

A UNIVERSITY IN THE TROPICS.

THE TIMES of January 23 devotes one of its leading articles to the important question of the need of establishing a university in the tropics for the study of tropical agriculture. The subject is dealt with in a very interesting and forcible manner, and it is to be hoped that it may not be long before the proposal is realised.

At present, beyond the few facilities which exist at the Imperial College of Science and Technology, there is no place within the British Dominions where men who aspire to a tropical post, or have to deal with tropical estates, can learn more than a smattering of either the nature or magnitude of the problems which await solution. Yet men are constantly being sent out as agricultural officers to fill highly important and responsible posts, and they are expected to be able at once to cope with the difficulties which are presented from all sides.

Did we but stop to count the cost of our want of foresight in this matter we should realise that the expenditure in establishing a proper training centre in the tropics would long ago have been repaid by the increase of efficiency in the officers and the resultant improvement in agricultural operations.

The paramount advantage of a university or college of science established in some tropical colony would be that it would provide a centre where questions relating to soil, plant and animal breeding, plant and animal pathology, economic zoology, and various chemical and other questions could be investigated under tropical conditions by a highly competent professorial body, and where advanced instruction could be given to students—whose preliminary training had been received elsewhere—destined to fill agricultural posts in one or other of our tropical colonies. If the need of such an institution be admitted the question then arises, Where should such a university be stationed? Before suggesting an answer to this question it is necessary to point out that in view of the two-fold nature of the proposed institution, three points must be kept in mind. In the first place it should be situated in a colony offering the greatest possible scope for diverse agricultural pursuits; secondly, the healthiness of the colony should, so far as possible, be beyond reproach; and thirdly, the spot chosen for the university should be within easy access of the British Isles.

This last point is perhaps the most important one of all, since not only is it desirable on behalf of the students from home that the expenditure of time and money should not be unduly large, but also it is of paramount importance that the professors and lecturers should be able to have the opportunity of frequent intercourse with home, and so reduce to a minimum the possibility of stagnation and loss of vigour which might be liable to occur if personal intercourse with fellow-workers at home were rendered difficult by distance and expense.

This danger of stagnation would also tend very effectively to be obviated if the tropical university

or college of science could be definitely linked with an institution at home. Such an institution should be either a university especially interested in agricultural matters or an institution of university standing, such as the Imperial College of Science and Technology.

If then it be agreed that the points which have been urged, in considering the requirements of an agricultural institution in the tropics, must be regarded as conditions essential to its success, it would seem clear that the site for the institution must be sought in the Antilles. Nowhere among these islands do we find all the requisite conditions so fully met as in the easily accessible and beautiful island of Trinidad.

THE NATURAL HISTORY COLLECTIONS OF THE BRITISH MUSEUM.¹

TO those familiar with the natural history collections in the old British Museum in Bloomsbury the work of Dr. Günther must revive many pleasant associations of the 'fifties and 'sixties of last century—when the insect room was frequented by naturalists of note in various departments. Thus, besides the staff of the museum, which then included the brothers J. E. and R. Gray, Dr. Günther himself, F. Smith, and foreign naturalists, one met such men as Dr. Bowerbank, Mr. Busk, Dr. Carpenter, Mr. John Gould, and such ladies as the charming Mrs. Alfred Gatty—all eager to absorb as well as impart information. No marine laboratories then existed, so that marine, as well as terrestrial, natural history centred in the great museum. In the historical treatise heading the list, which no one could write so well as Dr. Günther, we are brought face to face with all the conspicuous additions to the vast collections, which in 1868 were close on a million and in 1895 two millions, the changes in the staff, the nature of their work, the financial allowances, and, more than all, the remarkable task of transporting the collections from the old museum to the new quarters in Cromwell Road.

Few have any notion of the vast stores in every department of zoology which have been assiduously collected in one way or another by the trustees, or of the labour entailed on the staff, for instance, by the receipt of 63,000 specimens of a particular group at once, especially if they were not carefully named and labelled. Besides the task of incorporating the rare or new species, duplicates have to be selected and treated differ-

¹ "The History of the Collections contained in the Natural History Departments of the British Museum." Vol. ii. Appendix. General History of the Department of Zoology from 1856 to 1895. By Dr. Albert Günther, F.R.S. Pp. ix+109. (London: British Museum (Natural History); Longmans and Co., 1912.) Price 5s.

Catalogue of the Mammals of Western Europe (Europe exclusive of Russia) in the Collection of the British Museum. By Gerrit S. Miller. Pp. xv+109. (London: British Museum (Natural History); Longmans and Co., 1912.) Price 26s.

Catalogue of the Collection of Birds' Eggs in the British Museum (Natural History). Vol. v. Carinatae (Passeriformes completed). By W. R. Ogilvie-Grant. Pp. xxii+547+22 plates. (London: British Museum (Natural History); Longmans and Co., 1912.) Price £2 7s. 6d.

