equitable distribution of tax burdens. To what extent agriculture may be properly asked to bear a larger or smaller part of the tax burden is an unanswered question in most of the European countries. We do know that tariffs are, in a number of instances, used to protect or virtually to subsidize domestic production of food. The industrial elements in the population are naturally inclined to protest against high tariffs on agricultural commodities, for these tend to increase the cost of living. Both the employers and employees of the industries recognize this fact.

The transportation of agricultural commodities is passing through rather interesting readjustments. Despite the high cost of motor fuel, transportation by truck is, in a measure, doing for European farmers what it has done for farmers in the United States. Gradually but steadily the average distance between producer and consumer is growing longer. There is less intimate contact than there has been between the farmer and the purchaser of his products. The services of the middleman must, of necessity, become relatively more important as the distance between the producer and consumer is increased. We must likewise consider roads, freight rates, storage and local distribution as a part of the modern program of agricultural marketing.

Finally, we may note that agricultural research in Europe as well as agricultural education are very much out of keeping with the needs of a progressive agriculture. With few notable exceptions, agricultural research in Europe is supported in a niggardly way. Moreover, the experiment stations have not the intimate contact with the farmers that the American experiment stations have developed. The level of education among the owners of large farms is high enough. On the other hand, the level of education among the small farmers is again, with some notable examples, too low to permit of the most effective use of inventions and discoveries. European governments are obviously aware of this fact but very often find themselves unable to apply the remedy because of lack of financial resources. In some instances greater resources for agricultural research and education could be made available if the political leaders could be made to realize that the support of agricultural schools, colleges and experiment stations is justified in the returns which sooner or later come because of more efficient production, greater contentment, higher economic levels and better social relations in the rural communities.

JACOB G. LIPMAN

NEW JERSEY AGRICULTURAL EXPERIMENT STATION

FRENCH INSTRUCTION AND RESEARCH IN BIOLOGY

THE young Frenchman comes to the university with a mature mind, well drilled in the fundamentals of general culture and with a set purpose to his studies. The "Baccalauréat," which he has just completed, is equivalent to the first two years' work in an American university of the highest grade, and to the bachelor's degree from a smaller American college. Biology, then, is taught in France not so much with the purpose of giving a general idea of the subject to great numbers of students, as with the view of training intensively a few young men and women as biologists or teachers of biology.

The "Licence," which is the first university title to be acquired by a student after the "Baccalauréat," is composed of three "Certificats" in as many subjects. For prospective teachers of biology in the Lycées, these "Certificats" must be in zoology, botany and geology. For future biologists, additional "Certificats" in chemistry, physiology and physics are recommended. The student in biology also usually spends some time, before his "Licence," at one of the several marine biological stations, where he studies marine invertebrates, and where he comes in close contact with research workers in biology from all over the world.

A "Certificat" consists of the combined teaching of two or three professors in the same subject. The full professors give only lectures on special subjects; the "Maîtres de Conférences," corresponding to the American associate professors, cover an entire subject during the year. Thus, during the academic year 1925–1926 in Paris, M. Paul Wintrebert, professor of comparative anatomy and histology, gave a series of lectures on the vertebrate skeleton, while M. François Picart, maître de conférences in embryology, covered the whole field of invertebrate and vertebrate embryology. The instructors do, on the whole, very little formal teaching, and the student is expected and even required to glean for himself out of text-books whatever of importance in a subject is not taken up by the professor or maître de conférences. He is liable to be examined on any part of his subject in the series of examinations which occur at the end of the academic year. While the laboratory work, which is in the hands of a "chef de trauvaux" or a "préparateur," is compulsory, attendance at any of the lectures is not required, and no examinations are usually given during the year.

If, at the end of his "Licence" the young biologist wishes to work either for a "diplôme d'études supérieures" or for a doctorate, both of which imply original research work, he chooses the laboratory in which he wishes to carry on his investigation, and

familiarizes himself of his own accord with the required technique. His relations to his professor now become those of an apprentice to his master, but the greatest latitude is given to him to work as he best sees fit. There are no special courses to be followed nor hours to be spent in the laboratory. Students who are working for the "diplôme d'études supérieures," which is required for teaching in a lycée, are usually given a research subject; those who have a doctorate in view search out a subject for themselves, or, if they ask suggestions from the professor, are quite free to work out the problem according to their own lights. Such a system is of course not fit for the mass production of doctors, but is excellent for the careful training of a few specially gifted individuals.

