VIRUS RESEARCH*

THE appearance of these two splendid volumes in this series has, I feel certain, fulfilled the expectations of virologists. Indeed, they are to be regarded as *vade mecum* of virus pathologists and physiologists, not to mention the many border-line scientists whose approach to the study of viruses has been biochemical or biophysical. Rich as they are in factuals, the highly specialized articles fulfil another purpose : they aim at stimulating new ideas in the specialist and judging from that angle, that keynote has been boldly underlined and admirably executed.

Volume III contains much original material. The chapter on Biochemistry and Virology presents a comparative account on the form and composition of plant viruses, bacterial viruses and animal viruses and critically summarizes available evidences on the fine structure of viral constituents, especially those relating to RNA and DNA contents of virus particles and the amino acid composition of the various strains of plant viruses so far studied. This is followed logically by a chapter on Chemotherapy of Viruses, a subject dealing with the effects of compounds which delay, or inhibit partially, virus multiplication or disease development. As is evident this subject has grown round recent studies on the composition of viruses and the functional mechanism of protein and nucleic acids in virus multiplication and their structure. Many compounds of the purine and pyrimidine analogues have been tried as antagonists and which could, therefore, be incorporated into nucleic acids rendering them biologically non-functional and the possibility of obtaining substantial inhibition of virus multiplication without disorganizing the functioning of the host nucleic acids. The more recent work on metallic ions and chelating agents and the use of antibiotics in relation to virus inhibition is summarized. Work on tumour viruses in bird and mammal is discussed in another chapter and the highlight and emphasis seems to be on the behaviour of the virus of erythromyeloblastic leukosis which "deviates from the average physical structure of other viruses in its pronounced expression of enzymatic activity and its kinship in antigenic constitution with the host cell in which it originates". It requires no great imagination to realize "the possible influence of the specific enzyme in the immediate utilization of the stores of energy waiting within the cell for the purposes of virus multiplication and diversion of the metabolic and genetic processes of the host cell".

An authoritative chapter on the morphology and development of insect viruses needs special mention. Electron micrographs have revealed that the polyhedral virus particles are contained within the polyhedral crystals and are crystalline aggregates of the viruses themselves. New and basic thinking in the field of plant virus multiplication in insect vectors is presented and it seems that there is ample evidence for the presence of viruses that multiply both in plants and animals requiring both hosts for their maintenance in nature, a complex situation, indeed, but pregnant with possibilities for further research in this field. The penultimate chapter discusses certain basic questions of natural and acquired immunity, mechanism of cross-protection, interference between viruses largely based on recent observations of yellows type of plant viruses and the concluding chapter deals with bacterial transformations, particularly, discussing the nucleoprotein nature of genes and the autonomy assigned to genes and viruses which appears to be relative. It is argued that DNA has a key role to perform in these determinations of specificity of hereditary characters and that there are subsidiary structures in cells that could influence the specificity of the newly formed DNA and that such a situation for RNA containing viruses like plant viruses has not been clearly demonstrated.

Volume IV in this series with nine chapters seems equally versatile in its presentation of material. The opening chapter on "Factors in Virus Evolution" includes a critical appraisal of the impact of virus evolution on taxonomy and nomenclature and discusses the possibility of introducing the Linnæan binomial nomenclature to viruses. This author concludes "we may have to be content for ever to sort viruses into small groups just for our convenience and not to attempt to relate our efforts to phylogeny as plant and animal taxonomists do". Many virus workers may not agree with this view but under existing knowledge there seems no escape from this unhappy position. Bacteriophages as genetic and biochemical systems including problems of protein synthesis and nucleic acid functioning forms the subject-matter of the second chapter. Attachment and

---

* *Advances in Virus Research.* Vols. III and IV. Edited by K. M. Smith and M. A. Lauffer. (The Academic Press, New York, India : Asia Publishing House, Bombay-1,) Pp. ix + 338 ; ix + 339. Price $ 7·00 each.

penetration by viruses as a fundamental question and the physical, chemical, immunological, anatomical and genetic approach to a study of this problem and another chapter on measuring concentration of animal viruses involving methods of calculation from mass, volume and density of virus particles are of absorbing technical interest. A detailed consideration of the anatomy of tobacco mosaic virus getting together a large assemblage of evidences on the particle size, surface features, internal structures, etc., make very interesting reading. Other chapters that follow contain information on effects of non-ionizing radiations on viruses, effects of changing temperature on plant virus diseases, mechanical transmissions of plant viruses. The final chapter is on the nature of serological relationships among influenza viruses. From the practical point of view, the chapter on heat therapy and *in vivo* inactivation of certain plant viruses would be read with considerable interest by plant pathologists in this country as many vegetatively propagated clones can be subjected to this therapy and it is to be hoped that some headway would be made in this simple yet practicable control measure.

The reviewer has had the pleasure of warmly commending the earlier volumes in this series and the present review of Volumes III and IV should convince everyone, more than ever, of the enormous part these publications play in stimulating original thinking in a difficult field of research with ultramicroscopic pathogens. There are, here and there, signs of slackness in proof-reading in these volumes but this is outbalanced by a fine get-up and rich scientific matter. One fondly hopes that in the not distant future India would have an Institute for Microbiology with strong arms of virus research in plant, insect, animal and human viruses as it is obvious we have to make much headway in this field of science.

T. S. SADASIVAN.

USSR ACADEMY OF SCIENCES DISCUSS DATA FROM SPUTNIKS EXPERIMENT WITH A DOG

THE dog "Laika" the first animal to travel into space aboard the second Soviet Sputnik stood satisfactorily not only the launching and the orbiting of the Sputnik but also the orbital flight itself.

This statement was made by Academician Aleksandr Topchiev, Chief Scientific Secretary of the Presidium of the USSR Academy of Sciences. He said that the checking of the possibility of survival of an organism in cosmic flight was a unique experiment which has provided valuable data.

Preliminary results of the study of "Laika's" behaviour show that the acceleration of the Sputnik's flight at its launching and orbiting—which is the most difficult stage from the biological standpoint—had acted on the animal in the direction from its chest to its back. He recalled that the movement of the Sputnik was accelerated and that the rate of acceleration was several times higher than the acceleration of gravity. It has been established that simultaneously with the effect of the acceleration the animal was also affected by the vibration and for a certain period by the sound of the rocket engine.

An analysis of the data has shown that immediately after the start the heart action quickened roughly three-fold as compared with its initial state. Later on, as the effect of the acceleration persisted and even increased, the frequency of the heart action fell. The electrocardiogram did not reveal any ill-effects. It showed a typical picture of thickened heartbeats, the so-called Sinus Tachycardia.

As the apparent weight of the animal increased, its respiration became more superficial and accelerated. At the height of the effect of the acceleration, the number of respirations was 3 to 4 times higher than initially.

Academician Topchiev declared that the animal had satisfactorily stood the flight of the Sputnik from start to orbiting. During the subsequent flight in orbit the animal was in a state of dynamic imponderability. The number of respirations declined, the frequency of the systole continued to fall systematically and to approach the initial magnitude. In spite of the unusual state of imponderability the motorial activity of the animal was moderate.

The experiment with "Laika" has demonstrated that imponderability did not in itself cause any substantial or enduring changes in the animal's physiological functions.