

motion from Edinburgh, Paisley, Beirut, and Toronto.—Charts of the Gulf of St. Lawrence, showing the co-tidal lines at mean time of Quebec: Captain Tizard, C.B., F.R.S.—Photographs of the "Cullinan" diamond: Sir William Crookes, F.R.S.

Microscopic preparations illustrating the development of calcareous spicules in various invertebrate animals: Prof. E. A. Minchin and Mr. W. Woodland. Calcareous spicules are small skeletal elements to be found in most of the lower animals. These spicules assume varied and often beautiful forms, those of sponges and "sea cucumbers" (Cucumariidæ and Synaptidæ) being especially striking in this latter respect, and are built up in all instances by the agency of scleroblasts—small nucleated protoplasmic masses which deposit the lime. The causes underlying the production of the curious forms which these spicules assume (triradiates, perforated plates, wheels and anchors, &c.) are not by any means yet understood, but are probably several in number, some being purely mechanical in nature, others, perhaps, being those which give rise to crystals.—Cellular constituents peculiar to cancerous and reproductive tissues: Prof. J. B. Farmer, F.R.S., Mr. J. E. S. Moore, and Mr. C. E. Walker. In the cells of malignant tumours, structures known as "Plimmer's bodies" are present in most cases. These structures have been regarded as parasitic organisms or as specific cellular peculiarities confined to such malignant tissues. They have recently been identified as also being present in normal reproductive tissues. They form a definite organ of the cell during its conversion to a spermatozoon, and they also can be identified in the two preceding divisions. They are absent from other cells of the body.—The simplest kind of protoplasm: Dr. Charlton Bastian, F.R.S. One drop of a fluid swarming with common bacteria had been introduced into one ounce of distilled water containing ten grains of neutral ammoniac tartrate in solution. The bacteria grow freely in this fluid, and as the constitution of the ammonia salt is $2\text{NH}_4\text{O}, \text{C}_2\text{H}_4\text{O}_4 + 2\text{H}_2\text{O}$, they must fashion their protoplasm in some way from C, H, O, and N only, though sulphur and phosphorus, one or both, are commonly regarded as necessary constituents of living matter.

The parasite of "kala azar": Brevet Lieut.-Colonel W. B. Leishman. This protozoal organism is found in the spleen and other organs in cases of "kala azar," an extremely fatal disease occurring in epidemic form in Assam, and also, in endemic form, in other parts of India and the tropics. Nothing is yet known as to the mode of infection or as to the life of the parasite outside its human host. In artificial cultures it develops into a flagellated organism closely resembling a trypanosome. Specimens and sketches were shown of the parasites as they occur in the tissues, and of the flagellated forms into which they develop in artificial cultures.—The isolation of *B. typhosus* from water by means of alum precipitation: Mr. H. S. Willson. Alum is added to the infected water in the proportion of 0.5 gram to the litre. When the precipitate of aluminium hydrate has fully formed, the water is centrifuged and the sediment containing most of the bacteria present in the water is spread on plates of suitable media, and incubated at 42°C . The precipitate, which is known to be destructive to many water and sewage organisms, has no germicidal action on *B. typhosus*.

(1) Stone adze heads in various stages of manufacture, and chips from the neighbourhood of Suloga, Woodlark Island, British New Guinea; (2) photographs of straight-haired individuals from Nara district central division, British New Guinea; (3) wood carvings and drawings, principally from Massim district, British New Guinea: Mr. C. G. Seligmann. Specimens of cross-bred maize illustrating inheritance in accordance with Mendel's law: Mr. R. H. Lock.—Living representatives of the Plymouth marine fauna: Marine Biological Association. Material obtained with the dredge from certain typical grounds in the neighbourhood of Plymouth was shown, together with representatives of the animals living on each ground.—Photographs illustrating young cuckoo in the act of ejecting egg and young bird from nest of foster-parent: Mr. W. Percival Westell.

A new problem on superposition: Mr. H. E. Dudeney. This was a demonstration that an equilateral triangle can

be cut into four pieces that may be re-assembled to form a square, with some examples of a general method for transforming all rectilinear triangles into squares by dissection.

Oil painting, a Friday evening lecture at the Royal Institution: Mr. H. J. Brooks.

ATMOSPHERIC ELECTRICITY OBSERVED FROM BALLOONS.

IT is now some years since attempts were first made to investigate the electrical conditions of the upper atmosphere by aid of manned balloons; but it is only within the last three years that the difficulties of the observations and the proper methods to be used have been anything like understood.

