ville, through Elm Point, to Grafton, on the Illinois shore of the Mississippi River.

Hail-storms have occurred as follows: at Big Creek, 10th; Centreville, 9th; eight miles north of Savannah, 3d; Hannibal, 9th; Louisiana, 9th and 10th (and at Springfield and Dover church, near Louisiana, large hail fell on the afternoon of the 18th); Lamar, 3d; Chamois, 9th, — a violent storm of wind and hail at 7 P.M., for seven to ten minutes, the hail completely covering the ground, some stones weighing six ounces. On the 18th, at 5.50 P.M., a dark cloud in the south-west moved to the west with a heavy roaring noise, appearing to spend its force when due west, rain and small hail following.

Killing frosts occurred on the nights of the 21st and 22d. At Big Creek great damage was done to wheat, corn, and fruit. At Centreville, at 9 P.M., on the 21st, the temperature was 32°, and fell later to 29.5°, — the latest frost in sixteen years. Fog prevented damage in the valleys of the Black River, but in the dry valleys every thing was killed. Louisiana, 32° at sunrise on the 22d; Chamois, destructive frost with ice an eighth of an inch thick in a pan of water; Greenfield, heavy frost, which injured foliage of forest-trees so that they looked as though scorched by fire.

White frosts occurred at Hannibal, Greenfield, Mexico, Chamois, 5th; Hannibal, Louisiana, Chamois, Miami, 11th; Ironton, 16th; over the entire state, 21st and 22d, but light in the south-west, where the temperature was about 40°; Mexico, Ironton (33° at 5.30 A.M.), Louisiana, Chamois, Miami, Greenfield, 23d; Sedalia, Centreville, Greenfield (heavy), Ironton, Chamois, Miami, 31st.

ADDENDUM to April report. — At Cairo a heavy shock of earthquake was felt at 2.36 A.M. on the 12th, which lasted thirty seconds. Vibrations, three per second, from south-south-west to north-north-east. An old one-story frame-building, which was occupied at the time the shock occurred, was shaken down and collapsed, the inmates receiving slight injuries.

Iowa weather service, Iowa City.

Weather bulletin for May. — May was remarkably cold, very rainy, with late frosts, westerly and northerly winds prevailing. The mean temperature of the air was nearly five degrees *below* normal. In forty-five years, May has been six times as cold or colder than this year; namely, in 1882, 1867, 1858, 1851, 1850, and 1849. The late frosts about the 12th and 22d were general.

The rainfall was much above normal throughout Iowa, except in middle northern Iowa and down the middle Cedar and Wapsipinicon valleys. The total rainfall was highest along the Mississippi and Missouri rivers, and from Wayne to Polk county: in the regions here specified, the rainfall averaged seven inches. The rain frequency was also high: two of every three days were rainy in most parts of the state.

The principal storm-days were the 8th and 9th, the 13th and 14th, 17th and 27th. On the 9th a very small tornado did slight damage in Linn county, near Norway station: on the other storm-days, Iowa was spared the visitation of tornadoes, which struck, on the 13th, Kansas City; 18th, Racine; 28th, southern Indiana.

While unusually cold and quite wet, the season is much more promising than last year, when May was much colder.

NOTES AND NEWS.

Stephen Alexander, professor emeritus of astronomy at Princeton, died June 26. He was born at Schenectady, N.Y., and was educated at Union college, where he graduated in 1824. Since 1840 he has been connected with Princeton, first as professor of astronomy, and later as professor of mechanics as well. As an astronomer he became widely known.

— Sir Edward Sabine, whose death has been lately announced, was born in Dublin, in October, 1788. He studied at the military schools of Marlow and Woolwich, and at the age of fifteen entered the English army. In 1813 he was made captain, and took part in the campaign on the Niagara frontier, commanding the batteries at the siege of Fort Erie, 1814. From 1818 to 1825 he made a number of voyages from the equator to the arctic regions for the purpose of studying terrestrial magnetism, the figure of the earth, and other questions in terrestrial physics. He was with Ross and Parry on the arctic expedition of 1818, and with Parry the following year. He edited a number of translations of scientific books, and published a large number of papers on his favorite studies, having read more than forty before the Royal society, and having contributed many to the proceedings of the British association. From 1827 to 1830 he was secretary of the Royal society, and president for the ten years 1861 to 1871, and president of the British association in 1853. In 1875 the French academy elected him as a corresponding member.

