

**Annual Review of Microbiology 1994.** Nicholas Ornston, Albert Belows and E. Peter Greenberg, eds. Annual Reviews Inc., 4139 El Camino Way, Palo Alto, California, USA. Vol. 48. Price: \$139. 834 pp.

While it is late to review the 1994 issue of this series at this time, several articles in the issue drew my attention. The first and foremost was the opening article 'A Charmed Life' by Boris Magasanik, senior lecturer at MIT, Cambridge, MA, USA. I was influenced by one of Boris' chalk board presentations during an in-house symposium in the honour of H. G. Khorana at his retirement a couple of years ago. Hence, it was with great pleasure that I went through this article. Reading through his biography was a reminder of how careers of scientists of his time depended on the events of the World War II and, in his case he even had to serve in the US army in England and France for nearly four years. In spite of this, his scientific career has been very illustrious. Immediately after completion of the army services, he joined Chargaff's group at the Columbia University for his Ph D to work on inositol metabolism and completed his degree in 1948. Just then Chargaff had begun his studies on the composition of nucleic acids, and Boris continued for one more year to work on chemical and enzymatic degradation of RNA before joining as faculty at the Harvard Medical School in 1949. Boris' alertness to the recent trends in scientific research helped him utilize the bacterial genetics to the best advantage in isolating a number of auxotrophic mutants of *Klebsiella aerogenes*, *Salmonella typhimurium* and *B. subtilis*. These mutants proved to be instrumental in his studies on inositol metabolism, purine and histidine biosynthesis and some earlier concepts on catabolite repression, both at the Harvard Medical School and later at MIT when he moved there in 1960. Subsequently these studies paved a way for him to study the elegant mechanism of regulation of expression of glutamine synthetase (*glnA*) by the regulatory proteins NRI (NtrC) and NRII (NtrB) in bacteria.

This volume of the Annual Reviews is also important in that it contains a good collection of articles on the unique biology of trypanosomes, a parasitic protozoan responsible for a number of dis-

eases in humans and domestic animals. Pays, Vanhamme and Berberof review the mechanisms of differential and stage-specific developmental gene expression of variant surface glycoproteins (VSGs) and procyclins responsible for antigenic variation in the host. These organisms are unique in that modulation of promoter activity does not play an important role in gene expression. Instead, gene rearrangements, change in chromatin structure, and various aspects of posttranscriptional and translational controls are mainly responsible for regulation of gene expression. Of particular interest to me was that the presence of a novel nucleotide,  $\beta$ -D-glucosylhydroxymethyluracil in the telomeric regions of the bloodstream forms correlated with the inactivation of expression sites possibly as a result of alterations in the chromatin structure. In bloodstream form, glycolysis is the major pathway used by the parasite for energy generation. Sommer and Wang have contributed an article that provides details on targeting of proteins to glycosomes (organelles that compartmentalize glycolytic enzymes). Detailed knowledge of targeting signals should prove useful in developing therapeutic reagents which can be targeted to glycosomes to inhibit glycolysis. *Trypanosoma brucei brucei* is infectious to domestic animals but it is rendered noninfectious in humans because of the presence of the cytolytic activity against this strain in normal human serum. However, this cytolytic activity does not restrict the disease-causing strains, *Trypanosoma brucei gambiense* and *Trypanosoma brucei rhodesiense*. High density lipoprotein (HDL) was characterized to be responsible for the lytic activity. Hajduc, Hager and Esko have reviewed the high density lipoprotein-mediated killing of the trypanosomes. Biochemical characterization suggests apolipoprotein A1 to be the active ingredient in this killing process. While the exact mechanism for the lytic activity of HDL/apolipoprotein A1 is not clear, various models that lead to internalization of HDL/apolipoprotein A1 and subsequent lysis of the parasite have been discussed. In any case, these observations could be very important in development of HDL-based therapeutic reagents against trypanosomes. Another aspect of trypanosome biochemistry on characterization of *trans*-sialidase (TS) has been described by Schenkman,

