Africa has been available. A year ago the financial position of the country justified the formation of a new survey department, of which the first annual report has now appeared. It has been decided to aim at a one-inch scale for the whole colony, which will entail 111 sheets. A start is to be made in the central and southern parts of the Northern Province. A school for training native surveyors has been started, but in order not to delay the work, trained surveyors have been temporarily transferred from the Gold Coast. A large scale cadastral survey of Freetown is in hand and well advanced.

APPLICATIONS are invited for the following appointments, on or before the dates mentioned:—A research student at St. Mary's Hospital Institute of Pathology and Research—The Secretary of the Institute, St. Mary's Hospital, Paddington, W.2 (December 20). A research assistant in the Department of Pharmacology of the University of Sheffield, to help in an investigation on cancer, and a laboratory attendant with experience of physiological or pathological and chemical technique for the same institution—Prof. E. Mellanby, The University, Sheffield (December 22). A demonstrator in chemistry at Guy's Hospital Medical School—The Dean, Guy's Hospital Medical School, London Bridge, S.E.1 (December 29). An adviser in agricultural chemistry in the University of Manchester, under the scheme of the Ministry of Agriculture and Fisheries—The Registrar, The University, Manchester (January 20). Lecturers in organic chemistry, physical chemistry, and biochemistry at the Indian Institute of Science, Bangalore, India—The Director (January 30). A professor of physiology in the University of the Witwatersrand, Johannesburg — The Secretary, Office of the High Commissioner for the Union of South Africa, Trafalgar Square, W.C.2 (January 31). A senior lecturer in philosophy in the Transvaal University College, Pretoria—The Registrar, Transvaal University College, Pretoria (January 31). A professor of anatomy in the University College of South Wales and Monmouthshire — The Registrar, University College, Cardiff (February 26). A professor of philosophy at Armstrong College—The Registrar, Armstrong College, Newcastle-upon-Tyne (March 12).

Our Astronomical Column.

THE COMET GRIGG-SKJELLERUP.—Mr. G. Merton read a paper on this comet at the meeting of the Royal Astronomical Society on December 10. The identity of the comet found by Skjellerup in 1922 with that found by Grigg in 1902 was first suggested by Crawford and Meyer. Mr. Merton has made it a practical certainty. He gets practically the same mean motion in 1922 from the observations in that year alone (they extended over three months, so the value is trustworthy) as by combination with those of 1902. The comet is due to return to perihelion on May 10, 1927; Mr. Knox Shaw is now searching for it with the large reflector at Helwan. It may be expected to be found not later than February. It approaches within 17 million miles of the earth in June; Comet Pons-Winnecke makes a still nearer approach (some 4 million miles) near the end of June.

INTERNATIONAL LONGITUDE DETERMINATIONS.—Dr. J. Jackson gives in the *Observatory* for November an interesting account of the extensive scheme of longitude determination by radio signals which has been in progress during October and November.

The observatories of Algiers, Shanghai, and San Diego (California) form the principal chain, but some fifty other observatories are co-operating. The use of travelling wire micrometers practically eliminates personal equation, and enables longitude differences to be determined without interchange of observers. Dr. Jackson obtained star observations on seventeen nights between September 27 and November 1, the transit instrument being reversed on each star to eliminate collimation. The Shortt clock has such a regular rate that its error can be interpolated for days without star observations. Thirty-four series of time signals are sent out daily from five stations; all except Saigon were regularly received at Greenwich.

THEORY OF SUNSPOTS.—An important contribution to the theory of sunspots and the sun's general circulation is made by Prof. V. Bjerknes in the *Astrophysical Journal*, September 1926, under the title "Solar Hydrodynamics." For the details of the theory reference must be made to the paper in question, but a short outline of the main points may be given as follows. On the assumption that a sunspot is a vortex decreasing in intensity from the photosphere downwards, their low temperatures are explained from general hydrodynamical and thermodynamical principles.

The results deduced are in accordance with the accepted temperatures of sunspots and the probable velocities of the gases involved in the vortex. A preliminary account of this part of Bjerknes' investigation was given in NATURE, March 27, p. 463. The well-known properties of sunspots (their usual occurrence in pairs having opposite magnetic polarities, the progression of the spot zones towards the equator during the 11-year cycle, the magnetic-polarity cycle of 22 years, etc.) are explained by making the following suppositions. In each of the sun's hemispheres, northern and southern, there are two zonal vortices, having opposite rotations and surrounding the sun approximately as parallels. Wherever part of either vortex rises and cuts the photosphere, a typical bipolar pair of sunspots makes its appearance. As part of a scheme of general circulation, these two zonal vortices revolve around each other in a period of 22 years, being brought alternately near to the surface of the photosphere in latitudes about 40°, progressing equatorwards in the course of 11 years, and descending again into the interior near the sun's equator. The scheme of general circulation is one demanding a condition of what is known as stratified circulation.

Renewed investigations are required on the part of observers to determine any possible systematic movements which may be shown by sunspots, faculæ, calcium and hydrogen flocculi, and prominences. The systematic drifts suggested by the theory are apparently too slow to be observed spectroscopically (cf. *Astrophysical Journal*, **32**, 80, 1910, where St. John compares the mean wave-length of K_2 and K_3 near the sun's poles and at the equator for detection of systematic movements).

Prof. Bjerknes' paper is also discussed, together with remarks bearing on the question of observed systematic motions of spots and faculæ, by 'W. M. H. G.' and 'H. W. N.' in the *Observatory* for December.