
BOOK REVIEWS

I want to be a Mathematician, an Automathography by Paul R. Halmos, 1985, pp. 407, (Published by Springer-Verlag, Postfach, Heidelberg, Plat 23, D-1000, Berlin 33, Germany), Price: DM 134.

Reading Paul Halmos has not always been so pleasant. One still retains memories of difficult exercises to be solved from his "Finite-Dimensional Vector Spaces" or "Measure Theory" before the Monday morning examination. At such times one often wished, rather uncharitably perhaps, that Halmos disappeared with his problem books into some distant Hilbert space.

Happily, Professor Halmos is still very much around. Now 70, he's as keen as ever "to be a mathematician". As if he hasn't been one: that pretty proof of the monotone class theorem, the theorems in ergodic theory, the contributions to logic, all those concepts in operator theory and, to be sure, the Halmos tombstone[] to embellish the end of each of his beautiful mathematical proofs.

It has certainly been a marvellous innings, and reading Halmos describe it is a memorable experience. "I like words more than figures", he says, as he sets off to recount his narrative. And very soon he's in the thick of things: the migration to the US from Hungary at the age of 13 and the experience with the boy in school who called Halmos a "goddam foreigner" ("I still hate such round-faced square-shouldered football types"); then the joy of reading Sherlock Holmes books in the original English; college at Urbana, Illinois and not home at Chicago because Illinois promised 'freedom' ("I have been kicking myself ever since for not choosing Chicago. Ah well, next time I'll know better!"); the terrible moment when he nearly opted for philosophy as a career; and, finally, the fortuitous arrival of Doob at Illinois leading to a Ph.D. in measure theory at the age of 22 (and the pride and glory of being addressed "Dr Halmos" by the great Khintchine himself).

And so the narrative continues. But it is more an 'automathography' and less an 'autobiography'. So while one gets to know the names of all of Halmos's Ph.D. students, one doesn't read the name of his wife! There is Halmos talking about the department common room (with its dark corridors, the smell of burning tobacco and the ubiquitous chessboard);

about collaborative research ("a collaboration once joined together shall not be put asunder"); about what makes a great university ("a great university means a great faculty; the condition is necessary and sufficient"); about how to be an editor ("an editor earns his keep not by reading manuscripts with a red pencil in hand but by being an advertisement and advisor to the publication"); about how to do research ("I love to do research but I hate to sit down and begin — I always try to put it off". "I am not good at research competition. My substitute for trying to be the first is to go off in a direction orthogonal to the mainstream"); and about how to select department chairman ("elections at departmental level usually produce second-rate leaders with no imagination and leadership. I personally prefer a good — appointed — fascist").

One doesn't necessarily have to agree with all that Halmos says but he writes compellingly and lucidly. And the automathography is not all sermon and discussion. There are anecdotes and there is gossip. Halmos's only Indian student, V. S. Sunder, for example, got on very well with the master and their collaboration was yielding a pretty good book until Sunder objected to the use of the impersonal "he" in a mathematical proof. "Sexist", said Sunder, "stuff and nonsense" retorted Halmos and there was a mighty row. (The book did eventually appear, and it is indeed a pretty good book.) Then there's the anecdote about Paul Halmos's advice to Paul Erdos. Being both Hungarians in America, and fancying himself Erdos's senior, Halmos advised Erdos to chuck travelling all the time and to settle down in one place. Erdos cheerfully disregarded this advice then and still continues to forty year hence! (As a consequence, Erdos is a frequent visitor to India while Halmos has probably not been here even once.) There is also the story of when Mrs Halmos ran into Einstein and his assistant on the University of Chicago campus. Hearing her pleasant exchange with his assistant, Einstein asked who the lady was. "That's Halmos's wife", he was told. "Ah", said Einstein, "and who is Halmos?"

That's a story Halmos never tires of repeating. And that in some sense explains Halmos the man. Someone who comes through as very human, very hardworking and very American. ("Use the American pronunciation 'Hal-moss' of my name, not the

Hungarian 'Hal-mush'", he once chided a colleague.) So read "I want to be a mathematician..." to know more about the man whose love for words has made him one of the greatest expositors of modern mathematics.

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Annual Review of Cell Biology, (eds) G. E. Palade, B. M. Alberts and J. A. Spudich, 1985, Vol. 1, pp. 561, (Published by Annual Reviews Inc., 4139, El Camino Way, Palo Alto, California 94306, USA), Price: USA \$27, Elsewhere \$30.