Eichinger, Pereira and Nussezeiwig. This enzyme catalyses transfer of sialic acids from host glycoconjugates to acceptor molecules of the parasite plasma membrane. Interestingly, *T. cruzi* (causative agent for Chaga's disease) expresses this enzyme both in the insect vector and the human host whereas the African trypanosomes (causative agents of sleeping sickness) express this enzyme only when in the insect vectors. This enzyme has been characterized and its gene has also been cloned. This enzyme is important in that it performs glycosyl transfers without using a nucleoside diphosphate substrate. Yet another article by Zilberstein and Shapiro provides details on the role of the environmental factors such as pH and temperature on stage-specific gene regulation of a related genus, *Leishmania* responsible for various human diseases.

Feagin reviews on extrachromosomal DNAs of apicomplexan (sporozoa) parasites. Well-known examples of these protozoans parasites are the *Plasmodium* species. Other parasites that cause diseases in humans include *Toxoplasma gondii* and *Cryptosporidium* species. Several others such as *Babesia*, *Theileria* and *Eimeria* cause diseases of domestic animals. What is most interesting of the mitochondrial DNA in these organisms is the presence of the ribosomal RNA (rRNA) sequences in discontinuous regions resulting in fragmentation of the rRNAs. These fragments correspond to only the highly conserved regions of the rRNAs. Variable region sequences of the rRNAs have been dispensed with. This 'gene shrinking' experiment that the nature has performed should be extremely useful for structure function analysis of the rRNA.

Further, Gerhart, Wagner and Simons have contributed a review on the regulation of expression by antisense RNA in prokaryotes. The article is very informative and a good starting point to learn 'everything you wanted know but were afraid to ask' about how the copy number of various plasmids is regulated by antisense RNA. The chapter also describes the role of antisense RNA in regulation of bacteriophage and in Tn10 (Tet<sup>R</sup>) gene expression. Conveniently, general aspects of both the later topics have been reviewed by Campbell and Hillen and Berens, respectively in the same issue. The book also contains a chapter by Loewen and Hengge-Aronis

on regulation of prokaryotic gene expression by  $\sigma$  in the stationary phase of the growth.

In retrospect, the review on prion proteins by Prusiner turned out to be a remarkable and ahead of its time contribution. The article journeys through the chronological developments of how from total denial, it became an established fact that the protein molecule alone is the infectious agent which causes scrapie of sheep, bovine spongiform encephalopathy (BSE) of cattle and Creutzfeldt-Jacob disease (CJD), fatal familial insomnia (FFI), etc. of humans. It is striking that a conformational change of some  $\alpha$ -helical regions of the prion protein to  $\beta$ -pleated sheets converts a normal protein into an infectious agent. With the recent outbreak of BSE in UK, this article will definitely be a thirst quencher to many curious biologists.

The book also includes reviews on many other infectious organisms such as mycoplasmas and their role as cofactors during HIV infection. Several articles have been devoted on the aspects of microbial physiology as well as on industrial production of economically important products. Overall, the editors – L. Nicholas Ornston, Albert Belows and E. Peter Greenberg – have put together a good collection of articles worthy of appreciation. Most certainly, one cannot go wrong in acquiring this book for a personal collection.

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**Dyke Swarms of Peninsular India.**  
T. C. Devaraju ed. Geological Society of India, Bangalore. Memoir 33. 1995. 451 pp. Price: Rs 500, \$ 50.

