

the art of the two races, and, secondly, the ancient people were dolichocephalic, while the existing inhabitants are brachycephalic. This older race, of whom little is as yet known, was skilled in various arts, particularly that of mortuary pottery, and the finds from their settlements include weapons and implements of stone, bone, and shell, with some rude stone images, fire and medicine stones, all of which are illustrated and described by Mr. E. L. Hewett.

THE reports of H.M. Inspectors of Mines show that the use of coal-cutting machinery in British collieries continues to increase. In 1903 there were in use 643 machines, 755 in 1904, and 946 in 1905. These 946 machines produced more than eight million tons of coal, and as the total output of Great Britain was 236 million, there is still a wide field open for the introduction of coal-cutting machines. Of the machines in use, 500 were driven by compressed air and 446 by electricity.

THE most striking paper in the *American Journal of Science* for October is that by Mr. A. L. Day and Mr. E. S. Shepherd on the lime-silica series of minerals, in which the authors give the results of a study of mineral and rock formation by direct measurement at the temperatures at which the minerals combine and separate, like the solutions of ordinary chemistry under ordinary conditions. The entire series of mixtures of lime and silica have been prepared and studied. The only serious attempt hitherto made to determine the constitution of this series of minerals is that of Boudouard (*Journal of the Iron and Steel Institute*, 1905, p. 339), but the method he used is shown to be a very inaccurate one.

THE summary report of the Geological Survey Department of Canada for 1905 (Sessional Paper, 1906, No. 26) gives a concise account of original investigations carried out in the field and at the Ottawa headquarters with the object of increasing the knowledge of the mineral wealth of Canada. The staff of the Survey numbers sixty-seven, and under the direction of Dr. Robert Bell a large number of important explorations and surveys were carried out during the year. Dr. Bell himself gives an account of the cobalt mining district on the Timiskaming and Northern Ontario Railway. Specimens of pure silver weighing from a few pounds up to twenty pounds or more have been obtained in a number of the mines. Nuggets of mixed silver and calcite, weighing upwards of 100 lb., are exhibited in some of the mining offices in the district.

THE seventy-third annual report (1905) of the Royal Cornwall Polytechnic Society contains, among other papers of scientific interest, a verbatim report of a lecture entitled "An Early Chapter in the History of Cornwall," which was delivered by Sir Norman Lockyer at Penzance in April last. Sir Norman explained that the work he has recently inaugurated, dealing with the *raison d'être* of the stone circles and other stone monuments of the county, has barely commenced; much more remains to be done, but the evidence so far obtained, that their erection depended upon the utilitarian necessity for regulating the calendar by observations of celestial timekeepers, is so remarkably conclusive that it is very desirable that many other workers should carry it on until the whole of these monuments have been considered in all their details. The results obtained in Cornwall amply confirm the similar conclusions obtained from the study of Egyptian temples, and are themselves confirmed by the latter. A number of slides showing Lady Lockyer's photographs of the prin-

cipal circles, e.g. "The Hurlers" and "The Merry Maidens," were exhibited on the screen, accompanied by maps and tables showing the wonderful similarity of purpose of sight-lines which, owing to varying local conditions, are themselves dissimilar in their directions.

WE have been favoured by Mr. F. Berwerth with a reprint of an interesting paper he has contributed to *Tschermaks Mitteilungen* (vol. xxv., part iii.) on the meteorite of Kodaikanal, Palni Hills, Madura district, Madras. This meteoric iron is of special interest in that, on etching, it exhibits a crystalline mass of large octahedral iron grains between which globular masses of silicates of unusual character have separated out. The general structure of the iron is thus of a porphyritic type. The ratio between the iron mass and the silicates is approximately 10 to 1. Careful examination has shown that the silicate segregations are of two kinds, a spherulitic ground mass and glassy globules. The former consists of weinbergite, diopside, bronzite, apatite, and chromite, and the latter of a glassy magma containing suspended bronzite and chromite. The new silicate compound to which the author gives the name of weinbergerite is found by analysis to have the composition represented by the formula $\text{NaAlSiO}_4 + 3\text{FeSiO}_3$. Mr. Berwerth also sends a reprint of his paper on artificial metabolites contributed to the Vienna Academy of Sciences (*Mathem. naturw. Klasse*, vol. cxiv., part i.), in which he gives the results of experiments made with a small plate of the Toluca iron to ascertain the accuracy of his view that the great group of crystalline-granular meteoric irons are octahedral irons re-crystallised in consequence of heating in a solid condition. The plate, 5 mm. in thickness, was embedded in powdered charcoal in a graphite crucible and heated for seven hours at a temperature of about 950° C. The results obtained induce the author to propose to term the re-crystallised meteoric irons "the group of the metabolites." With the increasing knowledge of the physical characters of the artificial iron-nickel alloys, fresh light will be thrown on the various forms of iron metabolites.

A CHEAP edition (price 7s. 6d. net) of M. Vallery-Radot's "Life of Pasteur," translated from the French by Mrs. R. L. Devonshire, has been published by Messrs. A. Constable and Co. The original English edition appeared in two volumes five years ago, and was reviewed at length in *NATURE* of December 5, 1901 (vol. lxxv., p. 97). As Pasteur's son-in-law, M. Radot had exceptional opportunities for preparing this biography, and his work is a faithful and fascinating history of Pasteur's scientific life and aspirations.

OUR ASTRONOMICAL COLUMN.

A NEW FORM OF PHOTOMETER.—In the attempts which from time to time have been made to photograph the solar corona without waiting for a total eclipse of the sun, the intensity of the atmospheric halo about the sun's disc has played an important part. Obviously the most suitable locality for these attempts would be where the atmospheric glare is least intense. With this in view, MM. Deslandres and Bernard have designed a photometer having for its special aim the determination of the intensity of the circum-solar light.

