

also previously made its appearance in an engineering publication, but the contribution of Mr. Vernon on this subject was taken as read.

On Saturday, the 8th inst., only three papers were taken. Prof. A. Lupton read a contribution on the pneumatic distribution of power; in the course of which he gave some interesting details of the important system which is now working at Birmingham. This paper gave rise to a good discussion, in the course of which the author was sharply taken to task for the efficiency he claimed for the system. It should be pointed out, however, that Mr. Lupton did not speak of "efficiency" as looked at from a scientific standpoint, but from a commercial point of view, which enabled him to take credit for certain waste heat, not obtained from the power installation, which would otherwise be thrown away. This was plainly stated in the paper. Mr. F. G. M. Stoney's paper on the construction of sluices for rivers, &c., was next read. The subject was of course well treated by the author, and the paper was acceptable; but there was little novel in it, except the reference to the new tilting sluices which are to be put up in connection with the new lock at Richmond. Mr. Cope Whitehouse's paper on the Raiyan reservoir was listened to by a thin audience, the preparation for the afternoon's excursions calling the majority away.

Monday in Section G is now given over to applied electricity, and there is invariably a large influx of the more abstract A's into the section. The Leeds meeting was no exception to this rule, and when Sir William Thomson opened the proceedings by reading his paper the People's Hall, which the section occupied, had quite a crowded appearance. The subject which first occupied Sir William's attention was the new electric meter which he has recently brought out. This apparatus is yet in the experimental stage. Perhaps Sir William will be able to do something towards cheapening the design. An example of the meter was shown in operation on the platform. In the discussion which followed, Prof. Fleming made some pertinent remarks on the effect of rough and smooth surfaces. The multi-cellular voltmeter and the engine-room voltmeter described by the author had previously been brought before the public through the medium of technical literature. A new form of volta-pile, also described, was an instrument which was intended for standardizing operations. Mr. Gisbert Kapp described the Lineff system of electric traction, by means of which a partially buried conductor can be used with safety to man and beast. Messrs. Lawrence and Harries next read a paper on alternate *v.* continuous currents in relation to the human body. No doubt at times the effect of electrical currents on the human body possesses a very intense interest for engineers, nevertheless the paper was hardly suitable for the Mechanical Section. It is well, however, that engineers should remember, as was stated in the paper, that not voltage only, but current strength is the important factor in estimating the danger from accidental contact. In the discussion which followed, the late American execution naturally occupied a prominent place. Mr. Wilson Hartnell brought the meeting back to a more mechanical complexion by reading a paper on electric lighting and fire insurance rules, illustrating his remarks by practical examples. He succeeded pretty conclusively in showing that the fire insurance companies want instruction in electrical matters, and, we think, at the same time, he surprised some of those present, who certainly have had considerable experience in electrical matters, by the result of his experiments. The paper was eminently practical and worthy of study by engineers. The last paper on the list for the day was by Mr. W. J. S. Barber Starkey on secondary batteries, in which the author described his system of adding carbonate of soda to secondary batteries. The subject is not new.

Tuesday, the 9th inst., was the last day on which Section G met. Mr. Preece first occupied about five minutes in reading a short contribution on submarine cables for long distance telephony. Mr. F. Higgins next exhibited the "Column Printing Machine," after which Mr. Arthur Greenwood read his paper on heavy lathes. Mr. W. Bayley Marshall followed with a suggestive paper on factors of safety, in which he gave the results of a large number of tests of iron and steel extending over a period of five or six years. The conclusion he had come to was that in roof and bridge work elastic limit, and not ultimate tensile strength, should be the important factor, but in the discussion that followed, which was the best discussion during the meeting, the pertinent question was raised as to what "elastic limit" is. A paper by Mr. J. H. Wicksteed on the measurement of elongation in test samples was also well discussed. A

paper by Mr. A. Mallock, on the measurement of strains, in which the author described an instrument he had devised for the purpose, and an exhibition by Prof. Barr of a mechanism for giving vertical motion to a camera, brought the business of the Section to a close.

SCIENTIFIC SERIALS.

