

Kollegorsky describing a series of experiments on the mechanism of photosynthesis by means of a luminous bacterium (*Photobacterium italicum*). Taking as the subject of their experiments two plants of strongly contrasted habits, *Aspidistra elatior* and *Bambusa verticillata*, they give the following summary of the results of their researches:—(1) The working out of a new method of the quantitative study of photosynthesis by the aid of luminescent bacteria. (2) It is established that the luminous intensity indispensable for the decomposition of carbonic acid is the same for plants which vary ecologically. (3) It is shown that the luminous intensity effecting the liberation of oxygen in photosynthesis may be in the case of plants possessing special light-collecting apparatus much lower than for those not so provided.

MUCH valuable meteorological and magnetical work is being done at Hongkong, and the report of the director, Mr. T. F. Claxton, has just reached this country. Continuous photographic records are being maintained showing the variations of barometric pressure and temperature, and there are daily automatic records of the direction and velocity of the wind, the amount of rain, duration of sunshine, and the relative humidity of the air. Eye observations of many of the elements are also made each hour. Attention is directed to the defect of wind velocity which has been noticed for several years past, and this has hitherto been attributed to instrumental rather than climatic causes. The decrease has occurred more or less steadily from 1884 to 1915. A similar defect in the wind velocity has been noticed at the Royal Alfred Observatory, Mauritius. The director of the Mauritius Observatory, in a recent report, remarks: "There is now reason to believe that the low velocities during the years 1901-11 are almost entirely climatic, and due probably to a periodic oscillation in this element." At Hongkong the decrease in the mean velocity of the wind is said to be far greater than the secular variations in any other element, and must, in the opinion of the director, at least in part, be attributed to instrumental causes.

THE Journal of the Franklin Institute for August contains a paper by Prof. Kennelly and Messrs. Achard and Dana, of the Massachusetts Institute of Technology, dealing with the increase of the resistance of standard forms of track and contact rails when the current through them is an alternating instead of a direct one. The currents used were sinusoidal of frequencies from 25 to 60 per second, and varied in root mean square values from 10 to 800 amperes. Both the alternating potentiometer method of comparing voltages down the rail and a manganin strip in series, and the dynamometer method of measuring the current and the active and reactive components of the voltage down the rail, were found satisfactory. The ratio of the resistances with alternating and direct currents increased with the magnitude of the currents to a maximum, at which it remained in most cases, but in a few cases it diminished again. The ratio, when a maximum, had values about 7 for track and 12 for contact rails at a frequency 25, and varied nearly as the square root of the frequency. The best form of rail is discussed, and it is shown that theory reproduces the observations with a fair degree of accuracy.

WE have received from Mr. Oertling a copy of his recently issued catalogue of balances and weights. This firm claims that all its balances, etc., are, and always have been, manufactured in London. On comparison of the present list with that issued in 1909, we notice that with few exceptions all the balances listed

seven years ago appear in the new catalogue; the prices, however, have increased in a proportion varying from 19 to 26 per cent., presumably owing to the general increase in cost of commodities and labour due to the war. Several balances designed especially for the Royal Arsenal, Woolwich, the Aircraft Factory, the Admiralty, and for explosives factories now appear for the first time. One of these is specially adapted for rapidity of weighing. Except in one item the weights are listed precisely as in the 1909 catalogue. The exception is that a cheap set has been introduced for school use. The increase in price of the sets of weights is not so large, varying from 11 to 20 per cent., except in one instance.

