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**Annual Review of Microbiology** (Vol. 34), Editor: Mortimer P. Starr. Associate Editors: John L. Ingraham and Albert Balows. (Annual Reviews Inc., Palo Alto, California), 1980, Pp. 764. Price \$ 20.00 U.S.A.; \$ 21.00 outside.

The rate of accumulation of fresh results is so fast these days, it has become almost impossible to keep track of all the developments in one's own field of research. In this context, a publication like *Annual Reviews of Microbiology* is of immense help where one can get at least a superficial glimpse of the developments in other areas of research in Microbiology. Even then a certain bias cannot be helped, due to the high degree of specialization; this reviewer, for instance, tends to read more thoroughly the articles related to molecular biology and genetics. The 1980 volume of ARM has 22 chapters embracing various aspects of microbiology and a prefatory chapter by Prof. Roger Stainer. This biographical sketch interwoven with his scientific discoveries by Stainer provides undoubtedly the best reading material in this volume. Prominent among Stainer's contributions are the regulation of pigment synthesis by nonsulfur purple bacteria, the role of carotenoid pigments as agents of photoprotection, the path of carbon in photoheterotrophy, the definition of bacteria as prokaryotes, the cyanobacteria (which he continues to work on at Paris, at present) and aromatic ring cleavage. The style in which these facts are brought out, the genesis of the classic text-book "The Microbial World" (which Stainer has written in collaboration with Doudoroff and Adelberg), the pleasant memories of his association with some of his illustrious colleagues are some of the best features of this article. The personality of the individual is abundantly reflected when Stainer discusses about his open conflict with the National Biological Laboratory on the issues of bacteriological warfare. A couple of his recapitulations, which I wish to quote below, should set an example to many of us. Thus, recalling his own involvement in the early work on the discovery of 70S ribosomes, which was not pursued further by him, Stainer points out ".....the inevitable penalty paid by foxes, who like to skim the cream off a diversity of promising subjects, and not be hedge hogs, who labour patiently over one big topic through decades". At another instance, citing the example of van Niel, he says..... "He never as a matter of principle coauthored articles of which he hadn't shared directly in research—a good lesson for all of us".

To the readers interested in the general areas of molecular biology, microbial genetics and virology, the following reviews are of interest. "Virus-like particles of yeast" by J. A. Bruenn starts with the discovery of *Saccharomyces cerevisiae* virus (ScV), emerging from the "Killer character" and gives a detailed account of the physical properties of ScV particles, the characteristics of ScV proteins and RNAs, the translation products of viral RNA, the properties of particle-associated RNA polymerase, the genetic interaction between the host cell and virus, etc. Despite the fact that ScV lack infectivity and is communicated from cell to cell only by mating, it appears to possess almost all the attributes of genuine segmented as RNA virus.

The analyses of phage DNAs have led to the discovery of several modified bases, the extent of modification going far beyond simple methylation of an occasional residue. At times the modified bases replace one of the normal bases either partly or completely. The modified bases known in phage DNAs are, 5-hydroxymethyl cytosine, 5-methyl cytosine uracil, 5-hydroxymethyl uracil,  $\alpha$ -putrescinylyl thymine, 5-dihydroxy pentinyl uracil,  $\alpha$ -glutamyl thymine and 2-amino adenine. These bases cause certain changes in the expected values of  $T_m$  or buoyant density. In the article "Modified bases of bacteriophage DNA" by R. A. J. Warren he has considered the biosynthesis of these modified bases as well as the biological consequence of these modifications with respect to the survival and propagation of the phages.

"Defective interfering influenza virus" by D. P. Nayak reviews the current literature on the properties and genomes of these particles. The influenza D1 virus contain new small RNA molecules that are absent in infectious virus. The RNAs vary from clone to clone and they are responsible for the interference of homologous virus replication. Influenza D1 RNAs are possibly formed by internal deletion and certain sequences of progenitor vRNAs are preserved in them.

