

Works" is being prepared. This entails the examination of the immense amount of unpublished MSS. which Hamilton left behind. Hamilton left unpublished many dynamical ideas which are attributed to later writers.

As time permits, I am investigating the connexion between wave mechanics and relativity.

Oct. 2, 1876.—THOMAS SHEPPARD, director of the Hull Municipal Museums, and editor of the *Naturalist*.

Realising the importance of the work of my old friend Dr. C. Davies Sherborn, I began early the thankless task of compiling bibliographies relating to British geology, prehistoric archaeology, zoology, and botany. These have been published by the Yorkshire Geological Society, British Association, East Riding Antiquarian Society, and in the *Naturalist*. The north of England bibliographies formerly compiled by Dr. A. Harker have been prepared by me since 1893, and in 1915 was published the bibliography of Yorkshire geology, 1534–1914 (666 pages).

In editing the natural history, geological, antiquarian, and museum publications during the past forty years, I have endeavoured to popularise various aspects of science. Towards this end I have written papers and books on numerous subjects, and am gratified by being told that there are more entries under my name in the Geological Society's card catalogue than under that of any other British geologist, living or dead.

Always interested in forgeries, I have caused trouble in high places by exposing fakes.

More than thirty years ago I was appointed to take over the Museum of the old Hull Literary and Philosophical Society, then typical of its kind, and this educational work has been so much appreciated by my fellow-citizens that we now have separate museums specialising in prehistoric archaeology, natural history, commerce and transport, fisheries and shipping, applied art (ancient and modern), a memorial to William Wilberforce, and folk-lore. Three others are in preparation.

Societies and Academies.

LONDON.

Institute of Metals, Sept. 15 (Annual Autumn Meeting, Zurich).—A. J. Murphy: The constitution of the alloys of silver and mercury; with an appendix by G. D. Preston on the X-ray examination of the system silver-mercury. Progressive additions of mercury to silver cause a continual reduction in the temperature of the initial freezing point down to -38.8°C ., the freezing point of mercury. No alloy in the series has a freezing point lower than that of pure mercury. Silver can retain in solid solution 55 per cent by weight of mercury at 276°C ., the amount probably increasing somewhat at lower temperatures.—A. von Zeerleder: Influence of variations in heat-treatment and ageing on duralumin. Quenching in hot water or in oil causes less deformation, and if the temperature of the quenching medium, as well as the ageing temperature, be 50°C ., there is no disadvantageous influence on the physical properties. Measurements of the electrochemical potential, electrical conductivity, tensile and corrosion properties showed that a temperature of 145°C . (293°F .) had a decidedly disadvantageous influence.—W. E. Alkins and W. Cartwright: Experiments in wire-drawing. (1) Behaviour of a composite rod. Composite round rods of annealed copper, built up by drawing a number of tubular layers of equal thickness

