made, it seems to possess a few admirable workers, who possess energy, knowledge, and earnestness enough to keep any such society from collapsing. The Botanical list is a model one. The papers in the Report are,—“Heraldry,” by Mr. F. E. Hulme, F.L.S.; “On the Perception of the Unseen,” by Mr. G. F. Rodwell; “A Walk across the Karst,” by the Rev. J. Sowerby; and “The Luschari (Heilige) Berg in Carinthia,” by the same gentleman.

LETTERS TO THE EDITOR

[The Editor does not hold himself responsible for opinions expressed by his correspondents. No notice is taken of anonymous communications.]

Prof. Agassiz

THE sad intelligence received in London this morning of the death of Prof. Agassiz adds another illustrious name to the long roll of victims to the insidious demon, “over-work.” May I ask you to give room in your next issue to the following passage from a letter (probably one of the last he penned) received from Prof. Agassiz only last week, which may be interesting to his many sorrowing friends on this side the Atlantic, as attesting indirectly to the cause of his death, viz., excess of mental and physical exertion.

P. DE M. GREY EGERTON

Athenæum Club, Dec. 16

“Museum of Comparative Zoology,

“Cambridge, Mass., Nov. 26, 1873

“A feeling of despondency comes over me when I see how long a time has elapsed since I received your last letter, which at the time I meant to answer immediately. With returning health, I have found the most frightful amount of neglected work to bring up to date, with the addition of a new institution to organise. I have given myself up to the task with all the energy of which I am capable, and have made a splendid success of the Anderson School, which cannot fail henceforth to have a powerful influence upon the progress of Science in the United States. But this has driven out everything else, and I should have neglected even the Museum had not a constant appeal to my attention arisen from the close connection in which the Anderson School stands to the Museum, of which it is, as it were, the educational branch. So School and Museum have made gigantic strides side by side; but I am down again. At least I feel unable to exert myself as usual, and such a feeling in the beginning of the working season is disheartening. When I last wrote I had strong hopes of an easy summer with my family, and confidently expected to be able to pass the greater part of the winter in Europe, and to have prepared the volume on Selachians of the ‘Poissons Fossiles’ for a new edition, or rather an English work on the subject. Now that hope is gone; the immense accessions to our Museum make even the progress of the Coal Fishes from Iowa slow and almost hopeless. With 22 assistants and 14 sub-assistants in the Museum, I have my hands full with administrative duties and responsibilities, and science and friends suffer.

“Ever truly your friend,

“(Signed) L. AGASSIZ”

Experiments on Frogs

WILL you grant me the space in your journal for a few words called forth by Mr. Lewes's letter in your number of December 4, on “Sensation in the Spinal Cord”?

In that letter the writer describes some experiments on frogs of such excessive cruelty that I cannot refrain from entering a protest against the principle which justifies such actions.

The right to perform such actions as vivisection, &c., in the cause of Science, has often before been questioned; but the present case—a case in which the infliction of pain is not an unavoidable attendant on the experiments, but the very essence or

object of them, and the slowness and prolongation of agony a necessary part—stirs and revolts the whole mind, and brings the question again prominently to the front.

The question then is—are either the possible or probable benefits to a portion of mankind, or the advancement of Science for its own sake, sufficient reasons for the infliction of intense suffering on our fellow-animals? Of course much may be urged in favour of vivisection. It may be said that without its assistance Science, and especially the science of medicine, could never have advanced to the point it has now reached; and mankind urges that the good of mankind is of such paramount importance that that of all other animals must be subordinated to it unconditionally, and consequently that the smallest good to mankind balances the greatest evil to other animals.

To many this would be considered an amply sufficient reason for answering the question in the affirmative, but at least it should be remembered at what tremendous cost to one portion of creation these benefits to another portion are purchased.

As time and Science advance it is becoming more recognised that other animals have their rights as well as men; and perhaps it may some day be found that the right which mankind assumes to himself of supremacy over his fellow-animals (including the right to inflict deliberate torture, for whatever purpose) is, after all, but the right of the strongest or most powerful.

It seems to me so shocking that such things should be written of and read with indifference, and without evoking one word of protest on the other side, that on this ground alone, *i.e.*, that the assumption of the right to inflict torture may not pass quite unchallenged, I venture to beg for the insertion of this letter.