American Journal of Science, September.—Rocky mountain protaxis and the post-cretaceous mountain-making along its course, by J. D. Dana.—The magneto-optical generation of electricity, by Dr. Sheldon. It is well known that, by using proper conditions, a beam of plane polarized light may be rotated by an electromagnet, and that a reversal of the current causes the plane to be rotated in the opposite direction. A rapidly alternating current thus produces a rapid swinging to and fro of the plane of light. The author has conducted the converse experiment, and by oscillating the plane of polarization through 90° about 300 times per second, has produced an alternating current.—Contributions to mineralogy, No. 49, by F. A. Genth, with crystallographic notes by S. L. Penfield. The results are given of the examination of some specimens of ferric sulphate from Mina de la Compania, Chili.—Chalcopyrite crystals from the French Creek Iron Mines, St. Peter, Chester County, Pa., by S. L. Penfield.—Koninckina and related genera, by Dr. Charles E. Beecher.—The effect of pressure on the electrical conductivity of liquids, by C. Barus. It is shown that, both in the case of mercury and a concentrated solution of zinc sulphate, the effect of isothermal compression is a decrement of resistance nearly proportional to pressure, and from this fact the deduction is made that the immediate effect of rise of temperature is a decrement of specific resistance.—Notice of two new iron meteorites from Hamilton County, Texas, and Puquos, Chili, by Edwin E. Howell. Analyses of the two meteorites are given.—The Cretaceous of Manitoba, by J. B. Tyrrell.—On mordenite, by Louis V. Pirsson.—Geology of Mon Louis Island, Mobile Bay, by Daniel W. Langdon, Jun.—On Leptænisca, a new genus of Brachiopod from the Lower Helderberg group, by Dr. Charles E. Beecher.—North American species of Strophalosia, by the same author.—Notes on the microscopic structure of oolite, with analyses, by Erwin H. Barbour and Joseph Torrey, Jun.

L'Anthropologie, sous la direction de MM. Cartailhac, Hamy, et Topinard, tome i., Nos. 3 and 4 (Paris, 1890).—The exotic races at the Exhibition in Paris, 1889, by MM. Deniker and Laloy. In this report the authors give the general results of the anthropometric determinations they obtained from their examination of 145 individuals belonging to the most different races, some of which had not previously been made the subject of scientific inquiry. The value of their remarks on the various Senegalese and other South African negroes is enhanced by an admirable series of portraits, copied from spirited photographs by Prince Roland Bonaparte. From the observations of the authors, it appears that the negroes of West Africa may be divided into three or four groups, differing in physical characters. In fact, crispness of the hair, and a more or less dark coloration of the skin, seem to be the only characteristics common to all. The negro races generally are tall, have flat noses, and are of a dolichocephalous type, each group presenting, however, certain features which distinguish them from the remainder. The two leading varieties are separated by tribes which are small in stature, with a very hairy skin, and are of a marked brachycephalic type. This intermediate group is spread across Africa from the extreme east to the west, in about 2° S. and 3° N. of the equator, and it is among these peoples that the true pygmy tribes are found, which under the name of Akkas or Tiki-Tiki of the Nile, Batus of the Congo, Akoas of the Ogowe, have become known to us through Stanley and other recent explorers. According to Emin Pasha, to whom we are indebted for the few particulars that we know regarding their physical character, the mean height of these so-called negrilloes is 1'36 m., and their mean cephalic index 79; brachycephalism being a marked character in all the pygmy tribes. Very complete tables are given by the authors.—New explorations at Solutré, by M. A. Arcelin. Palæontologists will welcome the report here given of the various explorations that have been in progress at Solutré since these important deposits were first made the subject of scientific inquiry in 1866. The extent of the beds, which at some points are fully