WE learn from the *Engineer* of September 1 that the Reclamation Service of the United States has recently finished at Elephant Butte, about twelve miles west of Engle, the dam which forms the keystone of its great water storage project in New Mexico. The work, which has been under construction since 1911, is designed with the object of providing water for irrigational purposes, by means of the storage of the flood waters of the Rio Grande, which are to be distributed at various points downstream, so that a total area of 185,000 acres will be brought under treatment. The district has a general elevation of 3700 ft. above sea-level; the climate is mild, and the temperature fairly equable throughout the year; the annual rainfall is about 10 in. It is thus a suitable location for husbandry, if the soil be adequately watered. The lake, or reservoir, which has been formed by damming the cañon of the Rio Grande at Elephant Butte, has, when full, a storage capacity of 862,200 million gallons, a surface area of 42,000 acres, a maximum length of 45 miles, a maximum depth of 193 ft. (the average is one-third of this), and a shore line of something above 200 miles. The dam contains 610,000 cubic yards of masonry, estimated to weigh about a million tons. It is not quite so imposing a structure as the two earlier dams built by the same service, but it is nevertheless a notable engineering achievement, and the outlay of about 1,000,000*l.* on the scheme will probably be considered but a moderate price to pay for the benefits which are expected to be derived from the undertaking.

MR. A. T. HOPWOOD writes to say that the display of aurora described by Mr. Denning in *NATURE* of August 3, was visible in Manchester about 11 p.m. (Summer Time) on the night of August 26.

ECONOMIC pamphlets on "The House-Flly as a Danger to Health," "The Louse and its Relation to Disease," and "Fleas as a Menace to Man and Domestic Animals," have already been published by the British Museum (Natural History), South Kensington. Three further pamphlets on, respectively, "Mosquitoes in Relation to Disease," "The Bed-Bug and its Relation to Disease," and "Ticks, etc., Injurious to Man," are in preparation.

#### OUR ASTRONOMICAL COLUMN.

MEASUREMENT OF CLOSE SOLAR LINES.—As a preliminary to the determination of the wave-lengths of solar lines in international units, and in connection with the search for mutual influence between neighbouring lines, Dr. C. E. St. John and Miss Ware have made a careful study of the difficulties attending the precise measurement of closely adjacent lines (*Astrophysical Journal*, xlv., p. 15). Micrometric measurements were made by at least two observers upon a series of spectrograms representing the first five orders of

the 30-ft., and the first order of the 75-ft. spectrograph, and in the case of the closest pairs curves were also obtained with the registering photomicrometer; the separations derived by the latter process appeared to be least affected by accidental or systematic errors. The mean separations determined at Mount Wilson by three methods were systematically smaller than those indicated by Rowland's tables, the difference varying inversely as the separation. For six pairs, mean separation 0.274, the difference was +0.003; for eight pairs, mean separation 0.145, it was +0.008; and for eight other pairs, mean separation 0.075, it was +0.013. These differences are regarded as being probably due to errors in the Rowland values. The filar-micrometer values were found to vary with the width of the slit and the density of the spectrograms; whatever decreased the intensity of the space between the two components, as compared with the continuous spectrum outside, led to over-estimation of the interval. These results have evidently an important bearing upon recent attempts to detect effects due to anomalous dispersion.

The curious personal errors in the measurement of close lines have also been discussed from another point of view by H. H. Plaskett, in a paper entitled "The Psychology of Differential Measurements" (*Journal R.A.S. Canada*, June, 1916; *NATURE*, vol. xcvi., p. 451.)

**SPECTRA AND ABSOLUTE MAGNITUDES OF STARS.**—It has previously been shown by Adams that stars of small proper motion are relatively weaker in the more refrangible parts of the spectrum than stars of large proper motion, and that for stars of classes F to K this difference increases with advancing type. While the first result suggests a scattering of light in space, the second indicates that the absorption in the violet depends, in part at least, on the physical state of the star. This investigation has recently been extended at Mount Wilson by G. S. Monk, who has examined about 1200 plates of stellar spectra (*Astrophysical Journal*, vol. xli., p. 45). The results are in general agreement with those of Adams, but show the effects to a less extent. All the density measures which could be so used were further discussed in relation to the absolute magnitudes of the stars, as determined by Adams on the basis of intensities of certain special lines. A relationship was thus indicated as existing between absolute magnitude and the relative weakness in the violet part of the spectra of stars having small proper motions, and it is concluded that the greater part of this effect is not due to absorption of light in space. It is thought probable that, with the aid of photographs specially taken for the purpose, the relative intensity of the violet part of the spectrum, together with spectral type, might be successfully employed to provide fairly accurate values of absolute magnitudes. An additional spectroscopic method of determining stellar distances is thus suggested.