Catalogue of the Chaetopoda in the British Museum (Natural History). A. Polychæta: Part I. Arenicolidae. By Dr. J. H. Ashworth. Pp. xii+175+2v plates. (London: British Museum (Natural History); Longmans and Co., 1912.) Price 27s. 6d.

ently, whilst if the collection is unnamed or of great rarity, a descriptive account in a catalogue may be necessary.

Moreover, whilst the collections remained in Bloomsbury the great library was at the command of the staff, but the transference to South Kensington wholly altered the situation. Even before 1882-3, indeed, a departmental library was known to be a necessity for facility in working out the collections. Accordingly, in 1879-81, a commencement was made, and soon the library comprised 1700 titles, while at the end of the period embraced in Dr. Günther's history, and largely by his unceasing efforts, there were 10,036 separate works, or 16,238 volumes. The library is not only indispensable to the staff, but many zoologists outside—both British and foreign—have had their labours lightened by the conveniences thus afforded of consulting rare books, as well as by the courtesy of the staff.

But the care and custody of the nation's natural history collections form only a part of the duty of the staff. For, besides the select series for exhibition to the public, another for study by students (using this term in its widest sense) has to be arranged for, so as to leave those in the public galleries untouched; indeed, the exigencies of space, as well as the importance of the system, had caused Dr. Gray to adopt it so early as 1858. Moreover, descriptive catalogues, great and small, with plates and text-figures of every group, have to be prepared for publication—for example, the great, and to workers the indispensable, catalogue of fishes in many volumes, by the keeper himself (Dr. Günther). Single volumes of some of these publications, *e.g.*, that on monotremes and marsupials, by Mr. Oldfield Thomas, represent the labour of three years. Popular guides to the various galleries, on the plan proposed by the author of the history, that is, of a kind not only useful to every intelligent visitor, but in most cases of value to students of the department as well as to those in charge of other museums, have likewise to be prepared by the staff. Thus the collections of the great museum are utilised from various points of view.

As we read those terse and pregnant pages of Dr. Günther's, a procession of great naturalists and their collections passes before us in kaleidoscopic variety, and the familiar names of Sir Joseph Banks, Mr. Cuming, Col. Beddome, Dr. Jerdon, John Gould, A. R. Wallace, Mr. Hewitson, A. Hume, Messrs. Godman and Salvin, George Busk, Joshua Alder, Dr. Sclater, Dr. Gwyn Jeffrys, F. Day, Dr. John Anderson, and Lords Tweeddale, Lilford and Walsingham, and many others recall in each case a life-long devotion to particular groups.

Further, a long series of expeditions by sea and by land—from the Arctic to the Antarctic regions, as well as in the neighbouring waters and countries, besides the circumnavigating voyage of H.M.S. *Challenger*—have poured their riches into this great museum, which also received notable increments from the collections made by

the East India Company, the Linnean Society, and the great Fisheries Exhibition of 1883. Mammals, from the huge whales, elephants and giraffes to the tiny marsupials, rodents and insectivores, find their place in this vast array, and so throughout the orders of mammals, the endless series of birds, reptiles, amphibians and fishes. The vast numbers of invertebrates, from cuttle-fishes and shells, insects and crabs to corals, sponges and foraminifera, can only be estimated by the records in this volume. Not a few collections typify the Colonial possessions and dependencies of the Empire—from New Zealand to South America, Canada, Egypt, and India; whilst the native animals—land, fresh-water, and marine—have each a place in the series.

The period embraced by this treatise is of special interest, since it covers the erection of the fine Natural History Museum at South Kensington and the preparation of the plans for the furniture and fittings by the keeper, as well as the removal of the vast collections from their old quarters in Bloomsbury to their new premises in South Kensington. This task, carefully planned and skilfully carried out in about six months by Dr. Günther, without appreciable injury, is one that redounds to the credit of the keeper—whether in respect to the delicacy of many of the specimens, or the distance to be traversed in the streets of a busy city. The larger forms, perhaps, gave less anxiety than the dried and brittle corals, echinoderms and sponges, and, still more, the 52,635 jars and bottles of all sizes containing specimens in spirit. Dr. Günther thus well merited the congratulations of the trustees on this feat. In the material of the cases of the new museum a change from metal (recommended by the keeper) to mahogany was made by the trustees, probably on the grounds of economy; and for the same reason the reduction of the size of the separate building for the spirit collections, as Sir R. Owen, Dr. Gray and Dr. Günther foresaw, caused an extension of double the amount ten years later. A cetacean room had also to be improvised for these huge mammals.

Further, the system whereby the selected duplicates in every group, from primates to protozoa, are distributed to home and to Colonial museums was put in active operation, and not a few university and other museums have reason to be grateful to the trustees for this great privilege.