over a central solid core, have been drawn in drafts of varying severity through straight-sided dies of three different angles of taper. Butt ends when drawn through the dies become concave without showing any steps between the layers; the concavity increases with the angle of taper of the die and also with the amount of reduction at the draft. All the layers undergo a proportionate reduction in thickness and therefore the same relative reduction in area of cross-section.—E. L. Francis and F. C. Thompson: The drawing of non-ferrous wires. The power required to draw wire is directly proportional to the maximum stress of the original material. With tungsten carbide dies, the pull required is practically independent of the speed of drawing over a wide range. A comparison is made between the efficiency of steel, carbide, and diamond dies.—H. W. Brownsdon and E. H. S. van Someren: Application of the spectrograph to the analysis of non-ferrous metals and alloys. The possibilities and limitations of spectrographic methods are reviewed. Methods for the routine spectrographic examination of brass and some lead alloys are outlined, and tables are given indicating the relationship between impurity or minor constituent concentration and relative line intensities.—D. M. Smith: The spectrographic assay of some alloys of lead. The method is based on standards of known composition either synthetically prepared or determined by accurate chemical analysis. One of its great practical advantages is that it is very much more rapid than ordinary chemical assay of these metals. Spark spectra are preferred, as giving more consistent results than arc spectra. By simple direct comparison of spectra the constituents can be determined within the range 0.1–1 per cent, with an accuracy of 10 per cent.—John L. Haughton and Ronald J. M. Payne: Transformations in the gold-copper alloys, with an appendix on X-ray examination of gold-copper alloys, by G. D. Preston. By recording autographically the variation of resistance with changing temperature of alloys of composition ranging between 20 per cent and 70 per cent atomic of gold, and by measurements of the specific resistance of alloys slowly cooled to room temperature, the transformations in alloys with compositions in the neighbourhood of those corresponding with the compounds AuCu and AuCu₃ have been confirmed, and the presence of another transformation in alloys approximating to the concentration of compound Au₂Cu₃ has been established.—N. S. Kurnakow and N. W. Ageew: Physico-chemical study of the gold-copper solid solutions. Both annealed and quenched alloys were studied. The existence of the compounds AuCu and AuCu₃ has been confirmed by constructing isothermal diagrams of the electrical resistance, and the limits of the solid solutions have been indicated.—M. Cook and E. C. Larke: Physical testing of copper and copper-rich alloys in the form of thin strip. Consistent results for tensile strength and elongation are obtainable on all the materials down to and including 0.02 in. thickness. One of the most satisfying methods of measuring hardness is the diamond pyramid static indentation method. Cupping machines, although they may measure some kind of ductility and, if properly correlated, may afford a good sound indication of the behaviour of a material for cupping and drawing operations, are limited in respect of specification.

(To be continued.)

PARIS.

Academy of Sciences, August 3.—A. Lacroix: The tectites of the Philippines. These correspond closely in appearance and chemical composition with the

tectites from Indo-China, Malay, and Borneo, and have probably the same origin as the latter.—**Aimé Cotton**: Polarising prisms with normal field based on internal crystalline reflection.—**Charles Achard, Augustin Boutaric, and Maurice Doladilhe**: The physical properties of the blood serum and of the proteins separated from this serum by the acetone method in man and in some animals in the normal state. The experiments detailed show that colloidal suspensions made up from the proteins separated from a serum and a volume of water equal to the original volume of a serum possess a viscosity and an optical density practically identical with those given by the original serum. Hence the properties of the proteins separated by the acetone method appear to remain unaltered.—**Gabriel Bertrand and P. de Berredo Carneiro**: The active principle of guarana. The presence of a new alkaloid in guarana (Schar, Thoms, Nierenstein), not caffeine, is definitely negated by the author's work. He found 4.8 per cent of caffeine, and careful examination of this failed to show the presence of any other alkaloid.—**André Blondel**: Some new forms of the method of recording and observing the angular deviations of internal combustion engines. A neon lamp is substituted for the spark or arc lamp used in earlier methods.—**A. Bigot and J. Dubois**: The presence of the Ordovician in the Moroccan Anti-Atlas. This is proved by the discovery of an *Acidaspis Buchi* in an exceptional state of preservation near the base of the schists and quartzites of Djebel Tachilla.—**G. Pfeiffer**: The reciprocal relation between two systems of linear equations in involution.—**Jean Placinteanu**: The true vibration of ionised gases.—**J. Cabannes and E. Canals**: The Raman effect in a crystal of sodium nitrate.—**René Audubert and Jean Roulleau**: The rôle of the phenomena of photoconductance in the photovoltaic effect. The results of experiments described show that the phenomenon of photoconductance cannot be considered as the essential factor of the photoelectric effects: if it intervenes, it should be considered as a secondary phenomenon.—**G. Darzens and André Lévy**: The direct bromination of meta-cresol. The exact conditions for the direct bromination of meta-cresol to monobromocresol are given: the compound was proved to contain the bromine atom in the para position to the hydroxy group.—**P. Vayssière**: Some observations on the migratory acridians.—**Louis Bounoure**: The Golgian nature of a characteristic cytoplasmic element of the germ in the first stages of the development of the frog.—**A. Paillet**: Parasitism and symbiosis in the aphides.—**E. Landauer**: Study of a medium for cultivating the spirochæte of fowls.—**G. Delamare and C. Gatti**: Some characters of *T. rigidum*.