ten metres in depth, has retarded the work, which is of a complicated nature in consequence of the different groups of materials that have been brought to light, and which include two distinct *foyers*, belonging the one to the reindeer age, and the other to a probably earlier period, besides numerous sepulchral remains and several accumulations of the bones of horses. The latter are perhaps the most curious of the Solutré finds, since within an area of about 4000 metres there is a circular embankment constructed of horse-bones so densely packed that it is estimated to contain the remains of no less than 10,000 animals. According to the author, these bone-mounds may be regarded as the *köbken möddings* of the early men of Solutré, whose principal food must therefore have been horse-flesh.—A note on two Phœnician skulls found in Tunis, by Dr. Bertholon.—Art among the barbarian races at the fall of the Roman Empire, by Baron J. de Baye. The author shows how greatly archæology has gained in recent times by the researches of French and other men of science in regard to art among the barbarian nations. In France the Abbé Cochet, by his clear definitions of the distinctive features of industrial art among races of Burgundian and Frankish origin, has given a new and firm basis to mediæval archæology, and to him we are indebted for several very important works on the forms and symbolical character of barbaric ornamentation, which is now shown to be common to peoples of the most widely separated countries. The present article is copiously illustrated with drawings of buckles and other ornaments presenting symbolical designs, which have been found not only in Central Europe, but in Russia, the Crimea, and Northern Caucasia. From a careful study of these objects, which have ordinarily been referred to as specimens of Gothic art, it would appear that so-called Gothic forms of ornamentation have an eastern origin, and were gradually vulgarized by barbarian tribes in their passage westward.—A history of the so-called Oppidum de Castel-Meur en Cléden (Finistère), by Paul du Chatellier.—The muscles of the face in a negro of Ashantee, by Dr. Popovskiy. This case, according to the author, supplies an instance of the interlacing of the facial muscles, which is not unfrequent among the inferior races, and belongs to a class of anomalies presenting a strongly-marked character of atavism.

Bulletin de l'Académie des Sciences de St. Pétersbourg, nouvelle série, vol. i., Nos. 2 and 3.—The chief papers (in French or German) are:—On the normal variations and the perturbations of magnetical declination, by H. Wild.—On some (seven) species of Russian and Siberian earthworms, by N. Kulaguin.—New contributions relative to the *Olenellus michewitzii* from the Lower Cambrian deposits of Esthonia, by Fr. Schmidt.—On the quantitative determination of antimony and sodium, by F. Beilstein and O. Blaese.—A formula for the computation of the length of the arcs of longitude upon the earth ellipsoid, by A. Bonsdorff.—The bases of a mathematical theory of the interior diffusion of light, by Dr. O. Chwolson. The general solution of the problem is not possible; but, on the hypothesis that the interior diffusion of light in a transparent body is due to particles of matter which reflect the light, and can be considered as independent sources of light, the author, after having established the general theory, discusses several special cases in which the problem appears simplified to some extent.—Sahidic fragments of the Bible, by O. Lemm.—Fishes from the Lower Silurian deposits, by J. Rohon. The little hooks, described by Pander as "Conodonts," which formerly were taken for teeth of fishes, but are now considered to have belonged to Annelids and *Gephyrea*, are accompanied by real teeth of Vertebrata which wholly differ from them, and prove that fishes were living at the earliest times of the Silurian epoch as well.—Report of the Russian delegates to the Paris Conference upon Metrical Measures, by H. Wild and O. Backlund.—On the ancient Turkish dialects: (1) Seldschuk verses in the Rebab-Nâmeh, by W. Radloff.—Ad Plutarchi quæ feruntur Moralia, by P. Nikitin.—Devonian fishes from the Yenisei, by J. Rohon, followed by remarks upon the spinal cord of Devonian fishes generally.—De scholiis in Sophoclis tragædiis a P. N. Papageorgio editis, by A. Nauck.—Preliminary results of his observations made upon the satellites of Saturn by means of the 30-inch refractor, by Herm. Struve. The observations were made for the purpose of determining the orbits of the interior satellites, Rhea, Dione, Tethys, Enceladus, and Mimas, and later on, the dimensions of the planet and its rings.

