

THE STRASSBURG BOTANICAL
INSTITUTE.

IN the American *Botanical Gazette* for December 1888 (vol. xiii. No. 12) there is a paper by Mr. William R. Dudley on the Botanical Institute at Strassburg. This paper is valuable and interesting as showing the sort of provision for botanical study that is thought right and necessary in Germany. The Institute forms part of the new University buildings of Strassburg. Mr. Dudley gives plans of the ground floor and first floor, and from these it appears that a considerable portion of the building is reserved as a residence for the Director and his family, and that two rooms are allotted to the Director's assistant, usually a young man who has recently taken his degree as a doctor. On the ground floor, besides the living-rooms, are a larger and smaller lecture-room, a "*Lehrsammlung*," or illustrative museum, and a "preparation-room," which is used in the preparation of lectures, and is also found useful by those who wish to carry on work in connection with the museum. On the first floor a large part of the space is given up to laboratories. It includes also an herbarium, a library, a weighing-room, a chemical-room, a dark room, and a small greenhouse.

After some introductory statements, Mr. Dudley continues as follows:—

No doubt the architect who designed this building is accountable for cutting it up into symmetrical squares; any German architect who failed in this would be sure to die unhappy. Nevertheless, for the sequence of the rooms and for the details, De Bary was responsible, and, taking everything into consideration, it is considered in Germany their best single laboratory for botany.

Its chief characteristics are the abundance of all necessary appliances and apparatus, cleanliness and orderly disposition of all its supplies, good light from huge windows and white wall-surfaces. Wall-cases are numerous, and the contained glass-ware, reagents, &c., nicely arranged. Drawers are abundant—this one containing only reagent tubes, that glass plates, another pipettes, burettes, &c. Running water is convenient, of course, and distilled water and three grades of alcohol where they can be readily obtained by students if necessary. There are several sterilizing boxes in the large laboratories; also constant-temperature boxes provided with thermostats. The chemical-room is provided with a hood for fumes and for the steam generated by the steam sterilizing cylinders. Gas is provided at each table, and a separate room is set apart for delicate instruments, such as balances. Indeed the association and dissociation of rooms and apparatus, the conveniences, the absence of unnecessary things and showy effects, indicate the intelligence and discernment of a worker and a master.

The tables are broad, very heavy, and designed so as to prevent warping or seaming. They are convenient for two beginners or a single special student. Each person is provided, at the outset, with about a dozen common reagents and fluids. The microscopes for laboratory use are chiefly Hartnack. Most of the private microscopes in the laboratory at the time I was there were from Seibert, an excellent Wetzlar manufacturer, not well known in America, and one or two from Zeiss. The stock of reagents in the cases is large, and, if necessary, new ones will be cheerfully ordered. The University requires of special students working every day in the laboratory, a payment of fifteen dollars, which covers all necessary expenses.

Strassburg University had about 1000 students during the winter semester of 1887-88, and 104 professors, *privat-docents*, and assistants. It is, therefore, neither one of the largest, nor one of the smallest, of Germany's twenty-one Universities.

The Botanical Laboratory had six advanced and five beginning students, and I do not think the number was affected by De Bary's illness. To instruct or counsel these were four instructors: the Professor; the associate Professor, Dr. Zacharias; the *privat-docent*, Dr. Wortman; and the assistant, Dr. Jost—all contributors, in a greater or less degree, to science, and of course well-trained men. At least three of the advanced students were working quite independently during De Bary's illness, although it was the latter's custom to inquire nearly every day after the work of the advanced students, when he was in health. But the German Government, which employs and pays these instructors, is not afflicted with that particular kind of malaria which enters into the management of almost every American institution, and gives it alternate chills and fever over fall and

rise in numbers. Numbers are a matter of indifference to it. A very distinguished German Professor once said to me: "The truth is, we teach whatever we please, we do as much or as little as we please, and the Government does not interfere with us." Yet these men teach enthusiastically, and accomplish in scientific research ten times as much as the American Professor, who is "personally conducted" by a whole Board of Trustees. The German Government *does* "personally conduct," however, in certain very important matters. In the first place, it provides a suitable *corps* of assistants, and makes it sure, therefore, that the Professor has *not* too great a burden of teaching on his hands. It provides ample appropriations; it appoints its Professors for merit, and it sends up its students from the secondary schools with an excellent and uniform training.

The advanced students were mostly engaged in bacteriological investigations, although one was working out certain biological questions of fern development. Prof. Zacharias was engaged in histological work, Dr. Wortman in physiology, and Dr. Jost completed a paper during the winter on the morphology of certain mistletoes.

