(1) As a means of giving general scientific information and practical education in the county, and as a local centre of nstruction for Chelmsford and its neighbourhood.

(2) As a place for instruction in the higher branches of any subject for advanced pupils, and as giving opportunities for individual practical work; the laboratories and class-room would also be of general advantage as an examination centre for any science or technical classes held in the county, whether under the Club's scheme or otherwise.

(3) It is submitted also that the museum, laboratories, and library at Chelmsford will be of considerable utility to the inhabitants of the county at large, to farmers, gardeners, fishermen, &c., and to members of the County Council, county officers, and others desirous of obtaining accurate information about Essex, its natural productions and industries, and also as affording facilities for any special technical investigations in the subjects above mentioned.

The Club would become affiliated to the Science and Art Department, so that Government examinations could be held, prizes and payments on results earned, and grants claimed towards the building fund, and for the purchase of apparatus, examples, &c. This affiliation would bring the Club clearly within the terms of the Technical Instruction Act, 1889.

In the work of carrying out the above scheme, the Essex Field Club would have special facilities; it would be in fulfilment of one of the highest objects of the Club, and the Council and members would have every incentive to carry out the scheme well and energetically. The ordinary meetings, serial publications, and circulars of the Club would also aid much in making the work widely known and appreciated, and in attracting students likely to receive benefit from the teaching afforded.

The grants from the County Council would be supplemented by (*a*) local contributions; (*b*) fees from students; (*c*) grants earned from the Science and Art Department; (*d*) special aid, both in money, specimens, and assistance by the Club and its members, the scheme being really complementary to the existing work of the Club.

The management of the classes would be in the hands of a special committee or committees, appointed by the Council of the Club, not necessarily chosen from the members, which committee or committees would have control over the apparatus during the continuance of the grants, and the Council of the Club would undertake, on its part, to carry out the above stipulations also during the continuance of the grants.

The Council claims that the scheme above set forth is of a wide-reaching character, embracing the whole county and not any particular district; that it will supplement in a very useful way the work of existing educational centres; and that it is calculated to be particularly serviceable in those districts not provided for by urban educational institutions. It has been formulated under the advice of some eminent practical educators; it is in accordance with the recommendations of the National Society for the Promotion of Technical and Secondary Education, and above all, it is perfectly workable provided sufficient funds are available for the purpose.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

Cambridge.—The following is the speech delivered by the Public Orator, *Dr. Sandys*, Fellow and Tutor of St. John's, in presenting for the complete degree of M.A. *honoris causâ* Mr. J. A. Ewing, B.Sc. (Edinburgh), F.R.S., recently elected to the Professorship of Mechanism and Applied Sciences, vacated by the resignation of Professor Stuart, M.P.:—

Dignissime domine, domine Procancellarie, et tota Academia:—

Uni e professoribus nostris, Britanniae senatoribus adscripto, nuper valediximus, cuius merita de Academiae praesertim finibus Britanniae in oppidis magnis late prorogandis, animo grato in perpetuum recordabimur. Successorem autem eius hodie salutamus, qui, vitae humanae spatio dimidio vixdum decurso, quindecim iam annos, primum solis orientis inter insulas, deinde patriae septentrionalis in litore, professoris munere egregie functus est. Interim opera eius insignia, partim machinis vapore actis explicandis, partim scientiae magneticae investigandae dedicata, non modo doctrinae Britannicae inter thesauros, sed etiam Societatis Regiae inter annales relata sunt. Quid dicam de pulcherrimo eius invento, quo terrae motus etiam levissimi accuratissime indicantur? Nonnulli certe vestrum audivistis orationem eximiam, quâ nuper, munus suum auspicatus, scientiae machinali Academiae inter studia locum vindicavit, supellectilem ampliorem ei deberi arbitratus. Croesi divitiis si forte frueremur, Archimedis scientiam apparatu amplissimo libenter ornaremus. Interim civium munificorum liberalitatem exspectantes, his studiis in hac arce doctrinae denuo instaurandis (ut Vergili utar versu) *Dividimus muros et moenia pandimus urbis.* Quod si quis hodie loci eiusdem verbis male ominatis abuti velit, *Scandit fatalis machina muros;* omen illud in melius statim convertimus, recordati ex equo Troiano viros fortes, meros principes, exstitisse. Tali igitur viro, scientiae tantae inter principes numerato, non iam manus nostras velut devicti dedimus; foedere potius novo utrimque devincti, dextram dextrae libenter iungimus. Duco ad vos Professorem Ewing.

