tions between structure and function Dr. Conklin reveals increasing complexity of organization as more efficient adaptation. Carefully he considers factors in psychic and social development.

The philosophical portion of Dr. Conklin's book deals with the antagonism of science and tradition in which scientific evidence is contrasted with emotional belief. One may infer that Conklin would hold that science sets the limits to belief and faith. He insists on the unity of nature and emphasizes the importance of biological satisfaction in living things. This adaptation for satisfaction becomes the basis for a biological appreciation of value, and for a biological basis for ethics. Ideals are emphasized by Professor Conklin as highly significant if appreciated as goals toward which it may be possible to develop. This offers a basis for a sort of scientific religion.

Of course, the volume must be carefully read in order to appreciate the skill with which Professor Conklin develops his thesis. His achievement is highly artistic and his work is earnestly commended to the sincere study of philosophers, scientists and scholars.

First delivered at Rice Institute, Houston, Texas, in 1941, the lectures comprising this book have already been published in part in the *Rice Institute Pamphlet* (28: 153–281, 1941). It is sincerely to be hoped that Professor Conklin's effort, in relation to many similar attempts by his scientific and philosophical colleagues, may result in a United Nations symposium on science and ethics. Such a symposium might lead to international agreements on articles of a scientific faith that might be very instrumental in helping us to obtain the sort of a peaceful and satisfying world which we all want.

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## OPTICAL CRYSTALLOGRAPHY

*Optical Crystallography.* By ERNEST E. WAHLSTROM, professor of mineralogy, University of Colorado. $5\frac{1}{2} \times 8\frac{1}{2}$ inches. v + 206 pp. 209 figs. New York: John Wiley and Sons, Inc. London: Chapman and Hall, Ltd. 1943. $3.00.

THIS well-designed new text-book is a welcome boon to the students of optical crystallography. The author covers the essential phases of his subject in seventeen short but pithy chapters under the following headings: 1. Crystallography; 2. Physical properties; 3. Elementary optics; 4. The polarizing microscope; 5. Optics of isotropic substances; 6. Measurement of index of refraction; 7. The Uniaxial Indicatrix; 8. Polarization of light; 9. Uniaxial crystals in plane-polarized light; 10. Uniaxial crystals in convergent polarized light; 11. Optical accessories; 12. Sign determination in uniaxial crystals; 13. Biaxial crystals —the triaxial ellipsoid; 14. Biaxial crystals in convergent polarized light; 15. Determination of optical sign in biaxial crystals; 16. Dispersion in biaxial crystals; 17. Microscopic examination of nonopaque substances.

The text contains numerous (209) selected illustrations, including line drawings, half-tone reproductions and stipple-shaded diagrams. Approximately 80 pages of the 206-page book are occupied by illustrations. Diagrams designed to illustrate the three-dimensional visualization of the relationships between crystallographic directions and optical directions are well constructed and will give valuable aid to students who find difficulty in visualizing three-dimensional relationships.

In addition to the author's original material, he has brought together items and illustrations from other good sources and arranged them in a unified order so as to make it easy for the user to get the information he seeks.

His definitions have been carefully written in clear simple language to keep within the understanding of the user. This feature along with others shows the author's recognition of the fact that it is the function of a text-book to inform those who do not know.

In the first half of the book the author reviews briefly the principles of optical crystallographic theories, emphasizing only fundamental ideas; in a few pages discusses the physical properties of crystalline substances, and devotes a short chapter (6 pp., 9 figs.) to elementary optics dealing principally with the nature of light, followed by a well-illustrated chapter on the construction of the polarizing microscope. In the opinion of the reviewer, the chapter describing optical accessories—quartz wedge, gypsum plate, mica plate, etc., recognized as standard equipment—might well follow the chapter on the polarizing microscope.

In the author's discussion of refraction, reflection and the measurement of the indices of refraction (24 pp., 22 figs.), he describes several variations of the immersion method and other methods, using numerous and effective diagrams.

Since immersion media are an invaluable part of the equipment when working with crystal fragments, it will interest the reader to know that a more satisfactory, very inexpensive series of low-index liquids[1] has replaced the alcohols, butyrates and volatile distillates given on page 45. Isopropyl acetate (1.385, very slowly volatile), and diethyl oxalate (1.408) and dibutyl phthalate (1.490), both non-volatile, are miscible in all proportions and are colorless, viscous, odorless, and do not react with mineral grains within that range. The author did not have this information.

[1] These liquids may be purchased from U. S. Industrial Chemicals, Inc., 3200 N. 17th Street, Philadelphia, Pa., for $1.00 per pound.

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.