in Volume 2. Under the chapter 'cell and organism' (volume 2) one finds such diverse topics as structure of biopolymers, DNA double helix, gene expression, operon theory, etc. According to the author "Repetition of important facts and theories has been a common feature throughout the text with the belief that repetition is invaluable in the learning process" (preface). This may be so in class room teaching but is of doubtful value in a text book. Another unusual feature of the book is the inclusion of qualitative and quantitative tests for carbohydrates, proteins and lipids, which properly belong to the realm of practical biochemistry.

There is no dearth of good text-books in biochemistry. An outstanding feature of a majority of these books, is the excellent illustrations, diagrams, pathways, schemes, etc. The illustrations in the book by S. K. Dasgupta, though adequate, fail to make an impact on the reader. A number of mistakes have unfortunately crept into the book, and it is hoped that these will be corrected in the subsequent editions of the book.

Considering the modest price of the three volumes and wealth of information presented, the book by S. K. Dasgupta fulfills the function of a standard text-book for the students of clinical biochemistry.

T. K. VIRUPAKSHA.

Annual Review of Physiology. Volume 40. Editor: Ernst Knobil. Associate Editors: Ralph R. Sonnenschein and I. S. Edelman. (*Annual Reviews, Inc., 4139,* El Camino Way, Palo Alto, California 94306, U.S.A.), 1978. Pp. 604. Price $17·00 in USA; $17·50 elsewhere.

Taking into consideration the realities of the ever increasing diversity and specialization of physiology, the editors announce the sectionalization of the forthcoming volumes. This major change is expected to "significantly increase the utility of the Annual Review of Physiology to its vast and varied readership, by improving, extending, and deepening coverage of the field". The present volume starts with an interesting autobiographical sketch by P. F. Scholander titled 'Rhapsody in Science'.

The field of comparative physiology of gas exchange is rapdily emerging from an era of descriptive studies of diverse organisms toward more synthetic, comprehensive and perspective analysis. Those aspects of functional morphology and physiology that bear on the phenomena of gas exchange in nonmammalian vertebrates are reviewed in 'Comparative aspects of Vertebrate cardiorespiratory physiology'. The review illustrates functional similarities among species or groups that should provide the basis for meaningful generalizations.

The concept, that forces are transmitted through the lung parenchyma, has resulted in the application of the elastic theory and finite element analysis to the lung. These and other issues in respiratory mechanics such as the role of nonadrenergic inhibitory system in controlling bronchial smooth muscle and of contractile interstitial cells in controlling lung elasticity are reviewed in 'Respiratory mechanics'.

The changes in respiration that occur in the different stages of sleep and current concepts of both sleep-wakefulness on the one hand and respiratory control on the other are discussed in 'Respiratory adaptations in Sleep'.

'Studies of single isolated renal tubules *in vitro*' present several important new findings about the nature of renal function. The processes that control hydrogen ion secretion both in proximal and distal nephron and how these functions are related to volume regulation are detailed in 'Relationship of

renal sodium and water transport to hydrogen ion secretion'. The role of central nervous system in the control of renin secretion and the regulation of the production of angiotensin are reviewed in 'Renin–Angiotensin System'. Local regulation of blood flow is accomplished by numerous somewhat redundant but nonetheless independent mechanisms. The operation of the regulatory agents in kidney, skeletal muscle and coronary vasculature is reviewed in 'The peripheral circulation'.

'Physiology of the hippocampus and related Structures' is dedicated to the basic physiology of the hippocampus seen as a group of input output subsystems. The anatomical and physiological work relevant to pain sensation and the neural mechanisms of the analgesia produced by electrical and pharmacological manipulation of brain stem sites, is the topic reviewed in 'Brainstem control of spinal pain-transmission neurons'. Where and how, rapid and slow eye movements are generated in the brainstem, and how, suitable models to give insight into the structure of the oculomotor system could be formulated, is a theme of an another review.