**OBSERVATIONS OF MINOR PLANETS IN FRANCE.**—It is gratifying to find that in spite of difficulties caused by the war, the French observatories have been able to secure a large number of observations of minor planets. A useful summary of these observations, made during the year 1915, is given in the *Journal des Observateurs*, vol. i., No. 10. Although no new discoveries were made by French astronomers, an abundance of precise observations of about 120 known minor planets were obtained. About two-thirds of the observations were made at Algiers, on plates taken with the instrument employed for the photographic chart of the heavens. In addition, numerous ephemerides, in many cases constructed from corrected orbital elements, were issued by the Marseilles Observatory.

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### THE MARITZBURG MEETING OF THE SOUTH AFRICAN ASSOCIATION.

THE fourteenth annual session of the South African Association for the Advancement of Science was held in Maritzburg, the capital of the Province of Natal, on July 3-8, under the presidency of Dr. Lawrence Crawford, professor of mathematics in the South African College, Capetown. The meetings of the sections took place in what used to be the Natal Houses of Parliament, the buildings of which are now the abode of the Natal Provincial Council. On the afternoon of the opening day of the session the president and members of the association were officially welcomed by the Mayor and Corporation of Maritzburg, and in the evening his worship gave a reception in the Town Hall, after which the president took the chair and delivered his address.

About eighty-five papers were read in the four sections into which the association is usually divided, and summaries of a few of these are given below.

Prof. John Orr, who will preside over the 1917 session of the association, which is to be held at Stellenbosch, Cape Province, was president of Section A at Maritzburg, and his presidential address, which was profusely illustrated by means of lantern slides, was largely a review of the progress of engineering science in South Africa of late years, particularly in connection with mining operations on the Rand.

The presidential address in Section B was given by Prof. J. A. Wilkinson, professor of chemistry in the South African School of Mines and Technology, Johannesburg. He laid stress on the fact that South Africa continues to exist on its rich stock of raw materials—its exports, in addition to the raw products of agriculture, being chiefly metals, crude and unrefined, and uncut diamonds. He devoted his address to urging the need of organising the development of chemical industry and research in the widest sense of those terms. He deplored the existence of the popular impression that the duties of the chemist and the pharmacist are identical, and to this cause he ascribed the fact that South African products were not up to the standard of imported goods. In conclusion, he submitted details of a scheme for organising chemical research in South Africa upon sound lines, and urged that this organisation should be undertaken without delay.

Mr. I. B. Pole Evans, chief of the division of botany in the Union Department of Agriculture, was president of Section C. His presidential address took the form of a sketch of the rise and development of mycology in South Africa. Persoon, the father of the science of mycology, he pointed out, was a South African, having been born at the Cape in 1755, and some of the earliest references to Cape fungi are in his "Synopsis methodica fungorum," published in 1801. During the course of his address Mr. Pole Evans incidentally referred to his own appointment as mycologist to the Transvaal Government in 1905. He could not be expected to know that some years previously the Cape Government, too, had put a sum of money on the Estimates for the salary of a mycologist, but so much sport was made of the item in the Cape Parliament that it was hurriedly withdrawn. "The ignorance of the subject and the vague notions that people have about fungi are," said Mr. Pole Evans, "due chiefly to the fact that most of them are microscopic, and consequently cannot easily be conceived by those unfamiliar with the life of the unseen world."

Section D was presided over by Mr. M. S. Evans, who took as the subject of his address a survey of the past and present relations of the European and Bantu