

of an insulated wire, while the other pole is in communication with an insulated metal plate fixed inside a pivot in the upper part of the machine. Upon this pivot swings a moveable hood, or cage, and the latter, though not affected by the motion of waves, will, upon being struck by a passing vessel, swerve round and come into metallic contact with the insulated plate above mentioned, thus completing the electric circuit with the earth, or, more strictly speaking, with the water. As will be readily perceived therefore, in this case, a single wire only is needed to connect one element of the battery with the fuze, the other element being of course allowed to pass to earth. In the other description of torpedo, a *circuit closer* of the same construction is used, and this on being struck furnishes a signal to the shore, whence a sentinel at once explodes any charge, or charges, which may be in the vicinity of the submerged machine. When disconnected from the batteries, these torpedoes naturally cease to be a source of danger, and herein lies one of the most valuable qualities of the electric exploding method. If considered desirable, the machines need in fact never be put into an active state except in a case of imminent danger. Thus, if a fleet of friendly vessels were pursued by hostile ships, the sentinel on the look-out would not connect his batteries until the former had passed over the torpedoes, and when the machines were well left behind, by simply turning a switch arrangement he would be enabled instantly to close the line of defence, and set up a formidable barrier not to be passed with impunity.

In the simplest form of electric torpedoes (such as the majority of those used in America) where ignition is brought about by simply sending a current through the circuit, one wire leading from the torpedo to the battery and another to earth, the employment of the Abel fuze presents one very important advantage. Explosive machines fitted with these appliances may, when in position, be tested at any moment to ascertain their state of efficiency, and the operator is thus made cognisant of the serviceableness or otherwise of his apparatus and batteries; this operation is effected by simply passing a weak current through the wire and fuze, which although insufficient to produce ignition, is yet powerful enough for the transmission of signals.

Where a large number of torpedoes are grouped together, it is found undesirable, except in special cases, to use either the frictional or dynamo-electric machines for exploding the fuzes, for the reason that a current sent from one of these instruments to ignite a specific charge, induces similar currents in adjacent wires and at once causes a wholesale explosion. Constant voltaic batteries or piles are therefore generally resorted to, and the construction of simple forms of these from rough, handy materials (some sheet zinc and copper, a few pieces of wood, and a little vinegar and common salt) is a favourite occupation among sailors who have received elementary instruction in this system of warfare.

By employing in torpedoes, instead of powder, a heavy charge of gun-cotton, and exploding this by the newly-discovered method of detonation, a force is developed which, it is no exaggeration to say, would prove fatal against a vessel of the strongest and most cunning construction.

NOTES

WE are glad to be able to announce that the arrangements for the Eclipse Expedition are progressing very rapidly and satisfactorily, and that there seems every chance of everything being done which can insure success. In response to their circular, the Council of the Royal Astronomical Society have received upwards of sixty applications from observers anxious to help in an examination of the phenomenon. It is proposed that, if possible, there

shall be two expeditions; one to Spain, the other to Sicily. The desirability of this is obvious, as the chances of bad weather are thereby considerably reduced. Unfortunately, those who know Sicily well state that the region to be visited is so brigand-ridden that other precautions besides those usually employed in Eclipse Expeditions will be desirable. The Italian Government, which will also, we believe, send an expedition to Sicily, will, doubtless, look to this. The French Expedition will observe in Algeria.

OUR Berlin Correspondent writes that Baron Liebig has recovered from his recent severe illness.

WE regret to learn that Mr. Archibald Geikie, who recently left England to investigate the Geology of the Lipari Islands, was prostrated by fever as soon as he arrived there, and is in such a weak state of health, that he has been ordered back to England.

AN Imperial decree has been published in Paris, ordering that the Minister of Fine Arts shall henceforth bear the title of Minister of Literature, Science, and Art, and also that his department shall include the superintendence of the Institut de France, Académie des Sciences, the libraries, learned societies, and the like. When shall we get *our* Ministry of Literature, Science, and Art?

THIS will be a week of Anniversary Meetings. On Monday the annual réunion of the Royal Geographical Society will be held at one o'clock, and of the Victoria Institute at four; and on Tuesday the Linnean Society will celebrate its anniversary at three, and the Ethnological at four.