The Council of the Senate report that, in view of the dissent of ten of the Colleges therefrom, they have resolved to proceed no further with the proposed statute for relieving distressed Colleges from the contribution to the University funds.

E. A. T. Wallis Budge, M.A. of Christ's College, the distinguished Egyptologist of the British Museum, has been approved for the degree of Doctor in Letters.

A portrait of Prof. A. Newton, F.R.S., painted by Mr. C. W. Furse, has been presented to the University by the subscribers, and will probably be hung in the New Museum.

Mr. S. J. Hickson, M.A., the author of a recent work on Celebes, has been appointed to the Lectureship in the Advanced Morphology of Invertebrates, vacant by the resignation of Prof. Weldon, F.R.S., now of University College, London.

Mr. G. F. C. Searle and Mr. S. Skinner have been appointed Demonstrators of Experimental Physics at the Cavendish Laboratory.

Dr. Anningson, University Lecturer in Medical Jurisprudence, and Medical Officer of Health for Cambridge, announces a course of lectures and demonstrations in public health, suitable for candidates for the University diploma. The course will be given in the Long Vacation.

The Annual Reports of the Fitzwilliam Museum Syndicate and of the Antiquarian Committee contain long lists of valuable gifts and acquisitions of archæological and ethnographical interest received during the past year.

SOCIETIES AND ACADEMIES.

London.

Royal Society, January 22.—"The Passive State of Iron and Steel. Part II." By Thos. Andrews, F.R.SS.L. and E., M.Inst.C.E.

The experiments of Series III., in this paper, relate to the effect of temperature, and the observations of Series IV. refer to the influence exerted by nitric acid, of varied concentration, on the passive condition of iron and steel.

Series III.—Effect of Temperature on the Passivity of Iron and Steel.

The bars selected for these observations were unmagnetized polished rods, which had been previously drawn cold through a wortle; a pair of bars of each metal were cut adjacently from one longer bar, and then placed securely in the wooden stand; each bar was $8\frac{1}{4}$ inches long, 0·261 diameter. The **U** tube, containing $1\frac{1}{4}$ fluid ounce of nitric acid, sp. gr. 1·42, was rigidly placed in an arrangement as shown on Fig. 3 in the paper. One limb was surrounded by a tank containing water, the other limb by a tank of the same capacity containing powdered ice; the arrangement was such that the water-tank could be heated by a Bunsen burner, and its temperature slowly raised, whilst the ice-tank was kept full of powdered ice.

The bars were in circuit with the galvanometer, and soon after immersing them in the nitric acid heat was applied to the water-tank, and the temperature of the nitric acid in that limb of the **U**-tube slowly raised to the temperatures required, whilst the acid in the other limb of the **U**-tube was meanwhile maintained at a temperature of 32° F.

The arrangement will be understood on reference to Fig. 3 in the paper, and the electro-chemical results obtained are graphically recorded on diagram I.

These electro-chemical experiments indicated that the wrought iron was less passive in the warm nitric acid than the soft cast steel: the average E.M.F. of 94 observations with wrought iron was 0·030 volt; whereas, in the case of the 94 observations on cast steel, the average E.M.F. was only 0·010 volt.

It was noticed that the behaviour of the steel, under the conditions stated, was more irregular than that of the wrought iron.

In the whole of the series of experiments on diagram I. the nitric acid was raised to a temperature of 175° F.; the cold nitric acid in the limb of the U-tube A remained perfectly colourless, and the steel or iron therein absolutely passive; but the steel or iron in the warm nitric acid in tube A, commenced to be gradually acted upon as the temperature increased, a pale yellow tint beginning to appear in the solution in the tube A, shortly after commencement.

The results showed that iron or steel does not fully lose its passivity up to a temperature even of 175° F., though the passivity is shown to have been considerably modified by temperature. The critical point of temperature of transition from the passive to the active state is therefore higher than 175° F., and is shown in the experiments of Part I., Series II., Table II., to have been about 195° F.

Series IV.—The Passivity of Iron and various Steels increases with the Concentration of the Nitric Acid.

Scheurer-Kestner considered that the passivity of iron was not dependent on the greater or less degree of saturation of the acid. In connection with this aspect of the subject, the electro-chemical experiments of Series IV. indicate, however, that the property of passivity in iron is not absolutely fixed or static, but that its passivity is modified to a certain extent in relation to the strength of the nitric acid used.

