various furnaces and factories, it is evident that observations for meteoric and volcanic dust should be made at elevated stations far removed from large cities. If a station were established upon Mount Shasta, California, as suggested by Mr. Gilbert Thompson, it would afford excellent opportunity for such observations. The station on Mount Washington is also favourably situated, and if regular observations were made at these stations and in Alaska for small as well as large quantities of such dust, and the sediments collected subjected to microscopical examination, the result would doubtless be of great interest.

Washington, D.C., March 25

THE POLAR CONFERENCE[1]

THE Fellows need hardly be reminded that it was at the suggestion of an Austrian, the late Carl Weyprecht, that this great international undertaking was set on foot, and accordingly Vienna was the most fitting city in which to welcome the several expeditions on their return to civilisation, and to discuss the best mode of utilising their labours.

The chiefs of nine expeditions were present at the meeting. The unrepresented stations were the two Russian ones, at Nova Zemlya and at the mouth of the Lena (at which latter station the observations will be continued until August 1884); that established by the Society of Science of Finland at Sodankylä, the German station in South Georgia, and the second American station at Lady Franklin Bay. As to the fate of the observers at the last-named locality there are unfortunately grave reasons for anxiety.

Most of the expeditions had brought home a collection of photographs, giving a vivid representation of their respective surroundings during their sojourn. Many of these possess ethnological interest, and one was humorous, as it showed the Dutch Arctic tin band, with instruments made out of preserved meat canisters.

I suppose my audience is aware that the Dutch Expedition was ice-bound and drifted about in the Kara Sea, ultimately saving itself in its boats. The ship was crushed in the autumn of 1882, but did not actually sink for six months, so that all the property was saved. Under such circumstances, however, it is no wonder that no magnetical observations were made.

As regards the publications, these are to be carried out independently in each country, but on a uniform plan. The meteorological observations are to be given in metric and centigrade measures; the magnetical according to the C.G.S. system of units.

The hourly observations are to be published in detail. The barometer observations are not to be corrected for gravity, but the value of this correction is to be given in the tables.

As regards terrestrial magnetism, besides the publication of the term day observations a detailed reproduction of all the observations for certain days of disturbance is to be given. A list of these days will be prepared by Prof. Wild.

All the members of the Conference are requested to collect data for earth currents for their respective countries during the period of the circumpolar observations. The auroral observations are to be published on the scheme proposed by Weyprecht.

As to the magnetic disturbances and their elimination there was, as might be expected, a long debate, but no definite resolutions were adopted.

The publication of a number of observations was left optional, such as evaporation, solar radiation, the resolution of the wind to four components, the calculation of wind-roses according as the pressure was above or below 760 mm., &c.

It is hoped that the whole of the results will have appeared by the end of 1885.

The Conference was most graciously received by the Emperor at an audience. The members were also entertained at a magnificent banquet on April 23 by Count Wilczek, at whose sole expense the Austrian Expedition to Jan Mayen had been fitted out and maintained during its stay.

The detailed report of the proceedings of the Conference will be published in French and German, and will appear before long.

[1] Notes on the Proceedings of the International Polar Conference, held at Vienna, April 17-24, 1884. Read at the Royal Meteorological Society by Robert H. Scott, F.R.S., President.

GEOLOGY IN RUSSIA

ALTHOUGH a large amount of geological work has been done in Russia, especially during the last twenty years, the geological exploration of this wide region has not been carried on in the detailed and accurate manner required by modern geology. An important step towards the attainment of more precise knowledge on this subject was taken in 1882 by the formation of a special Geological Commission intrusted with the geological survey of Russia. A yearly subsidy of 30,000 roubles was granted for that purpose by the State, to which must be added various occasional subsidies for special aims, supplied either by Government or by provincial assemblies and private bodies. This Commission has now published two volumes of its *Bulletin* and one fasciculus of *Memoirs*.[1] From these we learn that the chief work undertaken has been the preparation of a geological map of Russia on the scale of 10 versts (6·7 miles) to an inch. Russia has been divided into ten regions: Baltic, Central, Dnieper, Western Frontier, Volga and Don, Caspian, Ural, Crimea and Caucasus, Northern, and Finland. The survey has been started in several regions at once, each region being subdivided into three parts: (1) those which are well explored, and the maps of which already exist and could be employed for geological purposes; (2) those in which various isolated explorations have been made; and (3) unexplored parts. The explorations will be prosecuted first of all in the second of these three areas. The system of colours for the map will be adopted which was recommended by the Congress of Bologna. The explanations, as also the chief names, will be printed in French, side by side with the Russian text.

The first volume of the *Memoirs* contains a work by M. Lahusen, on the Jurassic fauna of the Government of Ryazan, written in Russian, with a summary in German. It is a complete enumeration of the Jurassic fossils of the region, the deposits of which belong—the black clay, with *Cardioceras cordatum*, to the Lower Oxfordian; the oolitic gray clay, with iron and *Cardioceras lamberti*, to the Upper Callovian; the gray and brown clays, with *Perisphinctes mosquensis* and *mutatus*, to the Middle; and the brown iron sandstone, with sheets of black clay and characterised by *Cosmoceras gowerianum*, *Cardioceras chamusseti*, and *Stephanoceras elatinæ*, to the Lower Callovian. The new fossils of the *Aucella* sandstone will be described by M. Nikitin. Eleven quarto plates illustrating a great number of species, many of which are new, accompany the paper.