— A few weeks ago (April 26) *Nature* gave a sketch of the life of Spottiswoode. In the number for June 14 we find a regret expressed at his absence, on account of sickness, from the Royal society meeting of that week. On June 27 he died. Born in London, Jan. 11, 1825, he began his education in a private school at Laleham, and then at Eton and Harrow; his stay at Eton being short on account of some experiments with detonating mixtures, in which he was found to be interested. In 1842 he entered Balliol college, Oxford, where, in his last year (1845) as undergraduate, he read with the Rev. Bartholomew Rice. After graduation he held university mathematical scholarships for two years, and for a short time lectured on geometry of three dimensions. But he soon took an active part in the management of the large printing-business about this time resigned to him by his father, and which he largely developed. His scientific work was mainly in mathematics, although of late years he has devoted himself to physics, his recent investigations in electricity being well known. When a young man, he travelled widely, and, among others, published a very lively account entitled "A Farantasse journey through

eastern Russia in the autumn of 1856." He also studied languages, both oriental and European, and gave evidence of the thoroughness of these studies in his contributions to our knowledge.

— The Dickson expedition, in charge of Professor Nordenskiöld, which left Thurso May 29, is reported as having called at Reikiavik, Iceland, June 6, and was to sail for Greenland on the 10th. When the expedition started, it was the intention that Count Stromfeldt (botanist), Dr. Arpi (philologist and archeologist), and Mr. Flink (mineralogist) should disembark at Reikiavik, and remain in Iceland for study and exploration. It is reported by recently arrived whalers that the condition of the seas west from Iceland, as regards ice, is at present not unfavorable to the success of the expedition. The Sofia, upon which the party is embarked, is a little iron propeller of less than two hundred tons, capable of a speed of eleven knots, and draws ten feet of water, — a vessel much better suited to her purpose than the unwieldy craft which have been used in many of the English expeditions. It was originally intended that Palander should command the Sofia, but circumstances intervened to prevent this ; and the vessel has been intrusted to Capt. Emil Nilsson, who is well qualified by experience, and who will be ably seconded by the well-known Norwegian ice-master, Johannesen. The scientific staff does not comprehend any of the members of the Vega expedition, who are mostly engaged in working up the investigations made on that voyage, but, after Baron Nordenskiöld, is composed of Dr. Kolthoff, entomologist and ornithologist; Dr. Nathorst, geologist and paleontologist; Dr. Berlin, surgeon, botanist, and general biologist ; Mr. Forsstrand, taxidermist and preparator ; Dr. Hamberg, hydrographer ; Mr. Kjellström, photographer. Beside these, there are a harpooneer, two mountain Lapps (in accordance with the suggestion of Professor Fries, to which we have already alluded), and eight or nine picked men, to accompany the party over the inland ice. This party will be provided with fourteen months' provisions in the most compact shape possible. The crew of the Sofia comprises twenty-four men. The party is thoroughly equipped with scientific apparatus, and even includes a flying-machine contributed for trial by its inventor, according to the Swedish papers.

— Among the most interesting of the living animals in the gardens of the London fisheries exhibition are two British-born beavers from the Isle of Bute in Scotland. They were members of a colony established by the Earl of Bute upon his estate of Rothesay several years since. A considerable tract of land was walled in, and beavers were imported from Canada, which soon established themselves, gnawing down the trees, building a dam, and forming a lake of considerable size. The 'beaver wood' is considered one of the most interesting features of the island. Mr. R. B. Matthews writes to the *Field*, complaining, that, in capturing the two beavers to send to the exhibition, the colony has been broken up, the dams destroyed, the houses pulled down, and all the other beavers killed. It is to be hoped that the damage is not so serious as is represented, for the acclimation of the American beaver in Scotland is a task which is not likely to be often attempted.

— The next issue of the Proceedings of the naval institute (vol. ix. no. 3; whole no. 25) will be entirely devoted to an article by Lieut. Edward W. Very, on the development of armor for naval use. The number will thus be a complete work of itself, fully illustrated, and will possess more than ordinary interest in being the only work extant devoted exclusively to the details of armor development. Orders for this number should be sent to the secretary U. S. naval institute, Annapolis, Md., as early as possible. Price $1.

— The extraordinary meeting of the geological society of France for this year is to take place at Charleville (Ardennes) on Sunday, Sept. 2, and the excursions will end Tuesday, Sept. 11.

— The yearly meeting of the Schweizerischen naturforschenden gesellschaft will take place from the 6th to the 9th of August in Zurich, where the national exposition is attracting many people this year.

— G. Valentin, for forty-five years professor of physiology at the university of Berne, died on the 24th of May at the age of seventy-three. He was a native of Breslau. He was formerly one of Louis Agassiz's collaborators; and the fourth *livraison* of Agassiz's 'Monographies d'echinodermes vivants et fossiles', containing the anatomy of the genus Echinus, is by Valentin.

