

the influence of ice sheets on the geographical distribution of plants. Prof. Thomas Meehan, the father of the latter, in a "Catalogue of Plants collected in July, 1883, during an Excursion along the Pacific Coast in South-eastern Alaska,"¹ had given reasons for believing that plants did not merely advance in the wake of retreating glaciers, or push into growth from material brought down in their advance, but that when caught under the mass of flowing ice, would remain for an indefinite period, retaining vitality, and push again into growth when the ice retreated. Prof. Meehan was led to this conclusion from finding no annual plants among those collected in the immediate wake of retreating glaciers in Alaska, while the actual number of species of perennials collected in such locations would be as great as if much time had been given for a floral advance. He had but little opportunity for actual observation as to the plants brought down with the earth carried on the ice, but so far as this went only *Epilobium latifolium* and *Dryas octopetala* were found in this condition, and scarcely any plants were observed on recently deposited moraines. These and some other facts led to the hypothesis that the plants were not migratory, but had held their position through the whole icy period.

These facts were supported by the determination of the existence of much the same flora in isolated spots of land recently bared by the névé of the inland ice, as grow away from the margins of the ice sheet, while the finding of living willow trunks, grass, and perennial plants of many years' growth close to the edges of retreating glaciers, seem to place the point beyond any reasonable doubt, especially when, after careful survey, through the construction and positions of the glaciers, there was the absolute certainty that the plants could not have been deposited by lateral, medial, or terminal moraines, though they might have been by ground moraines—a circumstance which would settle Prof. Meehan's position affirmatively beyond dispute, since the ground moraines are borne under the flowing ice rivers. Abundant vegetation was also found in nunataks—peaks of land projecting above the glaciers or ice cap—but little significance was placed on this circumstance, since all such nunataks visited were within a reasonably close proximity to the main land masses, and the vegetation might readily have sprung from seeds blown there by the winds or brought by mud on the feet of birds. But the demonstration of aged living plants in the other situations named must have a strong bearing on the discussions involved as to the influence of the ice age on the distribution of plants over the surface of the earth.

The abundance of lichens is characteristic of the flora of Greenland. Rocks supposed from a distance to be naturally coloured are found on closer inspection to derive their hue from a complete investiture of some lichen. In this particular the crimson cliffs, beginning at Cape York and extending many miles northward, are a conspicuous example. These cliffs, rising sheer from the water's edge to heights of from seventeen hundred to two thousand feet or more, though of grey granite, show no spot of the intrinsic colour even on being nearly approached, but present a uniform red appearance over their whole surface from a large orange red lichen which covers them.

In view of Schwendener's theory that lichens are but symbiotic forms of algae and fungi, it is to be regretted that the probably rich fields afforded by the latter named great families in this region have yet to be investigated.

Mosses are even more abundant than lichens. They grow in such vast quantities in spots, that their light or dark greens are visible often for some miles away, brightening the otherwise bleak shores wonderfully. Their persistence in growth under apparently adverse circumstances is also remarkable. No obstacle save the sea seems sufficient to stop their progress. Even dead glaciers have been and are being buried under the steady march of these cryptogamous plants. Mosses fulfil the same duty in Greenland that other forms of plant life perform in more favoured climes, and the amount of rich vegetable matter being deposited by them may be of great value in the future of that great arctic island.

UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

THE Rev. Bartholomew Price, Master of Pembroke College, has been added to the electors to the Savilian Chair of Astronomy on the present occasion.

¹ Proceedings of the Academy of Natural Sciences of Philadelphia, 1884.

SIR HENRY HOWORTH, F.R.S., has had the honorary degree of D.C.L. conferred upon him by Durham University.

OXFORD has conferred the degree of M.A. upon Dr. W. B. Benham, Aldrichian Demonstrator.

MR. W. FISHER, late Conservator of Forests in the North-West Provinces of India, has been appointed Assistant Professor of Forestry at Cooper's Hill.

