

and replacing the hoop when he had passed through. On returning from his ride the gate was still shut, when, to his surprise, his horse, without any hesitation, took the hoop in his mouth and tried to lift it off the gate. He, however, was not successful in his efforts, and Mr. Chamberlayne had to finish the operation for him, but the exhibition of memory was certainly remarkable.

Mr. T. B. Groves, of Weymouth, sends the following account given to him by a relative, a gentleman well known in the district, and who would be everywhere accepted as a trustworthy and competent observer:—

In the wine-cellar two vessels, one an open earthen jar containing hazel-nuts, the other a wooden sieve, tub, or something of the kind, full of wine-corks, stood side by side. It was observed that the nuts were gradually diminishing, owing to the depredations of mice; but after a time this seemed to have altogether ceased, and it was inferred that the difficulty of egress had caused the mice to abandon the enterprise as soon as the level of the nuts had reached a certain depth from the mouth of the jar. Matters so remained for some little time; but afterwards, on visiting the cellar, it was found, to the owner's great surprise, that his nuts had now entirely disappeared, and in their place were discovered the corks! The only explanation that could be suggested was this: that the mice, reflecting on the difficulty of making their exit from the partially-emptied jar, had conceived and carried out the plan of providing for their escape by dropping into the jar from time to time sufficient corks to enable them to make a safe retreat with their plunder.

Mr. R. Howson sends us the story of a terrier-like dog of no particular breed, named Uglymug, who had a poodle for companion. Whenever Uglymug saw signs of a family meal being laid out, he inveigled the poodle into a labyrinthine shrubbery under pretence of seeking for rats, and when the latter was fairly intent on its game, Uglymug sneaked back to enjoy all by himself what he could get from the family table.

V. I. writes:—The following instance will show that in the case of the mule intelligence has a limit. We had a mule who could take the staple out of a gate and open it (he never shut it). This mule used to go to the water-but, turn the brass tap, and drink, but never turned the water off. Common sense would have forbidden a human being neglecting such a precaution.

MR. E. PARFITT, of the Devon and Exeter Institution, writes of a favourite cat:—She would frequently come and sit near the door opening into the library of the institution. The door only divides my house from the library; puss would place herself here mostly at dinner-time, and, as I am informed, not before; she would wait here until she heard my footsteps down the library; she would then proceed directly to the kitchen, and inform the servant, either by mewing or looking up into her face. She would then come to me and tell me in her way that she had ordered dinner. I have seen her scores of times trotting along the passage to the kitchen, when I have opened the library door, to inform the servant that I was coming. How Topsy ascertained the time to proceed to the door I do not know, except that she saw that dinner was preparing; but how did she know the time it would be ready and the time that I was expected to come in?

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

THE Association for promoting the Higher Education of Women in Oxford is to open two halls in Oxford in October for the reception of lady students. One of these is to be an "Academical house on the principles of the Church of England," and in the other, "Somerville Hall" (after Mrs. Somerville), care will be taken that members of different religious denominations are placed on the same footing. The charges in the latter will be considerably lower than in the former.

TWO Combe Exhibitions of 35 $\frac{1}{2}$ each will be open for competition in May next at Trinity College, Oxford. Candidates will be at liberty to offer classics, mathematics, chemistry, and physics, a period of history, or any two or more of these branches of study. There is no fixed limit of age. The examination, which will be combined with the ordinary Matriculation examination, will commence on Tuesday, May 20, at 9 A.M. Names, with

subjects offered and testimonials of good conduct, to be sent to the president not later than May 12.

THE Astronomer-Royal continues to give evidence of his intense desire for the promotion of sound mathematical training, and has published to the Cambridge Senate his views as to the papers set in the Smith's Prize examinations of recent years, classifying the questions set, and showing that several subjects, more valuable, in his opinion, to men of science and to students, than all the others together, have had no questions set upon them. Among these are attractions, higher dynamics, perturbations, figure of the earth, thermodynamics, waves and tides, sound, physical optics, &c. He says very pertinently: "The use of an examination is to test the power of a candidate to command the application of mathematics when required. The use of publication of examination is to guide students in the subjects recommended for their study. The guidance which too many of these subjects intimate is this: that clever and abstruse algebra, without any reference to its benefit as an application of a tool to other purposes, is the *summum bonum*." He believes this guidance is against the instincts of many residents at Cambridge and the desires of undergraduates.

PROGRESS is evident at Cambridge in response to the memorial we recently referred to against the compulsory study of Greek by all undergraduates. Very few votes prevented reform years ago; no doubt the claims of science students and of liberty for all will now be more fairly listened to. The syndicate on the subject includes Dr. Humphry, Professors Liveing and James Stuart, and Mr. Todhunter, and thus the real interests of mathematics, physics, biology, and medicine, as regards the education of students, as well as the progress of science, will be sure of recognition.