— Past assistant-engineer N. B. Clarke, U. S. N., read a paper on water-line defence and gun-shields for cruisers, at the meeting of the U. S. naval institute (Washington branch) on June 7.

— The bureau of education has issued, as one of the 'circulars of information,' a pamphlet containing the legal provisions respecting the examination and licensing of teachers.

— A contributor's note in the *Atlantic monthly* for June calls attention to the question of the spelling and pronunciation of geographic names, on which several articles have lately appeared in foreign journals. The question is not always settled by adopting local spelling and sound, for in many cases foreign names are well Anglicized, and will so remain ; the difficulty is rather in knowing where to begin using the original pronunciation. As we do not say Paree and Bairleen, why may we not say Prägue and Hägue, even though we do drop a visible *s* from Calais, and attempt the difficulties of Rouen, Amiens, Chartres, and Blois? As to St. Petersburg, the error of sanctification is not ours, but the Russians', from whom we have taken it. Our mistake, if it be one, is in putting an *s* after Peter, for this seldom occurs in the original. A similar but incorrect addition is often made in Prince Edward Island. The back-and-forth method of naming seen in the German *Vogesen*, which the contributor explains as coming from the original German *Wassigen* (watery), through the French *Vosges*, is found again in the same polyglot borderland in the *Laacher See*.

— The Comision del mapa geologico de España has just published, for the Exposicion de mineria at Madrid, a brief account of the history of the survey from its beginning, about the year 1831, under D. Angel Vallejo, down to the present time. Two maps show the condition of the work in March, 1873, at the beginning of the present system of the survey, and in March of the present year, showing how great an amount of work has been done in the last ten years. Eighteen provinces are finished; viz., Oviedo, Madrid, Santander, Castellon, Albacete, Murcia, Teruel, Cadiz, Zaragoza, Cuenca, Cáceres, Valladolid, Huesca, Avila, Salamanca, Guadalajara, Barcelona, and Valencia. More or less has been published concerning twenty-three other provinces, but their full descriptive memoirs are still to appear; viz., Coruña, Lugo, Orense, Pontevedra, Segovia, Palencia, Baleares, Alicante, Burgos, Logroño, Soria, Alava, Guipúzcoa, Vizcaya, Tarragona, Huelva, Toledo, Badajoz, Cordoba, Ciudad-Real, Granada, Navarre, and Almeria. Seven provinces are entirely unpublished or under study; namely, León, Lérida, Zamora, Málaga, Gerona, Jaén, and Sévilla. A rough draught of the final map, on the scale of 1 : 400,000, is shown in the exposition, upon which all the work done up to date is entered.

— The Belgian photographic association has organized an international exhibition of photography to be held, during the month of August, 1883, in the palais des beaux-arts at Brussels.

— The sixth international congress of orientalists will be held at Leyden, Sept. 10.

— The international congress of societies for the prevention of cruelty to animals will be held at Vienna in September. A number of local societies, among them those of Berlin, Cologne, Munich, Dresden, and Hanover, besides several Spanish Italian, and Russian, have expressed their intention to be represented.

— The British association for the advancement of science meets this year at Southport, Sept. 10.

— Dr. William Lee read before the Philosophical society of Washington, June 2, a paper on medical history as illustrated by medals; Prof. Theo. Gill discussed analogues in zoögeography. The society then adjourned till October.

The Mathematical section of the society adjourned for the summer on June 6. At the last two meetings, Mr. G. W. Hill discussed the planetary perturbations of the moon, Mr. G. K. Gilbert explained the construction of graphic tables for use in connection with his new method of determining heights from barometric data, and Mr. E. B. Elliott gave an improved system of electrical units.

— An excursion to northern Norway and Spitzbergen is projected for some of the students at the Paris École des mines. Two French naturalists will accompany the party, which will charter a steamer directed by a competent arctic navigator for the purpose.

— Professor Fries has proposed the colonization of Greenland by Lapps, on the hypothesis that in the interior, in summer, abundant reindeer-pasture can be found. How the reindeer are to get at it does not seem to have been considered, nor how they are to be subsisted during their travels over the continental ice-sheet.

— Mr. Oliver W. Huntington, assistant in the chemical laboratory of Harvard college, has edited a book of five-place logarithms, which will finally form part of a set of tables mostly for use in chemical calculations, but is now published in separate form. The logarithm tables are well arranged, and very clearly printed. The book is published by Moses King, Cambridge.

