

or other branch of Natural Philosophy, the competition being open to all persons who have at any time been admitted to a degree in the University of Cambridge, has been adjudged to Edward John Routh, M.A., F.R.S., St. Peter's College. The subject of the essay is "The Criterion of Dynamical Stability." The value of the prize is about 250*l*.

A Warden of Cavendish College in the place of the Rev. T. J. Lawrence, resigned, will be elected on Tuesday, June 5. The College is intended for students somewhat younger than ordinary undergraduates, and the teaching and discipline correspond with those of the higher forms in a public school. The salary is 500*l*., or a capitation fee of 5*l* when the number of students exceeds 100. Candidates are requested to communicate with the Rev. Prebendary Brereton, Little Massingham, Rougham, Norfolk.

GLASGOW.—The Town Council has given a subscription of 5,000*l*. to the funds of the University of that city.

BRISTOL.—It will be seen from our advertising columns that a Principal is wanted for University College. For so young an institution the salary offered is very fair, and we hope that a thoroughly good man will be obtained for the post, one who, if not a man of science himself, at least regards it as of equal importance with literature.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, April 12.—"On certain Molecular Changes which occur in Iron and Steel during the separate acts of Heating and Cooling," by Prof. Norris, M.D., Queen's College, Birmingham.

An exhaustive study of the various conditions has led to the elucidation of the nature of hardening, softening, tempering, annealing, &c., and has further shown that numerical values may be assigned to these states.

The research has further established the existence in steel and in iron containing *free* carbon of a contraction or shortening which is excited by heat, and which proceeds simultaneously with the dynamical expansion, and masks its true amount. This is divisible into *high* and *low* temperature contraction.

The presence of a cooling expansion or crystallisation, which comes in during the dynamical contraction, and masks its true amount.

These effects, due to crystallisation and decrystallisation, are the causes of the so-called kicks, or temporary contractions and expansions which occur during the heating and cooling of the steel.

That the low-temperature contraction and cooling expansion are due to decrystallisation and crystallisation which occur during the acts of heating and cooling, while the kicks themselves are simply the thermal effects associated with these changes, and are proportionate to their extent.

That protracted annealing, that is, *extremely slow cooling*, brings about molecular separation of the carbon and iron; and steel in such a state contracts greatly when high temperatures are reached, producing the *contraction returns* seen at the end of the heating, and which are due to the condensation produced by the recombination of the carbon and iron. Steels in this state are less susceptible to cooling expansion (crystallisation), and therefore to low temperature contraction on subsequent heating.

April 26.—"Researches on Emeralds and Beryls.—Part II. On some of the Processes Employed in the Analysis of Emeralds and Beryls," by Greville Williams, F.R.S.

"On the Nature and Origin of the Beds of Chert in the Upper Carboniferous Limestones of Ireland," by Prof. Edward Hull, M.A., F.R.S., Director of the Geological Survey of Ireland. With "Chemical Notes," by E. T. Hardman, F.C.S., of the Geological Survey of Ireland.

From a review of the whole circumstances, it appeared that the origin of the chert-beds was to be attributed to the replacement of the original limestone or calcareous "ooze," due to organic agency, by silica, and that the rock is truly a pseudomorph, a view held by several observers.

The manner in which this replacement had been brought about was then touched upon. It was shown that there was reason for believing that at the close of the period during which the carboniferous limestone was formed over the area of Central Ireland, the sea-bed was elevated so as to be covered by the

waters of a shallow sea exposed to the sun's rays, and of a warmer temperature than when at a greater depth. The waters appear to have been charged with a more than usual supply of silica in solution, derived (as Mr. Hardman suggests) from the surrounding lands, formed, for the most part, of highly siliceous materials. As silica is less soluble than carbonate of lime, chemical replacement would naturally take place, the carbonate of lime being dissolved out and its place taken by the silica. The warm condition of the sea-water, its exposure to sunlight, the porous character of the coralline, corioid and other forms, and the soft and "oozy" condition of the foraminiferous mud would give easy access to the sea-waters, and the process of silicification would take place analogous to that described by Dr. Martin Duncan, F.R.S., as having occurred in the West Indies.