THE examiners in the Cambridge natural sciences tripos this year are Dr. Humphry, Prof. Bonney, Mr. J. F. Walker, (Lecturer on Chemistry at Sidney Sussex College), and Mr. Yule, of Magdalen, Oxford, the foregoing being re-appointments, and Prof. Liveing, the Rev. J. W. Hicks (University Demonstrator of Chemistry, and Lecturer on Botany at Sidney Sussex College), Mr. W. Garnett, Demonstrator of Experimental Physics, and Mr. F. M. Balfour; the latter three are fresh nominations.

In the last Cambridge Local Examinations (December, 1878), among 626 senior boys there were 92 candidates for the chemistry paper and 44 for practical chemistry; of 997 senior girls, 29 took the paper and only 4 the practical examination; 21 boys and no girls entered for experimental statics and dynamics, &c., 38 boys and 24 girls for heat, 30 boys and 4 girls for electricity. The result is that only 3 boys, 2 from the Liverpool Institute and 1 from Newton College, Devon, obtained the mark of distinction in the section "natural philosophy," in which all these subjects are included; and no girls. It should be added that a pass may be attained on two of these subjects, and only three in all may be taken by any candidate. Is it possible to show more strongly the lack of attention to and interest in the elementary forces of nature in English schools and by English parents? These are boys and girls between sixteen and eighteen years of age, most of them supposed to be ready, or almost ready, to leave school and take part in the battle of life. Among 3,329 junior boys and 1,483 junior girls, 423 boys and 13 girls took the chemistry paper, 169 boys and 1 girl the practical chemistry, 76 boys and no girls statics, &c., 178 boys and 12 girls heat. Seven boys, the majority from Liverpool College, and no girls, obtained distinction. We do not become further consoled by finding that 15 senior boys and 79 senior girls took zoology, 11 boys and 177 girls botany, 24 boys and 150 girls geology; for girls have no more right to a scientific training than boys. Most likely, however, boys and their teachers will seek to know more of the life and the past history of the globe when they find that girls can really hold their own in and enjoy these studies, and look with amazement on men for being so unwilling to learn or teach them. Among the juniors, 75 boys and 148 girls took zoology, 45 boys and 238 girls botany. These numbers, however, represent no great attainments as yet, for the standard of passing is very low; severity would only kill the tender growth. But evidently there is in secondary schools little belief in the educative and attractive power of the study of nature. Why is it not considered that *mathematicians* are fostered by neglect and hindrance? It appears to be thought capital training to produce physicists and naturalists. Really, conservatism and unwillingness to take a little trouble are the enemies.

A REVISED schedule of subjects in natural science for the ordinary B.A. degree at Cambridge has just been issued. This is for the third or final examination, and a pass in one subject is sufficient to give a degree. Is it supposed at Cambridge that a year is to be fully employed in dealing with botany in an elementary manner? The schedule says the questions (all elementary) will include the description and classification of plants; the form, structure, and development of stem, root, leaf, flower, and fruit; inflorescence, cross-fertilisation, germination, and nutrition. Twenty-one "natural orders" are specified for special attention, including one cryptogamic group, Filices. This seems a vague syllabus, not likely to encourage the study of botany. How much and how little knowledge of physiology and histology will satisfy such terms as "nutrition," "structure"? No doubt the present is better than the old in omitting to insist on technical terms, some of them antiquated. But cannot more definite requirements be suggested for ensuring some practical insight into vegetable life on the part of the man who is to be stamped as an elementary botanist? Surely the best way is to let the knowledge be good, and sound, and practical, as far as it goes, giving some training in scientific method, and capable of further development in after life. We believe many would welcome a change giving the ordinary B.A. for a lower standard of attainment in the first part of the natural science tripos, thus doing away with the recognition of *dilettante* work in a single subject as a sufficient basis for a B.A. degree. A very satisfactory schedule is presented for zoology, requiring a knowledge of the anatomy of certain selected principal types, as well as the characters of orders, and the comparative anatomy and functions of the systems and organs as exemplified in the animal kingdom. Further, the general development of the embryo chick, the leading facts and conclusions respecting the geographical distribution of animals are included in the subjects. The schedule is to be discussed next Saturday.

THE Cambridge Council of the Senate has framed a draft statute to carry out the grace passed in December last in favour of the appointment of a general Board of Studies, representative in character, to report upon the proposals of each special board of studies as they arise, and so aid in holding the balance among the various interests concerned. The draft statute provides that the new Board shall consist partly of persons appointed on the nomination of the Boards of Studies, but abundant freedom is left to the senate to add other members and to vary from time to time the composition, mode of appointment, and duties of the new board.