A current was observed between two bright "passive" wrought iron or various steel bars of the same composition, one in cold nitric acid, sp. gr. 1·5, the other in cold nitric acid, sp. gr. 1·42; the electro chemical position of the bar in the weaker acid was positive. The mode of experimentation was generally similar to that previously employed. The chemical composition and general physical properties of the various steels used in the experiments are given in Tables IV. and V.

The results, the average of many repeated experiments in each case, are given in Table III., and show that the passivity of iron increases considerably with the strength of the nitric acid.

The results of the experiments of Series IV., Table III., show that wrought iron was less passive in the weaker acid than most of the steels, the soft Bessemer steel being found similar in passivity to the wrought iron.

The average E.M.F. was as follows:—With wrought iron, 0·054 volt; soft cast steel, 0·028 volt; hard cast steel, 0·036 volt; soft Bessemer steel, 0·059 volt; tungsten steel, 0·039 volt.

Geological Society, January 21.—A. Geikie, F.R.S., President, in the chair.—The following communications were read:—On the age, formation, and successive drift stages of the valley of the Darent; with remarks on the Palæolithic implements of the district, and on the origin of the chalk escarpment, by Prof. Joseph Prestwich, F.R.S. i. *General Character and Age of the Darenth Valley.* The river is formed by the union of two streams, the main one flowing east from near Limpsfield, the other west from near Ightham, parallel with the ranges of Lower Greensand and Chalk, and flows northward into the Thames. The first indent of the valley was subsequent to the deposition of the Lenham sands, and, indeed, to the Red Clay with flints, and the old implement-bearing drift with which this is associated; and the same remark applies to a system of smaller valleys starting near the crest of the escarpment and running into the Thames. ii. *The Chalk Plateau Drifts and Associated Flint Implements.* Since the publication of the author's Ightham paper, Mr. Harrison and Mr. De B. Crawshay have found implements mostly of rude type (though a few are as well-finished as those of Abbeville) in numerous localities on the plateau, where, owing to the gradients, the difference of level between plateau and valley-bottom is much greater than at Currie Farm. Evidence derived from the character and conditions of preservation of these implements is adduced in favour of their great antiquity. iii. *The Initial Stages of the Darent Valley.* The author has previously shown that in early Pliocene times a plain of marine denudation extended over the present Vale of Holmesdale, and that in preglacial times the plain was scored by streams flowing from the high central Wealden ranges. These streams centred in the Darent, and the excavation of the present valley then commenced. There is a gap in the sequence between the preglacial drifts and the earliest post-glacial drifts of the valley, which is probably covered by the extreme glacial epoch. It was a time of erosion, rather than of deposition in this area. Of the earliest drift of the Darent valley, little has escaped later denudation. The bank of coarse gravel on the hill on the west side of the valley between Eynsford and Farningham, certain flint-drifts in the upper part of the valley, and a breccia of chalk-fragments on the hill west of Shoreham, may be referred to this period. iv. *The High-Level or Limpsfield Gravel Stage.