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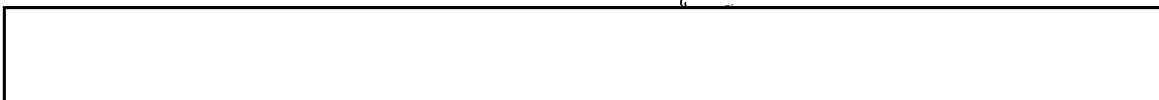
USSR CONFERENCE ON SYSTEMATIZATION OF VIRUSES

The scientific conference which took place on 9 April 1952 at the Institute of Microbiology, Academy of Sciences USSR, dealt with the problem of the systematization of viruses. V. L. Ryzhkov, corresponding member of the Academy of Sciences USSR, discussed the previous attempts at systematization of viruses which had been reported in contemporary literature and proposed his own scheme of systematization.

As was brought out in Ryzhkov's report, the systematization of viruses is rendered more difficult because of incomplete knowledge of viruses, and also because of differences of opinion on a number of theoretical problems. Ryzhkov asked if it were possible to systematize viruses, as plants and animals have been systematized. Those who consider viruses as biocatalysts, or, in other words, enzymes, will, of course, give a negative reply, he said. He said that many investigators continue to maintain that viruses originate spontaneously in the organism under the influence of disturbance of metabolism. After objecting very definitely to this approach, Ryzhkov reminded the audience that he had asserted, as early as 1942, that the idea of evolution is applicable even to the simplest viruses. Much later, Bernet, starting from the same ecological premises, advanced the idea that all viruses must be regarded as organisms. In 1947, Ryzhkov applied the concept of species to virus nucleoproteids. Ryzhkov now considers it possible to unify all viruses, notwithstanding their diversity, into one type referred to by him as the Ivanovskya type.

Ryzhkov further stated that lately there has been a tendency, which is obviously idealistic, to divide viruses into small ones and medium-sized ones, on the one hand, and large ones on the other. This is the classification of Troll. In the opinion of Ryzhkov, Troll is afraid of the idea that unifying all viruses into a single type would give a grandiose picture of successive gradations leading to increasing complexity of life processes. To this concept, Ryzhkov said, Troll attempts to oppose the assertion that viruses of small and medium sizes are ordinary chemical substances and are fundamentally different from large viruses which are organisms. According to Ryzhkov, Troll openly states that, in his opinion, unification of viruses into one type represents a danger to the doctrine of eternal life.

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Ryzhkov objected to the general subdivision of viruses into viruses of animals, viruses of higher plants, and viruses of bacteria. This subdivision, he said, is not in accordance with the principals of scientific classification, because no large group of species is unified on the basis of the locality which the species inhabit. Ryzhkov called attention to the fact that adherents of this subdivision of viruses do not even attempt to define properties which differentiate the viruses of the groups mentioned, besides the environment which they inhabit. Finally, he said, the system in question does not reflect the stages of evolution of viruses, because it unifies into one class viruses of different degrees of complexity.

Ryzhkov said that the only complete system of viruses which has been advanced hitherto has been proposed by Holmes, and bears a purely artificial and anti-scientific character, because, in this system, viruses are not classified together on the basis of their own properties, but on the basis of symptoms which they produce. The nomenclature used by Holmes is characteristic in that it has been drawn predominantly from the criminal jargon, Ryzhkov said. Viruses are referred to as "villain," "murderer," "tramp," "executioner," etc., he added.

The reporter made an attempt to systematize viruses on the basis of their own properties and the relationships which exist between viruses and higher animals and plants. The Ivanovskya type is divided by the reporter into two subtypes: Crystallobiotae and Plasmobiotae. He stated that viruses which do not contain any lipoids belong to the first subtype. In his view, the particles of such viruses cannot be designated as protoplasts. Many of these viruses, he said, are able to crystallize. The second subtype, according to Ryzhkov, is characterized by the presence of lipoids in the majority of its representatives and by the more complex structure of the particles, which may be regarded as the simplest precellular protoplasts.

Ryzhkov continued the description of his system as follows:

The subtype Crystallobiotae is divided into two classes: Eucrystallinae, to which belong viruses which form genuine crystals, such as the classical virus of the mosaic disease of tobacco, and Pseueocrystallinae, to which belong viruses which produce more complex crystal-like formations, such as the polyheders in the chlorosis of butterflies.

