in the form of a sharply corrugated circle, and the negative electrode was placed in the centre, so that the resistance should be low, it varied from ·2 to 4 ohms according to the liquid used. The E.M.F. was practically constant during its determination, as the current drawn from the cell was only about ·001 ampere. The minimum cell was of similar form to the maximum, only the positive electrode was in the centre and was a wire of about 0·5 mm. diameter, and the negative electrode was in the form of a cylinder. By using cells of these forms he was able easily to change either of the electrodes or the electrolyte. The method of determining the minima electromotive forces was to short-circuit the cell for several hours, and immediately on opening the circuit to determine the E.M.F. The following are some of the results that he obtained with an electrolyte of acidulated water, 2 parts in 1000 being sulphuric acid :—

Electrodes		E.M.F. in volts	
Negative	Positive	Maxima	Minima
Zinc, ordinary	Carbon	1·22 ...	0·04
,, amalgamated ...	Carbon	1·26 ...	0·226
,, ordinary	Lead	0·55 ...	0·144
,, amalgamated ...	Lead	0·684 ...	0·152
,, ordinary	Copper	0·94 ...	0·194
,, amalgamated ...	Copper	1·072 ...	0·272
,, ordinary	Iron	0·429 ...	0·309
,, amalgamated ...	Iron	0·476 ...	0·323
,, ,, ...	Zinc, ordinary ...	— ...	<0·09
Iron	Copper ...	0·49 to 0·51 ...	—

AN experimental reproduction on the screen of the phenomenon of the solar halo has been recently brought before the Physical Society of Paris by M. Cornu. M. Cornu also discussed the phenomenon of the pink corona which has been visible around the sun during the past few months. He thinks it has its seat in the atmosphere at an elevation considerably higher than the level of the cirrus clouds which give the common ring-halo of 22°. According to M. Cornu the polarisation of the sky has been "profoundly modified" by the present phenomenon, especially when viewed through red glass.

SIGNOR A. RICCO sends us a lengthy memoir on a new form of electro-magnet invented by him. It consists of a sheet of iron rolled into a spiral round an iron core, the convolutions being separated by oiled paper. The current traverses the coiled sheet, which thereby becomes powerfully magnetised. A spiral of forty turns of insulated copper wire is added outside. The lifting power of this magnet appears to be very great in proportion to its weight.

A PAMPHLET on the system of simultaneous telephony and telegraphy invented by F. van Rysselberghe has lately appeared from the pen of M. Ch. Mourlon, secretary of the Société belge d'Electriciens.

DR. E. VON FLEISCHL recently communicated to the Viennese Academy a paper on the double-refraction of light in liquids. Concentrated solutions of tartaric acid and of various sugars were employed, also certain active oils, in a compound hollow prism resembling a Fresnel's quartz combination in its general disposition. The research proves the existence of doubly-refracting liquids; but they possess no optic axis. The wave-surfaces are in every case two concentric spheres.

CHEMICAL NOTES

ATTENTION was lately drawn in these Notes to Schiff's recent researches on the connections between the capillary coefficients of various liquid carbon compounds and the structure of the molecules of these compounds (see also NATURE, vol. xxx. p. 618). The same subject has very recently been examined by J. Traube (*Ber.* xvii. 2294). Traube thinks that the differences between the various capillary elevations observed by Schiff are too small to allow of trustworthy conclusions being drawn: he has therefore undertaken a series of observations with aqueous solutions of various classes of carbon compounds. Inasmuch as the capillary elevation of water in a tube of ·34 mm. radius is about 41·5 mm., while that of most liquid carbon compounds does not exceed 25 mm., Traube concluded that there will probably be well-marked differences between the capillary elevations of aqueous solutions, and mixtures of aqueous solutions, of definite concentration, of various compounds of carbon. The height in capillary tubes was determined for each solution for varying degrees of concentration, and the results are stated for equal weights of compounds in equal volumes of solution. From these results Traube draws the conclusions :—(1) The capillary elevation of the solution of a compound decreases as concentration increases; the differences of elevation are not equal for equal increases in concentration. (2) The capillary elevations decrease in a homologous series of carbon compounds as molecular weight increases. (3) Isomeric compounds in solutions of equal concentration do not always exhibit equal capillary elevations. Schiff's generalisation, that the number of molecules of isomerides raised by capillary action is equal, does not hold good for aqueous solutions of isomerides. As in Traube's experiments the liquids examined were of equal concentration, it follows that the ratios of the capillary elevations are equal to the ratios of the masses of the dissolved compounds raised in the capillary tubes. Calling the capillary elevation h, and the specific gravity of the solution s, Traube considers the product hs, which he calls the capillary coefficient of the solution. The value of h is conditioned by the chemical constitution of the compounds examined. If m = molecular weight of compound in solution, then the difference between $\frac{h}{m}$ for solutions of two compounds, within certain limits of concentration, is a constant which depends only on the relative concentrations of the two solutions. The values of $\frac{h}{m}$ for an homologous series, dealing with solutions containing equal masses of the compounds in equal volumes, are referred to the value of $\frac{h}{m}$ for the first member of the series, and the differences thus obtained, when calculated for a tube 1 mm. radius, are called the *specific capillary constants* of the compounds in the series. The values of this quantity are almost wholly dependent on the nature of the solution, perhaps only on the nature of the dissolved substance, and are independent, within certain limits, for each homologous series, of the absolute concentration of the solutions, and are scarcely, if at all, dependent on temperature. Traube thinks he is justified from his experimental results in concluding that the differences between the capillary elevations of the solutions of two analogous compounds are in the same ratio as the molecular weights of the compounds. Thus, let h_α and $h_{\alpha 1}$ represent the capillary elevations of two solutions, of different concentrations, of the compound with molecular weight m; and let h_β and $h_{\beta 1}$ represent the capillary elevations of two solutions, of the same concentration as those of the former compound, of an analogous compound with molecular weight m_1. Then, according to Traube,