* The gravel at Limpsfield occurs on the watershed between the Darent valley and the Oxsted stream, but the author agrees with Mr. Topley that the gravel belongs to the Darent system, and Westheath Hill may be part of the original ridge separating the two valleys. This gravel is post-glacial, and the denudation of the area had made considerable progress at the time of its formation, for the chalk escarpment rises 200–300 feet, and the Lower Greensand 100–200 feet above the gravel-bed. The author traces outliers of this gravel down the valley at lower and lower points to the Thames valley at Dartford, and correlates it, not with the high plateau-gravel, but with the high-level gravel of the Thames valley, and shows that its composition indicates that it is derived from the denudation of the Chalk and Tertiary beds. Mr. A. M. Bell has discovered numerous implements in it, mostly of the smaller St. Acheul type, and the author hopes that they will soon be described by their discoverer. These implements agree in general type with the "Hill group" of the Shode valley, and not with the older group of the Chalk plateau, or those of the lower levels of the Thames and Medway. v. *Contemporaneous Drift of the Cray Valley.* Implements of this age have been found by Mr. Crawshay and by Mr. P. Norman, near Green Street Green, in gravel which is more than 100 feet below the Red Clay of the plateau. vi. *Brick-earths of the Darent Valley.* These are traced along the upper course of the valley from near Limpsfield. They seem to show glacial influence, and Mr. Bell has discovered a few implements in them. The Limpsfield deposit is from 10 to 30 feet below the adjacent gravel. Brick-earth, possibly of somewhat later date, also occurs near Dartford. vii. *Other Gravels of the Darent Valley: the Chevening and Dunton Green Drifts.* The relations of the gravels grouped under this head are more uncertain than those of the Limpsfield stage. Various features in the gravels point to the temporary return of glacial conditions during the period of formation of these and the brick-earths; and these are described in detail. viii. *The Low-level Valley-Gravels.* The correlation of these is also uncertain. West of Dartford is a bed corresponding with that at Erith, in which Mr. Spurrell found a Palæolithic floor. It contains land and fresh-water shells. The surface of the Chalk is here festooned under a covering of the fluviatile drift. The author attributes this festooning to the effects of cold. ix. *The Rubble on the Sides and in the Bed of the Valley.* The author describes this rubble, and rejects the view that it is rain-wash or due to subaërial action, and discusses the possibility of its having been produced by ice-action. x. *Alluvium and Neolithic Implements.* These occur chiefly between Shoreham and Riverhead. xi. *On the Chalk Escarpment within the Darent District.* The author, after discussing and dismissing the view that the escarpment was formed by marine denudation, criticizes the theory that it was due to ordinary sub-aerial denudation, and lays stress on the irregular distribution and diversity of the drift-beds in the Darent area; these do not possess the characters which we should expect if they were formed by the material left during the recession of the Chalk escarpment owing to sub-aërial action; and he believes that glacial agency was the great motor in developing the valleys, and, as a consequence, the escarpment, and that the denudation was aftewards further carried on in the same lines by strong river action and weathering, though supplemented at times by renewed ice-action. By such agencies, aided by the influence of rainfall and the issue of powerful springs, he considers that the escarpment was gradually pared back and brought into its present prominent relief. After the reading of this paper there was a discussion, in which Mr. Topley, Dr. Le Neve Foster, Mr. De B. Crawshay, the President, and the author took part.—On *Agrosaurus Macgillivrayi*, Seeley, a Saurischian reptile from the north-east coast of Australia, by Prof. H. G. Seeley, F.R.S.—On *Saurodesmus Robertsoni*, a Crocodilian reptile from the Rhætic of Linksfield, in Elgin, by Prof. H. G. Seeley, F.R.S.