SCIENTIFIC SERIALS.

American Journal of Science, June.—Electro-chemical effects due to magnetisation, by George Owen Squier.—Nikitin on the quaternary deposits of Russia and their relations to prehistoric man, by A. A. Wright. A summary of the views laid before the International Congress of Archaeology in Moscow, 1892, by the Russian geologist, Mr. S. Nikitin, regarding the palaeolithic and neolithic epochs in European Russia, and their coincidence with the geological divisions of pleistocene and modern.—Rigidity not to be relied upon in estimating the earth's age, by Osmond Fisher. A criticism of Mr. Clarence King's estimate of the probable age of the earth on the ground of its assumed rigidity not being an established fact. The argument derived from tidal action is fully discussed. Had the solid part of the earth so little rigidity as to allow it to yield in its own figure very nearly as much as if it were fluid, there would be very nearly nothing of what we call tides—that is to say, rise and fall of the sea relatively to the land—but sea and land together would rise or fall a few feet every twelve lunar hours. This would be the case if the geological hypothesis of a thin crust were true. This is the argument for tidal rigidity as enunciated by Kelvin. But this does not take into account the horizontal motion of the water. It rests upon the equilibrium theory of tides as against the canal theory. The latter has been symbolically worked out by Prof. G. H. Darwin. If the earth's interior be assumed to be a liquid of small viscosity, the bodily tide at its equilibrium value will have a height of $1\frac{1}{4}$ feet. This will diminish the hydrodynamical tide by not more than a fifth of its value, and it is quite possible that the tides we actually experience may be tides thus diminished by the fluidity of the earth's interior.—On the treatment of barium sulphate in analysis, by J. I. Phinney. The author shows that alkaline chlorides contaminate barium sulphate thrown down in the presence of an excess of sulphuric acid, and that the process of purifying by hydrochloric acid is inefficient. The only good method for purification is either to fuse, according to Fresenius, with sodium carbonate, extracting and reprecipitating as sulphate, or to evaporate from solution in concentrated sulphuric acid according to Mar.—On the nature of certain solutions and on a new means of investigating them, by M. Carey Lea. The solutions in question are those of sulphates which were tested for free sulphuric acid by a solution of iodoquinia, a very delicate and trustworthy test. Solutions of heavy metallic sulphates, with the exception of ferrous sulphate, contain no free acid. All sesquisulphates examined were dissociated in solution. So were acid salts and alums, with the exception of chrome alum.—Also papers by Messrs. Fairbanks, Moses, Penfield, Johnson, and Pupin.

Bulletin of the New York Mathematical Society, vol. ii. No. 8 [May, 1893, New York]. This number opens (pp. 175-178), with a review by Miss C. A. Scott of Prof. W. B. Smith's "Introductory Modern Geometry of Point, Ray, and Circle" (see NATURE, vol. xlvi. p. 532). We endorse her closing remarks that the usefulness of the book would be greatly increased if he were to translate his work into ordinary mathematical English.—Prof. Echols contributes an interesting note, biographical and otherwise, entitled Wronski's expansion (pp. 178-184). The expansion was presented by Höené Wronski in 1810, to the French Academy of Sciences, and is as follows:— $f(x) = a_0 + a_1 w_1 + a_2 w_2 + \dots ad infinitum$, where $f(x)$, w_1 , w_2 , ... are arbitrary functions of x , and a_0 , a_1 , ... are independent of x . The law of formation of the coefficients he calls "la loi suprême."—Dr. Cole, in a note on the substitution groups of 6, 7, and 8 letters (pp. 184-190), furnishes a list of over forty omitted groups supplementary to the lists given by Messrs. Askwith and Cayley in vol. xxiv. of the *Quarterly Journal of Mathematics*.—The *Mathematical Bibliography*, by A. Ziwei (pp. 190-192) gives in some detail an account of the new *Revue Semestrielle des Publications Mathématiques*, &c., issued by the Mathematical Society of

Amsterdam, to which attention has been drawn in our columns. The notice is on the whole favourable to this new venture.—The notes and new publications are well up to date.

