The last half of the book is devoted largely to the interpretation of optical phenomena exhibited by uniaxial and biaxial crystals in both plane polarized light and in convergent polarized light under a petrographic microscope. By difficultly constructed diagrams and by clear, simplified explanation of optic-axis interference figures, optical signs, dispersion, etc., the author has clarified many points that cause trouble but are not covered in the average text on mineralogy.

To summarize, it is safe to say that this book stands alone in its field. In the opinion of the reviewer it is the most readable and most usable book on the subject of optical crystallography that has yet been produced. It will undoubtedly serve the purpose for which the author designed it—for use in college courses in optical crystallography and optical mineralogy. It will also, no doubt, become an indispensable handbook for all investigators interested in its practical applications in other fields of endeavor.

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SPECIAL ARTICLES

VENEZUELAN-TYPE EQUINE ENCEPHALOMYELITIS VIRUS IN TRINIDAD

VENEZUELAN-TYPE equine encephalomyelitis virus is the agent of a severe equine encephalomyelitis which has been occurring in Colombia[1] since 1935 and in Venezuela[2] since 1936. In 1941 it seems to have invaded also the northern coast of Ecuador.[3]

The corresponding virus has been isolated in Venezuela by Kubes and Ríos in 1938.[4] The comparative immunological studies[5,6] determined this virus as *sui generis,* differing from both the U. S. eastern and western encephalomyelitis strain. Neither has there been found any specific relation to the rabies virus.[7] On the contrary, an immunological identity with the encephalomyelitis virus isolated later in Colombia has been demonstrated.[8]

With regard to Trinidad, this island was considered free from this disease, until this colony's Department of Agriculture[9] announced on October 2, 1943, the first outbreak of it in the southern part of the island, *i.e.,* in the zone opposite the Venezuelan territory. There, 47 cases in all have been diagnosed, 30 in the San Francique Pluck-La Fortune area and 17 in the Debe-Penal area. Eight animals survived the infection.

On October 19, 1943, we received through the courtesy of Major Gilyard from the U. S. Army Veterinary Corps, by this time on the island, two samples of material collected in the infected area some days before: material No. 4 from a horse and material No. 5 from a mule, both in form of brain tissue conserved in a sterile glycerine solution. By intracerebral inoculations of those materials (a 5 per cent. brain-tissue suspension in saline) into white mice and guinea-pigs the presence of a virus has been established in both of them. Material No. 5 has had an especially rich virus content.

The isolated agent showed the same properties as the Venezuelan encephalomyelitis strain in Swiss white mice, guinea-pigs and developing chick-embryos. Swiss white mice, from the second or third passage on, given intracerebrally 0.02 cc of a 10 per cent. brain-tissue suspension in saline, died in from 3 to 5 days. In guinea-pigs inoculated with the same suspension (0.2 cc intracerebrally), the course of the disease was still more rapid. The same suspension dropped on to the chorio-allantoic membrane of eleven-day-old chick-embryos killed them in between fifteen to twenty hours, their bodies showing hemorrhagic infiltrations equal to those produced by the Venezuelan encephalomyelitis virus.

In order to demonstrate the concentration of the virus in the brain-tissue of mice and in the chick-embryos, the titration was started from a 1 per cent. suspension in saline of 7 mouse brains, on the one hand, and of 16 chick-embryos on the other, with a view to eliminating possible individual influences. The titration has been carried out in white mice by the inoculation of 6 of them with 0.02 cc of each ten-fold dilution. The mouse brain tissue suspensions were mortal in 100 per cent. from the dilution of 10^{-2} to 10^{-8}. Seventeen per cent. of the mice survived the dilution of 10^{-10}. The embryo-cultured virus suspensions had a dilution endpoint of 10^{-7} that indicates a virus concentration which is considerably lower.

[1] J. E. Albornoz, Suppl. to *Bol. de Agric.,* No. 26: 1, 1935, Bogotá, Colombia. Published by Ministerio de Agricultura y Comercio.

[2] V. Kubes, "La peste loca de las bestias. Sus manifestaciones, tratamiento y prevención." Caracas, Venezuela, 1936. Published by Ministerio de Agricultura y Cría.

[3] Personal communication from Servicio Veterinario Oficial, Guayaquil, Ecuador, 1943.

[4] V. Kubes and F. Ríos, SCIENCE, 90: 20, 1939.

[5] C. E. Beck and R. W. C. Wyckoff, SCIENCE, 88: 530, 1938.

[6] V. Kubes and A. Diamante, *Bol. Inst. Inv. Vet.,* Caracas, 1: 49, 1942.

[7] V. Kubes and F. Gallia, *ibid.*: 81.

[8] V. Kubes, *The Puerto Rico Jour. Pub. Health and Trop. Med.,* June, 1943: 391.

