

Elements of Solid State Theory. By G. H. Wannier. (Cambridge University Press, London N.W. 1), 1959. Pp. vii + 270. Price 35 sh.

The Clonal Selection Theory of Acquired Immunity. By Sir M. Burnet. (Cambridge University Press, London N.W. 1), 1959. Pp. ix + 208. Price 22 sh. 6 d.

Utilization of Nitrogen and its Compounds by Plants. (Symposia of the Society for Experimental Biology, No. XIII.) (Cambridge University Press, London N.W. 1), 1959. Pp. vii + 385. Price 50 sh.

The Temperature of British Fish during Distribution in Summer. (Torry Research Station—Paper 1). By G. H. D. Burgess, R. M. Cockburn, C. L. Cutting and W. B. Bobb. (Department of Scientific and Industrial Research, 5-11, Regent Street, London S.W. 1), 1959. Pp. iv + 54. Price 3 sh. 6 d.

Human Nutrition and Dietetics. By Sir Stanley Davidson, A. P. Meiklejohn and R. Passmore. (E. & S. Livingstone Ltd., 16-17, Tevist Place, Edinburgh), 1959. Pp. xii + 844. Price 84 sh.

Elementary Statistics with Applications in Medicine and the Biological Sciences. By F. E. Croxton. (Dover Publications Inc., New York-15 N.Y.), 1959. Pp. vii + 376. Price \$ 1.95.

Evolution of Nervous Control from Primitive Organisms to Man. Edited by Allan D. Bass. (American Association for the Advancement of Science, Washington D.C.), 1959. Pp. vii + 231. Price \$ 5.75.

Lectures in Applied Mathematics, Vol. 1. (Probability and Related Topics in Physical Sciences.) By Mark Kac, G. E. Uhlenbeck, A. R. Hibbs and B. Vander Pol. (Interscience Pub., New York-1), 1959. Pp. xiii + 266. Price \$ 5.60.

SCIENCE NOTES AND NEWS

Central Botanical Laboratory, Allahabad

Dr. G. S. Puri succeeds Dr. E. K. Janaki Ammal as the Director of the Laboratory.

Award of Research Degree

The Annamalai University has awarded the Ph.D. Degree in Chemistry to Mr. R. Varadachari for his thesis entitled "Synthesis and Ultra-violet Absorption Spectra of Some Sulphoxides and Sulphones".

UNESCO Regional Training Courses

A regional training course on the use of Radioisotopes in agricultural research, organized jointly by the Ministry of Food and Agriculture, Government of India, FAO, International Atomic Energy Agency and UNESCO South Asia Science Co-operation Office, will be held at the Indian Agricultural Research Institute, New Delhi, from 20th January to 17th February 1960.

The syllabus of the course will deal with the role of radiation in cytology and genetics, radio-isotope techniques as applied to problems in soil fertility, fertilizer application and plant biochemistry and radiation as a protective agent. A maximum of 25 participants will be admitted to the course.

A regional training course on 'High Vacuum Techniques', sponsored jointly by the National Physical Laboratory, New Delhi, and the

UNESCO South Asia Science Co-operation Office, will be held at the National Physical Laboratory, from 18th January to 12th February 1960.

The syllabus will relate especially to the developments in high vacuum techniques in science and industry during the last 20 years. The course will be directed by Prof. A. L. Reimann, Research Professor of Physics, University of Queensland, Brisbane (Australia), who will be assisted by Dr. J. H. Leck of Liverpool and members of the NPL staff (New Delhi). A maximum of 20 participants will be admitted.

Enquiries about the training courses should be addressed to the UNESCO South Asia Science Co-operation Office (SASCO), 21, Curzon Road, New Delhi, India, of the Indian National Commission for UNESCO, Ministry of Education, Government of India, New Delhi.