$$\frac{h_\alpha}{m} - \frac{h_{\alpha 1}}{m_1} = \frac{h_\beta}{m} - \frac{h_{\beta 1}}{m_1};$$

therefore

$$\frac{h_\alpha - h_{\alpha 1}}{h_\beta - h_{\beta 1}} = \frac{m}{m_1}.$$

If, therefore, h_α, $h_{\alpha 1}$, &c., are determined, the ratio $\frac{m}{m_1}$ can be found; and if m is known, the value of the molecular weight of the second compound (m_1) can be calculated.

GEOGRAPHICAL NOTES

WE are glad to see that at last there is some probability of the almost unknown but certainly interesting country of Tibet being opened up to outsiders. We know the frequent but unsuccessful efforts which Prjevalsky and others have been recently making to penetrate to Lassa. But now the *Times* Calcutta correspondent informs us that the Regent of the Tashu Lama at Shigatze has sent a most cordial reply to the letter which Mr. Macaulay despatched to him from the frontier through the agency of the Governor of Kambajong, and has also addressed a letter to the Viceroy. With these letters, besides the silk scarves which ordinarily accompany Tibetan correspondence, the correspondent understands he has sent some relics of the late Tashu Lama himself, and has asked Mr. Macaulay to send him a Tibetan-English dictionary and phrase-book and some scientific instruments. This is the first official communication received from Tibet for about a hundred years. The correspondent suggests that the Government should put our relations on a firm footing by sending at once a friendly mission in connection with the identification which takes place this year of the infant in whom Tashu Lama is supposed to have been born again.

THE town of Bhamo, in Upper Burma, the destruction of which by the Kakhyen tribes is reported from Rangoon, is one well known in the exploration of South-Western China in recent years. The route so often traversed from Shanghai to Rangoon by the Yangtsze, Talifu, and the Irrawaddy passes through Bhamo. It is mainly a trading town, from which the caravans start into Yunnan, as here the navigation of the Irrawaddy ceases. The first modern explorer to visit it was Mr. Cooper, the traveller "in pigtail and petticoats," who journeyed so courageously throughout South-West China during the Mohammedan rebellion. The Indian Government was disposed at that time to pay more attention to a trade route into Yunnan than they appear to have been recently, and the importance of Bhamo on the route from British Burmah was recognised by the appointment of an agent to reside there, and gather information useful for commerce in these regions. Mr. Cooper, the most competent man for the post, was selected, but the good work which he was doing was cut short by his death one night in his tent near Bhamo, at the hands of one of his Burmese guards. At Manwyne, not far on the Chinese side of Bhamo, Mr. Margary was murdered in 1876, when on his way from the Yangtsze and Talifu, to meet Col. Browne's expedition, which advanced from Rangoon along the Irrawaddy, through Bhamo. A year later it was visited by the Commission of English officials under Mr. Grosvenor, which went to inquire into Margary's death; and, on account of the place being within easy reach of Rangoon and Mandalay by the river, it has been frequently visited by officials of the Indian Government, such as Cols. Browne and Fytche and Major Sladen. The latter's journey had for its object the removal of dangers to traders on the route from the Kakhyens, and he succeeded in coming to an understanding with the chiefs to keep the route open. Within the last few years McCarthy, on his way from Shanghai by the Japanese route, and Colquhoun from the capital of Yunnan, passed through the town. It was a small stockaded settlement of Chinese and Shan traders, with a lower order of Burmese, and there is a French missionary station at the place, while some Americans are also engaged in missionary work there and at Mauwyne. The Kakhyens inhabit the greater part of North-Eastern Burmah, between the Irrawaddy and Salween, and live mainly on the trade between China and Burmah, either as brigands and robbers or as carriers on the river and roads. In addition, they appear to trade a little on their own account. The grounds of their destruction of the town are unknown, but it is probably due to their predatory habits, the comparative wealth of the town as a central trading station in the region, and the weakness and incompetence of the native government of Upper Burmah, especially in a wild and remote border-land, such as that in which Bhamo is situated, and of which it is the capital.