The Parisian laboratories, placed in a great center of intellectual life, and usually with more funds to dispose of than the provincial laboratories, are the ones which are most likely to attract foreign investigators. It may thus not be amiss to lay particular stress on the enumeration and description of the laboratories in the capital.

Zoology is taught in five laboratories at the Sorbonne, at the École Normale Supérieure and at the École de Pharmacie. The premedical students attend special courses, which while given by professors of the Sorbonne, are apart both in their location and in their mode of treatment from the other courses at the Faculté des Sciences. The professor of zoology at the P. C. N., as the premedical school is called (physical, chemical, natural sciences), is Rémy Perrier, brother of the famed comparative anatomist, Edmond Perrier; he has continued, in a way, the latter's work. He is ably seconded by Georges Bohn, who has done much work on comparative psychology and on the chemical aspects of biology. Zoology for non-premedical students is taught by Professors Charles Pérez and Hérouard, both of them morphologists, in the laboratory lately held by Yves Delage. Comparative anatomy and histology are in the hands of Professor Paul Wintrebert, whose work has mostly been in experimental zoology. General biology and embryology are taught both at the Laboratoire d'Evolution des Êtres Organisés, by Professor Maurice Caullery and M. François Picart, and at the Laboratoire de Biologie Expérimentale, by Professor Etienne Rabaud. At the École Normale Supérieure the laboratory of zoology is directed by Professor Robert Lévy.

Besides these teaching laboratories, there are others where only research is ordinarily carried out. Such are the biological laboratories of the Collège de France and of the Muséum d'Histoire Naturelle. In the former institution the chair of comparative embryology is held by Professor Henneguy, ably seconded by M. E. Fauré-Frémiet; in this laboratory much experimental work is being carried out. The chair of histology is in the hands of Professor Nageotte, while there has been recently created a chair of physiological histology for Professor Jolly. At the Muséum d'Histoire Naturelle there are several laboratories of zoology, which are mainly devoted to taxonomy and morphology. Chief among them are the laboratories of Professor Bouvier, in entomology, Professor Roule, in herpetology and ichthyology, Professor Gravier, in Crustacea and worms, Professor Joubin, in Coelenterates, Professor Anthony, in comparative anatomy of vertebrates. Similar laboratories, dealing with marine life, exist at the Institut Océanographique.

Of interest also to zoologists are the laboratories of histology of Professor A. Prenant, and of parasitology of Professor Brumpt—at the Faculté de Médecine—and of parasitology of Professor F. Mesnil, at the Institut Pasteur.

General physiology at the Sorbonne is taught by Professor Lapicque, the discoverer of chronaxy. His laboratory deals very largely with the physical aspects of physiology. On the contrary, in Professor A. Mayer's laboratory at the Collège de France, and in Professor Portier's laboratory of comparative physiology at the Sorbonne, it is the chemical aspects which are largely stressed. At the Collège de France also is the laboratory of Professor Gley, where the work deals with hormones and with the nervous system. Professor Richet's recent chair at the medical school is now occupied by Dean Roger, while there is also located here the laboratory of Professor Gautrelet, attached to the École des Hautes Études.

Biochemistry is taught at the Sorbonne by Professor Gabriel Bertrand, whose work deals mostly with enzymes and the physiological action of metals, and by M. Javillier, of the Institut Agronomique. At the medical school biochemistry is in the hands of Professor Desgrez.

Botany is extensively studied at the Sorbonne. Plant morphology is taken up by Professor Dangeard, cytology by Professor Guilliermond, while plant physiology is taught by Professor Molliard. The biological aspects of botany, such as variation, heredity, etc., are studied under the direction of Professor Blaringhem.

Attached to the University of Paris are three marine biological stations and several stations for botanical and limnological investigations. Of the marine stations, the one at Wimereux, Pas-de-Calais, is small, while the ones at Roscoff, Finistére, and Banyuls, Pyrénées-Orientales, are modern and well equipped. The direction of these stations is in the hands, respectively, of Professors Caullery, Pérez and Duboscq.

Of interest also are the independent marine stations of Monaco and of Salammbô, Tunis.

The main provincial cities where biological research is being actively carried out are Strasbourg, Montpellier, Nancy, Lyon. In Strasburg are Professors Bouin and Ancel, who have done remarkable work on the biology of sex; Nicloux and Blum, who have applied to biochemistry the methods of micro-chemistry; the physico-biologist, Vlès, the physiologist Terroine, the protozoologist Chatton, besides many younger able men. At Montpellier are the experimental zoologist Bataillon, the comparative anatomist Vialleton, the histologists Hollande and Turchini, and the physiologists Hédon and Derrien. At Nancy is the school formed by Professor Cuénot, leader of French geneticists, while at Lyon an outstanding figure is Professor Policart, physiological histologist.