Linnean Society, April 19.—G. Bentham, F.R.S., vice-president, in the chair.—M. Cassimir De Candolle read an important paper on the geographical distribution of the Meliaceæ. His general conclusions with regard to the Melia family may thus be summarised: (a) The number and the mutual affinities of the various genera of Meliaceæ decrease from the Asiatic region towards Africa and America on one side and towards East Polynesia on the other; (b) Between the Meliaceæ of America and Africa there exists analogy, whilst Polynesian species belong to Indian type; (c) New Caledonia contains within itself a remarkable number of distinct species, the type of which, however, is Indian; (d) In Australia three Indian genera are found, along with three genera exclusively belonging to Australia; (e) No species of Meliaceæ have hitherto been collected in the most eastern islands of Polynesia; if subsequent observations reveal such it will be interesting to know whether they pertain to Indian or American type.—Another contribution on the geographical distribution of the Indian fresh-water fishes (Part II. The Siluridæ), read by Dr. Francis Day, curiously enough in some ways points to a similar conclusion to that derived from the plants above-mentioned. Dr. Day showed that of the twenty-six genera of Siluridæ represented in the Indian Empire, ten are found in the Malay Archipelago, two more reach Cochin China or China, whilst *Clarias* only is common to India and Africa, and moreover it likewise is found in the Malay Archipelago. He infers that the said freshwater fish of India are more closely related to a Malayan than to an African fish fauna.—Mr. R. Irwin Lynch, of Kew Gardens, brought before the notice of the Society some observations on the disarticulation of the branches of *Castilleja elastica*, the caoutchouc tree of Central America. He has noticed that the lateral branches are detached from the ascending stem of the plant in a regular manner from below upwards in the same way as leaves, and this happens always at the point of insertion. In certain Euphorbiaceous genera which have leaf-like branches, these fall as does a leaf, and they bear in their axils a bud from which alone the permanent branches are produced. They are themselves subtended by a leaf reduced to a scale.—Capt. Chimmo followed by two communications, one concerning the mode of obtaining and the structure of the so-called *Euplectella* of the Philippines, the other a description of a supposed new Rhizopod.

Anthropological Institute, May 8.—John Evans, F.R.S., president, in the chair.—Special thanks were voted for the present to the Library of a complete set of the volumes relating to the voyage of the *Novara*, published and presented by the Austrian Government.—On an exhibition, by Mr. R. Biddulph Martin, of objects from a large refuse heap in the neighbourhood of Smyrna, Mr. Hyde Clarke, Col. Lane Fox, and the president offered remarks.—Mr. A. L. Lewis communicated a description of the remains of a stone circle at Colderham, Kent, illustrating his remarks by a well-prepared plan.—Dr. John Rae read a paper on the skulls of the Esquimaux, attributing the fact that two distinct types of skull exist among these peoples to an admixture of blood. An interesting discussion followed, in which Dr. Beddoe, Col. Lane Fox, and others took part.—Dr. Beddoe, F.R.S., communicated a paper on the Aborigines of Queensland, whom he described, on the authority of Mr. Christison, who had had many years' knowledge of them, and employed them very largely in sheep-farming, to be, in many respects, not so black as they have been painted.

Royal Microscopical Society, May 2.—H. C. Sorby, F.R.S., president, in the chair. A number of donations to the society were announced, including a sum of 500*l*. presented by Mr. C. Lambert, from a bequest of 25,000*l*. left by that gentleman's late father, to be appropriated to benevolent and scientific purposes.

—The first of a series of lectures founded in honour of the late Prof. J. Quekett was delivered by Sir John Lubbock, Bart., M. P., "On Some Points in the Anatomy of Ants." Commencing by reference to the occasion, and appropriately giving a short history of the life and labours of Prof. J. Quekett, the lecturer proceeded to describe in a minute and interesting manner the general structure and microscopic anatomy of these insects, pointing out the differences found to exist between individuals of different species, and also between the various classes of the same species. Attention was specially drawn to the structure of the antennæ, and to certain organs presumed to be those of hearing, also to the structure of the mouth, with its extensive muscles and mouth-sac. At the conclusion of the lecture, the "Quekett Medal" of the society, struck for the occasion, was presented to Sir John Lubbock by the president, amidst great applause from the fellows.

Victoria (Philosophical) Institute, May 7.—Dr. C. Brooke, F. R.S., in the chair.—A paper on the indestructibility of matter by Prof. Challis, F. R.S., was read.