The *Bulletin* (*Izvestia*) contains, besides the minutes of meetings, a number of preliminary reports of the geologists of the Survey, and the description, by M. Nikitin, of the sheet 58 (*Yaroslavl*) of the geological map of Russia. These notices are full of valuable information regarding the details of the geological structure of Russia. Among papers of more general interest we may mention Prof. Fr. Schmidt's report upon his explorations on the Baltic Railway, which embodies the results of his prolonged researches in the same region (vol. ii. fasc. 5). It has long been known that Esthonia is built up of Silurian formations, from beneath which rises the Cambrian Ungulite sandstone characterised by *Obolus apollinis*. After the emergence of the Silurian deposits, the country remained for a vast period a barren land undergoing atmospheric denudation. During this long lapse of time the terrace of the Glint, which runs from Lake Ladoga to Baltisch Port, was formed. During the Glacial period the country was covered with an immense ice-sheet, which moved south-west in its western parts, due south in the middle, and south-east in its eastern parts. The bottom moraine of this ice-sheet spreads over the country, and consists of a mixture of far-transported boulders with debris of the local rocks. It is the equivalent of the British Till and of the Swedish *Krossstensgrus*. It sometimes gets the local name of *Richk*. It rises into elongated hills or "drums," which extend also throughout the Government of Novgorod, and must be distinguished from the Åscar. These last, in the opinion of Prof. Schmidt, who indorses the explanation of A. Törnebohm, are shore-walls of those mighty sub-glacial rivers, so well described by Nordenskjöld, which circulate on the surface of the ice-sheets, and, after having found an exit through the ice, run beneath it.

During the first part of the Post-Glacial period the Gulf of Finland, and probably all the northern part of the Baltic Sea, formed an immense lake which subsequently was connected with the ocean, and received its brackish-water fauna. The level of this lake was about 60 feet higher than the present level of the Baltic. The presence of Baltic shells at greater heights in the north (the author of this notice found them at 124 feet, on

[1] *Izvestia geologicheskago Komiteta*, vols. i. and ii. (fasc. 1 to 6), 1882 and 1883.—*Trudy geologicheskago Komiteta*, vol. i. fasc. 1; 4to. (St Petersburg, 1883.)

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the northern coast of the Gulf of Finland, seven miles distant from the sea-shore) is explained by the increase of the rate of upheaval of the country towards the north. This old lake, like Lake Ladoga of our days, seems to have had but a poor fauna. Many smaller lakes which covered Esthonia, had a peculiar freshwater fauna. Gravel and sand, with *Ancylus fluviatilis*, like that found in Lake Baykal, and *Lymnæus ovatus*, as also *Neritina fluviatilis*, *Paludina impura*, *Unio*, and *Cyclas* are found at heights varying from 50 to 150 feet above the actual sea-level. On Œsel these deposits are widely spread, and descend to a level of 20 feet above the sea. At a still later period the lakes were filled with ooze, which constitutes now the so-called "marl of prairies" (*Wiesenmergel*) filled up with *Planorbis*, *Lymnæus*, &c., and containing also remains of man, together with bones of reindeer, as described by Prof. Grewingk.

In connection with this subject reference may be made to the conclusions arrived at as to the glacial formations by M. Nikitin, while making the geological survey within the limits of sheet 58 of the geological map of Russia, comprising Yaroslav and the eastern parts of Novgorod and Tver. The features of the Till, or Boulder-clay, which covers this region, are so much at variance with the theory of floating ice, which has been proposed to explain them, as well as with every other aqueous theory, and so much in conformity with the idea of a bottom moraine, that M. Nikitin has been compelled to admit the former extension of the northern ice-sheet of the Glacial period throughout the region of the Upper Volga (vol. ii. fasc. 3). The Boulder-clay of the Government of Poltava, sometimes 20 m. thick, consists of triturated, unstratified materials, partly derived from sources within the region itself, and partly brought from the north. It contains scratched boulders, and though undoubtedly of glacial origin, its precise mode of formation still remains in dispute, notwithstanding the careful attention given to the study of the question by M. Armashevsky (vol. ii. fasc. 6).

UNIVERSITY AND EDUCATIONAL INTELLIGENCE

CAMBRIDGE.—The Natural Sciences Tripos, Part I., commenced on May 17; Part II. will commence on May 29.

The examiners in the Mathematical Tripos of 1883-84 have reported that the work done in Part II. was on the whole disappointing, and inferior to that usually done in the old "five-days" examination. They suggest that this may be due to its taking place in the Easter Term, in which revision of subjects is usually much interrupted. In Part III. eleven candidates presented themselves, of whom seven were placed in the first division. The work was extremely good, the candidates having judiciously specialised their reading.