Improved Grain Storage Structure for Village Conditions

Messrs. S. Pradhan, P. B. Mookherjee and G. C. Sharma, Division of Entomology, Indian Agricultural Research Institute, New Delhi, write: It is the common practice in villages to store grains in earthen structures. However in this type of storage the grains are often found to be infested with insect pests. It is found that the storage effect is improved if the mud wall of the structure is built with a thin sheet

of polythene (0.007" thick) inserted in the middle. The idea behind this sandwiching of the polythene film within the body of the wall is to combine the mechanical strength of the mud wall with the more effective imperviousness of polythene to vapours and gases. Further this method keeps the polythene film safe from mechanical strains and abrasion injuries which would result if it is used as an inner or outer lining.

Results of comparative observations show that freshly harvested wheat stored in the polythene-reinforced structure remained in excellent condition from July 1958 to April 1959, whereas that stored in the ordinary earthen structure for the same period was found to be 90% infested by *Calandra oryzae*. In another trial with 23 maunds of wheat each stored for the same period in the two structures, after one initial fumigation with carbon tetrachloride, the grain in the polythene storage remained in good condition, while that in the other was found infested over 16% by *Rhizopertha dominica*.

Also preliminary experiments have given indications that even when introduced, the four principal storage pests (*Calandra oryzae*, *Rhizopertha dominica*, *Tribolium castaneum* and *Trogoderma granaria*) are not in a position to breed well in this improved type of storage structure. Studies on the moisture content of wheat showed that it was less in the polythene structure storage than in the other. These observations were carried out with wheat having an initial moisture content of about 10% which subsequently rose up to 13% in some cases.

Beneficiation of Minerals

The Golden Jubilee Symposium on the "Beneficiation of Minerals" was held in the Department of General Chemistry of the Indian Institute of Science, Bangalore, on 28-30 September, 1959. Mr. B. Rama Rao, Retired Director, Indian Bureau of Mines, inaugurating the symposium, surveyed the position of the mineral wealth in India and pointed out that the value of the mineral production, which was Rs. 7 to 8 crores in the early part of this century, had risen to more than Rs. 100 crores at present. Also the number of minerals mined has increased from half-a-dozen to more than 35. Mr. Rao then delivered his presidential address on "Beneficiation and Processing of Minerals with Special Reference to the Minerals of Mysore State".

Earlier Prof. M. R. A. Rao welcomed the delegates to the Symposium.

The subject-matter of the Symposium could

be broadly classified into (i) theory of grinding, (ii) flotation theory and practice with particular reference to sulphides, manganese ores, beach sands, gold tailings, uraniferous granite, (iii) heavy media and hydrocyclone methods in the beneficiation of pyrites and coals, (iv) phase separation methods for demineralisation of coals and graphites, (v) chemical methods including the theory and practice of chlorination and (vi) miscellaneous subjects including the methods of production of ferromanganese from ferruginous manganese ores, contact angle measurements in welding and microscopic petrography in beneficiation methods.

On the second day of the Symposium Dr. C. C. Patel gave a lecture on recent developments in the beneficiation of minerals by gravity, magnetic, electrostatic and flotation methods.

Bacterial Blight Disease of Rice

Messrs. M. C. Srinivasan, M. J. Thirumalachar and M. K. Patel of the Plant Pathology Laboratory, College of Agriculture, Poona-5, write:—

The bacterial blight disease of rice occurs in Bombay State on an extensive scale, often epiphytotic in restricted pockets. The disease causes considerable damage by inciting yellowing of the leaves and premature wilting. The plants are susceptible to infection at all stages of growth, depending upon the occurrence of predisposing conditions. The first stage of infection appears as a water-soaked, translucent streak on the leaf and leaf-sheath, 5-10 mm. in length. The streaks often coalesce with one another, appearing pallid white. Under humid weather conditions, bacterial exudate may be seen on the infection spot as tiny white encrustations.

The inciting organism is chiefly vascular. Attempts to isolate the bacterium in artificial culture on routine laboratory media were not successful and an enriched medium had to be devised for obtaining successful growth. Cultural studies have indicated that the organism is a strain of *Xanthomonas oryzae* (Uyeda & Ishiyama) Dowson which is of slow growing type.

Inoculation experiments were carried out to evaluate the resistance in important commercial rice varieties and wild species of *Oryza*. Thirty-two cultivated varieties and eight wild rice species were inoculated under favourable conditions and host reaction was studied at various periods. Observations have indicated that while most of the cultivated varieties and *Oryza* Spp. were highly susceptible, only two of them

BAM-9 and MTO-15 showed some degree of resistance.