Meteorologische Zeitschrift, April.—On the hypotheses of the oscillations of the so-called maximum zone of the aurora, and the peculiarities of the development of the aurora in this zone, by A. Paulsen. In 1872 Prof. Fritz asserted that the winter minimum of the aurora diminished with increase of latitude, and in 1880 M. Tromholt endeavoured to show that the maximum zone is in a state of continual oscillation, as it makes not only a yearly and eleven-yearly movement, but also a daily periodical change of position. Also that auroræ are more frequent in the morning hours than in the evening, and therefore that the maximum zone shifts to the northward during the night. The object of Dr. Paulsen's paper is to refute these assertions, and he quotes observations to show that the movement of the zone of greatest auroral display during the course of the night is not towards the north, and states that no single phenomenon exists that can be explained by a daily oscillation of the maximum zone, but that, on the contrary, all that we know about the daily range of the aurora points to the fact that no such movement can exist.—Relations of daily synoptic weather charts to the general circulation of the atmosphere, by L. Herrmann. Starting from the point of view that the resultants of the forces of the earth's rotation and of centrifugal force, in a stationary condition of the atmosphere, must be normal to the areas of equal pressure, the author shows how the normal distribution of pressure is solely a result of the difference of rotation of the atmosphere round the earth's axis, and of the rotation of the earth itself. On the basis of the distribution of pressure according to Maury's zones, there result three zones in each hemisphere:—An equatorial zone of easterly winds, a zone of westerly winds, and a polar zone of easterly winds, with corresponding changes of pressure. It follows from the decrease of temperature towards the pole that at a certain height the zone of westerly winds extends over the zone of easterly winds. The daily positions and extent of the zones are determined by the distribution of pressure in all latitudes, and their existence is a necessary consequence of the principle of the preservation of areas, but applied to the whole atmosphere, and not to individual particles as Ferrel has done. The author urges the importance of the continuance of synoptic charts, and of the desirability of telegraphic reports from Iceland and the Azores.

Bulletin de l'Académie Royale de Belgique, No. 4.—The most interesting paper is one by G. Van der Meusbrugge on negative hydrostatic pressure. It is well known that any horizontal layer of a liquid in equilibrium supports a hydrostatic pressure equal to the weight of a column of liquid, whose base is equal to the area of the layer considered, and whose height is the vertical distance of the layer from the surface. The author investigates the pressures existing in layers lifted up above the level, whether by atmospheric pressure, capillarity, or otherwise. In this case the hydrostatic pressure will be similarly calculated, but will be negative, so that it must be subtracted from the external pressure upon the surface of the liquid in order to obtain the true pressure on the layer. This conclusion is illustrated by a series of striking experiments. A test-tube was filled with water and withdrawn, mouth downwards, from the tank, leaving the mouth an inch or so below the level. A U-tube was closed with the thumb at one end, while the other was inserted in the test-tube. On releasing it, air was sucked into the test tube and the liquid reduced to the exterior level. A long cylindrical tube of paper, similarly filled with water and withdrawn, was flattened more and more towards the top, owing to the atmospheric pressure exceeding that of the liquid inside. The same reasoning applied to cases where the liquid was raised by capillary action, the distribution of pressure being the same as if the tubes had been closed at the capillary surfaces. A wide tube was provided with a closely-fitting cork, through which was passed a very fine tube. The liquid was held suspended in the wide tube owing to the capillary action of the surface in the thin tube, which was 4 cm. above the level. On introducing a U-tube as before, the water was again expelled by the air rushing in, and reduced to the external level.