Measurements of the normal potential gradient were first attempted. The early observers worked very much in the dark, Linke being the first, in 1901, to investigate the errors due to the mere presence of the balloon itself. He found that for the influence of an uncharged balloon to be small enough to be neglected, the upper of the two collectors used must be at least 10 metres below the basket.

Linke also investigated the efficiency of different forms of collectors. The original form of collector used in balloon work was a modification of Kelvin's drop collector. A wire was lowered from an insulated vessel out of which water flowed and ran down the wire; the drops forming on the end of the wire and then falling off brought the whole wire to the potential of the air at its end. There are many objections to this form of collector; it is very slow in action, uses a large quantity of water, and will not work when the temperature falls below freezing. Flame collectors are obviously out of the question for balloon work on account of their danger, and, much to the regret of the experimenters, radium did not come up to expectation. The difficulty with radium collectors is that the radium ionises a large volume of air, which, on account of the absence of relative motion between the balloon and the surrounding air, travels along with the balloon and completely alters the electrical conditions of the atmosphere in its neighbourhood. By a simple device Linke has finally overcome all difficulties connected with the collectors. A vessel containing spirits is insulated on a shelf fastened to the outside of the basket. From this vessel hangs a long thin lead or other flexible pipe. At the lower end of the pipe is a nozzle which forms the collector proper. As stated above, the collector must be 10 metres below the balloon; thus there is at least a 10-metre head of liquid acting at the nozzle. The pressure due to this causes a very fine jet to escape from a pin-hole in the nozzle. As the jet breaks up into exceedingly fine drops, a very rapid collector action takes place. Collectors of this form have acted splendidly, and their use makes it possible to measure the potential gradient with accuracy and ease.

The rate of dissipation of electricity from a charged body, and the degree of ionisation of the air, have also been made subjects for investigation in the upper atmosphere. Ebert and Linke have devoted several ascents to measurements of the dissipation, and Ebert designed the first instrument to measure the natural ionisation of the air; but the ionisation has been most carefully investigated by Gerdien, who improved Ebert's instrument so that it measures not only the ionisation, but the conductivity of the air also.

It was when making these latter investigations that a number of difficulties connected with the casting of ballast were first observed. Ebert found that the pouring of sand from the ballast bags so highly charged the balloon with friction electricity that electrical observations became impossible. Gerdien found that after sand had been cast the balloon remained for some minutes in an atmosphere filled with fine sand dust, which greatly affected the measurements of the ionisation. Linke also found that on account of the sudden upward acceleration given to the balloon after sand had been cast the position of the electro-scope leaves changed without any change of voltage. Gerdien was the first to overcome these difficulties. Besides sand, he took two large watertight sacks filled

with water. By having pipes and taps fitted to the sacks water could be discharged as desired. Sand still remained the ordinary ballast; but when electrical measurements were being made water only was used. In order to prevent the water freezing in the cold upper atmosphere, Gerdien filled the sacks with boiling water, which, experience proved, kept sufficiently warm to prevent freezing before it was all used. This method was found to be entirely satisfactory, for it not only got over all difficulties connected with the sand, but by regulating the flow of the water much greater control could be exercised over the balloon than had before been possible with sand.

These and other difficulties have been so recently recognised and overcome that trustworthy results have as yet hardly been obtained, but the observations appear to justify the following conclusions:—

The normal potential gradient remains positive to the highest point yet investigated (5900 metres by Gerdien), but decreases in magnitude as the height increases. This points to the lower regions of the atmosphere containing a positive charge equal to the negative charge on the earth's surface, so that the globe as a whole is not charged.

The number of ions in a cubic metre of air is the same at all heights.

Electricity is dissipated more rapidly from a charged body the higher it is in the atmosphere, this being, no doubt, due to the greater ease with which ions move in rarified air.

These results require further verification before they can be accepted as final, and it is to be hoped that facilities will be forthcoming for the investigations to be followed up in this country. It is a strange fact that no Englishman has yet devoted himself to a study which combines science and sport in such an attractive manner.

GEORGE C. SIMPSON.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—The syndicate the proposals of which with regard to the previous examinations were thrown out by the Senate last term, was elected to consider the studies and examinations of the University, and, although it has so far considered but one examination, a determined attempt is being made to bring its deliberations to a close. The period for which the syndicate was appointed lapses at the end of this term, and the grace which authorises its re-appointment will to-day be "non-placeted" in the Senate. A short time ago four members were added to the syndicate. Their nomination was not objected to, though the action of the council in appointing them was termed inexpedient. It seems a strange piece of courtesy to acquiesce in the appointment of men like the master of Gonville and Caius, Mr. S. H. Butcher, late professor of Greek in Edinburgh, Dr. Adam, and Mr. Hardy to a syndicate which the opponents of change intended, so far as lay within their power, to render moribund.