In all the laboratories which have been enumerated, as well as in all other French research laboratories, foreign investigators are made welcome. American biologists coming to work in France should not, however, choose any laboratory in which to do their investigation before meeting the various directors personally. The various laboratories differ so much from each other, in both spirit and equipment, that it is far preferable to decide "sur place" which suits best one's particular needs.

The spirit of individualism and personal liberty, preeminent in France, is amply reflected in the life of its laboratories. Americans, accustomed to a system which has a tendency to over-organization in science, can greatly benefit from association with a method which is totally different from their own.

RAOUL M. MAY

AMERICAN FIELD SERVICE,
PARIS, FRANCE

SCIENTIFIC EVENTS

LECTURES AT THE ROYAL INSTITUTION

THE following lecture arrangements at the Royal Institution before Easter next year have been announced: The Christmas course of six lectures for juveniles were delivered by Professor A. V. Hill, on "Nerves and Muscles: how we feel and move," commencing on December 28. On Tuesdays, at 5.15 P. M., beginning on January 18, there will be two lectures by Professor R. Whytlaw-Gray on smokes as aerial disperse systems; six by Professor Julian Huxley on problems of animal growth and development; two by Dr. G. Shearer on X-rays and the chemical molecule, and two by Professor J. W. Cobb on some properties of coke. Thursday afternoon lectures, at the same hour, include three lectures by Sir William Bragg on acoustical problems treated by Lord Rayleigh; three by Professor John Garstang on the progress of Hittite studies; two by Mr. J. Guild on color measurement and standardization, and two by Mr. Harold J. E. Peake on the beginnings and early spread of agriculture. Saturday afternoon lectures, at 3 P. M., include four by Sir Ernest Rutherford on the α-rays and their application to atomic structure. The Friday evening meetings will begin on January 21, when Sir William Bragg will deliver a discourse on Tyndall's experiments on magne-crystallic action. Succeeding discourses will probably be given by Professor E. P. Cathcart, Mr. T. L. Eckersley, Dr. Ernest Law, Sir Josiah Stamp, Professor D'Arcy Thompson, Sir Herbert Jackson, Dr. George Macdonald, Mr. E. Hatschek, Professor C. T. R. Wilson, Sir Ernest Rutherford and others.

PUBLIC LECTURES AT THE HARVARD MEDICAL SCHOOL

THE faculty of medicine of Harvard University is offering a course of free public lectures on medical subjects, at the Medical School, Longwood Avenue, Boston, on Sunday afternoons at four o'clock, beginning on January 9 and ending March 27.

January 9.—*Healthy children.* Dr. Richard M. Smith, assistant professor of child hygiene.

January 16.—*The public health aspects of venereal diseases.* (To women only.) Dr. Myrtelle M. Canavan, curator of the Warren anatomical museum.

January 23.—*Alcoholism, syphilis, and some other conditions as causes of mental disease.* Dr. Harry C. Solomon, instructor in neuropathology and associate in psychiatry.

January 30.—*The dangers of overweight.* Dr. Lawrence T. Fairhall, instructor in physiology.

February 6.—*The internal secretions.* Dr. Joseph C. Aub, assistant professor of medicine.

February 13.—*Some causes of bladder trouble.* (To men only.) Dr. J. Dellinger Barney, assistant professor of genito-urinary surgery.

February 20.—*The problem child.* Dr. Douglas A. Thom, instructor in psychiatry.

February 27.—*How the nerves, eyes, nose and throat may be affected by the teeth.* Dr. George H. Wright, assistant professor of dentistry.

March 6.—*The meaning of blood pressure.* Dr. William H. Robey, assistant professor of medicine.

March 13.—*Fresh air, sunlight, and vitamines.* Dr. Edwin T. Wyman, instructor in pediatrics.

March 20.—*Something about dreams.* Dr. Percy G. Stiles, assistant professor of physiology.

March 27.—*Cancer and new growths.* Dr. Shields Warren, instructor in pathology.

GIFT OF THE ROEBLING MINERAL COLLECTION TO THE SMITHSONIAN INSTITUTION

WHAT is said to be the finest private collection of minerals in the world, belonging to the late Colonel