Bulletin de la Société des Naturalistes de Moscou, 1892, No. 3.—Sources for the flora of the Kieff educational district (Kieff, Volhynia, Podolia, Tchernigov, and Poltava), by Comte Bourdelle de Montrésor, being a full bibliography of all publications relative to the subject.—Contributions to the ornithology of the

Transcaspian region, according to the researches of M. Thomas Barey, by J. Stolzmann. M. Barey travelled in the region in 1889-91 for the Branicki Museum of Warsaw. Of the 230 species mentioned in the detailed list now given, 17 are new for the region.—On the alkalies of the blood and the lymph, by J. M. Syechenov. Blood being not only the store for the food materials of the organism, but also the medium for breathing, it is desirable to ascertain the means of maintaining the composition of blood which is necessary for that purpose. The fact that the carbonate of sodium from the pancreatic and intestine juice enters the blood, is considered as a process for feeding the blood with necessary alkalies.—The Upper Tithonic deposits of Central Russia; note by N. Krischtafowitch.—Glaciers in Russia, by H. Trautschold. Remarks against the glaciation of middle Russia, based upon the old conception of only mountain glaciers being able to produce glacial effects.—The *Oleostephanus nodiger* zone near Milkovo in Podolsk, government of Moscow, by D. Stremoukhoff. New species, *O. milkovensis*, described.—Note on some special cases of the problem of several bodies, by Th. Sloudsky.—Short report upon geological and botanical excursions in Yaroslav and Vologda, by Dr. Zickendrath.—On the neurokeratin, by Dr. J. Ognell. This substance, in the sense established by Kühne and his followers, does not exist either in the peripheral nerves or in the brain; when obtained from the brain it represents a varied mixture of unsoluble remainders from the tissues composing the brain; the molecular substance (retina, brain) on the one side, and the neurokeratin in the peripheral nerves on the other side, cannot be considered as homological formations.—(id. No. 4). A list of the mammals and birds from the Aral steppes, by A. M. Nikolsky.—New species, *Astragalus uralsensis*, by Dr. Litvinov.—Note on the cold of January, 1893, by B. Sresnewskij.—To the memory of N. J. Kokcharoff and A. W. Gadolin, by V. Veradsky.

SOCIETIES AND ACADEMIES.

LONDON.

Mathematical Society, June 8.—Mr. A. B. Basset, F.R.S., vice-president, in the chair.—The chairman announced that the Council had unanimously made the fourth award of its De-Morgan gold medal to Prof. F. Klein, of Göttingen, on the ground of his many contributions to the advance of mathematical science. The following communications were made:—Complex integers derived from $\theta^3 - 2 = 0$, and on the algebraical integers derived from an irreducible cubic equation, by Prof. G. B. Mathews.—Pseudo-elliptic integrals and their dynamical applications, by A. G. Greenhill, F.R.S. Writing the Elliptic Integral of the Third Kind in the canonical form—

$$I = \int \frac{Pz + nx}{(z + x)\sqrt{Z}} dz,$$

where

$$Z = 4z(z + x)^2 - \{(y + 1)z + xy\}^2,$$

then x and y are the quantities employed by Halphen in his "Fonctions Elliptiques," t. i. p. 103. Putting

$$z + x = pu - pv,$$

where

$$12pv = -(y + 1)^2 - 4x,$$

and

$$z_m + x = pmv - pv,$$

then

$$z_1 + x = 0,$$

$$z_2 + x = x,$$

$$z_3 + x = y,$$

$$z_4 + x = \frac{x(y - x)}{y},$$

and so on; and generally $z_m + x$ is the same as Abel's $\frac{1}{2}g_{m-1}$ if we replace Abel's x by $\frac{px}{4b}$, and $1 + \frac{4ab}{p^2}$ and $1 - \frac{4ab}{p^2}$ by Halphen's $-x$ and $-y$ (Abel's "Éuvres Complètes," t. ii. pp. 157, 163). Abel's recurring equation for g_m is now only another form of this elliptic function formula—

$$p(u + v) + p(u - v) = 2pv + \frac{p^{1/2}v}{(1u - 1v)^2} + \frac{p^{1/2}v}{pu - 1v},$$