The three volumes following Dr. Günther's are typical examples of the important publications of the museum. The catalogue of mammals of Western Europe, by Gerrit S. Miller, of the United States National Museum at Washington, is a laborious and exact treatise, the origin of which is largely due to the efforts of Lord Lilford, Mr. Oldfield Thomas and Major Barrett-Hamilton. All the mammals except the cetaceans, seals and introduced forms, like *Simia sylvanus*, from the Rock of Gibraltar, are entered, and the manner in which the task has been executed is worthy of all praise—in regard to both descriptions and figures. As an instance of modern nomenclature, *Orycto-*

lagus cuniculus would puzzle not a few zoologists. The second treatise is the catalogue of passeriform bird's eggs, by Mr. Ogilvie-Grant, so well known in the department, and it is the fifth volume of the series. Both in text and plates—of which there are twenty-two, all coloured—it is worthy of the reputation of the author. The value of such a work to all ornithologists is sufficiently obvious, and the trustees have to be congratulated on this addition to the series. The third catalogue, that of the Arenicolidae, by Dr. J. H. Ashworth, is really a monograph of the family, containing as it does the results of years of labour by the author on the structure of the group, and admirably illustrated by text-figures and fifteen plates. By his devoted and varied researches on this family and its allies, the author is rightly regarded as one of the chief authorities on the subject, and this task for the trustees of the British Museum still further emphasises that view.

From the narrative of Dr. Günther, and the three works which form the latest additions to the long roll of important publications, it is clear that the great national zoological collection is one of which the country may justly be proud; and a tribute may well, in addition, be paid to the staff, whose courteous aid is ever at the disposal of zoologists of every nation.

W. C. M.

PAUL GORDAN.

THE death of Paul Gordan, which occurred on December 21, has removed a mathematician of pre-eminent rank in his own particular field. When the calculus of invariants and covariants was started it was taken up with great vigour in Germany, and very important developments were effected by Aronhold, Clebsch, and Gordan respectively. Aronhold invented the symbolical method, Clebsch gave brilliant applications of it to geometry, and Gordan, besides collaborating with Clebsch, wrote numerous papers on the purely algebraic part of the theory.

Gordan's best-known, and perhaps greatest, achievement is his proof of the existence of a complete system of concomitants for any given binary form. In its original shape the proof was very laborious and difficult to grasp; even in the simpler form to which he and others reduced it, it is still very hard, and is not, perhaps, the proper and natural demonstration. However that may be, to have given the first strict proof of the theorem is an algebraic feat of the highest order. Gordan also worked out in detail the theory of transvection and "folding," ultimately arriving at formulæ which provide a sort of engine for establishing the syzygies connected with any particular binary form.

Among Gordan's other work may be mentioned his papers on finite groups, and in particular on the simple group of order 168, and its associated curve $y^3z + z^3x + x^3y = 0$. His book on binary forms is very valuable, and easier to read than most of his papers. The joint papers of Gordan and Clebsch are admirable: for instance, the

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memoir on ternary cubics in *Math. Ann.*, vi., should be read by everyone who has mastered the easier parts of invariant-theory.

Gordan was born at Breslau in 1837, ultimately became professor at Erlangen, and was a corresponding member of the Paris Academy of Sciences.

M.

NOTES.

THE President of the Board of Agriculture and Fisheries has just appointed a departmental committee to advise the Board as to the steps which could be taken with advantage for the preservation and development of the inshore fisheries. The committee consists of Sir E. S. Howard, chairman of the Wye Board of Conservators; Sir K. S. Anderson, chairman of the Orient Steam Navigation Company; Sir S. Fay, manager of the Great Central Railway Company; Sir Norval Helme, M.P., a manufacturer; the Hon. T. H. W. Pelham, of the Harbours Department of the Board of Trade; Mr. Norman Craig, M.P.; Mr. W. Brace, a Labour M.P.; Mr. J. W. Beaumont Pease, vice-chairman of Lloyds Bank; Mr. C. Hellyer, a trawl-vessel owner; Mr. S. Bostock; and Mr. Cecil Harmsworth, M.P. Commerce and finance on the great scale are thus well represented, and no doubt the committee will be able to supplement the knowledge of the inshore fisheries which it may not possess by accepting evidence from those who do possess it. The interests of the inshore fishermen are opposed to those of the steam-trawling industry on one hand, and of the salmon fisheries on the other, and this is, no doubt, the reason why the only two fishery members of the committee are a prominent owner of steam fishing vessels and the chairman of a very important board of salmon fisheries. Those who know the highly technical occupations of the inshore fishermen will also know that the whole question of the decadence of these industries must by and by involve a scientific knowledge of the natural conditions under which inshore fishing is carried on. Yet the committee does not contain a scientific man, and it is unlikely that its members can acquire second-hand, from expert evidence, that knowledge of the "inwardness" of technical marine biology which can alone render their advice to the Board of permanent value.

SIR WILLIAM TILDEN, F.R.S., has been elected a corresponding member of the Imperial Academy of Sciences, St. Petersburg.

THE death is announced, at seventy years of age, of Prof. R. Collett, professor of zoology in the University of Christiania.

THE subject selected by Dr. A. J. Jex-Blake for his Goulstonian lectures, to be delivered before the Royal College of Physicians on February 25 and 27 and March 4, is "Death by Lightning and Electric Currents."

THE Mexican Minister has desired the Secretary of State for Foreign Affairs to announce in this country that the Astronomical Society of Mexico has decided, beginning from 1913, to offer a medal and diploma