Circadian biology is at an exciting point in its development. The physiology of Circadian pace makers discusses some aspects of the wet physiology of circadian organization and reviews the experimental work on five circadian systems in three diverse phyla of multicellular organisms.

Genetic sex is established at the time of fertilization both by the composition of the sex chromosomes and by a variety of autosomal genes; it is no longer appropriate to consider chromosal sex as the sole or even main basis for sex determination. Gonadal Sex, in concert with a variety of genetic determinants, in turn determines phenotypic sex. These and some other aspects in the overall programming of embryologic development are reviewed in 'Sexual differentiation'.

'Endocrine mechanisms of parturition' presents the foetal and maternal endocrine mechanisms that terminate the pregnant state and the significant physiological differences and common mechanism among species.

Other interesting topics reviewed include 'Membrane cation transport and control of proliferation of mammalian cells'; 'Insulin, Glucogan and Somatostatin secretion in the regulation of metabolism; 'Skeletal muscle energetics and metabolism'; 'Activity metabolism of the lower vertebrates' and 'Localisation and release of hypophysins'.

The review ends with the cumulative index of contributing authors and chapter titles of volumes 36–40.

M. S.

Perspectives in Industrial Microbiology (Proceedings of the Symposium held at the Hindustan Lever Research Centre, Bombay, on 2nd and 3rd of April, 1977). Editors: G. P. Kalle, Yvonne M. Freitas and D. V. Tamhane. [Association of Microbiologists of India (Bombay Unit), Sir M. V. College of Science, Andheri (E), Bombay 400 069], 1978. Pp. viii + 166. Price : Members : Rs. 20/-, Non-Members : Rs. 30/-.

This book gives an account of the 16 papers presented at the Symposium broadly under the following heads: (1) Some General Aspects; (2) Fermentation as a Low Cost Technology; (3) Chemicals through Fermentation; (4) Immobilisation as a Technique for Fermentation; (5) Application of Genetics to Industrial Fermentations.

Under the General Aspects, the following papers were presented: (i) Introductory Remarks by K. K. G. Menon; (ii) Industrial microbiology : Indian Scene by D. V. Rege; (iii) Future for industrial microbiology in India by T. N. Ramachandra Rao; and (iv) Fermentation Technology: Indian Scene by K. S. Gopalakrishnan. Under "Fermentation as a Low Cost Technology", the following papers were presented: (i) Rural and urban waste recycling through fermentation by J. V. Bhat; (ii) Utilisation of cellulose by fermentation by M. C. Srinivasan and V. Jagannathan; and (iii) Practical aspects of gobar gas production by Ram Bux Singh and B. K. Gupta. Under "Chemicals through Fermentation," the following papers were presented: (i) The future of chemicals through fermentation by V. Srinivasan; (ii) Biochemical engineering—a developing field in India by H. N. Asthana; and (iii) Production of chemicals through fermentation of molasses and agricultural by-products by A. W. Khan and V. C. Vora. Under "Immobilisation as a Technique for Fermentation," the following papers were presented: (i) Prospects of using immobilisation as a technique for fermentation by S. Ramachandran; (ii) Affinity characteristics of artificial cells—medical applications by B K. Bachhawat, Avadesh Surolia, D. Thambi Dorai and S. K. Podder; and (iii) Horizons in fermentation and enzyme engineering by P. K. Bhattacharyya. Under "Application of Genetics to Industrial Fermentations", the following papers were presented: (i) Regulation of secondary metabolites by G. P. Kalle; (ii) Strain improvement and increased production of microbial products by P. R. Mahadevan; and (iii) Application of the techniques of genetic engineering in industrial microbiology by N. K. Notani. The discussions that followed the presentation of the papers are also included in the book.

The purpose of the Symposium, was, as stated by the Editors, "to bring about a greater awareness among the scientists working on such esoteric problems, as

genetic engineering and immobilisation of enzymes, of the real problems facing industrial microbiologists in India today; and to make the technologists conscious of the need to derive the relevant benfits of research carried out in Indian laboratories."

