WEEKLY SUMMARY OF THE PROGRESS OF SCIENCE.

ASTRONOMY.

Siemens on solar physics. — In a recent lecture at the Royal institution, Sir. W. Siemens discusses the subject of solar radiation. He gives reasons for fixing the temperature of the photosphere at about 2800° C., based, first, upon the behavior of a rod of carbon and a gas-flame in the focus of a reflector exposed to the sun; second, upon a comparison between spectra of different luminous intensities; and, third, upon experiments for determining the relation between temperature and radiation made by means of an iridio-platinum wire a metre long, heated by an electric current. He finds the radiation to be expressible by the formula, Radiation $= Mt^2 + \phi t$, M being a coefficient due to the radiating substance. He discusses also the effect of diminished pressure in lowering the dissociation temperature of compound gases, and restates and advocates anew his last year's theory of the maintenance of the solar heat. — (*Nature*, May 3.) C. A. Y. [1061

Scintillation of stars as affected by the aurora borealis. — M. Ch. Montigny, observing for many years at Brussels, has noticed, as previous observers have done, that the scintillation of stars is much increased during the occurrence of an aurora. He has noticed, further, that every aurora 'produces immediately its effects upon the scintillation,' that stars in the north are most affected, and that the influence of the phenomenon is most marked for the stars which are observed across the upper regions of the air. Magnetic disturbances also, even when accompanied by no aurora visible at Brussels, increase the scintillation to a marked extent. On two occasions during July, 1881, the effect of magnetic disturbances was observed with no aurora visible in Brussels, or even, so far as can be learned, in any part of Denmark. — (*Comptes rendus*, Feb. 26.) E. H. H. [1062

Deviation of axis of meridian-circle. — M. Loewy of the Paris observatory gives two new methods of determining the azimuth constant of a meridian-circle. The first method depends on the following principle: if we take two points in the path of a star so that the chord joining them is approximately at right angles to the instrumental plane, and not greatly different in length from the polar distance, the inclination of the instrumental axis to the equator can be determined by readings of the instrumental declination and distances from the instrumental plane. Owing to the limited field, only those stars whose polar distances are about 1° 40′ or less can be used. About one hour and forty-six minutes before meridian-transit, simultaneous readings of the right ascension and declination micrometers are made, and also a reading of the circle. It is not necessary to record the time. After an interval of about three hours and a half, the series is repeated. The chord of the path described by the star during this interval will equal its polar distance. From these observations, we can deduce the inclination of the instrumental axis to the equator, and by means of this the azimuth constant, without using the right ascension of the star. The method gives thus an independent determination of the azimuth. The old method, that of upper and lower culminations of the same star, requires an interval of twelve hours, thus greatly increasing the uncertainty of the determination on account of instrumental changes; besides, for a large part of the year it can be applied to only one star, α Ursae Minoris

M. Loewy's second method, which he does not consider as good as the first, depends on observations of the distance of the star from the instrumental plane, time of observation being accurately noted. When both right ascension and inclination of axis are sought, it is best to observe these polars at an hour angle of about three hours. When the interval between observations is twelve hours, the inclination of the axis can be determined independent of the right ascension.

M. Loewy gives some results of determinations of inclination by his first method which show a very close agreement with the results given by that ordinarily employed. He believes that the probable error of his method will not exceed 0ˢ.02. — (*Comptes rendus*, April 16 and 23.) M. Mc N. [1063

MATHEMATICS.

Spherical representation of surfaces. — In a series of previous communications, M. Darboux treated the particular case of spherical representation when the spherical images of the lines of curvature form an orthogonal and isothermal system. In the present communication, he shows how the method previously employed conducts to the complete solution of the problem of spherical representation whenever this solution can be obtained in finite terms. Employing certain propositions due to M. Montard, the author arrives at the conclusion that we can obtain all the cases in which the problem of spherical representation is susceptible of a solution in finite terms, and that, whenever the problem of spherical representation has been solved in any manner for a system of orthogonal curves, we can derive from the obtained solution an entire unlimited series of orthogonal spherical systems. — (*Comptes rendus*, Feb. 5.) T. C. [1064

Motion of a material point. — In concluding a paper on a certain peculiar case of the motion of a material point, M. Gascheau considers the problem of finding the equations of motion of a material point acted upon by a central attractive force, varying inversely as the cube of the distance from the point to the centre of action. The trajectory is shown to be an hyperbolic spiral. The curve itself is discussed, and a formula is obtained for its rectification. Special phases of the motion of the point are also investigated. — (*Bull. soc. math.*, x. no. 7.) T. C. [1065

Partial differential equations. — It is impossible to do more than call attention to this memoir by M. Lemonnier, which treats of the integration of partial differential equations of the first order in n independent variables. The process followed is new, and decidedly simple and interesting; but an abstract can scarcely be given here without introducing a good deal of algebraical work. — (*Bull. soc. math.*, x. no. 7.) T. C. [1066

A differential equation. — Capt. MacMahon considers the differential equation,

$$X^{-\frac{2}{3}}dx + Y^{-\frac{2}{3}}dy + Z^{-\frac{2}{3}}dz = 0,$$

where X and Y are cubic functions of x and y respectively. The equation obtained from the above by dropping out the term in z has been investigated by Allegret (*Comptes rendus*, lxvi. p. 1144), who has obtained the integral in an irrational form. If a denote the constant of integration, Allegret's result is symmetrical in x, y, and a. Capt. MacMahon puts a equal to z, and obtains a solution of the above equation in the form of a rational algebraical integral.

Prof. Cayley adds an interesting note to this paper. — (*Quart. journ. math.*, Feb.) T. C. [1067

PHYSICS.

Optics.

Reversal of hydrogen-lines. — Liveing and Dewar communicate to the Royal society an interesting note, showing, that, when the induction-spark is taken between electrodes of aluminium at a pressure of two or three atmospheres, the reversal of *F* is easily obtained; that of *C*, only with difficulty. By spirting fine drops of water with a pipette into the electric arc, the hydrogen-lines become brilliantly, and, so to speak, 'explosively' visible for an instant, but without any reversal. — (*Nature*, May 3.) C. A. Y. [1068

(*Photography.*)

Iodide of silver in the emulsion. — Herr Schumann has been experimenting on emulsions sensitized by combinations of the iodide and bromide of silver. Capt. Abney, Dr. Eder, and Dr. Vogel found that the introduction of iodide diminished rather than increased the sensitiveness of the emulsion, while Herr Schumann obtained the opposite result. He now finds the cause of this discrepancy to be, that while the former authorities prepared their iodide and bromide emulsions separately, and then mixed them, in order to obtain accurate quantitative results, he has been in the habit of precipitating the two together in one and the same solution, as would be done in the practical working of the process. As prepared by the former method, the emulsion is of a pale yellow color; while, by the latter, it is darker and of a citron-yellow tint. The sensitiveness of the mixed emulsions is at a maximum in that portion of the spectrum lying between *F* and *G*. It has a lower maximum in the vicinity of the *H* line, and is practically insensitive to the region half way between *G* and *h*. The spectrum of the combined emulsion differs from the above in having a distinct maximum between *b* and *F*, and in its much greater sensitiveness to the less refrangible rays. —(*Brit. journ. phot.*, April 27.) W. H. P. [1069

