tracts, its advances led only by its method. Here a contradiction appears, which is apt to give occasion to reflection and which lets us perhaps surmise or even perceive a greater personal and spiritual connection, which is not accessible to science as such. I mean that seeming contradiction, that research proves to be most practical when it is purely theoretical. Science has made many of its greatest conquests when, impelled by its own genius, it has said, not: I want to accomplish, I want to rule, but only I want to know. Saul, the son of Kish, went out in his daily business and sought after his father's asses, but he found a royal crown. In the same way science does not always know where it will arrive. But advancing with unswerving faithfulness to its own principles and with an unselfish, exalted desire to widen the limits of knowledge, advancing in severe self-discipline and self-forgetfulness it attains to ends exceeding abundantly all that it could hope or think.

It belongs to the proud charter of science to be itself and to obey its own law. But when science is faithful to itself and works without by-designs, it gains a still greater glory than knowledge and its own inviolate independence. It proves to be a servant of life. No quality of research is more wonderful. When a discovery has been made through the sole unprejudiced desire to know, it appears that life and humanity profit by it in a way that is most unexpected—perhaps epoch-making.

Therefore I greet you as knights of science and as servants of life, and I wish you continued success in your high calling.

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SCIENTIFIC EVENTS

WIRELESS RESEARCH IN ENGLAND

ACCORDING to an article in the London *Times* the wireless division of the National Physical Laboratory at Teddington continues to make good progress with the several and varied problems which are submitted to it for solution by the Radio Research Board. For several years past a comprehensive investigation has been carried out on the mode of propagation of wireless waves over the earth's surface, and for this purpose apparatus has been developed for the accurate simultaneous measurement of both the intensity and direction of arriving wireless waves. This work has recently led to some most successful demonstrations of the existence of an upper ionized layer at the top of the earth's atmosphere, which serves to deflect wireless waves reaching it and to return them to the earth's surface. By taking account of the combination of these downcoming waves with those transmitted straight along the earth's surface, an explanation can be given of all the phenomena of fading of wireless signals and the erratic behavior of wireless direction finders when the transmission is over any but the shortest distances. In a similar manner the influence of the atmosphere can be shown to account for the wonderful results which have been obtained by both amateur and professional workers in transmitting over very long distances with short waves. In this connection it may be noted that a small frame aerial receiving sets with only two valves has been used at the laboratory for the reception of signals on short wave-lengths from a small ship's transmitter at a distance of over 7,000 miles. These investigations are being continued as a means of obtaining further knowledge about the parts of the upper atmosphere which are beyond the reach of the direct observations employed in meteorology.

Another portion of the wireless work of the laboratory concerns the complete study of the behavior of valve amplifiers for use in receivers used for broadcasting and general purposes. For this purpose a somewhat elaborate equipment has been built up, using the most modern measuring apparatus, for testing the effective magnification given by valve amplifiers as well as the amount of distortion which they may introduce when used for the reproduction of speech and music. A feature of this equipment, to which the staff of the laboratory have devoted a great deal of attention, is the manner in which portions of the apparatus are shielded by metal plates and wire gauze from the effects of stray electric and magnetic fields, which would seriously detract from the accuracy of the measurements. In one case a whole room has been completely lined with galvanized iron wire netting of small mesh to protect the apparatus within from these stray effects.

In addition to research on wireless receivers a certain amount of work is carried out in connection with wireless transmitters. The major portion of such work is confined to the use of special forms of transmission to meet the needs of other investigations. Also, by the aid of its standard wave meter for the measurement of wave-length or frequency, the laboratory continues to maintain a regular program of the transmission of standard waves of accurately adjusted length or frequency, by means of which any listener within range may calibrate a wave meter or receiver.

In order to keep pace with the rapid development which is taking place in the science and practice of wireless communication, the staff of the National Physical Laboratory has found it necessary to acquire a detailed knowledge of the technique applying to a very large range of wave-lengths. On account of the

very specialized nature of the work, much of the apparatus is designed and constructed at the laboratory, although full cognizance is taken of the progress of design and manufacture which is continually taking place in the wireless industry. As the various researches are completed the results are published in the form of official reports, papers read before scientific societies, or articles in the technical press, and they are found to be of great value to all those engaged in the wireless profession, as well as to those who have found wireless an interesting hobby.