Annual Reviews Inc., discharge the commendable task of feeding the scientific community with comprehensive reviews on advancing frontiers of contemporary research. With the advent of cell culture as an effective and popular model for research in biochemistry, molecular biology, genetics, cancer biology and immunology, the subject of cell biology has been 'transformed' into a fast expanding interdisciplinary area. In this context the introduction of a new series of "Annual Review of Cell Biology" is appropriate and opportune.

This inaugural volume contains sixteen reviews and these cover a wide range of topics, compiled mostly by scientists who have contributed to the development of the respective subject. In the first article entitled "Receptor mediated endocytosis", the Nobel Laureates Goldstein and Brown and their associates endeavour to review the developments in receptor chemistry in the last two years and elaborate on their work on the structure and genetics of the LDL receptor the amino acid sequence of which is now known. This and the comprehensive coverage on the structure, function and evolution of the acetylcholine receptor illustrate the massive work and rapid advances being made in receptor chemistry.

Several articles deal with newer cell components, particularly proteins. The reviews on intermediate filaments which form part of the cytoskeleton, on fibronectin, a glycoprotein of extracellular matrices, on cell migration in the vertebrate embryo and on the organizing centres of microtubules, give a perspective of the several proteins that function in

ciliary and flagellar movement, cell motility, cytoplasmic streaming, chromosome movement, maintenance of cell shape and form and anchorage of cell surface receptors. Generation of polarity during cell differentiation of *Caulobacter* has been described in another article to illustrate the programming of the timing of differential gene expression, the regulation of the assembly of complex subcellular structures and the control of spatial organization. A related article describes how cell surface polarity which gives the capacity for selective permeability and vectorial functions is developed in epithelia.

The self-assembly of actin into three-dimensional structures which influence cell form and function, is regulated by the "actin binding" proteins. Binding of these proteins to actin monomers causes inhibition of self-assembly into filaments, breakage of filaments, cross linking among filaments and to other structures. One article deals with this subject and describes the properties of several of these proteins.

The bulk of the remaining articles is devoted to compartmentation and targeting of proteins. While Garoff discusses how recombinant DNA techniques are being used to marshal support for the 'signal hypothesis' through the synthesis of 'chimeric proteins', the role of Golgi apparatus in protein processing and sequestration is reviewed by Farguhar. The article by Lazarow and Fujiki on biogenesis of peroxisomes invites attention on the controversies that surround these tiny vesicles; their genesis, structure and function. As time passes, more and more enzymes are being identified to be localized in these particles!

Those who enjoy the personalized accounts of science by stalwarts in the 'Prefatory Chapter' will miss it in this issue. One hopes that pioneers in cell biology would share their personal experiences in the coming ones.

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Fracture at Stress Concentrations—Proceedings of the 1984 International Conference on Mechanics and Physics of Fracture III, 1986, pp. 73. (Published by The Institute of Metals, 1, Carlton House Terrace, London SW1Y 5DB, UK). Price: UK £12, Overseas \$21.

This book is a compilation of papers presented at the International Conference on Mechanics and Physics of Fracture III organized by the Metals Society and held at the Cambridge University. The papers included in this book have been published previously in the journal *Materials Science and Technology*. The scope of this book can be categorized into three vital areas of interest, namely environment assisted fracture, void nucleation and growth, and fatigue and fracture at preexisting notches with particular emphasis on modelling of crack initiation under these situations.

A major portion of the proceedings has been devoted to the topics on environment induced fracture. A noteworthy paper analyzes the implications of crack dimensions and mass transfer at the crack tip in corrosion fatigue. Equally admirable is the paper by Coffin concerning the problem of crack initiation from notches and the significance of the use of pseudo-elastic stress analysis in describing stress and strain distributions at the notch root. A brief discussion on the monitoring of crack growth using electric potential drop technique is also presented. The role of hydrogen embrittlement as reviewed by Thompson will no doubt lead to the understanding of the influence of gaseous hydrogen in fracture initiation from notches and will be of particular interest to pressure vessel designers. It also questions the use of stress or strain distribution ahead of the notch in formulating the cleavage crack on void initiation ahead of the notch. The significance of pits and cracks in environment assisted fracture has been elegantly outlined by Parkins and in particular the need to establish a relation between the electro chemical parameters and the stress distribution is emphasized.