Photographing the vocal organs. — Messrs. H. T. Wood, Behnke, and Cadett have recently succeeded in photographing the vocal organs in action. An electric light and laryngoscope were employed. It was necessary, in these experiments, to so arrange the light, that the singer should at the same time be enabled to see that the mirror was in the proper position, and also that the image was reflected directly into the camera lens. The light was placed by the side of the camera, and a little in front of it; and the rays were directed by means of a condenser upon a mirror placed immediately above the lens; this mirror being set at an angle of 45° so as to direct the light upon the subject. The condenser was furnished on the side next the lamp with a water-jacket, through which a current of water was kept flowing to prevent injury to the lens from the heat of the lamp. The rays from the first mirror were received upon the small laryngoscopic mirror placed at the back of the throat, and the image formed in this was reflected upon another small mirror fixed to the front of a drop-shutter; the object of this arrangement being to enable the person whose organs were being photographed to see when the image was properly directed. When this was done, he gave the signal to the operator, and the exposure was made. In some of the latter experiments, arrangements were adopted by which a pair of stereoscopic lenses could be used, one lens serving as a finder, and the other producing the picture. — (*Brit. journ. phot.*, April 13.) W. H. P. [1070

Electricity.

Resistance of the electric arc. — Ayrton and Perry, experimenting upon the electric arc between carbon poles, employing at times a battery of Grove cells, and at others a Brush dynamo, find, like Schwendler, that the resistance of the arc, including under this head both the resistance proper and the opposing electromotive force at the carbon surfaces, is nearly inversely proportional to the current. The following is given as a sample of the results obtained from a number of tests with Grove cells: —

No. of cells.	Current, in ampères.	Difference of potential between carbons, in volts.	Work, in foot-pounds, per second in arc.
30	6.52	30.4	146.2
40	10.16	30.4	227.8
50	11.92	30.4	267.2

Other experiments showed, that, when a given current was trebled, the difference of potential between the poles was slightly increased. The authors have also tested the relation between length of the arc and the difference of potential between the poles. A large number of experiments were made for this purpose with a Brush machine, giving currents varying between 5.5 and 10.4 ampères, the distance between the carbon points varying between 0 and $1\frac{1}{4}$ inches, and the difference of potentials from 0 to 140 volts, the carbons being 0.24 inch thick. The results are plotted, giving a curve for which the approximate equation is, —

$$E = 63 + 55a - 63 \times 10^{-10a},$$

where E is the difference of potentials in volts, and a the distance between the points in inches. — (*Phil. mag.*, May.) E. H. H. [1071

ENGINEERING.

The steamer City of Fall River. — The steamer City of Fall River, which has been recently added to the Fall River line between New York and Boston, exhibits some decided innovations. The engine, of 2,000-horse power, was designed and built by Messrs. A. & W. Fletcher of New-York City. It is a compound beam engine, fitted with the Morgan feathering paddle-wheels, and supplied with steam by a Redfield boiler, all of which features are unusual. The steam-cylinders are 44 inches diameter by 8 feet stroke, and 68 inches by 12 feet stroke. The wheels are 25 feet 6 inches in diameter. The boilers are of Otis steel, and are tested to 150 pounds pressure per square inch. The boat is 260 feet long, 41 feet beam, 17 feet deep. Over the guards the breadth is 73 feet. The draught of water, loaded with 600 tons of freight, is 12 feet. This steamer has made the 181 miles from port to port in $10\frac{1}{2}$ hours, and has made 17 miles an hour. The coal consumption is small, — 20 tons per round trip. — (*Sc. Amer.*, May 5.) R. H. T. [1072

CHEMISTRY.

(*Organic.*)

Oxidation of aromatic monamines and diamines. — When equal molecules of dimethylparaphenylendiamine and dimethylaniline in an aqueous solution with zinc chloride were treated with the

quantity of potassic bichromate required to furnish two atoms of oxygen, R. Bindschedler found that the following reaction took place: —

$$C_6H_4\overset{N\overset{CH_3}{CH_3}}{\underset{NH_2}{}} + C_6H_5N\overset{CH_3}{CH_3} + O_2 = C_{16}H_{19}N_3 + 2H_2O.$$

Dimethylphenylen green.

Tetramethylphenylsafranine ($C_{22}H_{18}N_4$) resulted when aniline was substituted for dimethylaniline. With two molecules of aniline, dimethylparaphenylendiamine gave dimethylphenylensafranine ($C_{20}H_{18}N_4$). Phenylensafranine was formed in the reaction, —

$$C_6H_4(NH_2)_2 + 2C_6H_5NH_2 + O_4 = C_{18}H_{14}N_4 + 4H_2O.$$

— (*Berichte deutsch. chem. gesellsch.*, xvi. 864.) C. F. M. [1073

A new synthesis of anthracene. — By means of the aluminum chloride reaction, using benzol and tetrabromethan, R. Anschutz and F. Eltsbacher obtained anthracene, —

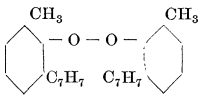
$$C_6H_6 + CHBr_2 - CHBr_2 = C_6H_4\overset{CH}{\underset{CH}{<\!\!>}}C_6H_4 + 4HBr.$$

—*Berichte deutsch. chem. gesellsch.*, xvi. 623.) C. F. M. [1074

Derivatives of meconic acid. — In Kolbe's laboratory a series of compounds has been obtained by Ost, which he regards as derivatives of the hypothetical body *pyridon* (C_5H_5NO). Pyromekazonic acid $\left(C_6H_3NO\overset{OH}{OH}\right)$ was made by the action of hydriodic acid upon oxypyromekazonic acid. It resembles the hydrochinones in that by careful oxidation pyromekazon ($C_6H_3NO \cdot O_2$), a substance analogous to the chinones, is formed. When treated with ammonia, comenic acid was converted into comenaminic, $\left(C_5H_3NO\overset{OH}{COOH}\right)$. Oxycomenic acid gave oxycomenaminic $\left(C_5H_2NO\overset{(OH)_2}{COOH}\right)$, which, by further oxidation, was converted into azoncarboxylic acid $\left(C_5H_2NO\overset{O_2}{COOH}\right)$. All the oxygen in comenaminic acid was replaced by chlorine when the acid was heated to 100° with phosphoric pentachloride, with the formation of pentachlorpicoline ($C_5H_2Cl_2NCCl_3$) and hexachlorpicoline ($C_5HCl_3NCCl_3$). Monochlorpicoline (C_6H_5ClN) was the chief product of the reduction of the acid by sodium amalgam. The decomposition products of comenic acid, when treated with phosphoric pentachloride, were perchlormekylen (C_5Cl_6) and hexachlorethan (C_2Cl_6). — (*Journ. prakt. chem.*, xxvii. 257.) C. F. M. [1075

