

latter will carry the water to the Jordan valley, running straight down the steep mountain-side, the available head being 343 metres. From the power-house in the valley the outflow will be in a canal, running with a moderate slope along the side of the range, down to the Dead Sea, where an additional fall of 120 metres to a second power-house can be obtained. The Mediterranean water will be pumped from reach to reach of the canal by means of electric pumps. It is proposed to store the fresh water of the Jordan, and use it for irrigation; and as the present average flow of the river is about 70 m.³ per second, and this amount of water is now disposed of annually by evaporation, it is considered that, by raising the level and so increasing the surface of the Dead Sea, it should be possible to dispose of an influx of salt water of 103 m.³ per second. To raise this water 80 metres to the head of the pass will require 190,500 horse-power, and 617,000 horse-power will then be available for conversion into electric energy, 426,000 of which, or 240,000 kilowatts, will be available for distribution in Palestine and Syria.

THE inaugural meeting of the forty-fifth session of the Junior Institution of Engineers will be held at the Society of Arts on Friday, December 11, when Mr. J. S. Highfield will be inducted president of the Institution by Dr. Alexander Russell and will deliver his presidential address.

MR. F. W. H. MIGEOD, the well-known African traveller and authority on native languages, has consented to assume the leadership of the British Museum East African Expedition in succession to Mr. W. E. Cutler, whose death from malaria was announced at the beginning of September. Mr. Migeod will sail for Dar-es-Salaam by the next boat.

APPLICATIONS are invited for the following appointments, on or before the dates mentioned: Senior entomologist, Ministry of Agriculture, Egypt—H.E. The Under-Secretary of State, Ministry of Agriculture, Cairo (November 1). Chemical officer in the Medical Research Laboratory, Nairobi—Private Secretary (Appointments), Colonial Office, 38 Old Queen Street, S.W.1 (October 15).

Our Astronomical Column.

RECENT MODIFICATIONS IN THE THEORY OF STELLAR EVOLUTION.—Prof. H. N. Russell, who shared with Prof. Hertzsprung the honour of originating the giant and dwarf theory of the evolution of stars, is contributing a series of papers to the *Scientific American* (beginning in the September issue) on the changes of view that have taken place in the last year or two.

Prof. Eddington showed from statistics that when absolute magnitude and mass were correlated, giants and dwarfs lay on a single curve, in contradiction to the earlier view that an abrupt change took place at the point where the star became too dense to act as a gas.

The recent spectroscopic demonstration of the immensely high density of the companion of Sirius was a striking verification of Eddington's conclusion that the atom when stripped of its outer electrons is capable of enormous compression without ceasing to be a gas. This completely modifies the older conception of the falling temperature in dwarf stars. It now appears that the temperature in their interiors will continue to rise far into the dwarf stage. But a full consideration of the best manner of modifying the theory in view of the new facts is postponed.

OBSCURING COSMIC CLOUDS.—Father Hagen, of the Vatican Observatory, has during recent years published successive lists of what he describes as dark nebulae, covering considerable regions of the sky, in both low and high galactic latitudes. Prof. Öpik, of Tartu Observatory, concluded from a count of the faint stars on the Paris Astrographic Charts that these were produced by some obscuring medium.

As this would be a matter of supreme importance in all researches on distant objects, Prof. Harlow Shapley has made a fresh investigation, by taking long-exposure photographs with 24-inch or 16-inch refractors. These show stars nearly 3 magnitudes fainter than the limit (14.5 mag.) of the Paris Charts. His conclusion (Harvard Coll. Ob. Circ. 278) is that the deficiency of stars in the regions in question does not extend to these fainter stars, as it would if obscuring clouds were the cause of it. In other words, the actual distribution of the stars brighter than 14.5 is much more irregular than the laws of chance distribution would suggest. Doubtless this is a manifestation on

a larger scale of the well-known tendency of stars in many regions to group themselves along regular curves.

The "obscure nebulae" of Father Hagen are concluded to be an effect produced on the eye by the great contrast in star density between the neighbouring regions. The star deficiency is real, but the appearance of a visible obscuring medium is illusory.

U.S. NAVAL OBSERVATORY ECLIPSE OBSERVATIONS, 1905-18.—The appendix to the Publications of the United States Naval Observatory, Second Series, Volume 10, Part 2, contains an account of the total solar eclipses of August 30, 1905, and June 8, 1918, with aviators' notes on the total solar eclipse of September 10, 1923. The first account opens with the general report of the 1905 Expedition by Rear-Admiral Colby M. Chester, who was Commander-in-Chief of the special line squadron of three vessels detailed by the Navy Department. Three principal stations were occupied not far from the shores of the Mediterranean, and each station was completely equipped for photographing the corona with long and short focus cameras, for spectroscopic and polariscope work, for meteorological observations, and for position observations. At none of the stations was there any interference from clouds, and the programmes in general were carried out as planned. The volume contains the individual reports of all the officers in charge of the various departments, and covers 335 pages. It is well illustrated by a large number of excellent plates.

The reports of the 1918 eclipse, occupying 51 pages, are next dealt with. This eclipse was observed at Baker, Oregon, but partial cloudiness was responsible for the meagreness of the observations. Practically no spectroscopic results were secured.

Unfortunately the weather conditions for the eclipse of 1923 were also unfavourable at all points occupied by the naval aviators. The programme included photographs of the corona and the moon's shadow on the earth. Partly from the weather conditions and partly from the inherent difficulties of making such observations from aeroplanes, the photographs are stated to have no scientific value.