Sciences Tripos Examination as established in 1893. Regular courses of lectures are given in mathematics, mechanics, principles of mechanism and machine dynamics, strength of materials and theory of structures, heat and heat engines, and applied electricity. Instruction is also given in geometrical and mechanical drawing, and in graphic statics. In the laboratory there are regular courses in mechanics, elasticity, heat, the testing of steam, gas and other heat engines, applied electricity, and hydraulics. In the summer term there are lectures and field-work in surveying. Practice in the use of tools for wood-work and metal-work forms a regular part of the course, and at the same time the workshops, in which a considerable staff is employed, constitute a very useful adjunct to the laboratory.

During the past few years research has been taking a more and more prominent place in the work of the department, and with the larger space and special rooms now available further development in this direction may be looked for. At present a number of research students are at work in the elasticity, the electrical, and the steam laboratories. Evidence of the value of this work may be found in the current volume of the Royal Society's *Transactions*, where two papers, one, by Prof. Ewing and Mr. Rosenhain, on "The Microscopic Structure of Metals" (the Bakerian Lecture), the other, by Mr. J. Muir, on "The Recovery of Metals from Overstrain," deal with work which has been entirely carried on in the department.

The University grants an annual sum of between 1200*l.* and 1300*l.*, from which are paid the salaries of the Professor and the two University Demonstrators (1000*l.* in all), part of the wages of the workshop staff, and some other expenses. From the students' fees, which form the main source of revenue, are paid the salaries of four or five assistant demonstrators and lecturers, as well as the greater part of the wages of the workmen and laboratory attendants.

Many valuable gifts of apparatus have been made to the department during the past six years, and many pieces of heavy machinery have been supplied by engineering firms on specially favourable terms. A high speed compound combined engine and dynamo set, on which regular tests are made, was presented by Messrs. Mather and Platt in 1894. Recently a coupled set of two dynamos arranged for the Hopkinson test has been given by Messrs. Siemens Brothers and Company, and a gas engine of about ten horse-power by the Forward Engineering Company of Birmingham. A very valuable microscope, specially designed for the microscopic study of metals, was lately presented by Mr. Thomas Andrews, F.R.S. Among other recent additions are a five-ton testing machine by Messrs. Buckton and Co., presented by past and present pupils; and a set, comprising turbine, motor and pump, supplied by Messrs. Mather and Platt. Towards the further equipment of the laboratory a sum of 1200*l.* has recently been subscribed, and there is now on order from Messrs. Robey and Co. a compound horizontal engine of about fifty horse-power, specially arranged for testing purposes. This will form a very useful addition to the steam laboratory.

There can be no doubt that the Engineering Department has established for itself, under Prof. Ewing, a firm foothold among the scientific schools of the University. At the same time, if it is to take, as it may reasonably aspire to do, a foremost place among British Schools of Engineering, it must look to provide a wider curriculum. The laboratories necessary for the proper teaching of such subjects as mining, metallurgy and naval architecture, as well as for keeping abreast of the latest developments of the subjects already represented, cannot be founded or maintained without an endowment of an amount far exceeding the sums already so generously contributed.

While it is admitted that the establishment of the department was looked upon by some with misgiving, as an encroachment on the more purely academic studies of the University, it is certainly true now, as the Vice-Chancellor said on Friday last, that the great majority of resident members welcome the establishment of the department, and rejoice in its flourishing and successful state; and it is also true that the growth of this cordial recognition is due in no small degree to the support which has been so freely given by the engineering world outside the University. This view of the matter is supported by the *Times* when it says, in reviewing the inauguration we have just described, that "it is pleasant to see one of our old Universities, while remaining faithful to all the traditions of its venerable past, at the same time displaying an intelligent appreciation of the wants of the future, and affording to the most modern forms of learning the nurture and support which for many centuries it has afforded to those forms with which alone our forefathers were familiar."

THE NATURAL HISTORY OF THE SHORES OF BARENTS SEA.[1]