ROME

R. Accademia dei Lincei, March 4.—The Roman Tuscia and the Tolfa, by M. Ponzi.—On graphical statics, by M. Battalini.—On some cavern-myriapods of France and of Spain, by M. Fonzago.—Studies on some anouran amphibians of Piedmont, by M. Lessona.—On a new function of the liver and the effect of ligature of the vena porta, by M. Tommaso-Crudeli.—On the Meibomian glands, by the same.—On the chemical constitution of the cyanamides, by MM. Filetti and Schiff.—On the tenacity of copper, steel, brass, and aluminium, at various temperatures, by M. Pisati and others.—On the dilatation, capillarity, and viscosity of fused sulphur, by M. Pisati.—On organisation of the meteorological services of forecast for agriculture; on publication of meteorological observations; and on history of the atmosphere, April to September, 1876, by M. Tarry.—On the small proof plane, by M. Volpicelli.—Ephemerides and graphic representation of the height of the water surface of the Tiber, measured daily in 1876, by M. Belocchi.—On titanite and apatite of the plain of Spedallacio, near Sarsalba, and on mancinite, by M. Uzielli.—Indian corn and pellagra, by M. Selmi.

PARIS

Academy of Sciences, May 7.—M. Peligot in the chair.—The following papers were read:—Two general laws of geometric curves, by M. Chasles.—Studies of Mr. Sylvester on the algebraic theory of forms, by M. Hermite.—Note à propos of M. Favé's communications on the theory of heat, by M. Resal. He opposes M. Favé's views.—On determination of the difference of longitude between Paris and Berlin, by M. Mouchez. The first series of astronomical observations are on the eve of completion.—Researches on the law of Avogadro and Ampère, by M. Wurtz. Oxalate of potassium loses its water when heated in dry air under a certain pressure, but does not lose it, if heated under the same pressure, in chloral vapour or in a mixture of air and water vapour. We may infer that hydrated chloral vapour does not act like dry air, but like a mixture of anhydrous chloral and water vapour.—Chemical researches on the green matter of leaves, by M. Fremy (third paper). He thinks it proved that the colouring matter of leaves is a mixture of phylloxanthine and phyllocyanate of potash. During life chlorophyll acts by decomposing CO₂. When the leaves die and fall the colouring matter is destroyed and gives up to the ground the salt of potash it contained.—Change of colour of chlorophyll; its passage to blue and to red or orange, by M. Trecul.—On meteorological predictions sent from the United States, by M. Faye. Some think the success of these owing to the rôle of the Gulf Stream, which they suppose to be the grand route taken by storms in traversing the ocean. M. Faye shows this to be a mistake; the path of storms depending on currents in the higher regions of the atmosphere.—On the identity of anthrax in all the species of domestic animals, by M. Bouley. Contagion is its most essential character.—M. Bernard made some remarks in presenting his *Leçons sur le diabète et la glycogénèse animale*.—Reports on the geodetic and topographic works executed in Algeria, by M. Roudaire. This relates to his measurement of the meridian of Biskra, and survey of the region of the Chotts.—Practical reduced form of the development of Taylor, by M. Rouyaux.—Integration of linear differential equations of any co-efficients, with or without second member, by M. André.—Solar spots observed at Madrid in April, 1877,

by M. Ventosa. Another confirmation of what M. Janssen observed.—On M. Janssen's communication on the sudden formation of a very important sun-spot, by M. Gazan. He thinks the spot was not formed suddenly; all spots are preceded by violent agitation of the luminous matter. He passes some other strictures.—Researches on accidental double refraction, by M. Maré. The double refraction produced by hardening is identical with that produced by a regular heating of the contour of the plate.—On the interior resistance of thermo-electric elements, by M. Rolland. The experiments were made with Clamond's pile. The curve of resistances oscillates continually; its course, at first rather irregular, becomes nearly normal only after about twenty minutes; it is then fixed at a height which it retains during about ten minutes. When the pile cools the curve again oscillates irregularly.—On acid acetates, by M. Lescoeur.—On some derivatives of acetylacetic ether, by M. Demarçay.—On nitrosalicylic acid, by M. Phipson.—Action of toxic and antiseptic vapours on the fermentation of fruits, by MM. Lechartier and Bellamy. The action of vapour of phenic acid, cyanide of potassium, and camphor destroys or diminishes considerably the vitality of fruit cells.—On the same subject, by M. Gayon. He tried chloroform, ether, and sulphide of carbon with similar results. Sulphide of carbon and camphor (in the two series of experiments) acted less powerfully than the other substances; they allowed a little fermentation.—On two new niobates, by Mr. Lawrence Smith. These, found in North Carolina, he names *Hatchettolite* and *Rogersite*.—Researches on the mode of formation of Cyclopia, by M. Dureste.—Note on the peristaltic movement of the intestine, by M. Guerin. The matters in the intestine are not moved along by an action *a tergo*, resulting from simple circular contraction of the muscular membrane, but by a double propulsive and suctional action, realised through contraction of the circular and longitudinal planes of the intestine.—On a whale, properly so called, caught in the Bay of Tarentum, by M. Capellini.—On the mines of New South Wales, by M. Simon.

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