— The museum at Oxford, Eng., has lately bought the unique collection of Silurian fossils of Dr. Grindrad of Malvern.

— It is rare to find, at the present time, a scientific memoir in Latin. Aloysius Molina, a student at Pisa, has, however, recurred to the ancient custom, and has published a memoir, 'De hominis mammaliumque cute,' in volume v. of the *Atti della società Toscana*. The opening sentence sufficiently describes the paper: "Expectans dum Ranvierus in lucem perfecte proferat conclusiones omnes suarum investigationum de intima structura cutis, prodesse existimo breviter quae praecipua facta sunt resumere, nonnullas considerationes addens, quas ipse feci dum per duos annos ad Anatomicam Scientiam meum adhiberi studium in Laboratorio Anatomiae Comparativae hujus universitatis." The 'nonnullas considerationes, quas ipse feci' one finds not very numerous, the chief value of the paper being as a summary. A good bibliography is appended.

— Much progress has been made at the Lick observatory during the past year. The dome for the twelve-inch equatorial has been entirely completed in a very thorough manner. It is, without any doubt, the most convenient and complete dome of the size in the country. The four-inch transit-house, and the buildings for the photoheliograph, are in capital working order. They were utilized last December in a very successful observation of the transit of Venus. The walls of the main building are half done, and the cellar for the dome of the thirty-six-inch equatorial is excavated. Many of the original arrangements of the buildings and grounds were only provisional, and these are being replaced by others more substantial and permanent. A brick reservoir containing 83,000 gallons of water (derived from three springs) has been built during the season; another of 20,000 gallons (spring-water), and another of 83,000 gallons (rain-water), will shortly be begun. The roads have been extended. The house for the meridian circle (Repsold) will be begun in a few weeks, as well as a house for the astronomers, and buildings to contain the appliances for heating and lighting the buildings and moving the dome. The end of this season will show great progress.

— The division of entomology of the U. S. department of agriculture has begun the publication of a series of bulletins for the purpose of placing before the public, current matter that would either lose much of its value if kept for the annual report, or find no space in the limited pages of that volume.

Two numbers have been issued. The first includes reports of experiments, chiefly with kerosene, upon the insects injuriously affecting the orange-tree and the cotton-plant. The second includes reports of observations on the Rocky Mountain locust and the chinch-bug, together with extracts from the correspondence of the division on miscellaneous insects.

— The University of Pennsylvania has conferred the degree of M.A. on Professor Lewis M. Haupt, C.E.; and of Sc.D. on Professor Isaac Sharpless, professor in Haverford college.

— At the meeting of the Royal astronomical society, May 11, Professor C. Pritchard of Oxford gave an account of his recent expedition to Cairo, and of the work on which he has for the last two years been engaged; viz., the measurement of the magnitude of the stars visible to the naked eye from the pole to the equator, including at present all those brighter than the fifth magnitude. This work is now complete. He found, that, at Oxford, Laplace's law of alteration of a star's light as measured in magnitude — according to the secant of the star's zenith distance — did not hold good for zenith distances exceeding 65°, and that for stars at lower altitudes the alterations in apparent magnitude were conflicting and not satisfactory. For the purpose of accurately investigating the effect of atmospheric extinction of light under better circumstances, he chose the climate of Upper Egypt, where the atmosphere is uniform and stable, as the proper locality for repeating the Oxford observations, and rendering the research complete. A duplicate set of instruments was left at Oxford in charge of the senior assistant, who observed the same stars with Professor Pritchard at Cairo. The results of both sets of observations are embodied in the formulae, —

Atmospheric absorption
At Cairo $= 0.187 \times$ Sec. Z.D. in magnitude;
At Oxford $= 0.253 \times$ Sec. Z.D. in magnitude.

Thus the whole effect of the atmosphere at Cairo is to diminish the brightness of stars seen in the zenith by about two-tenths of a magnitude, and at Oxford by about one-fourth of a magnitude. At an altitude of about 30°, the stars at Cairo will be brighter than in England by about one-fifth of a magnitude, and consequently many more faint stars are just visible at Cairo than can be seen at Oxford.

— Alexander Melville Bell has written a primer, which will soon be published, for use in elementary schools in teaching the methods of visible speech. The book can be used by any teacher without special training in the peculiarities of the system.

— A correspondent states that the shortest scientific article known to him, and perhaps the shortest ever published, is by William Griffith, in the bulletin of the U. S. fish-commission for 1882, p. 12, under the title 'Result of planting shad in the Ohio River.' The article contains twenty-six words, and occupies two lines.