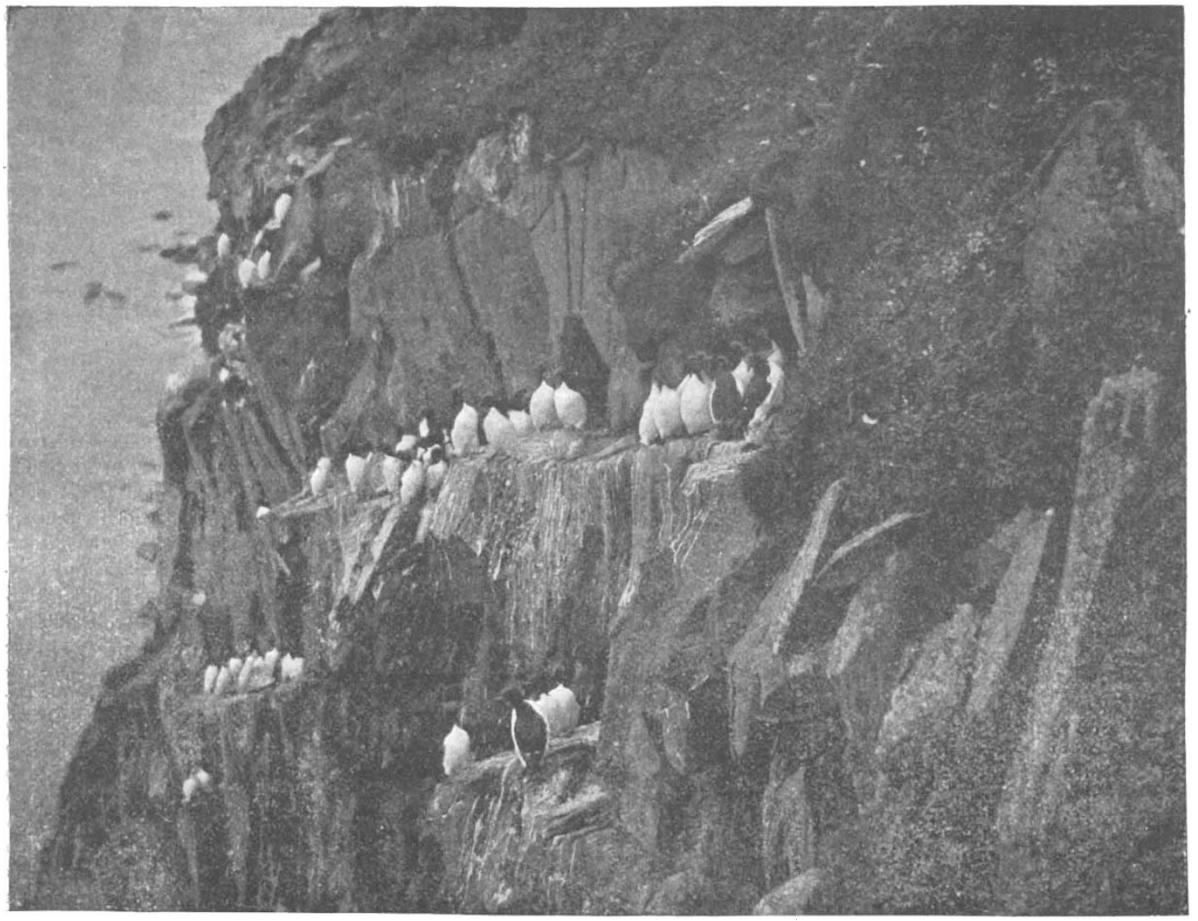
IN the summer of 1895 Mr. H. J. Pearson and a party of fellow naturalists visited the Barents Sea to study the birds that nest upon its shores. The party landed on Kolguev and Novaya Zemlya, and at one of the promontories on the Murman Coast. Many interesting observations were made on the natural history of the region, but work was hampered by the small size and limited coal capacity of their yacht, the *Saxon*. Two years later Mr. Pearson returned in a larger and more powerful vessel. The main object of the second journey was the investigation of the avifauna of the coastlands of north-eastern Russia, between the Pechora and the Urals, an area which the author describes as "ornithologically unknown." In the summer this country is accessible only from the sea, owing to the vast extent of flood and swamp. Mr. Pearson accordingly chartered the *Laura*, and, accompanied by Colonel Feilden and Mr. F. Curtis, left Tromso for the Pechora coastlands in June, 1897. The scheme was to land near the mouth of the Karataikha River. But the *Laura* could not approach nearer than twenty miles from the mouth of the river, and it was not considered safe to leave the steamer in the open bay for eight hours while the entrance was reconnoitred in the launch. Mr. Pearson was therefore reluctantly compelled "to abandon the chief object of the expedition as impracticable from the sea." The steamer was turned northward, and the rest of the season was spent in visits to Dolgoi Island, "Waigatch" and Novaya Zemlya.

