

is decreasing daily by some 460,000 miles; its distance from the earth on December 11, at 9 p.m., will be about 128.5 million miles.

Observations made at the Solar Physics Observatory, South Kensington, with the 36-inch reflector, show that the comet is a nebulous object, easily recognisable, and having no visible nucleus; exposures of five to ten minutes give a distinct image, and show how rapidly the object is moving in relation to the surrounding stars.

With a 3-inch Dallmeyer portrait lens, Mr. Longbottom, Chester, succeeded, on November 21, in photographing an excellent image of the comet, on an Ilford plate, in thirty minutes.

**ABSORPTION OF LIGHT IN SPACE.**—In this column for February 25 (vol. lxxix., p. 499) we directed attention to Prof. Kapteyn's researches on the absorption of light during its passage through interstellar space, in which he found a value corresponding to an absorption of 0.016 of a magnitude in a distance of thirty-three light-years.

Another paper dealing with this subject he now publishes in vol. xxx., No. 4, of the *Astrophysical Journal*, and as No. 42 of the "Contributions from the Mount Wilson Solar Observatory." The criterion he adopts is that such absorption would manifest itself, *ceteris paribus*, by the more distant stars being redder than the nearer ones. The subject is too complicated to discuss here, but, by comparing the photographic and visual magnitudes of stars of which the spectral types are known, from Misses Maury's and Cannon's classifications, and for which measures of distance are available, he succeeds in showing that such absorption probably does exist. The results indicate that for the photographic rays the loss per 32.6 light-years is 0.00945, while for the visual rays it is 0.00465, magnitude; the final value for  $d$  (increase in redness per 32.6 light-years) is  $0.0066 \pm 0.0031$  magnitude. Apparently there is no reason for assuming the absorption to be different in galactic and extra-galactic stars.

Incidentally, Prof. Kapteyn finds that for stars of the same spectral class, the ratio between the brightness of the violet radiations and that of the visual rays changes largely with the apparent magnitude. This, however, is probably a photographic, and not a cosmical, phenomenon.

Prof. Kapteyn's result proves abundantly that such large values, for the absorption, as are implied by the results recently brought out by certain investigators must be illusory.

**COPERNICUS ANTICIPATED.**—No. 21 of the *Revue générale des Sciences* (November 15, p. 866) contains an interesting article, by M. Pierre Duhem, giving an account of the life and works of Nicole Oresme, who became Bishop of Lisieux in 1377, and died at that place in 1382. Oresme translated, with commentaries, the four books of Aristotle, but the translation was never printed, although there are several manuscript copies; it is on one of these that M. Duhem bases his note. In this work, Oresme, commenting on Aristotle's contentions for an unmovable, central earth, gives numerous reasons and arguments against such an hypothesis, and clearly shows that, in his opinion, it was entirely wrong. In concluding his note, M. Duhem suggests that, not only was Oresme the precursor of Copernicus, but he may have been, also, the inspirer.

**STAR ALMANAC AND CALENDAR FOR 1910.**—From Messrs. King, Sell and Olding we have received copies of "The Star Almanac for 1910," "The Star Calendar for 1910," and "The Stars from Year to Year." These works, for 1909, were reviewed in our columns for December 3, 1908, and maintain the favourable opinions then expressed concerning them. The prices are 3d., 1s., and 1s., respectively.

#### MAGNETIC EXPEDITIONS.

OF the many successfully conducted land expeditions sent out by the Department of Terrestrial Magnetism of the Carnegie Institution of Washington since its establishment in 1904, news has just been received of the successful completion of two of the most important and interesting ones. Mr. D. C. Sowers headed an expedition which started out from Peking, China, on January 30 of

this year, passing through China and Chinese Turkestan, reaching Kashgar on August 2, and then crossing the Himalayan range and arriving at Leh, India, at the end of September. Magnetic observations and other geographical data were obtained along the entire route traversed. Mr. Sowers's chief assistant was Prof. Fuson, formerly professor of history and geography at the Christian College, Fuson, China.

Mr. C. C. Stewart started out from Washington last July to take charge of a canoeing magnetic exploring expedition in British North America. After reaching Lake Abitibi the party next proceeded to Moose Factory, then crossed James Bay to Rupert House, then up the Rupert River, and coming out at Roberval, Lake St. John, the middle of October.

News has also been received of the successful progress of the land magnetic surveys in Africa under the charge of Profs. Beattie and Morrison, research associates of the Carnegie Institution, and of the magnetic work in charge of Mr. J. C. Pearson in Persia, Asia Minor, and southern Asiatic Russia.