THE *British Medical Journal* states that the chair of Physiology, in the University of Prague, vacant by the death of the celebrated Purkinje, has been filled by the appointment of Dr. Hering, of Vienna. It was offered to Professor Helmholtz, who, however, preferred to remain at Heidelberg.

AT the annual meeting of the Newcastle Natural History Society on the 10th inst., a discussion took place on the present position of the Alder Memorial Fund. It was stated that while the original intention was to raise 600*l.* to carry out the memorial scheme, only about 300*l.* had been collected since March 1867. After some discussion, it was agreed to make efforts to raise an additional 100*l.*, which was considered a sufficient sum to carry out the objects proposed.

AT the recent general examination for women, held by the University of London, five passed in the "Honours" Division and four in the First Division. Of the seventeen candidates, five were from the Cheltenham Ladies' College, all of whom were successful, two being placed in the Honours and three in the First Division.

MR. J. W. ELWES, of King's College and the London University, and Mr. W. T. Sollas, of the Royal School of Mines, have been elected (equal) Exhibitioners in Natural Science, at St. John's College, Cambridge. There were eight candidates; the examiners being Prof. C. C. Babington (Botany), Prof. Humphry (Physiology), Prof. W. G. Adams (Physics), Mr. Bonney (Geology), and Mr. Main (Chemistry).

A RECENT number (94) of the German series known as "A Collection of Popular Scientific Treatises, edited by R. Virchow and Fr. von Holtzendorf," is a lecture on the Glacial Period (*Die Eiszeit der Erde*), by Alexander Braun. It gives a clear and concise history of the observations and arguments by which geologists have been led to the conclusion that a lengthened period of extreme cold overspread the greater part of Europe before the commencement of the historical epoch.

MR. C. P. SMITH reprints, as a separate publication, an epitome of a paper read before the Brighton and Sussex

Natural History Society on Nov. 11, 1869, under the title of "The Moss Flora of Sussex, together with Notes on the Structure and Reproduction of Mosses."

THE first volume is published of Dr. Oppolzer's "Lehrbuch zur Bahnbestimmung der Kometen und Planeten."

A PAMPHLET lies on our table entitled "History of Modern Anæsthetics, a second letter to Dr. Jacob Bigelow, by Sir J. Y. Simpson, Bart." Without entering into the merits of the controversy between the Scotch and American doctors, it is but just to the memory of Sir James Simpson to say that it appears to have been conducted by him in an admirable spirit of courtesy which is not always found in scientific discussions. It is admitted on both sides that the first case of an anæsthetic operation under sulphuric ether occurred at Boston on the 30th of September, 1846; and the first case of an anæsthetic operation under chloroform occurred at Edinburgh on the 15th of November, 1847. The last sentence of Sir James's letter to Dr. Bigelow, written when the grave was almost closing upon him, is full of touching pathos:—"With many of our profession in America I have the honour of being personally acquainted, and regard their friendship so very highly, that I shall not regret this attempt—my last, perhaps—at professional writing, as altogether useless on my part, if it tend to fix my name and memory duly in their love and esteem."

In the *North American Review* for April appeared an article entitled "Darwinism in Germany," from the pen of Mr. Charles L. Brace, giving a *résumé* of the present state of biological speculation on the Continent.

MR. WILLIAM HUGHES, Professor of Geography in King's College, London, reprints "Geography in its relation to History," a lecture delivered at the Birkbeck Institution; and "Geography, what it is, and how to teach it," a paper read before the College of Preceptors.

THE *Food Journal* for May commences a somewhat minute description of Mr. Twining's Museum of Domestic and Sanitary Economy at Twickenham, one of the most interesting and really valuable collections ever brought together by private enterprise.

DURING the present year, the following medals will be awarded for the encouragement of photographic discovery:—A large silver medal, by the French Photographic Society, for the best transparent pellicle that can be devised for the transfer of *cliches*; a large gold medal, by the Vienna Photographic Society, for the best dry process; and two silver and two bronze medals for other deserving inventions. The Hamburg Society also promises medals for important discoveries.