Spontaneous decomposition of oxalic acid. — On allowing a dilute solution of oxalic acid containing .4 to .6 grm. to the litre to stand for several years in a closed vessel, G. Fleury found that the solution lost its acid reaction. Large clusters of a vegetable growth had developed, similar to that often observed in tartaric acid. In a more concentrated solution (6.3 grms. to the litre) there was no appreciable change at the end of four years. — (*Journ. pharm. chim.*, 1883, 388.) C. F. M. [1076

New bodies from coal-tar. — In fractioning a sample of coal-tar, H. Schwarz obtained a distillate between 320° and 330° which solidified. By fractional crystallization he separated three products which melted respectively at 95°, 104°, and 124°. Analysis showed the same percentage of carbon and hydrogen which corresponded to the formula $C_{28}H_{26}O_2$. Oxides of the composition $C_{14}H_{11}O_2$ were formed by oxidation; and by nitration they gave heptanitroproducts. The three substances were therefore designated as α-, β-, and γ-pyrocresols. The name pyrocresol was adopted provisionally, since further study is necessary to establish their constitution. The author thinks they may be forms of a ditolylditolylenoxide, —



— (*Sitzungsberichte kais. akad. Wien*, lxxxvi. 835.) C. F. M. [1077

METALLURGY.

Lead-smelting at Altenau, Upper Hartz. — The low grade of the available lead ores, and the failure of the iron-rich copper slags from Oker, have necessitated a change in the process of smelting. The method now used is as follows: the ores are roasted in a single hearth reverberatory furnace until changed to oxide and silicate of lead, then smelted in a blast-furnace with the addition of 20% of raw ore to make a matte of all the copper. The ore must be crushed quite fine, namely, not over 2 mm. in size, and should contain about 15% of silica to 60% of lead, to give the best results in roasting. The charge for the blast-furnace is planned for a lime-iron slag. The lime-slag, which was at first tried, failed on account of the amount of zinc present. The cost of this process is not much less than the old method; but the Oker residues are at present used elsewhere, and are consequently not available, and, besides this, the furnace smoke is avoided. The process yields 98.5% of the lead, and the yield of silver is larger than the fire assay indicates. — (*Zeitschr. berg-, hütt.- sal. wesen*, xxxi.; *Eng. min. journ.*, March 24.) R. H. R. [1078

GEOLOGY.

The coal and mineral fields of Indo-China. — E. Fuchs, ingénieur en chef des mines, gives a long account, with maps and sketches, of his mission to Cochin-China, assisted by E. Saladin. The following formations are figured on the general map: granitic rocks, porphyritic rocks, volcanic rocks, ancient rocks, carboniferous or Devonian limestone, coal-basins, variegated sandstones and clays. The ancient rocks referred to the Silurian are unfossiliferous. The overlying schists and sandstones are referred to the Devonian; they contain fragments of a large crinoid, and imperfect impressions of a bivalve, probably an Orthis; and they are frequently cut by veins of quartz, which are sometimes auriferous. The carboniferous limestone plays an important part in the geology of Indo-China: it is five hundred or six hundred metres thick, and contains fragments of Zaphrentis; it is a fine-grained, compact, crystalline limestone, and might be utilized as a marble. Resting in discordance of stratification on this, is the thick clay and sandstone formation, which at its base contains the coal-beds whose study has been the chief object of the investigation. The base of the system is characterized by the felspathic nature of its sandstones, and their prevailing gray color. The principal coal-basins actually found are those of Tong-King, of Yun-Nan, of the province of Tinh-Hoa, of Nong-Sön (Annam), and of Laos; notably, that of Bas-ac, on the Mé Kong. Above the coal-beds come the series of variegated sandstones and clays: their thickness is estimated at a thousand metres; they contain no fossils, but beds of salt-bearing clays, and sandstones impregnated with copper. The upper mesozoic and tertiary beds have not yet been found in Indo-China.

The ancient and modern alluvial deposits are very extensive. The exploration failed to find the zinc and copper localities that were mentioned to them in Tourane, and did not extend so far as to reach the important tin-veins of Laos and Yun-Nan.

Mr. Zeiller, in his study of the fossil flora of the coal-beds of Tong-King, from material brought back by Mr. Fuchs, and in part collected by Mr. Douzans, reports twenty-two species, of which two are new. Out of the twenty remaining, ten are identical with European species, confined exclusively to rhetic beds. Of the remaining species, five belong to the lower Gondwánas, and four to the upper Gondwánas, while one belongs to both. From this there would seem to be strong reason for considering the coals of Tong-King as of rhetic (upper triassic) age, having analogies with the coals of India (Gondwánas), of South Africa (Karoo series). The coal-basin of the Ternera in the desert of Atacama, between Chili and Bolivia, also contained only rhetic species; and in our own country we have probably analogous beds in the Richmond and North Carolina trias (cf. **1086**). — (*Ann. des mines*, (8), ii. livr. 5.) J. B. M. [**1079**

Glacial depression of Scotland. — R. Richardson reviews all the localities at which arctic shells have been found associated with the drift in Scotland, and shows that arctic species not now living in the British seas have been discovered at various high levels throughout Scotland, ranging from 90 to 510 feet above tide at fourteen stations. At lower levels, such discoveries have been much more frequent. The shells are generally referred to interglacial deposits. A neatly drawn map illustrates the paper (*Trans. Edinb. geol. soc.*, iv. 1882, 179). In the same volume, D. Milne-Home devotes part of his inaugural address to the evidence favoring the iceberg theory, stating, that, when due regard is paid to the general south-easterly transport of bowlders at various parts of the United Kingdom, it is difficult to account for such an extensive operation, except by bergs floating in the sea over the submerged land (*Ib.*, 124). — W. M. D. [**1080**

Glaciation of Norway. — H. M. Cadell describes the plateau mountains of Norway as an old surface of denudation, now lifted above its former base level of erosion, and greatly roughened by subsequent erosive action. He agrees with Penck in maintaining that there is a fundamental difference between Swiss and Norwegian glaciers ; the former originating in sloping fields of *névé*, while the latter are overflows of upland ice-sheets. Three glaciers descend from the ice of the Folgefond, and twenty-three from the great Justedal ice-plateau. These upper sheets are regarded as small examples of the present Greenland ice, and as remnants of what once 'extended over the whole of northern Europe.' The fiords are described as 'most typical examples of true ice-formed rock-basins,' and it is stated that there is no evidence of fracturing or faulting in the rocks about them (although Kjerulf has shown the contrary statement to be true). — (*Trans. Edinb. geol. soc.*, iv. 1882, 227.) W. M. D. [**1081**

GEOGRAPHY.