WASHINGTON, D.C.

National Academy of Sciences (Proc., Vol. 17, No. 6, June 15).—**E. M. East**: Immunity to sugar cane mosaic acquired by the host. Sugar cane infected with mosaic can throw off all pathological symptoms and remain apparently healthy for a time. It is not known whether reappearance of mosaic is due to re-infection or whether the mosaic virus is merely reduced in virulence. Strains subject to mosaic, though apparently healthy, give the same precipitin test as those definitely infected with mosaic, whereas strains never known to have mosaic react differently.—**D. C. Cooper and R. A. Brink**: Cytological evidence for segmental interchange between non-homologous chromosomes in maize.—**Andrew Watson Sellards**: The behaviour of the virus of yellow fever in monkeys

and mice. Yellow fever virus maintained by passage from brain to brain of mice loses its virulence for monkeys by ordinary routes of injection. Intra-peritoneal injection of such virus immunises monkeys against typical yellow fever virus; similar inoculation of man may sometimes be justifiable.—**Frederick D. Rossini**: The heat of combustion of methyl alcohol. A stream of air was saturated with the vapour and burnt at constant pressure in an oxygen atmosphere. An electrical method was used to determine the thermal effect (*NATURE*, 127, 506, March 28, 1931). The heat of reaction found was 173.63 ± 0.05 kgm.-cal. per mole at 15° .—**Eric G. Ball and W. Mansfield Clark**: A potentiometric study of epinephrine.—**William Hovgaard**: The distribution of stresses in welded and riveted connexions. Theoretical investigations suggest that when a girder of limited length is attached to a major structure subject to tension or compression parallel to the girder, there is marked concentration of shearing stresses at the ends of the girder, and their intensity is much greater than ordinarily supposed. Experimental evidence of the effect is given. This has important consequences in ship design and may account for fracture of deck plating at corners of deckhouses, hatches, etc.—**Harry Grundfest**: The relative effectiveness of spectral radiation for the vision of the sun-fish, *Lepomis*. The fish is placed in a cylindrical glass tank surrounded by a cylindrical screen of equal and alternate vertical bars and spaces. The tank is placed on a glass-topped table and illuminated from below. Light is reflected through the screen round the tank from the inside of a hollow truncate 45° cone. Rotation of the screen causes movement of the fish, which is usually motionless. The least amount of illumination (spectral energy) causing movement is determined for various regions of the spectrum; the wave-length of maximum efficiency is $535\text{--}545m\mu$, corresponding well with the maximum of the visual purple absorption ($540m\mu$). This indicates that visual purple is the photosensitive agent for dim vision. Substituting a fine wire mesh for the screen, measurements were made at bright illuminations. The maximum efficiency is then at $640m\mu$. This suggests that in fishes, as in man, there are two visual mechanisms, for dim and bright illuminations respectively.—**J. F. Ritt**: Systems of algebraic differential equations.—**Gordon Pall**: The number of representations function for positive binary quadratic forms.—**Edward Kasner**: Dynamical trajectories and the ∞^3 plane sections of a surface.—**Einar Hille and J. D. Tamarkin**: On the summability of Fourier series (4).—**W. T. MacCreadie**: On the stability of the motion of a viscous fluid.—**A. Adrian Albert**: Normal division algebras of order 2^{2m} .—**Edwin H. Hall**: Electric conductivity and optical absorption in metals, once more. A discussion of the results obtained by Meier and by Hagen and Rubens on the basis of the dual theory of conduction.—**W. W. Coblenz, R. Stair, and J. M. Hogue**: The spectral erythemic reaction of the human skin to ultra-violet radiation. Isolated spectral lines from a large quartz monochromator were used, and the time of exposure to produce a minimum perceptible erythema on the authors was determined. The wave-length range of the erythemogenic rays begins about $315m\mu$; the response wave rises abruptly to a maximum at $297m\mu$, descends less abruptly to a minimum at about $280m\mu$, and rises to a less intense maximum at about $250m\mu$. The erythema produced by the shorter wave-lengths is very transitory. The response curve is practically the same for different persons.