Anthoceros punctatus in Bhopal

Sri. O. N. Handoo, Botany Department, Government Hamidia College, Bhopal, writes:—

A. punctatus Linn., a black-spored *Anthoceros*, grows commonly in hills of Delawari (Bhopal) in shade, somewhat sparsely, amidst grass, *Notothylas indica* Kash. and *Riccia billardieri* Mont. et N. It agrees closely with *A. crispulus* (Mont.) Douin but shows four tiers in the antheridial wall more distinctly. *A. crispulus* is a synonym of *A. punctatus*.

Previously this species was reported from Assam (Chopra, R. S., *Jour. Ind. Bot. Soc.*, 1943, 22, 239; Kachroo, P., *Sci. & Cult.*, 1952, 18, 284) and neighbourhood of Lucknow (Pande, S. K. and Bharadwaj, S. C., *Jour. Ind. Bot. Soc.*, 1949, 28, 15) and is new to Bhopal. It has not been collected from South India so far.

Effect of High Pressures on the Infra-Red Absorption of Calcite

Weir and his co-workers have studied the effect of pressures up to 30,000 atmospheres on the infra-red absorption spectra of calcite and other carbonates, with a specially constructed pressure cell using a pair of type-II diamonds as windows. Type-II diamond which combines high strength with excellent infra-red transmission in the range 1μ to 15μ (except for a strong absorption band near 5μ) is found to be a suitable window material for absorption studies under high pressure. The substance is taken in the form of a fine powder (and diluted, if necessary, with KBr or LiF) and placed between the two small diamond flats in the Bridgman pressure squeezer apparatus.

The results of detailed study show that under pressure, bands generally shift to higher frequencies and decrease in intensity. The magnitude of both changes depends on the mode of vibration. In calcite the carbon-oxygen symmetric stretching frequency ν_1 ($= 1097 \text{ cm.}^{-1}$) which is a prominent frequency in the Raman effect but forbidden in the infra-red, becomes active at elevated pressures and also shows an increase in intensity as the pressure rises. The doubly degenerate, asymmetric stretching frequency ν_3 ($= 1463 \text{ cm.}^{-1}$) splits into two components at 31,000 atm. showing a separation of 103 cm.^{-1} . This splitting is reversible and disappears when the pressure is lowered. The frequency ν_4 ($= 748 \text{ cm.}^{-1}$) doubly degenerate, planar bending, also splits under pressure but this is less apparent. The ν_2 mode at 883 cm.^{-1}

is not degenerate and shows no tendency towards splitting.

In the case of calcite these observed results may be explained by a shift of the CO_3^{2-} ion from the trigonal axis under pressure—*Jour. Research*, 1959, 63 A, p. 55.

Mirage and an Early Recorded Arctic Phenomenon

In an article on "The Optics of Mirages" which appeared in an earlier issue of this Journal (*Curr. Sci.*, August 1959) Sir C. V. Raman has shown that the usual explanation of mirages based on geometrical optics does not really solve the problem, but that a correct and complete elucidation of all the facts observed in the production of mirages involves a rigorous treatment based on the principles of the wave-theory of light. Accordingly he has developed a simple but elegant wave-optics theory which explains in a natural way not only the mirages but also many other features which arise in their formation.

The superior type of mirages mentioned in that article arise when the thermal conditions of the atmosphere are the reverse of those which give rise to the ordinary type, i.e., they are observed when the atmosphere rests on a cold level surface above which there lies a hot stratum of air. Objects at or near the level of the cold surface are usually visible to the observer, and in addition inverted images of them are also seen higher up in the atmosphere.

Apropos Raman's theory of mirages, the following observation of what is known as the "Novaya Zemlya Phenomenon" recorded by Gerrit de Veer, a Dutch Navigator, in 1598, will be of interest. We are indebted to the Royal Netherland Embassy in India for the information.