(*Alpina.*)

Hygiene of mountain climbing. — Dr. Brenner advocates exercise in the high, fine air of mountains as the best protection against the diseases contracted in city life. The characteristics of the mountain climate are the low temperature and air-pressure, the low relative humidity, the high per cent of ozone, the strong light and insolation, the freedom from dust and bacteria. All these act well on the bodily health. The lungs work with greater strength, the heart beats faster, the blood circulates more quickly, appetite is increased, perspiration becomes freer, the muscles become more energetic, and the whole body gains in strength and endurance. — (*Mittheil. deutsch. oest. Alpenv.*, 1882, 284.) W. M. D. [**1082**

Geographic nomenclature. — A chapter of definitions of Alpine words used in Trient is contributed by Apollonio, with a valuable pictorial supplement of thirty-seven figures, showing as many types of mountain form. Six cuts illustrate passes, and sixteen are given to peaks, the latter being chiefly of the acute form characteristic of the dolomites. Unfortunately it is not specified whether the figures are taken from nature. The style of work may be commended to our own mountain clubs. — (*Ann. soc. alp. trident.*, viii. 1882, 329.) W. M. D. [**1083**

(*Arctic.*)

Arctic notes. — Kumlein's researches among the Eskimo of Cumberland Inlet during the Howgate expedition are summarized and reviewed in the *Deutsche geographische blätter*, heft ii. 172–178. —— For the promotion of traffic with Siberia, it is proposed to construct a canal in about latitude 58°, connecting the Yenisei and the Ket branch of the Obi River. The distance is about twenty miles from water to water, but much improvement of the Ket, and a small branch of the Yenisei called the Kas, will be necessary before through navigation will be practicable. An investigation by official engineers is in progress; and, if the difficulties are no greater than anticipated, the work can be rapidly finished, and at a reasonable cost. At present, there are more than fifty steamers on the Obi, while in 1854 there were but two. —— The U. S. coast-survey has issued several new charts of the Alaskan coast. One covers part of the coal-fields of Cook's Inlet, and several glaciers bordering on Kachekmak Bay; another includes the codfishing grounds of the Shumagins, the sea-otter region of the south shores of Aliaska peninsula, and the peninsula itself from Coal Cape to Issannakh Strait. It is partly compiled from published data, but includes much new and important information on both sides of the peninsula. —— The position which should be taken by Germany, in regard to polar research, was discussed at the first day's meeting of the German geographers at Frankfurt, in March. —— Karl Pettersen has printed a scheme for international polar expeditions, which includes stations at Bering Strait, North Spitzbergen, and the north-east coast of Novaia Zemlaia, which should be occupied during summer, for ten years, making observations, watching the changing character of the seasons each year, making short expeditions northward, and annually visited by recruiting vessels, which should bring back the staff of observers at the end of the season. Something of this kind has been done by the more intelligent traders and whalers who annually visit these seas, but whose observations are rough, not comparable, and often lost entirely. Still more near to Pettersen's idea is the plan adopted by the Dutch, whose little schooner, the Willem Barents, has just sailed on her sixth cruise in the arctic European seas, and has each season brought back carefully systematized and comparable observations. —— The fourth number of the *Mittheilungen* of the international polar commission contains a number of notes and letters from various stations. The Lena station, on Sagastir

Island, is comfortably housed on the right bank of the Sagastir mouth of the river in latitude 73° 22′ 30″ north, and east longitude 126° 34′ 56″. Firewood and whitefish were abundant. November was very clear, with little snow, which interfered with reindeer-stalking. Dr. Bunge, the surgeon, had the misfortune of breaking a rib through a fall, but was doing well, and was visited by many Tungusi, who wished for medical advice. —— The last number of the Irkutsk bulletin contains four months' observations of the temperature of the air, by Ivan W. Pavloff, an exile, at the village of Marsha, the period covering August to November, 1882.—— A communication from the Danish ministry to the Parliament gives an account of the condition of the colonies in West Greenland for the year 1882. —— It is stated that the plans of Dr. Boas for his studies of the Innuit of Cumberland Inlet and vicinity embrace a visit this fall to Iglulik, and a return to Cumberland Inlet *viâ* the unknown west shores of Baffin Land, wintering at the station ; and, next year, an investigation of the little-known tribe of Eclipse Sound and Pond Inlet, returning by the most convenient whaleship. — W. H. D. [1084

(*South America.*)

Bove's Patagonian voyage. — Lieut. G. Bove gives a narrative of his unfortunate voyage southward from Montevideo, whence he sailed Dec. 25, 1881, to Santa Cruz, on the eastern coast of Patagonia, Staten Island, the easternmost of the Fuegian Archipelago, and other islands near Cape Horn, until his wreck in Hammacoja (Sloggett's Bay) on May 31, 1882. Santa Cruz is described as the fittest centre for the population of southern Patagonia, having a tolerable anchorage, and fair supply of water and wood, and a climate not too severe. But it is a poor place at best; for the surrounding country is dry and desolate, and the strong currents are continually shifting the sand-bars in its river-channel. The spring tides rise 16 met., and produce a violent bore. Forty days were given to a careful exploration of Staten Island: it is very mountainous, with peaks rising to 850 met., and a deeply indented shore-line; its rocks are mostly schists and quartzites, with nothing more recent than carboniferous strata; evidence of glacial action is distinctly found in old moraines and numerous lakes; and peat bogs of great area occur not only near sea-level, but on the mountain flanks as well. Further description of this region may be given in later reports. The islands next explored near Cape Horn are seldom visited; and one regrets to find so little description given of them in Bove's account, although as a simple narrative it possesses much interest. While the southern islands were extremely barren, a better country was found farther northward along the deep fiords; as, for example, about the successful English mission at Ustchiuvaja, — a fine site, with good anchorage, and sufficient wood and water, and pasturage for cattle, on the On-astchiaga (Beagle Channel). Bove compares the snowy Sarmiento peak (2,300 met.) to the finest of Alpine scenery: it gains from contrast with the sea what it loses in absolute height. Extended glacial action is often referred to; but, in the mention of rounded rocks and abandoned moraines, there is again need of more definite statement. Recent glacial retreat was shown by the interval of 100 met. between the foot of the Negri glacier and its nearest terminal moraine. The final wreck of the vessel was occasioned by the selection of an anchorage, unprotected on the southeast, where a rising storm exposed it to such severe weather and waves, that it was hastily decided that the only chance of safety lay in running ashore. This was accomplished without loss of life, and much was saved from the stranded vessel. After five days' waiting, their only boat was launched, and a few men returned in it to the English mission aboved named, whence the mission vessel, Allen Gardiner, was at once despatched, and rescued the entire party on June 10, after they had been somewhat disturbed by a band of natives. A rough outline map, and some views of doubtful accuracy, are among the few illustrations; those of the Fuegians, accompanying the author's special description of the Jagan tribe of the southern islands, being much better. Reports on zoölogy, botany, and geology, by Vinciguerra, Spegazzini, and Lovisata, all members of the expedition, give information of technical value (cf. **1100**). — (*Boll. soc. geogr. ital.*, viii. 1883, 5, 89.) W. M. D. [1085