The subtype Plasmobiotae is divided into three classes: Gamaleiae, Arthropodophilae, and Chlamydozoa. To the first class belong viruses which are known at present as parasites of bacteria and actinomycetes (bacteriophages and actinophages). Characteristics of the second class are its connection with arthropod transmitters, predominant occurrence in wild animals and plants of the forest and steppe, a content of yeast nucleic rather than thymonucleic acid, and the relatively small size of the virus particles. Representatives of the Chlamydozoa class are transmitted by contact infection. These viruses are parasites predominantly infecting humans and domestic animals. The particles of viruses of this class are relatively large and contain thymonucleic acid.

Among representatives of the Arthropodophilae class are the viruses of tick encephalitis, Japanese encephalitis, and other encephalites, also the viruses of the chlorosis group of diseases of plants ("stolbur," chlorosis of asters, "witches' brooms" of potatoes, etc.). Various orders of the Chlamydozoa class are represented by viruses of the group of psittacosis, smallpox, influenza, etc.

Viruses of the Gamaleiae class are the oldest. They are parasites of the lower plants, namely of Schizophyta. It is of fundamental importance that viruses do not occur on fungi, aquatic plants, and some other groups of plants, while a great variety of them suddenly appears in Angiospermae. In the animal kingdom, viruses occur widely among arthropods, birds, and mammals and are little known in other groups. This cannot be explained by the incomplete state of our knowledge.

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Viruses of bacteria are well known, but we do not know of any viruses affecting yeasts or mold fungi, although the microbiologist deals with the latter microorganisms to no lesser extent than with bacteria. Viruses of Angiospermae are known, while viruses of Gymnospermae are not known, although Gymnospermae have been cultivated by the human race along with Angiospermae. What is known about the distribution of viruses enables us to conclude that at least a part of them is derived from bacterial viruses. Insects contain considerable amounts of intracellular symbiotic bacteria, which could have originated from bacterial viruses. Adaptation of the virus to the insects could easily occur in the body of the insects. Similar adaptation could take place in the case of higher plants and animals. It is obvious that this is only an assumption which does not exclude other opinions as to the evolution of viruses.

Data on the geographic distribution of viruses occasionally permit us to establish relative age. Those viruses which produce chloroses of plants originated apparently during the time when Australia was still unified with other continents, in other words prior to the Jurassic era. The classical virus of the tobacco mosaic disease originated in America after the separation of that continent from other land masses, and consequently must be regarded as relatively young. Interesting data on viruses presumably could be obtained from paleontological studies. Of greatest interest is paleontological research on viruses which produce polyhedral diseases of insects.

Further, Ryzhkov touched on the problem of the connection of viruses with other precellular forms of life. He indicated that since 1930 there has been a traditional tendency to connect viruses with Rickettsiae. However, he said, although Rickettsiae are very close to bacteria, morphologically and physiologically they are far removed from viruses. At present, it becomes obvious that the traditional tendency to associate viruses with Rickettsiae must be abandoned, he added.

Ryzhkov expressed the opinion that to understand the earliest stages of life on earth, possibly much can be achieved by investigating cystocetes [cystocytes?], which are little known at present. He said that in this group of very simply organized precellular organisms, one encounters parasites [for instance, the causative factor of peripneumonia of cattle?], as well as independently existing forms.

The systematization of viruses proposed by the reporter resulted in a lively discussion on which N. D. Yelusalimskiy, V. I. Kudryavtsev, and Ya. I. Rautenshteyn participated. It was noted that Ryzhkov did not touch on the problem of species in viruses and the causes of the evolution of viruses. In the opinion of those who participated in the discussion, the circumstance that the properties of viruses have not been investigated thoroughly as yet forces us to classify viruses not according to their properties, but according to the biological symptoms which they produce in hosts. This led to objections on the part of the reporter, who emphasized that, although viruses have not been investigated thoroughly enough, knowledge of their properties is still sufficient to prevent confusion of the classification of viruses according to their properties with the classification according to virus diseases. This is a confusion of which Holmes has been guilty. As far as the problem of the species of viruses is concerned, Ryzhkov said that a special study of this matter will be needed.

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