

plants should not be picked except for special reasons; they should be investigated and left to seed. Wild-flower competitions in which children are told that they must actually pick a flower before they add it to their list are much to be deprecated."

WE have received from the firm of Eisenschmidt, 60 Dorotheenstrasse, Berlin, a complete catalogue of German official maps, including the maps published by the various States and the geological maps. There is added a catalogue of Austrian maps. Full indexes of most of the issues are given with the catalogue.

APPLICATIONS are invited for the following appointments, on or before the dates mentioned: A poultry instructor at the Norfolk Agricultural Station, Norwich—The Director of the Station, 11 Bridewell Alley, Norwich (October 17). Junior assistants at the National Physical Laboratory in the electricity and aeronautics departments—The Director, National Physical Laboratory, Teddington (October 24). Two research fellows in the department of Glass Technology of the University of Sheffield—The Registrar (October 24). An assistant for soil survey work in the Harper

Adams Agricultural College, Newport, Salop—The Principal (October 26). A professor of surgery in the University of Lucknow—The Registrar (October 31). A senior lecturer in botany and agronomy, and a lecturer in geography (especially in human and commercial geography), in the Transvaal University College—The Registrar, Transvaal University College, Pretoria (November 12). A professor of physics in the University College, Colombo, Ceylon—The Private Secretary (Appointments), Colonial Office, 38 Old Queen Street, S.W.1 (November 20). An assistant lecturer in agriculture at the Harper Adams Agricultural College, Newport, Salop—The Principal. A senior hydraulic engineer by the Government of the Gold Coast—The Crown Agents for the Colonies, 4 Millbank, S.W.1 (quoting M/13968). A computer for the Gold Coast Survey Department—The Crown Agents for the Colonies, 4 Millbank, S.W.1 (quoting M/13965). Teachers for evening classes at the Northampton Polytechnic Institute in the subjects of mathematics, electricity, mechanics and heat, light and lens workshop—The Principal. A fellowship in chemistry at Trinity College, Dublin—The Registrar.

Our Astronomical Column.

MEASUREMENT OF PLANETARY RADIATION.—W. W. Coblentz and C. O. Lampland describe their researches in this field in *Lowell Observatory Bulletin*, No. 85. Various screens (fluorite, quartz, water, glass) were used to isolate different regions of the spectrum; bismuth and platinum-rhodium wires were chiefly used in the thermo-couples; tellurium wire is found to be still more sensitive, but its action is slower.

The percentage of radiation that is planetary (*i.e.* due to warming of the planet's surface or atmosphere) is 3 from Jupiter, 9 from Venus, 15 from Saturn, 30 from Mars, 80 from the moon. It thus increases with diminution of atmospheric density. It cannot be inferred, where the atmosphere is dense, that the surface of the planet is as cold as these figures would indicate. It is, for example, quite improbable that the surface of Venus (on the sunlit side) is near freezing-point; the measures really refer to a high layer in its atmosphere. The case of Mars is discussed in great detail. It is concluded that its day surface temperature may reach 10° or 20° C., while that of the moon may reach 80° or 100°.

Investigations on stellar temperatures were also made. The results range from 13,000° for ϵ Orionis, Bo, to 3000° for Antares, Map, and β Pegasi, Mb.

A NEW THEORY OF VARIABLE STARS.—Dr. J. H. Jeans contributes a paper to the June issue of the *Monthly Notices of the Royal Astronomical Society* that contains some bold speculations connecting the long-period variable stars with spectroscopic binaries. He collects statistics of these binaries from Lick Observatory Bulletin 385, and deduces the mean value of the sum of masses of the two components as 18 (Sun), and the mass ratio as 0.73, the less massive star having the "earlier" spectral type. His suggestion is that the long-period variables represent the stage preceding fission in such stars. He postulates that both rotation and oscillation are present, and that the periods of these are at first different but gradually approach each other, becoming identical just before fission. The theory is shown to account

for several observed types of light curve, including the Cepheid type. Since even the M type variables have frequently a single definite period of light change, it is thought that these stars may have commenced the fission process in an earlier non-luminous stage. The author concludes that the temperature of both stars rises at fission, and thus explains the prevalence of type B in spectroscopic binaries.

SPIRAL NEBULÆ.—Dr. K. Lundmark, who has for some years made a special study of these objects, has written a further paper on them in the *Monthly Notices of the Royal Astronomical Society*, 85, No. 8. He first discusses proper motions and radial velocities; the latter are concluded to reach a maximum of 2250 km./sec. at a distance of 110 Andromeda-nebula units, or 10⁸ light years. The sun is moving (relatively to the spirals) towards galactic longitude 75°. It is conjectured that this may arise from a rotation of our local stellar system in a period of 3.10⁸ years. The proper motions appear to be too small and doubtful for use. From the fact that they appear to be less than 0.01" annually, a minimum distance of 30,000 light years is found. Indirect methods give much greater distances. Assuming the novæ in spirals to be of the same character as galactic novæ, distances of the order of a million light years are found for the nearer spirals, in good agreement with Dr. Hubble's results from Cepheid variables found in them. In this case the bright Nova S. Andromedæ, found in 1885, was of absolute magnitude -16, and was comparable with Tycho's Cassiopeia Nova. Dr. Lundmark has found a star of magnitude 13.7 and spectral type Mb, which is probably Tycho's star. Its spectrum shows giant characteristics, and it is concluded to have been of absolute magnitude -16 at maximum.

The paper concludes with some interesting speculations on the Lambert-Charlier suggestion of successively higher orders of systems; galaxies of galaxies, and so on. The facts, so far as known, are concluded to accord with the suggestion.