(*Asia.*)

Indo-China. — A successful search in certain parts of this peninsula for coal, iron, and gold, gave M. Edmond Fuchs opportunity to note some of its physical peculiarities. Its larger features are: the valley of the Red River (Song-ka) or Tonking, fertile and open, occupied by 12,000,000 inhabitants, and containing valuable coal of early mesozoic age; next westward, the granitic plateau of Laos (Annam), flanked with ranges of ancient slates, abruptly descending to the coast on the east, and with a long slope to the west into the valley of the Mekong, — a great river 1,800 miles long, with a rapidly growing delta, which is included in French Cochin-China. The daily discharge of this stream is estimated at almost 4,000,000,000 cubic metres, with a thousandth part of silt. By the extension of the delta, an old bay between mountain spurs on the north-west has been shut off, and now appears as the great Cambodian Lake, nearly two hundred miles inland. At the time of high water, the Mekong rises some forty feet, and reverses the current in the lake's outlet, flooding it with muddy water, and thus filling the lake from its lower end. Interesting notes are added on the native population, and further details are given on the geology and mineral resources of the vast region (cf. **1079**). — (*Rev. scient.*, 1883, 482.) W. M. D. [1086

BOTANY.

Experiments upon variation in plants. — In the botanical garden in Giessen, Prof. H. Hoffmann has conducted for many years an interesting series of researches upon variation, the results of which have been published from time to time, with little or no comment. The last notice gives a few facts relative to constancy of color, which may be briefly stated as follows: Adonis aestivalis, pure red, self-sown for 15 years, 410 plants in 15 generations, without any change of color; same species, yellow variety, no change in 13 generations.

Hieracium alpinum is regarded by Kerner as a plant which cannot thrive on a lime soil. Hoffmann obtained, however, good seeds from specimens grown in soil rich in lime, and afterwards carried on a series of observations relative to the variation of the species in soil both with and without lime. He found the widest variability as regards the branching and leaves; but, with the most divergent forms, he had also in every generation a few perfectly typical plants. — (*Bot. zeit.*, April, May.) G. L. G. [1087

Pollination of Rulingia. — According to Urban, several species of this Australian genus of Byttneriaceae possess curious adaptations to crossing by insect aid. The flowers are small (one cm. or less in di-

ameter) and whitish. The pistil secretes nectar, which collects about it or in the hollowed petals. At first the stigma is closely covered by five dilated staminodia, closely inflexed over it for a time, but later separate. In R. pannosa there is well-marked protandry, the staminodia not separating, nor the stigma maturing, until the stamens are all dehiscent. R. corylifolia, on the other hand, is synacmic, the expansion of the sepals and the dehiscence of the stamens occurring in regular succession, and being closely followed by the successive removal of the staminodia from the mature stigma. R. parviflora is intermediate between the two species already mentioned. Its flowers assume a rosy color with age, like those of Trillium grandiflorum, Weigelia, etc. — (*Sitzungsb. deutsch. bot. ges.*, 1883, i.) W. T. [1088

Pinus koraiensis Sieb. and Zucc. — Through the kindness of Chief Engineer G. W. Melville, U.S.N., Mr. Josiah Hoopes had received some specimens of this interesting species of pine collected during the voyage of the unfortunate Jeannette. They consist of a branch clothed with foliage, two immature cones, and a few mature seeds from eastern Siberia. The trees were seen along the banks of the Lena, the Yenisei, and the Obi rivers, growing to a height of about thirty feet, with trunks about ten inches in diameter at base. The collector further states that it fruits abundantly, and that the edible seeds are used by the natives as food, and by travellers as nuts. It is interesting to note that this heretofore comparatively rare species has a wider habitat, and is more numerous, than has generally been supposed. Siebold found it in Kamtchatka, and various authors have described it in the list of Japanese Coniferae as a rare introduced species.

This nut-bearing pine is well marked throughout, and especially so in its cones and seeds, the latter being wingless, sub-angulate, flatly compressed, leaving on both sides of the scale, when removed, remarkably deep impressions. The cones are very distinctive, with long reflexed scales, terminating in an abrupt mucro-like apex. Murray, in his Pines and firs of Japan, records its height as from ten to twelve feet; but Parlatore, on the authority of Perfetti, gives it as 'sometimes thirty to thirty-three feet.' The latter is corroborated by Mr. Melville, thus indicating that the tree is a true northern species, attaining its greatest size only near the extreme limits of arboreal vegetation. It will, no doubt, make a valuable addition to our list of ornamental conifers, as its hardiness is unquestioned, and the foliage is as attractive as any other of the white-pine group, with the exception, perhaps, of P. excelsa. In England it has proven reliable, and the small plants cultivated by Mr. Hoopes show evidences of success. — (*Acad. nat. sc. Philad.; meeting* May 8.) [1089

ZOÖLOGY.

Coelenterates.

Recent researches upon the Pennatulida. — As the result of a prolonged study of Renilla, Dr. Wilson gives a brief summary of his results and conclusions upon the following topics: the segmentation of the egg and the formation of the germ-layers, the formation of the organs and tissues of the axial polyp, the origin of the community by budding from the axial polyp, the significance of the polymorphism and bilateral symmetry of the community.

During segmentation the division of the nuclei appears to be nearly regular; but the vitellus may either divide with the first division of the nuclei, or it may remain at rest until a much later stage. In some eggs the first division of the vitellus was into thirty-two spheres. After segmentation the ectoderm is separated by delamination from the solid central endodermic mass, and the supporting layer is secreted from the inner ends of the ectoderm-cells.

