teresting instrument. A curious fact elicited is that there seems to be a slow alteration in the vibration periods of a number of pendulums at the same place, Dehra Dun. Thus all four pendulums used showed the apparent force of gravity as highest in January, 1904, and lowest in November, 1909, with a distinct rise since. No cause can be suggested to account for this variation. An investigation as to how far the Indian observations conform to the requirements of "isostacy" promises interesting results, but is as yet only in a preliminary stage.

THE *Alsatian*, which is the first of two quadruple-screw turbine steamers being constructed for the Allan Line, was launched from the yard of Messrs. Wm. Beardmore and Co. on March 22. An illustrated account of this vessel, which is 600 ft. long and of gross tonnage about 18,000, appears in *Engineering* for April 4. A notable feature is the adoption of the cruiser stern, an arrangement which permits of a greater displacement on a given length over-all, with corresponding increase in dead-weight, or, if the displacement be not increased, the lines may be fined down, so that the ship is more easily driven, with corresponding reduction in engine power. Further, the fuller water lines aft which are permissible with this type of stern ensure greater stability, especially at the deeper draughts. It is probable also that this form of stern tends to reduce the vibration due to the propellers. Hitherto the Board of Trade has only required a vessel to be capable of remaining afloat with any two adjacent compartments open to the sea. In the *Alsatian*, the aim of the designers has been to ensure her remaining afloat with four adjacent compartments open to the sea.

WE have received from Messrs. George Philip and Sons, Ltd., of Fleet Street, London, a specimen of a very handy, light terrestrial globe, 6 in. in diameter, showing by bold blue lines the new routes which will be opened when the Panama Canal is completed. "The Panama Canal Route Globe," as it is named, costs only 2*s*. 6*d*. net, and explains easily what a convenience to ocean travel the new canal will be.

MESSRS. CHARLES GRIFFIN AND CO., LTD., announce the following new books and new editions. In *Chemistry*:—The Petroleum Technologist's Pocket Book, by Sir Boverton Redwood, Bart., and A. Eastlake; Roberts-Austen: Addresses and Scientific Papers, together with a Record of the Work of Sir William Chandler Roberts-Austen, K.C.B., F.R.S., compiled and edited by S. W. Smith, illustrated; A Manual on the Examination of Fuel, by J. H. Coste and E. R. Andrews, illustrated; Outlines of Stationery Testing, by H. A. Bromley, illustrated; A Treatise on Petroleum, by Sir Boverton Redwood, Bart., new edition in three volumes, illustrated; A Handbook of Petroleum, by Capt. J. H. Thomson and Sir Boverton Redwood, Bart., new edition, revised throughout and added to by Major A. Cooper-Key and Sir Boverton Redwood, Bart., illustrated; The Synthetic Dyestuffs, and the Intermediate Products from which they are derived, by Dr. J. C. Cain and Dr. J. F. Thorpe, F.R.S., new edition. In *Engineering*:—Coast Erosion and Protection, by E. R. Matthews; The Dock and Harbour Engineer's Reference Book, by B. Cunningham; Electricity in Mining, by Siemens Brothers Dynamo Works, Ltd., illustrated; Griffin's New Guide to the Board of Trade Examination for Marine Engineers, by R. A. McMillan, part ii., Elementaries, Verbals and Drawing; A Manual of Petrol Motors and Motor-cars, comprising the Designing, Construction, and Working of Petrol Motors, by F. Strickland, new edition. In *Geology*:—A Textbook of Geology, by Prof. J. Park, illustrated. In *Mathematics and Physics*:—Electricity and Magnetism, by Prof. J. H. Poynting, F.R.S., and Sir J. J. Thomson, F.R.S., 2 vols., vol i., illustrated. In *Metallurgy*:—Autogenous Welding: a Practical Handbook on the Installation, Working, and Manipulation of Oxy-Acetylene Welding Plant, for the Unition of Metals without Flux or Compression, from the French of R. Granton and P. Rosemberg, translated by D. Richardson, illustrated; Practical Assaying, by Prof. James Park, revised and enlarged from the third New Zealand edition; Rand Metallurgical Practice, vol. i., new edition. In *Technology*:—Engraving for Calico Printing, by W. Blackwood, illustrated; Painters' Colours, Oils, and Varnishes, Hurst's Practical Manual, new edition, revised throughout and re-written by N. Heaton, with a chapter on Varnishes by Dr. M. B. Blackley, illustrated; Painting and Decorating, by W. J. Pearce, new edition, illustrated.