The story is of Willem Barentsz and his little band of sailor-adventurers who set forth in 1596 on an expedition to discover the North-East Passage across the Arctic. During the expedition the crew of Barentsz' ship was forced to pass the winter on Novaya Zemlya. Out of parts of their ice-bound ship they built a house where they lived during the long Arctic night. Barentsz himself died during the home voyage in 1597, but as early as the next year a printed account of the voyage appeared from the pen of Gerrit de Veer, one of Barentsz' companions.

"On 24 January, 1597", writes Gerrit de Veer, "it was faire cleare weather with a west wind. Then I and Jacob Hemskerche, and another with vs went to the sea-side on the south

side of Noua Zembla, where, contrary to our expectation, I the first of all saw the edge of the sun;—which has not been visible since the 3rd of November—; wherewith we went speedily home againe, to tell William Barents and the rest of our companions that joyfull newes. But William Barentsz, being a wise and well experienced pilot, would not beleieve it, esteeming it to be about fourteene daies too soone for the sunne to shin in that part of the world; but we earnestly affirmed the contrary and said we had seene the sunne.”

Further on in his account Gerrit de Veer reports three more occasions on which the sun was prematurely visible.

J. W. van Nouhuys has recorded in 1918, a similar observation in the story of Shackleton's last expedition (1914-17).

Isotope Techniques in Water Survey

The circulation of water is one of the most interesting of natural phenomena. The broad outline of this process is well known. Evaporation of water on the sea-surface and the eventual precipitation of the vapour follow a complete cycle that sustains life on the earth. The working of the cycle, however, is not quite uniform; the rate of precipitation varies from one region to another.

At present, the pattern of circulation is known only in rough outline; detailed information on a global scale is lacking. One of the most effective ways of gathering such information is to study the isotopic ratios of hydrogen and oxygen in water in different areas. The ratios vary for rain, river and ocean-water, and the variation has a relationship with the rate at which water circulates in nature. Water contains two stable hydrogen isotopes and three stable oxygen isotopes. In addition, very small quantities of radioactive hydrogen or tritium are added from outer space or as a result of reactions in the atmosphere brought about by cosmic rays or as a result of the testing of thermonuclear weapons. Tritium can serve as a tracer in the study of water circulation.

A variety of information can be obtained by measurements of the isotopic composition of water. For example, by comparison of the tritium concentration of inflowing water with that of outflowing water, the average age of the water molecule in a lake can be deduced.

Again, tritium determinations can sometimes yield valuable information on the age of ground water and on the size of the ground water body.

Looking to the importance of such investigations, the International Atomic Energy Agency has decided to initiate a study to determine the world-wide distribution of hydrogen and oxygen isotopes in water. Under this project, it is proposed to collect samples of rain, river and ocean-water in different parts of the world and carry out measurements through a world-wide network of sampling stations. The measurements will be interpreted by qualified experts with the object of assisting different countries in the evaluation of local data and in estimating the conditions of present and future water-supplies. —IAEA Bulletin, October 1959.

Cobalt Irradiation Facility at the New Delhi Agricultural Fair

An operating cobalt irradiation facility will be a feature of the U.S. Atomic Energy Exhibit at *Amriki Mela* in the World Agriculture Fair, which opens on December 11, 1959, in New Delhi. The pool-type irradiator will employ a 5,000 curie radiocobalt source, shielded by 14' of water. The radiation area is segmented so that any degree of exposure required is available within the limits of the source itself. Throughout the Fair, the facility will be used to irradiate seeds, plant cuttings, food and insects, as well as materials sent in by scientists elsewhere in India and South East Asia. Materials sent in will be irradiated free of charge and returned promptly by mail, a service which will serve as a considerable stimulus to atomic energy research in the area.

The radiation laboratory will be staffed by both Indian and American scientists, who will co-operate on research projects developed in collaboration with the Indian Agricultural Research Institute and the Indian Atomic Energy Establishment. An interesting feature of the laboratory, from the standpoint of the lay audience, will be the eerie blue Cerenkov glow which will emanate from the depths of the pool and will be clearly visible in the specially-lighted exhibition chamber. Material that Indian Researchers wish to be irradiated should be sent to the Indian Agricultural Research Institute at Pusa, New Delhi.

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