The natural sciences tripos continues to increase. There are 149 candidates entered for part i. and 30 candidates for part ii., both of which began this week. In the first part of the mathematical tripos there are 57, and in the first part of the classical tripos there are 102 candidates, in the second part 12. The entrances for the mechanical sciences tripos, part i., are 45.

The Board of Agricultural Studies reports a continuous increase both in the number of students attending the agricultural courses and in the number presenting themselves for the examinations. The number of students is now close upon fifty, and shows an increase of seven within the last twelvemonth.

The honorary degree of M.A. will to-day be conferred on Mr. Robert Stephenson, late chairman of the Cambridgeshire County Council, in recognition of his services to education, and especially to the promotion of agricultural education in the university.

The Rede lecture will be delivered on Saturday, June 10, at 11.30 a.m., by Sir Francis Younghusband, K.C.I.E. His subject is "Our True Relationship with India."

The council of the Senate has promulgated a grace proposing that a syndicate be appointed to consider the desirability of establishing in the university a diploma in forestry, and to draw up, if it thinks fit, a scheme of instruction and examination in forestry; that it be empowered to consult with any persons or bodies; and that it report to the Senate before the end of the Lent term, 1906.

The next combined examination for sixty-two entrance scholarships and various exhibitions at Pembroke, Gonville and Caius, King's, Jesus, Christ's, St. John's and Emmanuel Colleges will be held on Tuesday, December 5, 1905, and following days, commencing at 9 a.m. on Tuesday, December 5. Mathematics, classics, and natural sciences will be the subjects of examination at all the above-mentioned colleges, and certain colleges examine in history, modern languages, and Hebrew.

OXFORD.—Dr. Henry Wilde, F.R.S., has presented 100*l.* to the Hope Department of Zoology for the purchase and preparation of specimens illustrating mimicry and protective resemblance.

The Romanes lecture for 1905 will be delivered by Prof. Ray Lankester, F.R.S., in the Sheldonian Theatre on Wednesday, June 14, at 2.30. The subject of the lecture will be "Man and Nature."

Mr. R. de J. Fleming Struthers has been elected to a senior scholarship in chemistry at Exeter College.

The Junior Scientific Club will hold a *conversazione* at the Museum on Tuesday, May 30.

MR. E. P. CULVERWELL has been elected to the professorship of education founded by the Board of Trinity College, Dublin, for a period of five years.

A REUTER telegram from Toronto reports that the Ontario Government has announced a provisional grant of 100,000*l.* to the University of Toronto toward the proposed new buildings which, it is estimated, will cost 320,000*l.*

It has been announced, *Science* states, that the trustees of Columbia University have received 100,000*l.* from an anonymous donor for the construction of a new college hall; and that the Legislature of Minnesota has made direct appropriations for the University of Minnesota for the next two years amounting to 142,000*l.*, besides 12,000*l.* derived from the insurance on the old main building, destroyed by fire last September.

AN International Exhibition of Pedagogy, under the patronage of H.M. the King of Spain and of H.M. Queen Maria Christina, will be held in Barcelona from May to October. Particulars as to the scope of the exhibition and the conditions attaching to exhibits are given in the official programme, a limited number of copies of which can be obtained on application to the Director of Special Inquiries and Reports, Board of Education Library, St. Stephen's House, Cannon Row, Whitehall, London, S.W.

PRESIDING at the annual meeting of the British and Foreign School Society, Mr. A. H. D. Acland moved the adoption of the report on the year's work of the association. During the course of his speech, he remarked that in many schools too much is done for the brain and too little for the body. If hygiene, instead of being merely a special subject, were made part of the teacher's general outfit, much would be done for the health of the nation. Mr. Acland said he hopes also that by degrees the pest of examinations will be modified and got rid of—a matter in which the old universities are among the greatest sinners. Whoever could wipe out two-thirds of the examinations would be one of the greatest benefactors of the human species.

THE question of the concentration of the teaching of the preliminary and intermediate subjects of the medical curriculum in London at a few centres has long occupied the attention of those interested in medical education, as it has been felt that this step must result in greater efficiency in teaching, as well as economy in expenditure. The Westminster Hospital Medical School has been the first to take definite action in the matter, and has just completed negotiations with King's College by which arrangements have been made for the teaching of physics, chemistry, biology, anatomy, physiology, and materia medica (that is to say, the subjects of the preliminary and intermediate examinations) to Westminster students