The success of immunization against viral disease depends on achieving an appropriate and adequate immune response towards protective viral antigens. Utilizing synthetic antigens that contain immunoreactive region(s) of the viral proteins in vaccination against viruses may have several advantages over the use of intact, attenuated and killed viruses. The review "Chemically defined antiviral vaccines" by Ruth Arnon deals with these aspects and ends with

an optimistic note because of the feasibility of the chemical approach for the development of synthetic antiviral vaccines in future.

Plasmids are not essential for the successful growth and metabolism of their host bacterium but certainly allow them to survive in adverse environments. They also specify properties that directly contribute to the pathogenicity of several microorganisms, either by way of providing resistance to a variety of antibiotics or by leading to the production of toxins or adherence proteins. The interspecies transfer of plasmids and their high rates of multiplication in conjunction with the indiscriminate use of antibiotics in hospitals have led to the existence of many organisms with enhanced virulence and nonsusceptibility to antibiotics. The relationship between specific chromosomal genes and plasmid-borne virulence genes are subjects for active research. The discussions in the review entitled "Plasmid-mediated factors associated with virulence of bacteria to animals" by L. P. Elwell and P. L. Shipbey primarily center around these points. 'Natural  $\beta$ -lactam antibiotics' by H. Aoki and M. Okuhara, 'Nitrogen metabolite regulation of antibiotic biosynthesis' by Y. Aharonowitz and 'Antibiotics from Micromonospora' by G. H. Wagman and M. J. Weinstein are the other articles dealing with different aspects of antibiotics.

The taxonomy of *Staphylococcus* has undergone revision several times in the past decade. The review on 'Natural populations of the genus *Staphylococcus*' by W. E. Kloos attempts to familiarize the reader with taxonomic developments that have been made over the past century and then bring to focus an emerging new classification based on molecular approaches. "The genus *Spyroplasma*" (reviewed by R. F. Whitcomb), though discovered less than 10 years ago, has become a well established taxon, that offers significant opportunities as a model for studies of microbial biology. The very existence of helicity and mobility in these wall-less organisms has raised basic questions about the nature of membrane structure and the mechanism of mobility in microorganisms. The review covers the taxonomy, physiology and the biochemistry of this genus in fair detail. Another genus thoroughly covered in this volume is

*Chlamydiae* (by J. Schachter and H. D. Caldwell), one of the most ubiquitous parasites within the human kingdom. An informative article on the genetics of *Erwinia* is provided by A. K. Chatterjee and M. P. Starr. The overall resemblance of the genetic system and structure (conjugation, transducing bacteriophages, plasmids, the map locations of biochemical functions) to the well characterized *E. coli* is striking. The authors have described in detail the functional and structural characteristics of bacterial phytopathogenic determinants and projected the future uses of genetic technologies (e.g., the role of bacterial cell surface components in pathogen establishment, host specificity and induction of host defence reactions, production of virulence factors such as toxins and enzymes, etc.) in studies of plant associated bacteria.

Belonging to the category of Medical Microbiology are the articles, "Recent taxonomic developments and changes in medical mycology" by M. R. McGinnis, and "Diseases of humans (other than cholera) caused by *Vibrio*'s" by P. A. Blake, R. E. Weaver and D. G. Hollis. For the applied microbiologist there are articles on "Ore leaching by bacteria" by D. G. Lundgren and M. Silver, and "Chemical and fuel production by anaerobic bacteria" by J. G. Zeikus while the reviews "Flagellar structure and function in Eubacteria" by R. N. Doetsch and R. D. Sjoblad, "Oxygen and hydrogen in biological nitrogen fixation" by R. L. Robson and J. R. Postgate, "Proteins of the outer membranes of gram negative bacteria" by M. J. Osborn and H. C. P. Wu, and "Some aspects of structure and function N-fixing Cyanobacteria" by W. D. P. Stewart, cater for the basic microbiologist. "Mutagenicity and carcinogenicity of mycotoxins" by A. Stark and "The immunological activities of bacterial peptidoglycans" by D. E. S. Stewart-Tull should satisfy the specialists. As in the previous years, the present volume of Annual Reviews in Microbiology should be a useful possession for the microbiology teachers.

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