lamps—The Under-Secretary for Mines, Establishment Branch, Mines Department, Dean Stanley Street, S.W.1 (April 9). A junior chemist at the Building Research Station, Garston, near Watford, for investigations on the heating and ventilation of buildings—The Secretary, Department of Scientific and Industrial Research, 16 Old Queen Street, S.W.1 (April 10). A professor of zoology in the University of Cape Town—The Secretary, Office of the High Commissioner for the Union of South Africa, Trafalgar Square, W.C.2 (April 14). A professor of physics in the University of Tasmania, Hobart—The Agent-General for Tasmania, Australia House, Strand, W.C.2 (April 15). A junior scientific officer for work connected with aeronautical instruments at the Royal Aircraft Establishment—The Superintendent, R.A.E., South Farnborough, Hants (April 17) (quoting Ref. A. 107). A principal of the Sir John Cass Technical Institute — The Correspondent, Sir John Cass's Foundation, 31 Jewry Street, Aldgate, E.C.3 (April 24). A junior lecturer in mathematics, a lecturer in geography, and a lecturer in geology and palæontology at Bedford College for Women—The Secretary, Bedford College for Women, Regent's Park, N.W.1 (May 8). A professor of natural history in University College, Dundee—The Secretary and Registrar, The University, St. Andrews (May 8). A professor of physics in the University of Dacca, Bengal—The Registrar, University of Dacca, East Bengal, India (June 30). A test assistant for aircraft and instrument test work at the Aeroplane and Armament Experimental Establishment, R.A.F., Martlesham Heath—The Secretary of the Air Ministry, Adastral House, Kingsway, W.C.2 (quoting S. 2/R. 461). An assistant lecturer and demonstrator in botany at the South-Eastern Agricultural College, Wye, Kent—The Secretary. A pathological laboratory assistant for the Veterinary Department of the Government of Nigeria—The Crown Agents for the Colonies, 4 Millbank, S.W.1 (quoting M/14292).

Our Astronomical Column.

PENUMBRAL LUNAR ECLIPSES.—The January issue of *L'Astronomie* contains an article by M. Gaetan Blum on this subject. Consideration of these eclipses is necessary to make the theory complete ; when they are included there must be one lunar eclipse at every passage of the sun through either node, and there may be two. The almanacs as a rule do not give predictions of penumbral eclipse, but they have done so occasionally by some caprice. Eclipses in which the moon penetrates deeply into the penumbra are quite readily observable, it being obvious that a portion of the moon is dimmed by a smoky veil. There will be an eclipse of this kind on December 19 next, full moon being at $6^h\ 8^m$ A.M., so that it will be visible in Great Britain. The least distance of the moon's limb from the umbra will be less than a minute of arc. The article notes that the phenomenon is rendered more noticeable if the moon's light is weakened by reflection at an unsilvered glass surface.

A very instructive diagram shows all the eclipses of a Saros cycle (1908 to 1926), different symbols being used for each species of eclipse. It brings out clearly both the approximate 4-year cycle of recurrence and the much more exact one in 18 years 11 days.

The same publication contains a photograph of the solar eclipse of January 24, 1925, taken by Prof. Slocum at Middletown, and a diagram showing the exact position of the southern boundary of totality across New York as deduced from the observations made there.

THE JOHANNESBURG 24-INCH REFRACTOR.—This instrument is now in full working order, and is giving satisfaction. The outer portion of the lens is less good than the rest, so a slightly diminished aperture is employed

Dr. Van den Bos, of the University of Leyden, is engaged on an exhaustive search for southern double stars with the instrument. He has already found more than 180 new pairs, while according to a message which was published in the *Times* some weeks ago, the star β-Tucanæ has been found to consist of three separate pairs, making a splendid sextuple system. This rapid increase of the known southern binary systems calls for a new general catalogue of these objects, which is now in course of preparation at the Union Observatory. It is being printed by a type-writer and will be issued in separate sheets, so that new pages can easily be inserted.

It is noted that the planet Pallas appeared on a recent occasion exactly like a close binary star, and was for a time mistaken for one.

THE TEMPERATURE OF SUNSPOTS.—A preliminary paper on this subject by Prof. V. Bjerknes appears in *Comptes rendus*, **182**, 48, 1926. The author has contributed largely to the dynamics of meteorology, and his important investigation on the " Dynamics of the Circular Vortex " will be found in *Geofysiske Publikationer*, vol. 2, No. 4, Christiania, 1921. In the present paper the general principles previously established by him are applied to the problem of sunspots, in which the relative coolness is considered by him as an analogous phenomenon to the relatively low temperature in terrestrial cyclones. He postulates a fluid medium possessing a free surface and the properties of a gas with density increasing downwards more rapidly than would result from compression. For a horizontal vortex in such a medium, Prof. Bjerknes develops an expression for the fall in temperature ($\Delta T = T - T_0$) in the central part of the vortex—nat. log $T/T_0 = 2D/H$, where D is the depth of the depression of the free surface, and H is the depth to which vortical motion extends. Applying this formula to a sunspot vortex, given $T = 6000°$, the following depressions of temperatures are given :

D/H = 0·001	0·01	0·1	0·2	0·3	0·4	0·5
ΔT = 12°	120°	1100°	2000°	2700°	3300°	3800°

It is found as a corollary that the velocities in corresponding vortices should range from a fraction of a kilometre to 20 km./sec. The theory is stated not to be invalidated by the possible absence of a free surface in the sun, so long as there is a rapid change in the densities of the solar gases from photosphere outwards.

It may be added that the temperature of a sunspot at photospheric level is generally considered to be about half that of the photosphere itself. Prof. H. N. Russell, in a " Note on Cooling by Expansion in Sunspots " (*Astrophysical Journal*, 54, 293, 1921), gives as the temperature of the photosphere 6000° C. ; of the spot at the same level, 3500° to 4000° C. ; at base of the spot vortex, probably 20,000° C. (rough estimate).