With the resumption of the ocean magnetic work by the *Carnegie*, the director of the department, Dr. Bauer, estimates that at the present rate of progress it will be possible in another five years to construct accurate magnetic charts of declination, dip, and force, as based on freshly acquired data, for the region of the earth  $60^\circ$  N. to  $60^\circ$  S.

The department is also cooperating with polar expeditions so as to secure information in regions which cannot be entered by the *Carnegie*, this vessel not having been built for going into the ice. Thus instruments were loaned and instructions drawn up for Mr. Jackson, of the Canadian Meteorological Office, who was detailed for duty on the Canadian exploring steamer *Arctic* (formerly the *Gauss*), in command of Captain Bernier, the vessel having recently returned to Quebec. Mr. Jackson has informed Dr. Bauer that he has secured a series of magnetic, atmospheric electric, tidal and meteorological observations at various points in the Arctic regions.

So also Dr. C. C. Craft, magnetic observer of the department, was assigned to Commander Peary's auxiliary steamer, the *Eric*, a year ago, and obtained magnetic data at a number of points in Labrador, Baffin Land, and Greenland.

During the past summer Mr. E. Kidson, formerly assistant at the Christchurch Magnetic Observatory, completed a magnetic survey of the interior of Newfoundland, and in the early part of the year an expedition, in charge of Mr. C. Sligh, made magnetic observations along the coasts and in the interior of Central America.

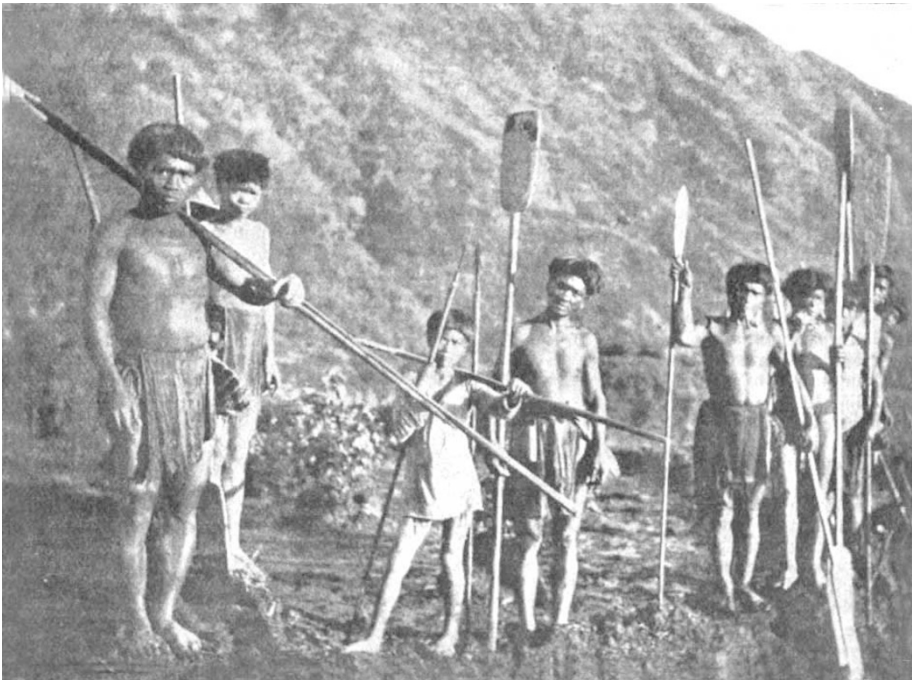
#### ETHNOGRAPHY IN THE PHILIPPINE ISLANDS.

THE Government Bureau of Science of the Philippine Islands is actively prosecuting inquiries into the physical anthropology and ethnography of the archipelago. The fourth part of the fourth volume of its Proceedings contains two papers of more than ordinary importance.

Mr. R. B. Bean contributes an elaborate article on the littoral population of Luzon and the adjacent islands, based on measurements of students at Manila. The view generally accepted is that of M. L. J. Montano ("Rapport a M. le Ministre de l'Instruction publique sur une Mission aux Îles Philippines et en Malaisie," Paris, 1879-81), who classes the inhabitants of the mountainous regions of the interior as Negritos; those of the fertile parts of the interior as Indonesian; those of the coast lands as Malay. In addition to these there is a considerable Spanish element, and, since the last conquest of the archipelago, American and negro mestizos or half-castes are springing up in every part of the islands, thus presenting in a very mixed population a series of most interesting problems for the physical anthropologist. Mr. Bean, from his recent inquiries, classifies the coast population into Modified Iberian, Australoid, and Primitive, with several intermediate types. The Modified Iberians correspond to the Mediterranean race of Sergi; the Australoids are below

the medium height, with narrow heads, broad noses and faces; the Primitives resemble the latter, but have a cephalic index ten in excess of the Iberian. The Australoid and Primitive types are probably the original elements in the population, the other types representing modifications caused by the introduction of Europeans and Chinese, recent and remote. The result is an improvement in all the physical measurements, which, with increasing European and Chinese immigration, will probably advance, and be accompanied by an increase of bodily and mental vigour, a process facilitated by improved nutrition and in hygiene by the reduction of noxious parasitic life.