The gastric cavity, which has at first no communication with the exterior, is formed by absorption of the central endoderm-cells by those which are more peripherally placed, and the oesophagus is formed as a solid invagination of ectoderm. Its central end is not simply perforated, but absorbed, during the formation of the mouth. The peduncular septum consists of three layers of endoderm-cells, and the author therefore believes that it is morphologically a fused pair of septa. The muscles are developed as processes from the bases of the endoderm-cells; and the cell-body, in many cases at least, becomes reduced to a small granular mass enclosing the nucleus, and closely applied to the side of the muscular fibre. The apicules are developed in the interior of cells, and are of two kinds (ectodermic and endodermic), which differ much in form and size

The buds which are to form the sexual polyps are developed along the axial polyp in pairs, as two simple lateral rows, and each of them soon becomes a secondary axis for two rows of buds which appear in the angles between the older buds. The law of budding is the same for the zooids and polyps.

The hauptzooid is formed at an early stage as a median bud upon the axial polyp; and its function is to discharge water from the colony, while the other zooids draw in water, as do also the young sexual polyps, but not the adults. Wilson therefore concludes that the zooids are homologous with young sexual polyps; that they are polyps in a state of arrested development. He believes that the polymorphism of the community has not been brought about by the gradual specialization of an undifferentiated community, but that the ancestors of the zooids never possessed a higher organization than at present. He believes that the bilateral symmetry of the community has been directly determined by the bilateral environment, and he holds that Renilla is descended from a form like the Bathyptileae, and not, as Kölliker believes, from a primitive simple 'Archyptilum.'

The paper is an abstract of an extended monograph which is to be published in the *Phil. trans.;* but the author is an American naturalist, and the researches were made upon the coast of North Carolina. — (*Proc. royal soc.*, no. 222.)

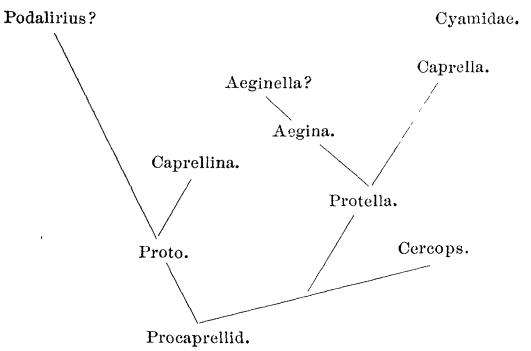
Living specimens of the very rare genus Funiculina have been obtained near Lisman Island, and they have been observed and studied by A. Milnes Marshall and William P. Marshall. The immature or young specimens have all the characteristics of Funiculina Forbesii (Verrill), while the full-grown ones are typical specimens of F. quadrangularis (Pallas); and the authors therefore reject Verrill's identification of the northern form as a new species. The paper contains a revision of the literature of the Pennatulidae, and an account of the general anatomy of Funiculina, Virgularia, and Pennatula, but it adds very little to the researches of Kölliker and others. — (*Rep. Oban Pennatulidae.*) W. K. B. [1090

Hydro-medusae without digestive organs. — Dr. Lendenfeld describes a new sub-family of hydroids, Eucopellinae, in which the medusa has no digestive organs, and lives only a short time after its escape from the genophore. Only one species, Eucopella campanularia, is known, and this is found in Australia. The larva is a campanularian whose hydranths are carried upon short, unbranched stems, which

spring from a creeping root. The medusa has a veil, well-developed marginal sense-organs, radial and circular chymiferous tubes, and large reproductive organs, but it has no mouth, stomach, or tentacles. It discharges its reproductive elements within twenty-four hours after its liberation, and it lives only about thirty-six hours. — (*Zool. anz.*, April 16.) W. K. B. [1091

Crustaceans.

Monograph of the Caprellidae. — In the sixth of the series of beautiful zoölogical and botanical monographs published by Dr. Dohrn's station at Naples, Dr. Paul Mayer treats of the bizarre crustaceans belonging to the family Caprellidae. The systematic part of the work (pp. 16–90) is the most important, being not barely descriptions of the species found in the Bay of Naples and its neighborhood, but a revision of all the known species of the world. The systematic part is followed by an account of the anatomy, histology, and habits. The few pages (165–168) devoted to development do not add much to the little previously known through the studies of Gamroth. Mayer concludes that the families Cyamidae and Caprellidae are closely related, and form a natural group, Laemodipoda; that the Cyamidae are a later group than the Caprellidae, and are derived from a genus very near Caprella; that the Laemodipoda form a group of the Amphipoda, and are most closely related to the gammaroid Amphipoda. The author's conception of the relationship of the eight known genera of Caprellidae is expressed in the following genealogical tree.



As nothing is known of the paleontological history of these animals, and but little of the development, this phylogeny is founded almost exclusively upon the adult structure. The species found in the Bay of Naples, together with anatomical and histological details, are figured on ten lithographic and photo-lithographic plates. — (*Fauna u. flora golfes Neapel*, vi. 1882.) W. F. [1092

Insects.

Color-preferences of insects. — Müller gives a general *résumé* of the results so far reached, with a brief account of the literature. — (*Biolog. centralbl.*, 1883, no. 4.) W. T. [1093

Illustrations of American butterflies. — In the eleventh part of his Butterflies of North America, Mr. W. H. Edwards furnishes plates of more than usual interest, and of a fidelity to nature which we have come to expect from this source. They have, indeed, never been surpassed, and it would be difficult to point out an error of delineation. The plates of this particular number do not show such a wealth of varietal illustration as some of the previous ones; but each of them presents new biological features. The first represents four species of Pieris, with larva and chrysalis of two of them (Sisymbri and Beckeri) from drawings made in southern California by Mead; the egg of the former is also given. The second plate is entirely given to Limenitis Eros, and illustrations are given of every stage of the larva (seven figures), of the egg and chrysalis, besides enlarged drawings of the details of structure in the larva. Considerable space is given to the natural history of the insect, largely from the observations of Wittfeld in Florida; its relations to L. Disippus are also discussed, as far as the preparatory stages are concerned.

The third plate has the highest interest, because we are for the first time introduced to the natural history of any of our native erycinid butterflies. Through the efforts of Mr. Doll at Tucson, Arizona, Mr. Edwards has been able to trace and figure the entire history of one and the earliest stages of another species of Lemonias, feeding naturally on mesquite (Prosopis juliflora), but which he managed to raise in West Virginia on wild plum, after repeated failures on other plants. Of L. Nais, three figures are given of the egg, or parts of the egg, seven of the four stages of the larva, besides four plain figures of structural details, two of the chrysalis, and four of the butterfly; of L. Palmerii, the egg, young larva, and butterfly are figured. These figures show the larva to have a head scarcely smaller than the body behind it, partially covered by, but not, as in lycaenid butterflies, retractile within, the segment following; to be clothed, when just from the egg, with long sweeping hairs, and in after life by clusters of short spreading hairs arranged in longitudinal rows, continuous without deviation over thoracic and abdominal segments. Neither egg nor chrysalis shows any difference of importance from lycaenids. Another number will complete the second series (or volume) of this excellent iconography. [1094

Fossil insects from Greenland. — Heer describes and figures a fragment of a large elytron from the cretaceous beds of Ivnanguit, besides a small series of tertiary insects from Atanekerdluk and Haseninsel. Five of these are elytra of Coleoptera of various families, one a Locusta compared to L. viridissima of Europe, and one a fragmentary Phryganea. Two other new fossil Phryganeae are also figured from Parschlug and from Aix, and a Helops from the Molasse of Lausanne. The number of tertiary insects so far found in Greenland is recorded as thirteen. — (*Heer's Flora foss. groenl.*, ii. 143, pl. 109.) [1095

VERTEBRATES.