"Beyond Pechora Northward" would therefore have been a more accurate title for the book, as except at the port of Habarova, the expedition did not alight on the mainland east of the Pechora. But in the islands of the Barents Sea, Mr. Pearson and his colleagues did excellent work, some of the results of which have been published in the *Ibis* and the *Journal* of the Geological Society. Mr. Pearson's book gives a detailed narrative of the two cruises, with appendices on the botanical and geological results by Colonel Feilden, Prof. Bonney and Messrs. E. T. Newton and A. C. Seward. It is no disparagement of Mr. Pearson's work to say that the appendices contain the greater amount of new information, as this is one of the indications of the more advanced state of ornithological knowledge. Owing to the wide range of the Palæarctic fauna, the discovery of new birds was not to be expected. There was even

[1] "Beyond Petsora Eastward: Two Summer Voyages to Novaya Zemlya and the Islands of Barents Sea." By H. J. Pearson. With Appendices on the Botany and Geology by Colonel H. W. Feilden. Pp. xiv + 335. (London: R. H. Porter, 1899.)

little scope for collecting hitherto unknown eggs, as Mr. Popham had in the same season already found the nest of the curlew sandpiper, thus, according to Mr. Pearson, gaining the "blue ribbon of the oological world." The main zoological object was the observation of new facts relating to the habits and nesting plumage of the birds that breed round the Barents Sea. The results are illustrated by a valuable series of photographs, including those of nests of the dotterel, red-throated diver, little stint, peregrine falcon and purple sandpiper, and the young of the rough-legged buzzard. The first young Bewick swans brought to England were collected during the expedition, which also obtained many eggs of the little stint. The finding of the first nest of this bird on shore from a steamer do not offer much opportunity for their study.

The same conditions have limited Colonel Feilden's work on botany and geology. An extensive series of plants was collected, enabling Mr. Burkill to make some collections and additions to the floral lists of this region. The physiological problems of the Arctic flora, such as those discussed in Ekstam's paper on the flora of Novaya Zemlya, require careful study on a small area, rather than rapid collecting during a lengthy cruise. Geological progress in this region also now requires continuous work on shore. The general outlines have been long well known. Thus, the mapping of the eastern side of Dolgaya Bay, where Colonel Feilden corrects the Russian



Brünnich's Guillemots. (Nameless Bay.)

Mr. Pearson describes as one of those "few joyful moments that stand out clear and sharp in the memory, and will never be forgotten while life lasts." The largest egg collection made was of Brünnich's guillemot; 440 specimens were obtained from one small cliff. The series showed extreme colour-variation, and as the birds were feeding on the same food and the eggs were laid under identical conditions, Mr. Pearson thinks that "it is scarcely possible these abnormal variations can serve any useful purpose." He commends this problem to other naturalists, as "this subject of the coloration of eggs is truly one of which we may be said to know nothing yet." Unfortunately no material contribution to such problems is made in this book, as short dashes

Index Map (1892), was correctly represented in Keyserling's map of 1846. Rapid reconnaissances from the sea cannot now yield such important results as zonal collecting in the palæozoic rocks, accurate mapping of small areas of the Archæan series, and careful analyses of the glacial gravels. The only point in the book open to serious criticism is the lack of system in the spelling of the proper names. As so much of the literature on this region is in Russian, it is a pity to add uncertainty regarding names to the existing difficulties. Some words, such as Habarova, are rendered phonetically; others, such as Waïgatch (Pearson) or Waigats (Feilden) may be concessions to convention; but others, such as Petsora and Matyushin, appear inexplicable. The two authors

use different renderings of the same name, and one at least of them has no consistent system. Thus, one island appears as Meshdoshapsk in the map and text, and as Meshdusharsky in the appendix; the name of a well-known Russian geologist appears as Chernysheff and Tscherneyschew (p. 288); the letters, which are translitered (p. 266) as "aya" in the case of Novaya, are abridged to "a" in the name Dolgaya, which therefore appears as Dolga. Belootchia and Belushja are no doubt renderings of the same word. But nomenclature is after all a matter of detail, and Mr. Pearson and Colonel Feilden are to be congratulated on a valuable contribution to the natural history of one of the least known regions of Europe. J. W. G.

INTERNATIONAL COMMITTEE OF WEIGHTS AND MEASURES.[1]

THE International Committee of Weights and Measures at Paris issue from time to time "Travaux et Mémoires" with reference to the investigations and comparisons undertaken at their Bureau during certain periods. Ten such volumes have been published since 1881—Tome i. to Tome xi.—and during last year a further volume, Tome ix., was distributed. This latter volume contains the final account by Dr. J. René Benoit and Dr. Max Thiesen of the comparisons made at the Bureau of forty standard kilograms, "Prototypes nationaux" with the "Prototype International K," which is kept at the Bureau. These national standard kilograms have long since been forwarded by the Committee to the several High Contracting States who (including Great Britain) have joined the Metric Convention of 1875; and the introductory account of the comparisons of these standards was given in Tome viii. (1893), the final account having only now been issued, although it deals with comparisons made so far back as 1884.