Only two papers stress the role of void nucleation, growth and coalescence in ductile fracture, one primarily devoted to the finite element modelling of void growth and the other concerned with the effect of constituent particles on void nucleation in Al-Li alloys. The concern for the application of mechanistic parameters to the microscale is suitably brought out.

Prime attention is given to designing against fracture at stress concentrations and the propagation

of "small" fatigue cracks from notches. The article by Smith systematically reviews the current state of the art approaches in the prediction of fatigue crack propagation from notches. It nevertheless is true that after reading these paper one gets the impression that we lack a suitable mechanistic methodology to evolve a theory for short cracks or our approaches, for no reason seems to have always been associated towards merely measuring the crack growth and cycles to failure which, of course, are easier to do. Burdekin's article will be of interest to the structural engineers and it reviews several practical design approaches to the problems of fatigue and fracture at stress risers. It is worthy to mention here that Coffin's paper encompasses the predictions and experimental observations for early crack growth from notches in corrosive conditions. He illustrates the validity of fatigue-data curve in ASTM section III and the effect of notch root radius, frequency and water chemistry on the initiation and propagation of failure from notches.

This book represents a skillful organization of problems on fracture which both the academicians and technologists will no doubt find very useful and interesting.

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Aquatic Microbiology by G. Rheinheimer, 1985, 3rd edn, Institut fur Meerkunde, University of Kiel, West Germany. Translated from the German by Dr Normal Walker, A Wiley Interscience Publication, John Wiley and Sons, Chichester, New York, Brisbane, Toronto. Price: not given.

In view of the great interest in applied and academic research in the recent past on microbial ecology of the aquatic environment the publication of a third updated English edition of Prof. Rheinheimer's now well-known book is timely.

The first six chapters deal with the microbes of the aquatic environment including the oceans. The illustrations are apt and excellent. The seventh chapter deals with microbial distribution in aquatic systems viz springs and inland waters, lakes, the marine sediments; and sediments of inland waters. Chapters 8 and 9 deal with influencing factors. The tenth chapter deals with association of microbes with aquatic plants and animals. The remaining

chapters cover the role of microbes in the recycling of elements, ecosystems, sedimentation, origin of mineral resources, water pollution and finally the economic significance of aquatic microbes.

Applied aquatic microbiology deserves more attention than it has. Questions like, primary production in aquatic systems, bacterial development and why ocean water is bactericidal for limnic and terrestrial organisms need to be answered. Behaviour of human pathogens in different waters and sediments is unknown and more research is needed to determine the microbial role in fouling, corrosion and leaching. The book is indeed well-written and achieves the twin tasks of comprehensiveness and compactness. Prof. Rheinheimer, a renowned aquatic microbiologist, has spent a life time on the subject of the book, the presentation is factual, the subject arrangement orderly, concise and yet comprehensive.

It will be a useful book for aquatic microbiologists and is a comprehensive introductory book for courses in oceanography, limnology, ecology, fishery, aquaculture and conservation. Dr Walker has done a commendable job in translating the original (in German).

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Annual Review of Earth and Planetary Sciences, (eds) G. W. Wetherill, A. L. Albee and F. G. Stehli, (Published by Annual Reviews Inc., 4139, El Caminoway, Palo Alto, California 94306, USA). Vol. 14, 1986, pp. 593, Price: US \$44, Elsewhere \$47.

The Annual Review eminently bridges the gap between the rapidly obsolescent text books and the proliferating scientific journals. The wide range of subject coverage, the very up-to-date nature of information and reasonable price are the attractive features of this review series. In the present volume, there are seventeen state-of-the-art papers covering a wide spectrum of geosciences. As is customary, the volume begins with the memoirs of an eminent scientist (A. L. Hales), who recounts the evolution of geophysics on three continents during the best part of his life.

Chemical geodynamics, started by Allegre in 1982, is a frontier field of high-brow research, and

its current progress is excellently reviewed by Zindler and Hart. Andesite petrogenesis is summarised by Grove and Kinzler. The close genetic connection between tektites and impact glasses is highlighted by Koeberl. Temperature distribution in the earth with reference to geodynamics is dealt with by Jeanloz and Morris.