Dec. 8

X.

Proposed Alterations in the Medical Curriculum

IN a recent number of NATURE, remarks are made in regard to the present Medical Curriculum, more especially in connection with the proposal of Prof. Huxley to alter the Curriculum for medical graduation in the University of Aberdeen. His object is to remove the subjects of Botany and Natural History from that Curriculum, and to put them in the category of a preliminary examination, without any compulsory attendance upon lectures. Such a proposal if carried into effect would tend in no small degree to limit the medical student's acquirements in the biological sciences, as he will not be required to take full scientific courses on these subjects. The tendency of such a system will be to encourage what is commonly called “cram,” inasmuch as there will be no guarantee for methodical practical instruction under a qualified teacher.

While it may be true that those who take the diplomas of the medical corporations are not called upon to attend courses of lectures on these subjects, and rarely undergo an examination on them, the case is quite different with those students who aspire to university degrees. The latter look not merely for a license to practise, but desire also a university honour. An important distinction at the present day, between the licentiates of colleges and the graduates of universities, is that the latter are expected to have a higher literary and scientific knowledge. In place of reducing the qualifications for degrees, so as to compete with colleges, we ought to keep up the standard, and send forth medical men who are not only well fitted for the practical duties of the profession, but who can also occupy a prominent position in the scientific world. In accomplishing this object we should arrange the curriculum in such a way as to put the study of the sciences in its proper place. The student ought to commence the study of botany and natural history in summer, before entering upon anatomy, surgery, and other purely medical subjects. This is now to a large extent carried out in the University of Edinburgh, and by so doing a three months' course of scientific study is added to the curriculum. The student might be encouraged to take his science examination at an early period of his curriculum, say at the end of his first year of study. The training which these studies give to the mind of the young medical student, is most important. They call forth his powers of observation and diagnosis; they present to him the principles of classification, and they enlarge his views of anatomy and physiology. In primary schools of the present day we frequently find that the elements of botany and zoology constitute a part of the teaching, and most properly so. But this is not enough for the graduate in medicine. He must supplement this by going through the higher University Curriculum.

The commissioners for visiting the Universities of Scotland, remark in their report "that it is desirable that graduates in medicine should have that degree of literary and scientific attainment which will prevent them when mingling as they must do with mankind, in the exercise of their profession, from being looked upon with contempt; or from committing errors in conversation and in writing, for which others would be despised; because even upon the supposition that they have high professional acquisitions, the law of association will operate, and the conclusion will be drawn that much confidence cannot be placed in them." The value of university training was strongly insisted on by the late Prof. Edward Forbes, when speaking of the relation which scientific studies bear to medicine. The following are his remarks:—"It is the training of the mind in correct methods of observation that gives the Natural History Sciences so much value as instruments for preparation in professional education. Not unfrequently do we hear the short-sighted and narrow-minded ask—what is the use of zoology or botany or geology to the physician and surgeon? what have they to do with beasts or plants or stones? Is not their work among men healing the sick? Of what use save as remedies, are the creeping things, or the grass that grows upon the earth, or the minerals in the rock? Vain and stupid questions all—yet they are sometimes put by persons who profess to promote the spread of education. They want something, but the best of them mistake the end for the means. The best want knowledge, but have not learnt that the mind must be trained ere it is prepared to gather and digest knowledge. They want science, but science turns mouldy and unwholesome in our unprepared mind. They forget or do not know that education consists chiefly in training, not in informing."

"We must counteract the natural tendency of purely professional studies—the tendency to limit the range of mental vision. We can do this most beneficially through the collateral sciences, which are sufficiently different to give them a wider sphere of action. It is from this point of view that we should regard the natural history sciences as branches of medical education. For my part," continues Forbes, "after much intercourse with medical men who had studied at many seats of professional education, some collegiate, some exclusively professional, I have no hesitation in saying that, as a rule, the former had the intellectual advantage. There are noble and notable exceptions old and young, but the rule is true in the main. The man who has studied at a seat of learning, university or college, has a wider range of sympathies, a more philosophical tone of mind and a higher estimate of the objects of intellectual ambition, than his fellow-practitioner who, from his youth upwards, has concentrated his thoughts upon the contracted professional subjects of an hospital school. I will not believe that the practitioner of medicine, any more than the clergyman, or the lawyer, or the soldier or merchant, is wiser, or better able to treat the offices of his calling, because his mind takes no note of subjects beyond the range of his professional pursuit. It is a great pleasure, both to patient and neighbourhood, to find in our doctor an enlightened friend, one who, whilst he does his duty ably and kindly, has a sympathy and an acquaintance with science, literature, and art."