In the "*Lehrsammlung*" are numerous beautiful preparations, some made by De Bary, and at once recognizable as the originals of well-known figures in his published works; and some by former pupils, some of whom are now famous men. These preparations are frequently used in illustrating the lectures, all of which were held late in the afternoon or in the evening.

The herbarium collection is not relatively large, and is situated rather remote from the other rooms. Had De Bary been a systematist, he would, no doubt, have placed his herbarium centrally. Instead, the large laboratories, the rooms which have seen so many distinguished investigators, and witnessed so many scientific discoveries under the guidance of the great Director, are the rooms around which the others are clustered.

The library, stocked with a fairly good number of the important serials, together with a few standard works in the principal departments of botany, is placed nearer the laboratory; and in this, every Monday evening, meets the "Botanical Colloquium," made up of the advanced students of the laboratory and the instructors. Certain members give carefully prepared abstracts and reviews of the current botanical literature, which are followed by spirited discussions. After an hour or more of arduous and profitable labour of this kind, by means of which each member is enabled to keep quite abreast of advanced lines of work, they adjourn to a more convivial place, and spend the remainder of the evening in the relaxation natural to the German. By eleven o'clock all their vast learning, and especially the hard facts of the recent Colloquium, are in a state of saturated solution, and by next morning are quite ready for use.

INDUSTRIAL EDUCATION.

MAY I ask you to publish and invite criticism on the inclosed Bill, which has been read a first time in the Kensington Parliament? It is put forward as not antagonistic to, but rather as including (see Clause 8), the academic schemes of technical education with which we are familiar. I write as one who was at a primary school, who has worked at the bench, who has great reason to be grateful to the Science and Art Department, who has been a master at a public school, a manager of works, and an employer of labour.

JOHN PERRY.

10 Penywern Road, South Kensington, S.W.,
December 28, 1888.

A Bill for Technical Industrial Education.

Whereas it is expedient to make provision for Technical Industrial Education in England and Wales:

Be it therefore enacted, &c.

(1) This Bill may be cited as the Technical Education Bill 1889, and shall not extend to Scotland or Ireland.

(2) "Apprentice" means any boy of less than 18, or any girl of less than 17 years of age employed, whether under indentures or not, in any place which, under the Factories or Workshops Acts, is denominated a factory or workshop, or in any warehouse, shop, office, or other place of business, or for wages, or other remuneration, in any place of employment. But apprentice so defined shall not include any menial or

domestic servant. "Master" means the employer of any apprentice as hereinbefore defined.

"School Authority" means the School Board exercising jurisdiction in the district in which the place of employment is situated, or any elected body which may take over the powers of such School Board; and in places where there is no School Board, it means the County or Borough Council under the Local Government Act, 1888, or the Municipal Corporations Acts.

"Technical Education" is an education in the scientific and artistic principles which govern the ordinary operations in any industry.

"Technical School" means a place for technical education, whether established and maintained—

(a) By the School Authority, and open to all apprentices;
(b) By voluntary effort, and open to the apprentices of more than one master;

(c) Or by a master for his own apprentices.

"Inspector" means the Inspector of Factories in whose district the place of employment is situated, or if there be no such inspector, then the School Board Visitor for such district.

(3) The Education Department shall forthwith and from time to time prescribe regulations in conformity with the rules for the time being of the Science and Art Department, in the subjects in respect of which Parliamentary grants are made by the Science and Art Department, for the formation and instruction of classes of elementary school children who have passed the Fourth Standard, and thereupon the School Authority may form such science and art classes, and provide such instruction accordingly, and earn such grants, and may assign such grants to the teachers of such classes, or may otherwise provide for their remuneration.

(4) Every master shall provide each of his apprentices with technical education at a technical school.

(5) Every apprentice shall devote at least two hours a day, five days in the week, during working hours, to study at a technical school.

(6) The School Authority shall annually in January prescribe the time for such study, having regard to the usual working hours in places of employment in their district, and shall publish a table of the times so prescribed. A printed copy of such table shall be conspicuously exhibited by the master in every such place of employment in such positions for such times and in such type and form as the School Authority shall prescribe.

(7) The School Authority shall have power to establish and maintain such technical schools as may be necessary to accommodate and provide technical education for all apprentices in their district whose masters do not otherwise efficiently provide for the technical education of their apprentices. The master of each apprentice shall pay the prescribed fees for his tuition at such schools.

(8) The technical schools established and maintained by the School Authority may provide technical education for persons other than apprentices.

(9) The course of studies at such schools, and fees payable for the same, shall be prescribed from time to time by the School Authority, subject to the sanction of the Education Department.