Kanamori interprets the rupture process of subduction zone earthquakes by seismological studies, in terms of an asperity model. Sibson traces the physical origin of earthquakes to the geological structure of fault zones. Simpson discusses the seismic risks of triggered earthquakes related to fluid injection during secondary oil recovery, rock failures in mines and quarries, and reservoir impounding as at Koyna. Decker's article on forecasting volcanic eruptions assumes topical importance in the wake of recent disasters in Colombia and Africa. Komar and Holman analyse the global problem of shoreline erosion in terms of the various coastal processes.

A fascinating account of climatic anomalies related to the Peruvian counter-current called El Nino (Child Christ) is given by Cane. The climatic rhythms recorded in varves, cyclic/rhythmic bedding and cyclothem is discussed by Fischer. The grim effects of the increasing carbon dioxide in the atmosphere on climate are sharply focussed by Chen and Drake. The geological significance of radiolarian cherts is brought out by Jones and Murchey. The origin of water-laid placers and their economic importance are discussed by Slingerland and Smith. An interesting account of basinal brine hypothesis for the origin of the strata-bound, Mississippi Valley-type lead-zinc deposits is provided by Sverjinsky. The use of molecular clocks to construct the family tree of mammals (including bovids) and extinct species like woolly mammoths, mastodons, sea cows (Sirenia), South African quagga etc., is interestingly narrated by Lowenstein. A valuable updated account on conodont biostratigraphy, subsequent to the benchmark publication of the Pander Society Symposium in 1971, is presented by Sweet and Bergstrom. In short, this volume transports the reader to a lofty scientific plane through the myriad paths of earth and planetary sciences.

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Systematic Studies in Polygonaceae of Kashmir Himalaya by A. H. Munshi and G. N. Javied, (Published by Scientific Publishers, Jodhpur, India), 1986, pp. 215, (ISBN 8-85046-32-8), Price Rs. 275.

The Polygonaceae are predominantly herbaceous plants of the north temperate regions and of high mountains but of limited distribution elsewhere in the tropics. The monogeneric, *Oxyria digyna* is unique in occurring in the arctic zone, on mountain ranges of Europe and Asia and even on the high mountains along the equator in East Africa. The family is well represented on the Himalayan mountain system. Some of its members, like *Bistorta affines* (D. Don) Greene (syn. *Polygonum affine* D. Don), form attractive creeping patches on rocks at high altitudes adding colour to the landscape with their pink, red or purple flowers. A few are of food value (buckwheat, *Rheum*) and medicinally useful (*Rheum-rhubarb*).

The book under review gives an exhaustive account of the morphology (including anatomy and cytology with chromosome numbers), taxonomy, palynology, epidermal features and relevant phytogeographical aspects of as many as 50 species belonging to 10 genera of the family collected by the

authors in different sectors of Kashmir Himalaya at altitudes ranging between 1000 and 4800 m. above msl. The supporting illustrations, however, are unsatisfactory, particularly those of Herbarium sheets in the taxonomy section. Line diagrams are always preferable for depicting the diagnostic features of a species. The photographs in other sections are also poor (e.g. what can one make of the illustration no.1. in Plate LV? – nothing is seen here, at least in the reviewer's copy). The book concludes with a general discussion, bibliography and index.

While, no doubt, there is useful information in the book, it can be of interest only to the select few interested in the particular family. For a first look, the book appears well produced and printed but there are several printing errors and the binding is weak (it had split even when it came to the hands of the reviewer). The price is also prohibitive, perhaps, even for the libraries.

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ANNOUNCEMENT

INSA BURSARY GRANT SCHEME

The Indian National Science Academy invites applications from individual scientists for the *Bursary grant* (non-recurring) which has been initiated by the Academy to provide *one time* supplementary support to individual scientists for carrying out research effectively. The grant must be utilized for the purchase of equipment (if not available in the laboratory), components and accessories, chemicals and other such items concerned for research and/or to organize a small group discussion of professional colleagues on important aspects of research and development, or any other significant activity related to research. Under no circumstances shall the Bursary grant be used for attending conferences abroad or in India. The Bursary grant will not be

periodic or recurring as this is a relatively small amount ranging between Rs. 10,000/- to Rs. 20,000/- and in exceptional cases up to Rs. 40,000/-.

The objectives and scope of the Bursary scheme will remain dynamic and will be suitably changed to render it more effective based on the experience gained.

Application form for the Bursary grant may be obtained from the office of the Executive Secretary, Indian National Science Academy, Bahadur Shah Zafar Marg, New Delhi 110 002 and may be submitted three months in advance. The applications normally get screened once in three months by a sub-committee constituted by the Academy.