— At the meeting of the Cambridge entomological club, June 8, Mr. S. H. Scudder discussed the homologies of the male abdominal appendages of butterflies, and Mr. G. Dimmock showed a living Buthus occitanus, and described some of its habits.

— The Argentine government has sent Col. Solá, with a party of two hundred soldiers, to explore the Pilcomayo in its course through the Gran Chaco. The party is accompanied by a delegate of the Argentine geographic institute, whose chief object is to discover the remains of Crevaux, and ransom two of his men who are reported to be held as prisoners by the Indians.

RECENT BOOKS AND PAMPHLETS.

*** Continuations and brief papers extracted from serial literature without repagination are not included in this list. Exceptions are made for annual reports of American institutions, newly established periodicals, and memoirs of considerable extent.*

Adam, L. Les idiomes négro-aryen et maléo-aryen, essai d'hybridologie linguistique. Paris, *Maisonneuve*, 1883. 76 p. 8°.

Bisson, E. Nouveau compas de mer donnant la direction vraie du méridien magnétique sur les navires en fer. Paris, *impr. Chaix*, 1883. 20 p., 4 fig. 8°.

Boutillier, L. Des corallaires à madrépores et de leur action géologique. Rouen, *impr. Cagniard*, 1883. 30 p. 8°.

Camoy, J. B. Biologie cellulaire: étude comparée de la cellule dans les deux règnes au triple point de vue, anatomique, chimique et physiologique. Aachen, *Barth*, 1883. 8°.

Crié, L. Les origines de la vie, essai sur la flore primordiale; organisation, développement, affinités; distribution géologique et géographique. Paris, *Doin*, 1883. 79 p., illustr. 8°.

Crozals, J. Les Peulhs, étude d'ethnologie africaine. Paris, *Maisonneuve*, 1883. 271 p. 8°.

Desdevises du Dezert, T. Le noyau central et les marches de la langue d'oyl. Rouen, *impr. Cagniard*, 1883. 28 p. 8°.

Duguit, L. Quelques mots sur la famille primitive, conférence faite à Bordeaux, le 16 mars 1883. Paris, *Larose*, 1883. 32 p. 8°.

Elsner, F. Recepte für pharmacie und chemische grossindustrie. Halle, *Knapp*, 1883. 9+216 p. 8°.

Fabre, J. H. Cours de physique (programmes de 1882). Paris, *Delagrave*, 1883. 304 p., illustr. 18°.

Ferri, L. La psychologie de l'association depuis Hobbes jusqu'à nos jours (histoire et critique). Paris, *Baillière*, 1883. 4+382 p. 8°.

Fricero, A. Considérations diverses sur l'emploi des huiles minérales lourdes dites oléonaphtes comme lubrifiants. Marseille, *impr. Grangé*, 1883. 12 p. 8°.

Greer, H. Recent wonders in electricity, electric lighting, magnetism, telegraphy, telephony, etc., N.Y., *Agent Coll. electr. eng.*, 1883. 168 p., illustr. 8°.

Guyot, A. Memoir of Louis Agassiz, 1807–73. Princeton, *Robinson pr.*, 1883. 49 p. 8°.

Instructions relatives à l'établissement des pépinières de vignes américaines. Paris, *impr. nat.* 1883. 36 p. 8°.

Le Breton, G. La céramique polychrome à glaçures mét. alliques dans l'antiquité. Rouen, *impr. Cagniard*, 1883. 45 p. 8°.

Leplay, H. Chimie théorique et pratique des industries du sucre: étude historique, chimique, et industrielle des procédés d'analyse des matières sucrées, etc., suivie de la description d'un nouveau procédé d'analyse chimique industrielle des matières sucrées. T. i. Paris, *Baudorn*, 1883. 28+452 p. 8°.

Marin La Meslée, E. L'Australie nouvelle. Paris, *Plon*, 1883. 12+298 p., illustr. 18°.

Quenstedt, F. A. Die ammoniten der schwäbischen Jura. i. heft, mit ein atlas. Stuttgart, *Schweizerbart*, 1883. 48 p., illustr. 8°.

Schneider, A. Zoologische beiträge. i. band, i. heft. Breslau, *Kern*, 1883. 3+63 p., 12 lith. 8°.

Tellier, C. Étude sur la thermo-dynamique appliquée à la production de la force motrice et du froid. fasc. i. Paris, *impr. Mouillot*, 1883. 7+97 p. 8°.

Thompson, D'Arcy W. A catalogue of books and papers relating to the fertilization of flowers. London, *Macmillan*, 1883. (2)+36 p. 8°.