AT the next meeting of the Governors of Addenbrooke's Hospital Mr. J. W. Cooper will propose: That a memorial be presented to Her Majesty's Commissioners for the University of Cambridge, under the seal of the Governors, representing that Addenbrooke's Hospital is extensively used as a place of study by the Medical Students of the University; that it is essential in the interests of the Medical School that it should not cease to be a recognised place of medical study; and, further, that as large endowments have been left to various colleges for the promotion of medical study, some adequate endowment should be made for Addenbrooke's Hospital out of the funds at the disposal of the Commissioners. There cannot be much chance of success for such a proposal unless it be made more definite. The hospital can only properly benefit by educational endowments by being the locus of the study and appliances of research in therapeutics, sanitation, and pathology.

GEOLOGICAL students at Cambridge will have plenty of work provided for next term. Prof. Hughes will give one course on the geology of the neighbourhood of Cambridge, and another stratigraphical course, beginning with the Permian, and ascending. Prof. Bonney will continue his lectures on elementary physiography, and will give weekly demonstrations on microscopic lithology. Mr. Tawney will be demonstrating the principal genera of fossil invertebrata; and both he and Dr. R. D. Roberts will give practical instruction in petrology. Lectures begin April 25. The first geological excursion of the term is fixed for Saturday, May 3.

MR. THOMAS W. BRIDGE, B.A., of Trinity College, Cambridge, and Demonstrator of Comparative Anatomy in the University of Cambridge, has been appointed to the Professorship of Zoology at the Royal College of Science at Dublin, vacant by the resignation of Dr. Leith Adams, F.R.S.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, March 13.—"The Contact Theory of Voltaic Action," No. III. By Professors W. E. Ayrton and John Perry. Communicated by Dr. C. W. Siemens, F.R.S.

The authors commence by referring to the experiments that had been made prior to 1876, on the difference of potentials of a solid in contact with a liquid, and of two liquids in contact with one another, and they point out that:—

1. The earlier experiments were not carried out with apparatus susceptible of giving accurate results.

2. Owing to the incompleteness of the apparatus assumptions had to be made not justified by the experiments.

3. No direct experiments had been performed to determine the difference of potential of two liquids in contact, with the exception of a few by Kohlrausch, using a method which appeared to the authors quite inadmissible as regards accuracy of result.

In consequence of this great vagueness existed as to whether the contact difference of potentials between two substances, when one or both were liquids, was a constant depending only on the substances and the temperature, or whether it was a variable dependent upon what other substance was in contact with either. Some authorities regarded it as a variable, Gerland considered he had proved it to be a constant, but first, the agreement of the value of the electromotive force of each of his cells with the algebraical sum of the separate differences of potential at the various surfaces of separation, and which was the test of the accuracy of his theory, was so striking, and so much greater than polarisation, &c., usually allows one to obtain in experiments of such delicacy, that one could not help feeling doubtful regarding his conclusions; secondly, his apparatus did not allow of his experimenting with two liquids in contact, consequently he could not legitimately draw any conclusion in this latter case. And although Kohlrausch had made some few experiments on the difference of potentials of liquids in contact, still since he employed moist blotting-paper surfaces instead of the surfaces of the liquids themselves, the authors considered for that reason alone, if for no other, that his results did not carry the conviction the distinguished position of the experimenter might have led them to anticipate.

They therefore designed a method and an apparatus for carrying it out, by means of which they could measure the difference of potentials, in volts, at each separate contact of dissimilar substances in the ordinary galvanic cells, from which they could ascertain whether the algebraical sum of all the contact differences of potential was, or was not, equal to the electromotive force of the particular cell in question. From the results they obtained, and which are given in Papers Nos. I. and II., *Proc. Roy. Soc.*, No. 186, 1878, they concluded within the limits of their experiments that if \overline{AB} , \overline{BC} , \overline{CD} , &c., were the contact differences of potential measured separately of the substances A in contact with B , and neither in contact with any other conductor, B in contact with C , &c., then, any one or more of the substances being solid or liquid, if any number A, B, C, \dots, K were joined together, and the electromotive force of the combination \overline{AK} , measured, the following equation was found true:—

$$\overline{AK} = \overline{AB} + \overline{BC} + \overline{CD} + \dots + \overline{JK},$$

which proved that each surface of separation produced its effect independently of any other.

Their method, by which any single contact difference of potentials was measured, was as follows:—Let 3 and 4 be two insulated gilt brass plates connected with the electrodes of a delicate quadrant electrometer. Let 1 under 3, and 2 under 4 be the surfaces whose contact difference of potential is to be measured; 3 and 4 are first connected together and then insulated, but remain connected with their respective electrometer quadrants. Now 1 and 2 are made to change places with one another, 1 being now under 4 and 2 under 3, then the deflection of the electrometer needle will give a measure of the difference of potentials between 1 and 2.

The apparatus employed by the authors in the present investigation is then explained in detail, and it is shown how, by improving on their earlier form, they have removed a difficulty which formerly existed, and which prevented their previously experimenting on pairs of substances having very different weights, such as a vessel of mercury and a sheet of metal.

The authors explain that the results they have obtained in this investigation have divided themselves into three groups:—