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Dyke swarms constitute an important feature of the earth's crust. These intrusive bodies represent major thermal and deformational events of the earth's long history and thus provide useful constraints to monitor the evolutionary processes leading to the development of crust and mantle. Like other shields of the world the Indian shield has also received voluminous amount of magmatic

material in the form of dykes and other shallow level intrusions at distinct time intervals. However, unlike other geological features, the dyke rocks of Indian Peninsula have not received due attention from geoscientists. Even details on their geological occurrence and distribution in time and space are lacking in the literature. The Geological Society of India, which has the reputation of bringing out monographs on such topics, has fulfilled a long-felt need of researchers working particularly in the field of petrology, geochemistry and tectonics which can provide up-to-date information on dyke rocks of peninsular India. Although a considerable amount of data in terms of geological occurrence, and major, trace and rare earth elements and also the isotopes are now available on their eruptive counterparts, the dyke rocks have generally been neglected. This monograph is an attempt to fill this gap for the benefit of researchers engaged in determination of chronology of geological events in peninsular India. The book covers not only some of the more significant features of dyke swarms of peninsular India, but also deals with some more important general aspects of dyke rocks.

The first three papers in the monograph are concerned with the review of research work done on general aspects of dyke rocks. These papers provide a good insight into some important features of dyke suites like flow and crystallization (by I. M. Platten), palaeomagnetism (by M. E. Evans) and clouding of feldspars (by H. C. Halls and Boaxing Zhang).

The next two papers deal with some general aspects of Precambrian dyke swarms of South Indian shield. On the basis of occurrence, distribution and age data, N. G. K. Murthy has identified five episodes of dyke activity ranging in age from 2240 m.y. to 75 m.y. A review of palaeomagnetic data on some dyke rocks of Indian shield is presented and discussed by V. Damodara Reddy *et al.*

The next three papers present case histories of some important Precambrian dyke swarms of southern Peninsula. Amitabha Sarkar and A. K. Mallik have discussed the isotopic and geochemical data to draw interpretations regarding age and petrogenesis of dykes of Kolar Gold Field. Two episodes of Proterozoic dyke activity are identified which the authors have tried to correlate with general dyke-forming events of Indian shield. T. Radhakrishna and J. Mathew have

presented a paper on mafic dyke swarm occurring in high-grade terrain of south India. Isotopic and geochemical data of advance nature are adequately used to interpret some important conclusions regarding evolution of Indian lithosphere. A detailed account of geochemical data on mineral phases of a dyke from Karnataka is presented by T. C. Devaraju and others for an understanding of differentiation processes.

A. B. Roy and others who have been authors/co-authors of some of the most informative papers on the Aravalli belt in the past, have contributed a paper on the dyke rocks of this region. The paper reveals seven dyke-forming events in Aravalli history. The occurrence of felsic dykes is of special significance. Another paper on dyke rocks of western Indian shield is by N. Kochhar and co-workers. These authors have presented the petrology and the geochemistry of acid and mafic dykes of Trans-Aravalli region associated with Jalor magmatic activity. This activity is considered to have been manifested in response to an abortive attempt of rifting in the Trans-Aravalli part of Indian lithosphere at about 750 m.y. ago.

The mafic dyke swarms of central Indian shield are dealt with in the paper by H. M. Ramachandra *et al.* The paper describes the occurrence of many dyke swarms in the region and provides details of Bhanupratappur–Keskal mafic dyke swarms. On the basis of field occurrence and geochemistry, the authors have discussed their petrogenesis and tectonic setting and find a close affinity of these dyke swarms with the famous Labrador and scourie dyke swarms.

An interesting case history pertaining to dyke swarms of southern Karnataka is given by T. C. Devaraju and others in two papers. The authors have contributed 66 pages on these dyke swarms covering field characteristics, petrography, mineral chemistry, whole rock geochemistry and isotopic compositions. The data are adequately used to evaluate the relative significance of petrogenetic processes in the magmatic evolution of these dyke swarms and to interpret their tectonic setting.

J. Mallikarjuna Rao and others have discussed the field occurrence and K–Ar and Ar–Ar ages and geochemistry of dyke swarms related to Cuddapah basin and draw interpretations regarding their petrogenesis and tectonics. These