In Scotland a university is not merely a board authorised to examine students and grant degrees, it is an educational institution, intended to exercise a surveillance over the studies of youth, to train their minds for the proper acquisition of knowledge, and to direct their energies in such a way as to insure that mental culture which will fit them for all the duties of life. We speak of our University in Scotland as our *Alma Mater* because she acts the part of a mother to her *alumni*, educating them and superintending their progress in liberal studies.

It appears to me that a great injury would be inflicted on the character of our medical degrees if the required curriculum did not embrace the natural sciences. To study these properly something more than books is required. There must be practical training under an able teacher, examination of living objects both with the naked eye and with the microscope, and a certified course of study. I am sure that everyone, in Scotland at all events, who desires to make graduation in medicine a University honour will aid in keeping up a scientific curriculum under qualified teachers.

Edinburgh University

JOHN H. BALFOUR

Ancient Egyptian Balances

I HAVE to thank Mr. Rodwell for calling my attention, in *NATURE*, vol. ix. p. 8, to the curious representation of an

equal-armed Egyptian balance in a papyrus, now in the British Museum. This papyrus, which is perhaps the most beautiful in the whole collection, all the colours and lines being as bright and distinct as when originally painted, has been shown to me by Dr. Birch, who also informed me where I could procure a photograph of it, being one of a series of photographs from the collection at the British Museum, taken by S. Thompson, and published by Mansell and Co., 2, Percy Street. By Mr. Mansell's permission the following drawing has been made.

From an ancient Egyptian papyrus in the British Museum, of Hennefer, superintendent of the cattle of Seti I., 19th Dynasty, about 1350 B.C., representing the "Ritual of the dead." The heart of the deceased is being weighed in an equal-armed balance, and found lighter than a feather. In the papyrus, the weighing is being made in the Hall of perfect Justice, in presence of Osiris.

It may be seen that what Mr. Rodwell mentions as a sliding weight on one side of the beam, appears rather to be a loop or ribbon for limiting the oscillation of the beam. In the original papyrus the middle and both ends of the beam, as well as the lower part of the column, are coloured to represent polished brass, whilst the other parts of the balance are dark, as if of bronze. It should be observed that the balance beam has box-ends for suspending the pans. Judging from the height of the human figures, the length of the balance beam represented is about six feet, and the height of the column of the balance is nearly the same. Several similar, though rougher, representations of weighing the heart of the deceased may be seen in the papyrus drawing on the staircase leading from the Egyptian sculpture room to the upper Egyptian room in the British Museum.

H. W. CHISHOLM

Stalagmitic Deposits

IN a former number of *NATURE* (vol. viii. p. 462), Mr. A. R. Wallace, in reviewing Sir Charles Lyell's last edition of the "Antiquity of Man," makes use of the rate of deposits of stalagmite as data for ascertaining the age of animal remains which are found buried in caves. It is evident that the variations of rate will render unreliable data for arriving at correct conclusions; still, calculations based thereon may be of service.

Some thirty years ago I procured a piece of lime deposit from a lead mine at Boltsburn, in the county of Durham; it measured about 18 in. in length, 10 in. in breadth, and fully $\frac{3}{4}$ in. thick; it was compact and crystalline, and showed distinct facets of crystals on its surface, over which the water was running. I had indisputable evidence that the deposit had taken place in fifteen years. The water, from which it was produced, issued from an adit driven in the Little limestone, which is about 9 ft. thick. After leaving the adit, the water ran down the perpendicular side of a rise, for some fathoms, on to some rock debris, which was lying on the bottom of a hopper, whence it proceeded from the upper part of the hopper mouth, then perpendicularly down over two narrowish wood deals, which were set on edge, and put across the mouth of the hopper to retain the specimen above described. On its back side the forms of the deals