The apparatus consists of an equatorially-mounted telescope tube having affixed to the narrower end, which is directed towards the sun, an opaque disc which just occults the actual solar disc. At the other end of the tube the light

is received on the one half of a small piece of ground-glass, the other half of which may be evenly illuminated by the light from a standard osmium lamp. By varying the distance of the latter the illumination of both halves may be equalised, and the distance of the lamp read off on a suitably divided scale.

M. Deslandres suggests that this photometer will be found extremely useful in determining the most suitable localities for solar observations of all kinds. By the interposition of violet glass the relative intensity of the glare which would affect spectroheliograph observations might be determined, and, similarly, the substitution of red glass would show the suitability of the atmosphere for the experiments on the photography of the corona, in which it is proposed to utilise the red rays (*Comptes rendus*, No. 3, 1906).

A NOVEL PLANISPHERE.—In collaboration with Mr. G. P. Serviss, of the Brooklyn Institute, Mr. L. Barritt, of 150 Nassau Street, New York, has recently published a planisphere which should prove very useful to amateur astronomers, teachers, and others who are interested in celestial phenomena.

As regards the constellations the apparatus is similar to other planispheres, but, in addition, it allows the user to determine the approximate positions of the planets, the sun, and the moon at any time and date. This is effected by having the ecliptic divided up into degrees, so that small discs representing the various bodies may be affixed at any indicated point in their respective paths. A set of tables accompanying the apparatus shows where each disc is to be affixed at different dates during the next twenty years, and thus by placing these discs as directed, and rotating the circular card for the current time and date in the usual way, the actual position of each celestial body may be seen at a glance. The observer may also, of course, determine approximately the times of rising and setting for each body on any date during the period 1906-1925. The price of the complete apparatus is five dollars.

THE OXFORD UNIVERSITY OBSERVATORY.—Prof. Turner's report of the work done at the Oxford University Observatory during the period May 1, 1905, to April 30, 1906, directs attention to the fact that the observatory staff is almost entirely engaged upon the proof-reading of the Oxford section of the *Astrographic Catalogue*, and that, in consequence, it does not seem advisable to undertake any new piece of observational work. The first of the eight volumes of the catalogue is now practically ready, and the printing of it has been commenced. It contains the measures of 66,000 star-images on the 160 plates with centres of declination $+31^{\circ}$. The report also contains brief accounts of the eclipse expedition to Aswan, and of the meeting of the Solar Research Union at Oxford in September, 1905.

THE PONCA SUN DANCE.¹

FEW Amerindian ceremonies have attracted more attention than the Sun Dance. It is found among the Arapaho, the Cheyenne, the Dakota, and the Blackfeet; and now we have a record of the rite among the Ponca. Unfortunately this account of the dance is far from complete; Mr. Dorsey was able to witness it once only, in addition to which it had become a theatrical performance for the benefit of white visitors.

The ceremony is held in June or July, and the name means "Sun-seeing-Dance," *i.e.* a dance which the sun witnesses; the priests are medicine-men who have fasted

¹ "The Ponca Sun Dance." By G. A. Dorsey. Field Columbian Museum, Anthropological Series, vii, ii. (Chicago, 1905.)

four times during previous ceremonies; these "thundermen" select the dancers, and it is a considerable honour to be thus chosen, for each dancer is held to bear a part of the sufferings of the tribe. Camp is moved on the day before the dance, the time of the ceremony having been previously proclaimed; continence must be observed by all who take part.

Five days in all were needed when Mr. Dorsey was present, of which the first was taken up with preparations. The forenoon of the second day was occupied with a mimic combat, after which the ceremonial huts were removed into position by female relatives of the priests. The supposed enemies in the fight were the men who left the camp to "spy the centre-pole" of the dance lodge; while the lodge was being erected, the centre-pole was felled and brought to the camp; at the same time four altars were prepared, one for each hut. The third day opened with a race to the centre-pole, which was still outside the camp, lying crosswise to the sun. It was then painted and raised into position; an altar was prepared, and before it was finished the dancers entered the lodge, bringing a painted buffalo skull. Prayers were offered by the dancers, and the dance began; it was continued at intervals during the whole of that day and night, and on both the fourth and fifth days the sunrise performance was specially important; on several occasions the priests made before the performers what seem to be hypnotic passes. Until the final dance all fasted; female relatives then brought food to the dancers, and the chief laved the mouth and



Raising the Centre Pole on the third day of the Ponca Sun Dance.

sprinkled the head of each dancer with water. The last ceremony was the offering of a portion of skin, cut from the shoulder of each dancer, to the sun, by placing it at the foot of the centre-pole.

All the participants were painted more than once, and careful descriptions of them are given, together with coloured plates of the more important. The remainder of the thirty-five plates show the altars and various scenes of the rites.

Mr. Dorsey was struck by the comparative simplicity of the ceremony, but he suggests that it may possibly be a case of degeneration. The centre-pole represents an enemy, and in its fork is supposed to be the Thunder Bird's nest; the altar is the sun or fireplace, which existed in the beginning; the buffalo bull came from the interior of the earth. The altar consists of the sage plant, symbolical of the people, the sun, and the buffalo. No satisfactory account of the origin of the dance could be obtained, and Mr. Dorsey offers no suggestion as to its significance. It has, however, been dealt with in the annual reports of the Bureau of Ethnology (vol. xi.) as regards the Dakota, and vol. iv. of the Field Columbian series contains a long account of the Arapaho dance by Mr. Dorsey himself. The statement on p. 88 of the present report that torture is not found among the Arapaho appears to be directly contradicted by the latter report (pp. 179 *et seq.*).

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