(10) The inspector shall inform himself as to the sufficiency of the technical education given to apprentices in his district, and report thereon to the School Authority and the Education Department at such times and in such manner as they shall respectively prescribe.

The duties, powers, and penalties relating to the office of inspector, specified in the Factories and Workshops Act, 1878, shall be applicable to any inspector under this Act, and to any place of employment within the provisions hereof.

The inspectors shall be paid by the School Authority such remuneration for their services under this Act as the Education Department shall approve.

(11) All offences under this Act shall be prosecuted, and all fines under this Act shall be recovered on summary conviction before a Court of Summary Jurisdiction in manner provided by the Summary Jurisdiction Acts.

The provisions of the Factories and Workshops Act, 1878, and the Acts amending the same as to legal proceedings and appeals, shall be deemed to be incorporated in, and made applicable to, this Act.

The punishment for any offence under this Act shall be a fine not exceeding £5.

(12) The expenses of carrying this Act into execution shall be

defrayed by the School Authority, who shall have power to provide for such expenditure by moneys raised, precepts issued, or rates levied under their powers. Separate statements of such expenditure shall be furnished annually to the Education Department.

ZOOLOGICAL NOTES FROM TORRES STRAITS.

CAUDAL Respiration in Periophthalmus.—At the Birmingham meeting of the British Association, in 1886, Dr. S. J. Hickson pointed out that the species of *Periophthalmus* which he had observed in the Celebes always rested with its tail immersed in water, although the body was out of the same. I do not know whether any experiments have been made on this fish, but I have made a few which tend to show that this remarkable animal largely respire by means of its caudal fin. The experiments were made on specimens obtained from a Mangrove swamp on the Island of Mabuag (Jervis Islands), and may be summarized as follows:—A specimen totally submerged in the sea was perfectly well and lively after forty-two hours. A second specimen lived a day and a half in a vessel containing just sufficient water to keep the tail-fin submerged, but not enough for respiration by means of the gills. (It is possible that the fish would have lived longer, if the sea-water had been continually renewed.) Fish with the caudal fin coated over with gold size, when put in a vessel of sea-water, only lived, on an average, from twelve to eighteen hours, although they could utilize their gills for respiration; others kept under similar circumstances, but not anointed with gold size, lived a day or two, apparently in perfect health. On submitting the caudal fins to the microscope, the circulation of the blood appeared to be exceptionally vigorous. I hope to be able to further test these observations on a future occasion.

The Employment of the Sucker-fish (Echeneis) in Turtle-fishing.—The only two references to the employment of the sucker-fish in turtle-fishing which I have by me are those in Dr. Günther's "Introduction to the Study of Fishes," and the "Narrative of the Voyage of H.M.S. *Rattlesnake*," by J. Macgillivray. The latter (vol. ii. p. 21) states that he was informed that the natives of Morlug (Prince of Wales Island), Torres Straits, catch a small species of turtle in the following manner:— "A live sucker-fish (*Echeneis remora*), having previously been secured by a line passed round the tail, is thrown into the water in certain places known to be suitable for the purpose; the fish while swimming about makes fast by its sucker to any turtle of this small kind which it may chance to encounter, and both are hauled in together!" Dr. Günther (*l.c.* p. 461) throws doubt upon the habitual utilization of the *Echeneis* for this purpose. In the Straits there are two periods for turtle-fishing, the one during October and November, which is the pairing season, and when turtle are easily speared owing to their floating on the surface of the water; the other, during the remaining months of the year when the turtle frequent the deeper water and the channels between the reefs. It is then that the sucker-fish—or, as the natives term it, "Gapu,"—is utilized. I have, at present, no means of determining the species of *Echeneis* common in the Straits. I believe it to be *E. naucrata*, as the species here attains a greater length than *E. remora*. When going out turtle-fishing, a Gapu is caught, and the more experienced natives have no great difficulty in procuring one when it is required. A hole is made at the base of the caudal fin by means of a turtle-bone, and the end of a very long piece of string is inserted in the hole and made fast. The end of a second, quite short, piece of string, is passed through the mouth and out by the gills. By means of these two strings the fish is retained, while slung over the sides of the canoe, in the water. When a turtle is sighted deep down in the water, the front piece of string is withdrawn, plenty of slack being allowed for the hind string. The Gapu on perceiving the turtle immediately swims towards it, and attaches itself to the reptile's carapace. A man, with a long rope attached to an upper arm, dives into the water and is guided to the turtle by the line fastened to the Gapu's tail. On reaching the turtle, the man gets on its back, and passes his arms behind and below the fore-flappers, and his legs in front and below the hind-flappers. The man is then rapidly drawn up to the surface of the water bearing the turtle with him. On the arrival of the