The unit of mass of the kilogram is determined by a solid piece of metal, iridio-platinum, in the form of a cylinder (of the height and diameter of 30 millimetres), and the comparisons of the forty cylinders included weighings in air and in water; the numerous observations made by Dr. Thiesen being stated in detail in Tome ix., the observations and reductions of the hydrostatic weighings alone occupying 229 pages of this large volume. The balances used were made by M. Bunge, of Hamburg (1879), and more recently by Messrs. A. Ruprecht and H. Schoss, of Vienna. Of the Bunge Balance an illustrated description is given in Tome ix., and of the original Ruprecht Balance in Tome i. of "Le Travaux et Mémoires." The balances were so designed that any two kilograms under comparison could be automatically interchanged from one side of the balance to the other without disturbing the balance-case, and any minute weights could be added to either pan by the observer without approaching the case. The results appear to have been highly satisfactory, the probable error of a final comparison of two kilograms not exceeding 0·002 mg. Such comparisons are inexhaustible, and therefore it is not surprising to find that no two of the kilograms were found to be absolutely alike.

The final density of the standard kilogram, No. 18, forwarded to Great Britain, appears to have been 21·5454, corresponding to a volume 0° C of 46·414 millilitres. The actual difference of No. 18 from the true kilogram was found to be:—No. 18 = K+0·070 mg.

By the Weights and Measures (Metric System) Act, 1897, it is provided that "No. 18" is to be the legal standard of this country, from which all other metric weights and all measures having reference to weight are ascertained; and its precise equivalent in terms of the pound avoirdupois has been found to be 2·20462234 lb., or the pound equals 0·45359243 kg.

The investigations of this Bureau as to modes of weighing and methods of reduction, have attracted the attention of all engaged in exact metrological inquiry, the results of the investigations being referred to in modern text-books on physical science; and in the present volume the several corrections and reductions found to be necessary in the precise weighings made by Dr. Thiesen during the years 1884-8 are fully stated in his excellent account.

[1] "Travaux et Mémoires du Bureau International des poids et mesures." (Paris, 1898.)

NOTES.

THE poll for the election of a Parliamentary representative of the University of London, in succession to Sir John Lubbock, opened on Tuesday morning, and will close on Saturday. The result will be declared at the University on Monday next, at noon. On Tuesday evening the number of votes recorded for each of the candidates was officially declared to be: Sir Michael Foster 255, Dr. Collins 156, and Mr. Busk 119, and we trust that when the poll is declared next Monday the numbers will be of the same relative order of magnitude. Graduates of a University which promises to become in the near future an even more powerful means of promoting scientific interests and encouraging intellectual activities than it has been in the past, should see for themselves that the return of any other candidate than Sir Michael Foster would be disastrous. It is unfortunate that sharp electioneering practice induced a number of the graduates to give their names as supporters of Mr. Busk and Dr. Collins before Sir Michael Foster entered the lists; but if they have the courage of their convictions they will seriously consider whether a promise made without a knowledge of the candidates who would contest the seat should not be withdrawn. Petty differences of opinion and individual grievances ought to be put on one side upon an occasion like the present, and the electors should vote for the candidate who would have the greatest influence upon the advancement of the University as a whole.

SOME weeks ago we expressed surprise that the Highland Agricultural Society of Scotland had not contributed towards the cost of Prof. Ewart's experiments on telegony and other subjects of special interest to breeders. From a contemporary we learn that the Society last week voted 200*l.* in aid of the very costly investigations, and that the former chairman (Sir John Gilmour), in a letter urging the secretary to make a grant, stated that he intended sending a donation of 50*l.*, and expressed the hope that others would follow his example. As there was some danger of the work collapsing for want of funds, this is altogether satisfactory. Though science in the past, to the great loss of the nation, has too often been systematically ignored, better times may be coming, for the new century may bring with it a higher appreciation of scientific methods, and thus keep us abreast with the spirit of the age.

IN his lecture at the Royal Institution on Friday last, Mr. Marconi made a statement as to the use of his system of wireless telegraphy in connection with the war. He is reported by the *Times* to have said that six of his assistants have been sent out to South Africa. The War Office intended that the wireless telegraph should only be used at the base and on the railways; but the officers on the spot, realising it could only be of practical use at the front, asked if the assistants were willing to go to the front, and accordingly on December 11 they moved up to De Aar. The results at first were not altogether satisfactory, owing to the want of poles, kites, or balloons, which are needed to elevate the vertical wires; but the difficulty was overcome by the manufacture of kites, in which work Major Baden-Powell and Captain Kennedy, R.E., took part. It has been