EXPEDITION TO CENTRAL AMERICA FOR MEDICAL RESEARCH

MEMBERS of the research expedition to the tropics of Central America, organized by the Johns Hopkins School of Hygiene and Public Health and conducted under the auspices of the International Health Board of the Rockefeller Foundation, returned on September 15.

Dr. W. W. Cort, professor of helminthology at the Johns Hopkins University, was director of the expedition. Others on the staff were Dr. Maurice C. Hall, chief of the zoological division of the U. S. Bureau of Animal Industry; Drs. N. R. Stoll and Harold Brown, of the Johns Hopkins University; D. L. Augustine, of the Harvard Medical School; W. A. Riley, of the University of Minnesota, and W. C. Sweet, of the Rockefeller Foundation. Besides gathering much information on parasites and parasitic diseases, the expedition brought back about 150 bottles of prevailing parasites, some of them apparently new and of economic and scientific importance.

Dr. Hall made the following statement regarding the results of the expedition:

> The trip has furnished a valuable background of tropical conditions as regards factors in parasitic development. In the extent and nature of diseases of livestock caused by parasites in the countries visited, the findings were unexpected and reassuring in many respects. The range cattle of those countries proved to be practically free from gastro-intestinal parasites, and in many cases appeared to be entirely so. While there is an abundance of moisture and warmth in the tropics, things which themselves are favorable to parasites, the seasonal distribution of rain is highly unfavorable to parasite eggs and larvae.
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> In the countries visited—Panama, Nicaragua, Salvador and Guatemala—there are from two to six months, as a rule, and more in exceptional seasons such as this year, when there is no rain whatever. In the absence of moisture the hot tropical sun has a desiccating effect which is fatal to parasite eggs and larvae and no doubt has a decided sterilizing action on bacteria. Furthermore, the rains themselves are torrential and in the mountainous countries must have a washing effect which serves to sweep worm eggs and larvae into the many water courses and out of contact with livestock. There is little overstocking on these ranges and consequently there is a lack of concentrated infection.

One important object of the expedition was to determine what tropical diseases are likely to be carried northward by shipments of livestock. The survey has given a satisfactory answer to that question.

Cattle in the countries visited suffer from ticks and tick fever. Tuberculosis appears to be rare among the range cattle; the bacterial diseases of importance were anthrax, blackleg and tetanus. In contrast to the relative freedom of range livestock from parasites, household animals in the countries visited showed fairly extensive infestation. Swine especially suffer from kidney worms which cause considerable loss of meat and lard. Another common swine parasite causes the disease known as swine measles or cysticercosis, due to bladder worms in the meat. These bladder worms are the larval stages of a large and dangerous human tapeworm.

The results of the expedition show that in shipping livestock from Central America to the United States the only diseases of livestock that appear to warrant serious consideration are tick fever, anthrax, blackleg and tetanus, though final conclusions depend on the identification of the parasites collected and also on further studies in Central America. Dr. Hall made his examinations of animal parasites largely at local abattoirs, in collaboration with Dr. Augustine.

SELECTION OF A CHEMIST FOR THE UNITED STATES BUREAU OF CHEMISTRY

THE United States Civil Service Commission states that the position of chemist in charge of drug control investigations in the Bureau of Chemistry of the Department of Agriculture is vacant, and that, in view of the importance of the position in the field of pharmaceutical and pharmacological research, and to insure the appointment of a thoroughly qualified man for the work, an unusual method of competition will be followed to fill the vacancy. Instead of the usual form of civil service examination, the qualifications of candidates will be passed upon by a special board of examiners, composed of Dr. W. W. Skinner, assistant chief of the Bureau of Chemistry, Department of Agriculture; Dr. G. W. McCoy, director of the Hygienic Laboratory; Dr. H. A. B. Dunning, of Hynson, Westcott and Dunning, Baltimore, Maryland; Dr. Carson P. Frailey, secretary of the American Drug Manufacturing Association, and Dr. A. S. Ernest, examiner of the United States Civil Service Commission, who will act as chairman of the committee. For the purposes of this examination all