Fish.

New southern marine fish. — Descriptions of twenty-five new fish from the southern United States have been published by Messrs. G. B. Goode and T. H. Bean. The new generic forms are of special interest. Ioglossus is a Gobiid allied to the Chinese Oxymetopon of Bleeker, although apparently not so 'closely' as supposed by the authors. It is much less compressed than Oxymetopon, has no keel on the head, and almost all the scales are cycloid. The individuals described were obtained at Pensacola, Fla. Chriodorus is a Hemirhamphine closely related to Arrhamphus, — so closely, indeed, that the differences between the two (if any) remain to be shown. The two have not been compared by the authors. The new type, C. atherinoides, was obtained at Key West, Fla. Letharchus is a new Ophisurid nearly related to Sphagebranchus, but differing externally by the

absence of an anal fin. Its species, L. velifer, was discovered in West Florida, and attains a length of about a foot and a half. Among the other noteworthy novelties, a new species of Porgy (Stenotomus caprinus) is also described from two specimens found in stomachs of the Red Snapper at Pensacola. — (*Proc. U. S. nat. mus.*, iv. 412.) T. G. [1096

Characters of the centropomids. — The family Centropomidae has been diagnosed by Theo. Gill. Its most marked distinctive characters seem to be the elongation of the postorbital portion of the skull, 'a well differentiated posterior oblong, pentagonal, or hastiform area,' resulting from constriction of the parietals near their middle, and peculiarities of the vertebrae and their apophyses. —(*Proc. U. S. nat. mus.*, iv. 484.) [1097

Mammals.

The bottle-nosed whale. — Capt. David Gray, through the agency of Prof. Flower, has recently made known, in a brief but interesting manner, the results of some observations on the whales of the genus Hyperoödon. It appears that the male bottle-nosed whale undergoes great changes in form with age, particularly as regards the head. The shape of this part of the body in females and young males is similar, the plane of the forehead making an acute angle with the plane of the mouth. As the male grows, however, the forehead becomes more and more prominent, and in old age its anterior surface stands at right angles with the plane of the mouth. Prof. Flower makes use of these observations to reduce the species hitherto recognized to a single one. — (*Proc. zoöl. soc. Lond.*, 1882, 726.) F. W. T. [1098

Development of the intermaxillary bone. — In an article published with great luxury of type and illustration, Th. Kölliker gives the results of his investigations on the intermaxillary bone, and the development of harelip and cleft palate. The memoir is one of special interest to the dentist and surgeon. We may mention here the following conclusions: 1. Since the human embryo has a separate intermaxillary, we may consider the same to be a typical structure in facial clefts; 2. The intermaxillary is composed of two bones; 3. The united bone is destined to carry the four incisors, and many of the irregularities of the teeth in position and number are due to the fact that they are developed independently of the bones destined to carry them. For further details we must refer to the original, which only partially comes within the scope of this journal. — (*Nova. acta. acad. nat. cur.*, xliii. 325.) C. S. M. [1099

ANTHROPOLOGY.

Bove on the Fuegians. — An interesting account of the Fuegians has appeared at Genoa under the auspices of the committee of the Italian antarctic expedition. It is prepared by Bove, and illustrated by a geographical chart of Tierra del Fuego and Patagonia, and an ethnological chart showing the distribution of the different races inhabiting the Land of Fire. The latter are divided into two very distinct stocks, separated by Admiralty Sound and Beagle Channel. The Ona reside on the east and north of these passages, on the largest of the Fuegian Islands, and comprise about two thousand souls. To the west and south are the Yamana (Jagan), a race comprising about three thousand, and the Alkaluf, about as many more. These people, perhaps of identical origin, now form two well-differentiated races, who are constantly at war. The Ona and Alkaluf have a rough and guttural language, while that of the Yamana is soft, and rich in vowel-sounds. A very vivid description of the character of the Fuegian country and of its people is given by Bove, who describes their distribution, physical characteristics, habits, dress, and wanderings; their birch-bark canoes, with which they brave storms, and pursue the seals and even whales; the wretched position of the women, who are practical slaves, living in polygamy, and yet unusually fertile, though a majority of the children succumb to exposure and insufficient food; their marriage customs, and treatment of their families, which appear to be chiefly remarkable for a stony selfishness unmitigated by affection or pity on the part of the males; their Shamanism and blood-revenge, the latter strictly on Mosaic principles; their weapons, camps, and ornaments; the treatment of the dead, linguistics and the ameliorating influence of the faithful missionaries in that desolate land. The language appears, like that of many barbarous peoples, to be rich in words. Over thirty thousand vocables are enumerated in the Yamana tongue, besides agglutinations. They appear to have no reverence for the dead. One fellow sold his father's skull to Bove, and wished it a pleasant journey over the sea (cf. **1085**). — W. H. D. [1100

Aboriginal soapstone-quarries. — Not many years ago the occurrence of copper, mica, and soapstone vessels in the Indian graves of our eastern states pointed, it was supposed, to a vast aboriginal commerce, embracing the whole continent in its network of communications. The researches of practical archeologists, however, are constantly bringing to light new sources of supply, that were formerly worked much nearer to the mounds and graves where their productions found their last resting-place. The finding of many half-finished pots and rude tools at Chula, in Virginia, was soon followed by the discovery of several large soapstone-quarries in the District of Columbia. To the subject of this class of Indian work, Mr. J. D. McGuire of Ellicott City, Md., has given much attention. He has found soapstone-quarries in Maryland, and, after considerable research, has discovered the methods of this aboriginal handicraft. — (*Amer. nat.*, June.) J. W. P. [1101

Words for color. — Lazarus Geiger, in one of his suggestive lectures, attempts to show that sense-perceptions have had a very recent evolution by tracing downward from the Homeric poems the terms employed to designate color. A very much more learned discussion of the same subject is that by Prof. Thomas R. Price, respecting the color-system of Virgil. In this essay it is not maintained that the words for color indicate the state of the color-sense, but the adaptation of language to the color-perceptions of the eye.