SCIENTIFIC SERIALS

Bulletin de l'Académie Royale de Belgique, February 2.—On the crepuscular phenomena of the months of November and December 1883, by F. Terby.—On the physiological action of aspidospermine (bark of *Aspidosperma quebracho*), by Dr. Closson.—Remarks on some Sanskrit verbal roots of the eighth class, by J. van den Gheyn.—Contributions to the biography of the portrait painter A. de Vries, and of the Flemish painter Theodore van Loon, by Auguste Castan.—Biographical notice of the Dutch painter Marin van Romerswael, by Henry Hymans.

March 1.—Note on the Pons-Brooks comet 1812, observed at Louvain during the winter of 1883-84, by F. Terby, and at Brussels by L. Niesten.—On an empirical relation between the coefficient of internal friction of liquids, and its variations under changes of temperature, by P. de Heen.—Preliminary communication on the anatomy of the Acarians, a group of Arachnidæ, by J. MacLeod.—On the changes of refrangibility in the electrical spectra of hydrogen and magnesium, by Ch. Fievez.

Journal of the Russian Chemical and Physical Society, vol. xvi. fasc. 1.—The dilatation of liquids, by D. Mendeléeff.—On the tension of vapour of solutions, by D. Konovaloff. The author has resorted in his measurements to a method much like that of Magnus, and gives the results of his measurements (illustrated by curves) for mixtures of water with alcohols and acids: formic, acetic, propionic, and butyric; they are followed by a discussion on the distillation of solutions, on mixtures, and on the solubility of liquids.—On an acoustic instrument for measuring the number of vibrations, by A. Izraïleff.—New demonstrations of the conditions of minimum of deviation of a ray by the prism, by K. Kraevitch. In most treatises on physics this demonstration is made by means of methods more or less artificial, excepting the treatise of Jamin, who has resorted to differential calculus. However long, M. Kraevitch's demonstration is very simple, and is deduced very naturally out of the fundamental laws of refraction.—On the friction of well lubricated bodies, by N. Petroff.

SOCIETIES AND ACADEMIES

LONDON

Royal Society, May 8.—"On a Relation between the Coefficient of the Thomson Effect and certain other Physical Properties of Metals." By Shelford Bidwell, M.A., LL.B.

Having observed that the coefficient of the Thomson effect is generally positive in those metals which have a great specific resistance and specific heat, and negative in those which are distinguished by a great coefficient of expansion, the author endeavoured to find an empirical formula expressing the coefficient of the Thomson effect in terms of the specific resistance, specific heat, and coefficient of expansion. Though he was not altogether successful, he believes that the subjoined table points to a close relation between them.

I. Metals	II. Coefficient of Thomson effect.	III. $H \times R - E^2$	IV. Last column divided by 2400
Ni	5·12	12320	5·13
Fe	4·87	9918	4·13
Pd	3·59	7086	2·95
Pt (soft)	1·10	2309	0·96
Pt (hard)	0·75	—	—
Mg	0·95	1384	0·58
Pb	0	− 604	−0·25
Al	−0·39	1942	0·81
Sn	−0·55	− 868	−0·36
Cu	−0·95	−1137	−0·47
Au	−1·02	−1172	−0·49
Ag	−1·50	−2246	−0·94
Zn	−2·40	−2355	−0·98
Cd	−4·29	−4958	−2·07

The first column contains the names of the metals, except alloys, given in Tait's thermo-electric diagram (*Trans. R.S.E.*, vol. xxvii. p. 125). The second column gives the coefficients of the Thomson effect: these are taken from Everett's table ("Units and Physical Constants," p. 151), which is based upon Tait's diagram.

H, R, and E being numbers proportional to the specific heats, specific resistances, and coefficients of expansion of the various metals, $H \times R - E^2$ gives the numbers in the third column of the table. $H =$ specific heat $\times 10^3$, $R =$ specific resistance $\times 10^3$, $E =$ coefficient of expansion $\times 10^8 \div 34$. The multipliers 10^3 and 10^8 were used merely for the convenience of getting rid of decimals; the divisor, 34, was so chosen that while the ratio of the first number to the last in Column III. should be as nearly as possible equal to the ratio of the first number to the last in Column II., the number corresponding to lead in Column III. should at the same time be as near zero as possible. Both conditions could not be exactly fulfilled at once. The authorities for the specific heats, specific resistances, and coefficients of expansion are given in the paper.

Column IV. gives the numbers in Column III. divided by 2400, to facilitate comparison with Column I.

It will be seen that with one exception the order of magnitude of the numbers in Column IV. is exactly the same as the order of those in Column II. The rate of decrease is not, however, the same, the numbers diminishing too rapidly in the upper half of Column IV., and too slowly in the lower half.[1]

[1] With regard to aluminium it is suggested that Matthiessen's determination of the specific resistance, 0·029, is possibly too high. Moreover the author found experimentally that the Thomson coefficient of the specimen of aluminium which he used was slightly + instead of −, as given in Column II.; it is also shown as + in the diagram at p. 178 of Jenkin's "Electricity." If its specific resistance were as high as 0·026, it would come between magnesium and lead in Column IV.

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