AT the sitting of the Paris Academy of Science for May 2, the President announced the death of Professor Lamé, a member of the Institute since 1843. The deceased, a very celebrated physicist and mathematician, was born in 1795, educated at the Ecole Polytechnique, and was for some time engineer in the Russian service. On his return to France, he was appointed Professor of Physics at the above-named school, and remained in that capacity until the year 1845, when he was elected Examiner at the school. In the year 1848 he was appointed Professor in the Faculty of Sciences at Paris. Among his very many published works those on mathematics and the elasticity of bodies are the most celebrated.

ACCORDING to the *British Medical Journal*, the weight of the late Sir James Simpson's brain, including the cerebellum, was 54 ounces. While, as is well known, the ratio between intellect and size of brain is by no means close, yet there can be no doubt that it is very important. Most of our great men have had large crania. The male brain ranges chiefly between 46 and 53 ounces, its average being $49\frac{1}{2}$ (Quain and Sharpey). That of Cuvier is stated to have weighed 64 ounces, and that of the late Dr. Abercrombie 63 ounces, but it is possible that some error may have

crept in through the use of weights of different standards. If not, Sir James's brain, whilst much above the average, did not nearly reach those of the celebrated men we have mentioned; but at the same time, the convolutions were remarkably numerous; they were, says a correspondent, "twisting and twining round on each other as if they could not find room within the head. The island of Reil was very wonderful."

THE frontispiece to the *Photographic Art Journal* for May is the first published example of Mr. Woodbury's new patent process of photo-mechanical printing in printing-ink. It was printed in a copper-plate press from a plate produced at the establishment of MM. Goupil, at Paris. It is entitled "Orpheline," and is a copy of a drawing by Girardet, an eminent modern French artist. The other illustrations in the same journal are a photograph by Messrs. Edwards and Kidd's photo-mechanical or surface-printing process, of a drawing made at Chartres last October by Mr. A. E. Browne; and a copy by the photo-engraving process of M. H. Garnier, of Paris, of an old lithograph by the celebrated French painter Géricault.

AN interesting application of photography to legal evidence has just taken place. The Spanish Government having refused to give up the *Tornado*, an English vessel captured some time since, or to give compensation to the owners, our own Government has acquiesced in the decision, a photographic copy of the private instructions given to the captain by the owners having proved conclusively the more than doubtful character of the vessel.

THE *American Entomologist* for April appears under the new title of the *American Entomologist and Botanist*. Mr. Charles V. Riley continues the editorship of the entomological department, while the botanical section is undertaken by Mr. George Vasey, of Richview, Illinois, who has long been known in the West as a careful botanist. The paper is published at the enterprising south-western capital, St. Louis, Missouri, a town which also supports the *Grape Culturist*, a monthly journal devoted exclusively to grape culture and wine making, and the *St. Louis Journal of Agriculture*, published weekly. An epitome of its contents will be found under the head of "Scientific Serials."

AT a recent meeting of the Paris Chemical Society, M. Scheurer-Kestner read a paper on the composition of fossil and recent bones. He finds that bones which have been buried for long periods contain, besides ossein, which is insoluble in water, another organic nitrogenous substance, soluble in water, and into which he supposes ossein to be slowly changed. Running water gradually removes this soluble modified ossein, and consequently the ancient bones found in loose impervious soils contain very little organic matter, while those buried in compact clay may retain a large quantity of it. The rate of decomposition thus varies with the nature of the soil; but in the same soil M. Scheurer-Kestner believes that the relative age of different bones can to a considerable extent be determined by their chemical composition.

THE *Scientific American* states that Mr. Sherwood has invented an ingenious method for the separation of animal fibre from vegetable. The process does not alter the colour or structure of the animal fibre, and permits the use of cotton or linen separated from it for numerous purposes. It is sufficient to suspend the goods in an atmosphere of nitrogen or carbonic acid, and to cause the vapour of perfectly dry sulphuric, phosphoric, or hydrochloric acid to enter the room. These fumes disentangle the vegetable fibre, and leave intact the animal—the two fibres can thus be separated and appropriated to their respective uses.

ACCORDING to the *Chamber of Agricultural Commerce*, Belgium sent us during the year 1869 3,000 tons of meat, poultry, and rabbits; and the birds, at any rate, we might as well have fed and hatched at home. Belgium exported in the same year 34,375 tons