The second paper devoted to pure ethnography is an account, by Fr. Juan Villaverde, of the Quiangan Ifugao tribes. They are of Negrito affinities, and present a remarkable combination of an advanced culture with savagery. They live by agriculture, cultivating rice in the hilly tracts by an elaborate system of terrace farming, by which they utilise the supplies of spring water which they consider necessary to the growth of this crop. They have neither king nor rulers, but are divided into two



Ifugaos with wooden shovels, Banaue.

distinct grades, the nobles exercising considerable authority over the plebeians. A man can rise to the higher from the lower class by the exercise of profuse hospitality, which is provided by a series of elaborate feasts. They respect the aged, who act the part of priests in their idolatrous rites, and generally hold women in high estimation. They divorce their wives continually, each of the pair readily finding a fresh partner. Their worship is chiefly that of the moon and other heavenly bodies, and they practise divination to relieve the fears of the spirit world which always beset them. They lend and borrow on exorbitant interest, and sons are responsible for the debts of their parents. Combined with this fairly advanced culture they are grossly addicted to drunkenness, and the absence of any controlling authority leads to constant blood feuds, every murder being followed by inexorable vengeance extending, not only to the offender, but embracing his nearest relatives. This is accompanied by the custom of head-hunting, in which even women, though ordinarily respected, and children are not spared, the heads of the victims being brought home in triumph, and the fronts of the houses decorated with the captured heads.

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### THE DEVELOPMENT OF EVOLUTIONARY IDEAS.

THE annual Herbert Spencer lecture was delivered at Oxford on December 2 by the Linacre professor, Dr. G. C. Bourne. In the course of a brief historical sketch, the lecturer pointed out that evolutionary ideas were widely prevalent at the end of the eighteenth century, though, after being apparently routed by Cuvier, the doctrine remained for many years in abeyance. Herbert Spencer was a pioneer in the evolutionary revival. Not an original investigator in zoology or botany, he was yet a very earnest student of biological subjects. Evolution, in Spencer's view, was a cosmic process, consisting essentially in the passage of the homogeneous into the heterogeneous. Confronted with the difficulty of the transition from the non-living to the living, Spencer framed the theory of "physiological units" with their mutual interactions. This proved to be a fertile idea, and was adopted in one form or another by many subsequent investigators. In phylogeny there is a real advance from the homogeneous

to the heterogeneous; in ontogeny, however, there are obvious difficulties in the way of this interpretation. These difficulties Herbert Spencer tried to meet by assuming for his units "polarities" of differing values, and a power of undergoing modification when subject to the influence of each other and of the environment. Hence a true epigenesis took place, and in this way he thought it possible to account for both inheritance and variation. Acquired characters, he held, *must* be inherited; and on this basis he reared the fabric of the "synthetic philosophy."

Against the system thus outlined, two crushing blows were delivered by Weismann. The first was his insistence on the fact that there is no clear evidence of the inheritance of acquired characters; the second was the demonstration that the germ-plasm in ontogeny is from the first a structure of very great complexity. The germ, it was found, must have historical properties, and the embryological history of the individual is really a genealogy.

The bearing of recent experiments in the "mechanics of development" upon the views of Spencer and Weismann respectively was very carefully and lucidly explained by Prof. Bourne, who showed that the pre-existence of certain materials in the germ, and their subsequent sorting out in the course of ontogeny, facts which could no longer be denied, were entirely adverse to the Spencerian conception. On the other hand, the view of Weismann, though in some particulars erroneous, received in the main a strong confirmation from experiments by the followers of Mendel. Prof. Bourne concluded his discourse by urging that biological studies were no mere plaything, but of the highest importance for dealing with human affairs. An essential link was now broken in the chain of the synthetic philosophy, and it behoved those concerned in such matters to inquire whether our sociological methods were right, and whether certain schemes of social improvement, founded on the biological principles of fifty years ago, should not be re-considered in the light of those of the present day.