AN interesting expedition has been undertaken by Mr. Shaw, a naturalist and artist of Sydney, New South Wales. He proposes to make a canoe voyage down the Lachlan, Murrumbidgee, and Murray rivers, his object being to enlarge our knowledge of the interior river-systems of Australia, and of natural history. The cost of the expedition is borne by the *Town and Country Journal* of Sydney, in which the artist's sketches will no doubt appear.

WE learn from the Australian papers that Mr. E. M. Curr of Victoria has been engaged on a work on the customs, language, and origin of the aborigines of Australia. Portions of the manuscripts were, early last year, sent to England to be submitted to the Council of the Anthropological Society. The Society has expressed the opinion that the Government of Victoria should publish the vocabularies and a record of the customs of the aborigines, as, otherwise, valuable information might be lost for ever. It is expected that arrangements will be made for the publication of the work at the public expense.

REPORT OF THE LONDON SCHOOL BOARD COMMITTEE ON TECHNICAL EDUCATION

WE are glad to publish the following Report on Technical Education which has been presented to the London School Board. The recommendations contained in it were passed on December 18, 1884, with a small modification in No. 5. The only one which received any serious opposition was No. 6, which relates to the Swedish Slöjd system, but this ultimately passed by a majority of two to one.

(1) *Constitution of Committee*

On February 1, 1883, the Board passed the following resolution:—"That a Special Committee be formed to consider and advise how far the Board may facilitate Technical Education, or co-operate with those bodies that are carrying it on."

On February 8, 1883, the Board resolved:—"That the Special Committee on Technical Education agreed to by the Board on February 1, 1883, consist of the following Members:—Mr. Roston Bourke, Mr. Bousfield, Mr. Bruce, Sir Edmund Currie, Miss Davenport Hill, Prof. Gladstone, Mr. Heller, Sir Arthur Hobhouse, Mr. Lucraft, Miss Muller, Rev. Henry Pearson, Mr. Lee Roberts, Mr. Whiteley, Mr. Mark Wilks, and *ex officio* the Chairman and the Vice-Chairman of the Board."

At the first meeting Prof. Gladstone was appointed Chairman of the Special Committee. Nine meetings of the Committee have been held.

(2) *Information from Gentlemen*

The Committee commenced their deliberations by endeavouring to obtain information from gentlemen who were interested in, and had studied, the subject.

The following gentlemen accordingly attended the Committee by invitation, and gave their views on the subject:—Dr. Silvanus P. Thompson, Professor of Natural Philosophy at University College, Bristol; Mr. H. Trueman Wood, Secretary of the Society of Arts; Mr. Philip Magnus, B.Sc., B.A., Director and Secretary of the City and Guilds of London Institute for the Advancement of Technical Education, and one of the members of the Royal Commission on Technical Instruction. The statements of these gentlemen are set out in detail in the Appendix to this Report.

(3) *Information from School Boards*

The Committee also obtained information from the clerks of the Glasgow, Manchester, and Sheffield School Boards respecting the steps taken by these Boards respectively for the instruction of children in technical education.

Glasgow, Allan Glen's Institution.—At the request of the clerk of the Glasgow School Board, Mr. A. Crum Maclae, Secretary of Allan Glen's Institution, Glasgow, replied, furnishing information respecting the technical instruction in that institution, and inclosing—(1) a prospectus of the school for 1883-84; (2) a report of the proceedings at the distribution of prizes and certificates in December, 1882; (3) a copy of a paper on the "Relation of the School to the Workshop," read before the Philosophical Society of Glasgow in December, 1882, by David Sandeman, Chairman of the Weaving Branch of the Technical College, and E. M. Dixon, B.Sc., Head Master of the Institution.

Manchester School Board.—The Clerk of the Board, in reply to the inquiry of the Committee, furnished information to the effect that the Board have no present intention of starting a technical school; that this work had been taken up by the trustees of the Manchester Mechanics' Institute, who have converted that institution into a technical school; that the Board have introduced a lathe and a group of joiners' benches into class-rooms of two of their schools, and each scholar in the higher standards of the school takes his turn at the manual exercises, receiving one or two lessons a-week, a joiner being present to give the instruction. No extra charge is made for the instruction. One of the schools is the lowest under the Board, where two-thirds of the children are admitted free, the other being attended by children of artisans and small shopkeepers.

Sheffield School Board.—The Clerk of the Board gave particulars respecting the admission, the examination, the fees, the subjects of instruction, and the results of the Central Higher School established in that town. In the workshop attached to the school the practical work contemplated will include—(1) the production of simple but perfect geometrical forms to teach accuracy and skill in the use of tools; (2) the construction of models in wood for use as examples in model drawing; (3) the construction of simple apparatus to illustrate, by actual experiment, the principles of levers, pulleys, wheel and axle, the crane and strain on beams with different positions of load; (4) the mechanics of the roof, arch, and bridge; (5) for more advanced pupils the construction of apparatus illustrating lessons in machine construction, applied mechanics, building construction, and mechanical engineering. It is added that there is a system of scholarships by means of which from fifteen to twenty specially clever boys and girls will be enabled to pass from the