What idea had the ancients of color? Certainly they did not hold it to be a subjective sensation produced by three sets of nerves within the eye by three kinds of waves differing in length. Rather, in the Indo-Germanic languages, the color of a thing is the cover or skin that overlies or hides the true substance.

In nature, seen under ordinary daylight, there are for the healthy human eye about eleven hundred distinguishable colors. For a hundred and two of these, Roget has names; but the number of color-names in modern French is said to be not short of five hundred. Alma Tadema reproduces his color-impressions of the antique world by a palette of twelve colors, while the palette of Virgil's vocabulary contains twenty-seven terms of high colors, and fifteen more for shades due to excess or deficiency of illumination.

An ingenious set of comparisons leads the author up to the ratio of the occurrence of each set of color-terms to the entire eleven hundred. "His perceptions of color are clearest and strongest in the middle of the spectrum; even in his sensuous imagination, he is temperate and reserved, avoiding the extremes of sensation, and dwelling by preference upon the mean terms, the *media via* of visual perception."

Prof. Price draws attention to the striking coincidence of scientific accuracy with prophetic genius in the phrase of Virgil, *Mille coloribus arcum* (*Ecl.*, v. 609), and the discovery of Aubert (*Rood*, p. 40), that in the solar spectrum the unaided eye may distinguish a thousand colors. The following terms are traced to their origin, and their fundamental idea fixed: ruber, rutilus, sanguineus, cruentus, sandix, minium, ferrugo, roseus, viridis, vitreus, hyalus, igneus, spadix, flavus, fulvus, croceus, luteus, aurum, cereus, pallidus, lividus, caeruleus, purpureus, puniceus, murex, ostrum, albus, candidus, niveus, argenteus, lacteus, marmoreus, decolor, canus, glaucus, ater, niger, fuscus, fumeus, pullus, piceus. — (*Amer. journ. phil.*, v. 1.) O. T. M. [1102

INTELLIGENCE FROM AMERICAN SCIENTIFIC STATIONS.

GOVERNMENT ORGANIZATIONS.

Smithsonian institution.

Explorations in Louisiana. — Capt. R. W. Shufeldt, medical corps U. S. A., has, since October last, assisted by grants from the Smithsonian institution, been exploring the country in the vicinity of the city of New Orleans, La. The collection that this officer has made has just been forwarded to the institution at Washington. It consists of some three thousand specimens of very interesting forms of the representative vertebrates and invertebrates of that region, besides the contents of the Indian shell-mound situated in the rear of Carrolton, — an antiquity suspected to exist by Foster, from reports he had heard when engaged in his explorations in that locality. Among the vertebrates, some very uncommon forms of bats have been forwarded, and six or seven specimens of the rare Bascanium anthicum, and one of the Aspidonectes asper, the soft-shelled turtle, so eagerly sought after by collectors. Of the fish, Dr. T. H. Bean, curator of the department of fishes at the Smithsonian institution, says, "Two of the determinations are uncertain. The examples of Lepomis 32410 and 32419 are so small that I cannot be sure what they are, the lower pharyngeals being little developed, and with incomplete dentition; 32412, 32414, and 32420 agree with the published descriptions of Zygonectes chrysoties Günth., but they may represent a species quite distinct from that. I will try to get fuller information about Günther's types through some one of my friends who will visit the British museum next summer. The species called Mollienesia latipinna would be regarded as M. lineolata by our friends, Jordan and Gilbert; but I think your series will prove that lineolata is not distinct from latipinna; and, as latipinna is the older name, we should use it.

"The lot of Elassoma zonatum (32423 = No. 108) is the largest and finest ever known in this museum, and there is no probability that any collector has secured a better series. The range of variation is greatly extended by them, and a new locality is found. O. P. Hay had the species from Mississippi; it is known, also, from Alabama, Texas, and South Illinois."

Dr. Shufeldt will work this material up for publication by the Smithsonian institution as soon as the opportunity offers.

STATE INSTITUTIONS.

State university of Kansas, Lawrence.

Weather report for May. — This month had the largest rainfall, the greatest aggregate wind-velocity, and, with one exception (1882), the lowest mean temperature, recorded in any May of our sixteen years' observations. The light white frost of the 22d did no damage to vegetation, and the growing crops are in prime condition at the close of the month.

Mean temperature, 62.05°, which is 4.08° below the average May temperature. The highest temperature was 91°, on the 2d; the lowest was 39°, on the 22d; monthly range, 52°: mean temperature at 7 A.M., 56.19°; at 2 P.M., 71.13°; at 9 P.M., 60.45°.

Rainfall, 7.63 inches, which is 3.56 inches above the May average. There were five thunder-showers. Hail accompanied the rain of the 13th without damage at this station. On the 13th the rainfall was three and one-half inches, which daily register has been but twice exceeded in the past sixteen years. Of this amount, two inches fell in one hour and three-quarters, from 3.45 to 5.30 P.M. The entire rainfall for the five months of 1883 now completed has been 14.07 inches, which is 2.25 inches above the average for the same period in the past fifteen years.

Mean cloudiness, 47.63% of the sky, the month being 1.75% clearer than usual. Number of clear days (less than one-third cloudy), 11; entirely clear, 3; half-clear (from one to two thirds cloudy), 14; cloudy (more than two-thirds), 6; entirely cloudy, 3; mean cloudiness at 7 A.M., 46.77%; at 2 P.M., 56.45%; at 9 P.M., 39.68%.

Wind: N.W., 25 times; S.E., 20 times; S.W., 16 times; S., 14 times; N.E., 13 times; W., 3 times; N., twice. The entire distance travelled by the wind was 15,661 miles, which is 3,334 miles above the May average. This gives a mean daily velocity of 505 miles, and a mean hourly velocity of 21.04 miles. The highest velocity was 60 miles an hour, on the 13th.

Mean height of barometer, 29.010 inches; at 7 A.M., 29.017 inches; at 2 P.M., 28.989 inches; at 9 P.M., 29.029 inches; maximum 29.355 inches, on the 5th; minimum, 28.496 inches, on the 13th; range, 0.859 inch.

Relative humidity: mean for month, 64.5; at 7 A.M., 75.3; at 2 P.M., 45.9; at 9 P.M., 72.3; greatest, 100, on 13th; least, 14, on the 9th.

NOTES AND NEWS.

The American association for the advancement of science will hold its thirty-second annual meeting at Minneapolis, Minn., Aug. 15 and following days. The president-elect is Prof. C. A. Young of Princeton, and the following is the list of the general officers of the meeting: section A (Mathematics and astronomy), vice-president, W. A. Rogers of Cambridge; secretary, W. W. Johnson of Annapo-