Royal Microscopical Society, January 21.—Annual Meeting.—Dr. C. T. Hudson, F.R.S., President, in the chair.—Mr. Swift exhibited and described a new form of petrological microscope which he had made under the instructions of Mr. Allen Dick. It differed from the ordinary patterns in having no revolving stage, but was so constructed that whilst the object remained fixed the eye-piece and the tube below the stage could be revolved.—Mr. E. M. Nelson exhibited a new apochromatic condenser, by Powell and Lealand, which gave a larger aplanatic solid cone than it had hitherto been found possible to obtain.—The report of the Council was read, showing an increase in the number of Fellows and in the revenue of the Society.—Dr. C. T. Hudson delivered his annual address.—Dr. R. Braithwaite was elected President for the ensuing year.

PARIS.

Academy of Sciences, February 2.—M. Duchartre in the chair.—The death of General Ibañez on the 29th ult. was announced. An account of his life and works was given by M. J. Bertrand.—On the approximate development of perturbing functions, by M. H. Poincaré.—The photography of colours, by M. G. Lippmann. The conditions said to be essential to photography in colours by M. Lippmann's method are: (1) a sensitive film showing no grain; (2) a reflecting surface at the back of this film. Albumen, collodion, and gelatine films sensitized with iodide or bromide of silver, and devoid of grain when microscopically examined, have been employed. Films so prepared have been placed in a hollow dark slide containing mercury. The mercury thus forms a reflecting layer in contact with the sensitive film. The exposure, development, and fixing of the film is done in the ordinary manner; but when the operations are completed, the colours of the spectrum become visible. The theory of the experiment is very simple. The incident light interferes with the light reflected by the mercury; consequently, a series of fringes are formed in the sensitive film, and silver is deposited at places of maximum luminosity of these fringes. The thickness of the film is divided according to the deposits of silver into laminæ whose thicknesses are equal to the interval separating two maxima of light in the fringes—that is, half the wave-length of the incident light. These laminæ of metallic silver, formed at regular distances from the surface of the film, give rise to the colours seen when the plate is developed and dried. Evidence of this is found in the fact that the proofs obtained are positive when viewed by reflected, and negative when viewed by transmitted, light—that is, each colour is represented by its complementary colour.—Observations by M. E. Becquerel on the above communication. M. Becquerel called attention to the experiments made by him on the photography of colours in 1849. His researches, however, dealt more with the chemical than the physical side of the question.—General Derrécagaix read a memoir on a table of centesimal logarithms to eight decimal places, issued by the Service Géographique.—M. Faye presented the *Connaissance des Temps* for 1892 and 1893, and *L'Annuaire du Bureau des Longitudes* for 1891, and described the additions to the latter.—On the distribution in latitude of solar phenomena observed at the Royal Observatory of the Roman College during the latter half of 1890, by M. P. Tacchini. The results, in conjunction with those previously presented, show that in 1890, as in 1889, the prominences were more frequent in the southern hemisphere of the sun than in the northern hemisphere. The maximum frequency occurred in the zone $-40°$ to $-50°$. Faculæ and spots have been most frequent in the northern hemisphere.—Remarks on the displacement of a figure of invariable form in all the planes that pass through some fixed points, by M. A. Mannheim.—Complementary note on the characteristic equation of gases and vapours, by M. C. Antoine.—On the basicity of organic acids according to their electrical conductivity; monobasic and bibasic acids, by M. Daniel Berthelot.—On the reactions of the oxyalkyl derivatives of dimethylaniline, by M. E. Grimaux. A new class of colouring-matters is described.—On the composition and properties of *levosine*, a new substance obtained from cereals, by M. C. Tanret.—On the quantity of oxygen contained in the blood of animals living on elevated regions in South America, by M. Viault. The results indicate that the proportion of oxygen contained in the blood of men and animals (indigenous or acclimatized) living in the rarefied air of mountainous regions, is sensibly the same as that which is contained in the blood of men and animals living at lower levels.—On the amount of hæmoglobin in the blood according to the conditions of existence, by M. A. Müntz. The author, like M. Viault, finds that animals living at great altitudes—that is, in a medium where the pressure of oxygen is low—have the proportion of hæmoglobin in the blood increased, and it consequently acquires an absorbing power for oxygen which compensates the effect of rarefaction. It is also concluded that altitude is not necessary to produce these modifications, and that the same results may be obtained if, instead of diminishing the amount of oxygen, the quantity of combustible matter is increased.—On the larvæ of *Astellium spongiforme* and on the *Pœcilogonia* of *Ascidiæ*, by M. A. Giard.—On the anatomy of *Corambe testudinaria*, by M. H. Fischer. A new species of mollusk is described. The author notes: "J'ai recontré dans l'oreillette et dans les muscles de la radule des fibres striées transversalement." This confirms the idea that the striation of muscles is intimately connected with the mechanism of their contraction.—On the *Acridium peregrinum* from the extreme south of Algeria, by M. J. Kunckel d'Herculais.—On the influence of the nature of soils on vegetation, by M. G. Raulin.—On the respiration of cells in the interior of masses of tissue, by M. H. Devaux.—Influence of the hygrometric state of the air on the position and functions of the leaves of mosses, by M. E. Bastit.—On the siliceous clays of the Paris basin, by M. A. de Lapparent. The formation of *glaçons-gâteaux*, by M. F. A. Forel. These ice formations are said by the author to be "les *pan-cakes* des Anglais."—Remarks on the temperature of Marseilles, by M. J. Léotard.

STOCKHOLM.

Royal Academy of Sciences, January 14.—Further notices on the molecular weight of the earth (oxide) of gadolinite, by Baron A. E. Nordenskiöld.—On the structure of the transversely striated muscular fibre, by Prof. G. Retzius.—The altitude of the clouds measured in the mountains of Jemtland during the summer of 1887, by Messrs. Hagström and Falk.—Photographs of the spectrum of iron taken with the aid of the Voltaic arc, and one of the "gitters" of Rowland, exhibited by Prof. Hasselberg.—On dinitro-diphenyl-disulphine, i., by Dr. A. Ekbom.—A short relation of a zoological tour to North Greenland during last summer, by Dr. D. Bergendæl.—Some observations on the water of the Gullmar fiord, by Dr. A. Stuxberg.

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