[9] Official statements of the Department of Agriculture, Trinidad, B. W. I., Oct., 1943.

Those results are in perfect accord with the titration of the Venezuelan encephalomyelitis virus, which has in the mouse brain a titre oscillating between 10^{-6} and 10^{-8}, less frequently 10^{-10} to 10^{-12}. In the chick-embryo the average titre corresponds to the dilution 10^{-7} and is rarely higher or lower.

The immunological relation between the recently isolated virus from Trinidad and the Venezuelan encephalomyelitis strain virus (1938) has been studied in the protection test as follows: 72 Swiss mice have been immunized by means of 4 subcutaneous injections of 0.2 cc of the Venezuelan antiencephalomyelitis vaccine from chick-embryo cultured virus, one injection given every other day. The same vaccine has for many years been used with great success in combating encephalomyelitis in Venezuela. Three days after the last vaccination, the animals were divided into two batches for the challenge inoculation: the first group received intracerebrally 6 tenfold dilutions from 10^{-1} to 10^{-6} (using 6 mice for each dilution) of a mouse brain suspension containing Venezuelan encephalomyelitis virus, and the second one equal dilutions of the virus proceeding from Trinidad. Both viruses have been simultaneously titrated intracerebrally in non-immunized mice.

The vaccinated mice showed a solid protection against both viruses on test. The degree of immunity has been more or less equal against both of them, because the mice of each group withstood about 1,000,000 minimal lethal doses.

Summing up our findings, we believe we are entitled to draw the following conclusions:

(1) From 2 studied materials proceeding from a horse and a mule which died in Trinidad with clinical manifestations of encephalomyelitis, a neurotropic virus has been isolated.

(2) Inoculated into mice, guinea-pigs and chick-embryos, this virus showed the same properties as the Venezuelan equine encephalomyelitis strain virus.

(3) The vaccine prepared from Venezuelan chick-embryo cultured virus conferred on mice an equal protection against both viruses, the homologous as that of Trinidad.

(4) Therefore, an immunological identity between those two viruses is suspected.

Work on this theme is being continued.

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AN EXPERIMENTAL TEST OF THE THEORY THAT SOCIAL BEHAVIOR DETERMINES SOCIAL ORGANIZATION

IT appeared to the author that the fighting behavior of male mice of an inbred strain was suitable material for testing a fundamental theory of general sociology —that differences in social organization are caused by differences in social behavior. The strain used was subline 10 of the C–57 black, originally from the Jackson Laboratory at Bar Harbor. These mice have nearly identical heredity and can be depended upon to give similar reactions in similar environments.[1]

Preliminary experiments indicated that the males could be easily trained either to fight or not to fight. It was expected that if two fighting males were placed together they would develop some sort of social control or dominance based on fighting and that this organization would be absent between peaceful mice. This expectation was confirmed in the series of experiments described below, in which the mice were not only from the same inbred strain, but the same individuals were used for both fighting and non-fighting situations.

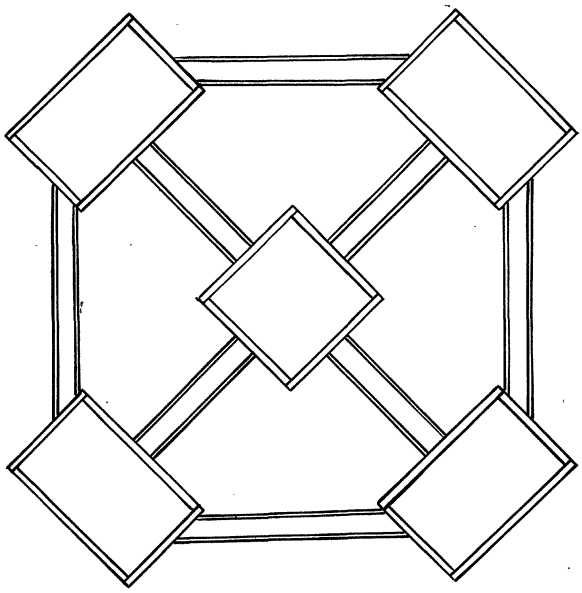

FIG. 1. Plan of multiple escape pen. The corner compartments are the same size as breeding boxes ($10 \times 15\frac{1}{2}''$), and the entire top is covered with hardware cloth.

The mice were trained not to fight by the following method. A male and female of the same litter were raised in the same pen with no handling after weaning. Young were removed as soon as they appeared. After sexual maturity, as shown by the birth of young, the animals on at least three successive days were lifted out of the pen with forceps, roughly stroked five times and replaced. When another male, similarly trained, was put in the pen, no fight took place. The same result was obtained with each of six different pairs. The peaceful situation lasted as long as observation was continued (up to nine days; longer in

[1] J. P. Scott, *Jour. Heredity*, 33: 11–15, 1942.