Memoirs of the Odessa Society of Naturalists, vol. xiv.—On the diffusion of a solution of common salt, by N. Umoff. The experiments were made on the system recommended by Sir

William Thomson, by means of glass balls, and the results are given day by day for a period of six months. The result is that the law proposed by Dr. Fick for cylindrical vessels is not yet proved.—On the influence of HCl and metallic chlorides upon the photochemical decomposition of water, by E. Klimentko and G. Pektoros.—On the excretory organs of the Invertebrates, note by A. Kovalevsky.—On isomery in the thiophene series, by N. Zelinsky. Preliminary report.—On M. Timtchenko's anemograph, which combines an anemometer with a weather-cock, by A. Klossovsky.—On some snow-storms, by the same author.—Catalogue of plants found in the neighbourhood of Kishineff (420 dicotyledons and 84 monocotyledons).—On the peritracheal cells of insects, by J. Pekarsky (with a plate).—On the action of the phosphor-pentachloride upon citric acid, by E. Klimentko and Buchstab.—On the snow-covering of South-West Russia, by P. Pantchenko.—On the Nemertinae of Sebastopol Bay, by J. Lebedinsky. Description of a dozen species of Nemertinae, formerly unknown at Sebastopol.—Geological exploration in the peninsula of Kertch, by N. Andrussoff. The Mediterranean Miocene deposits of Kertch belong to a basin of the Miocene sea, which extended from Varna, in the Balkan peninsula, to the Ust-Urt, and was connected in the west with the Miocene sea of Roumania and Galicia by means of one or several straits. A good deal of information supplementing the former explorations of the same author is also given.—On the history of the development of the crab *Eryphia spinifrons*, by J. Lebedinsky; an elaborate paper, illustrated by several plates.—On the excretory organs of some insects, spiders, and myriapods, note by A. Kovalevsky.

Bulletin de la Société des Naturalistes de Moscou, 1889, No. 4.—On the chief properties of meteoric showers, by Th. Bredichin (in French). After having developed in his former articles the idea that the "anomalous" tails of comets give rise to meteoric showers, which, as a rule, may appear annually with varying intensities, the author now examines into those meteoric streams which appear in great multitudes at intervals of several years.—Studies on the palæontology of Ungulata, by Marie Pavloff (in French).—The cosmical origin of naphtha, by W. Sokoloff.—Zoological researches in the Trans-Caspian region, by N. Zaroudnoi (in French). The list of mammals mentioned is now increased to 42 species, and that of birds to 309 species; the short notes about their habitats and modes of life are of the same high character as in the preceding work of the same author.

Geological Annals of the Balkan Peninsula, vol. ii., fasc. 1.—Note on the meteorite of Jelica, by J. M. Žujović. Twelve fragments of this meteorite, which fell on November 19, 1889, were collected; the largest of them weighed 3175 grammes. Its composition resembles that of a trachytic breccia. In an earthy, ash-coloured mass, porphyric elements and angular stony pieces of a dark colour, sometimes 4 centimetres long, are disseminated. The latter seem to be aggregates of crystals, probably of pyroxene. Closer microscopical examination is promised.

SOCIETIES AND ACADEMIES.

SYDNEY.

Royal Society of New South Wales, May 7.—Annual Meeting.—Prof. Liversidge, F.R.S., President, in the chair.—The Report stated that twelve new members had been elected during the year. One honorary member, the Rev. J. E. Tenison-Woods, and one corresponding member, Major-General Sir Edward Ward, R.E., had died, and the total number on the roll on April 30 was 461. During the year the Society held eight meetings, at which the following papers were read:—Annual address, by Sir Alfred Roberts. (1) Note on the composition of two sugar plantation soils; (2) well and river waters of New South Wales, by W. A. Dixon. The aborigines of Australia, by W. T. Wyndham. (1) Note on the recent rain-storm; (2) the source of the underground water in the Western Districts, by H. C. Russell, F.R.S. On the high tides of June 15-17, 1889, by John Tebbutt. List of the marine and fresh-water invertebrate fauna of Port Jackson and the neighbourhood, by T. Whitelegge. The eruptive rocks of New Zealand, by Prof. F. W. Hutton. On the application of prismatic lenses for making normal-sight magnifying spectacles, by P. J. Edmunds. Flying machine memoranda, by L. Hargrave. Irrigation in its relation to the pastoral industry of New South Wales, by H. G. McKinney. (1) The analysis of