Like all other branches of science, microbiology also has two main aspects, namely, its fundamental aspects and its practical applications. A fundamental aspect is the working philosophy of the molecular biologist which is guided by what is known as a Monod dictum and that is what is true of *E. coli* is also true of an elephant.

Microorganisms are not only excellent experimntal materials but are also of great practical importance as they are biotic forces which could be harnessed in the service of man.

The book is mainly concerned with the applications of microbial activities in the production of energy and feod from waste materials, in the control of environmental pollution and in the promotion of health.

The papers referred to above elucidate the great practical possiblities, *e.g.*, in rural, urban waste recycling, in the utilization of cellulose by fermentation, in the production of chemicals through fermentation and in the practical aspects of gobar gas production. The papers, as a whole, seem to serve to achieve the purpose of the Symposium.

The book will be appreciated by the students of Microbiology and others interested in the development of Industrial Microbiology.

S. C. PILLAI.
G. KASI VISWANATH.

Lectures on General Relativity and Cosmology. By Jayant V. Narlikar. (The Macmillan Company of India Limited, 4, Community Centre, Naraina Industrial Area Phase I, New Delhi 110 028), 1978. Pp. viii + 279. Price : Rs. 65·00.

This is the second book with the same title, the first one being by MeVitte. The scope and content of this volume however is very widely different. The present book includes a discussion of some of the *recent excitements in the field of General Relativity.*

This volume is an outcome of a course of 18 lectures the author gave at TIFR graduate school. Therefore a great deal of informality is seen throughout the presentation which is very refreshing. But a reader who does not have the author on the other side of the table, may have doubts which will have to remain with him. The first chapter is a general introduction wherein Narlikar introduces the lack of invariance of the Newtonian equations to Lorentxz transformation and hence the necessity for a new look. Chapters 2 and 3 are a general introduction to vectors, tensors, and tensor calculus wherein the introduces parallel transport. Riemannian affine connections, etc. These have been given in usual tensor notation and the reading is easy for a person who has had some initial introduction to tensor calculus.

Chapter four starts with the definition of space-time curvature and in his discussion the author derives the Bianchi identities. It is a pity that no one ever discusses why such an identity comes in, and what are the physical implications of such identities. Are there any symmetries involved in such a relation ? The uext chapter on spact time symmetries is well written wherein he has brought-out Killings equation and Killing vector fields which play an important role in later discussion. Chapter six is deveoted to a discussion of Energy-Momentum tensor and also discusses conformal invariances. In Chapter seven *Einstein's equation* of gravitation derived both from a heuristic point of View and from an action principle are introduced and then the Schwartzchild solution. Experimental tests for the Einstein theory from the next two chapters followed by Astrophysics of strong gravitational fields in which the author discusses the Kruskal-Szekers diagrams and the black hole physics. Then he goes over to cosmology, and the various models such as Friedmann, Steady State, de-Sitters' etc., and also discusses observational tests of cosmology. There is a well written chapter on Mach principle and then a look into the future.

This book is a very good addition to the existing literature, but it offers only a guide-line and cannot be treated as a self-contained book. One defect the reviewer found was that the author at every stage tries conform to classical physics. A new student to the subject would get a feeling that this is all that is there in relativity. While the author refers to some of the modern results (excepting his own) such as thermodynamic of blackhole, he is not at all critical. While one compares the surface area of a blackhole with entropy only on the basis of the result that the surface area cannot decrease, entropy has a much deeper meaning in that it is state function and that it is a consequence of an H theorem and irreversibility. The author mentions that the quantum effects allow *a Blackhole to radiate. Does it then mean that a* Blackhole can decrease its surface area ? Thermodynamics of Blackhole is still highly phenomenological and one cannot at this stage write an axiomatic theory of Caratheodary to Blackhole surface area.

The book would be useful to a serious student of relativity in conjunction with various other books in the field. There are quite a few printing mistakes that would keep the reader awake. The price of Rs. 65 will certainly give prospective student buyers food for thought.

R. PRATAP.

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