OUR ASTRONOMICAL COLUMN.

NOVA GEMINORUM No. 2.—In No. 4638 of the *Astronomische Nachrichten* three series of magnitude determinations of Nova Geminorum No. 2 are published. The first, from the University Observatory, Tokyo, commences with the nova's magnitude 5·1, on March 23, and observations were continued until August 17, when its magnitude was 7·89. Both the other sets of observations come from the Observatory of Cracow. The longer list gives the magnitude 3·96 for the nova on March 14; by the time the last determination was made, May 19, its light had dimmed to magnitude 7·60.

LIGHT-CHANGES OF α ORIONIS.—A list of 293 magnitude determinations of α Orionis, made between November, 1901, and August, 1912, by Mr. C. P. Olivier, of the Leander McCormick Observatory, is given in No. 4637 of the *Astronomische Nachrichten*. The table gives, in four columns, the date, Greenwich mean time, determined magnitude, and number of comparison stars used. The values found range from 0·21 (twice) to 1·06 (four times). Under the usual treatment the observations failed to reveal any regularity in the light changes.

PHOTOGRAPHS OF COMET BROOKS (1911*c*).—Dr. Luigi Taffara (*Mem. della Soc. d. Spett. Ital.*, disp. 1ª, vol. ii., ser. 2ª, p. 11) publishes an account of his photographic work on this comet during September, 1911. His observations were made at the Collurania Observatory in Teramo, at the invitation of Dr. Cerulli. The instrument employed was a Cooke triplet of 16·5 cm. aperture and 1·09 metres focal length. This camera was mounted on the equatorial constructed by Salmoiraghi (aperture 13·5 cm. and focal length 1·75 metres), which was used as a finder. In addition to giving a table of positions of the comet

for several dates, he publishes a series of photographs of its form, displaying the remarkable changes which the tail underwent.

FRANKLIN ADAMS CHART OF THE SKY.—The Royal Astronomical Society has undertaken the publication of a limited number of reproductions of the Franklin-Adams chart. The 206 sheets form a complete map of the whole sky, the area of each being 15° by 15°. It will be remembered that the original plates were secured with a 10-in. Cooke triplet objective of 45 in. focal length; the negatives show stars down to the sixteenth and seventeenth magnitudes. The reproductions will be on bromide paper, 15 by 12 in., the chart area being 11 by 11 in. The complete price will be ten guineas, and it is expected that the first sets will be ready for delivery in twelve months' time. It is hoped that a sufficient number of subscribers will be enlisted to help to defray the cost of such an expensive undertaking.

A CHEAP FORM OF GRATING SPECTROGRAPH.—In the current number of *Knowledge* (vol. xxxvi., No. 537, p. 142) Mr. A. H. Stuart describes what seems to be a new form of spectroscope in which a transmission grating is used. The instrument is there illustrated by two diagrams, and the principle involved can be easily grasped. The instrument is of the rectangular box form, having the slit and camera at one end of the box. The light, after passing through the slit, falls on an objective, at the back of and nearly in contact with it being placed a replica grating; behind this grating is placed a plane mirror at a distance of a few inches. The beam of light passes through the slit to the objective, and falls normally on the grating. A large portion of the light passes through the grating unchanged, and falls on the mirror. If it meets the mirror normally it will be reflected back to the grating, and a spectrum will pass out obliquely through the object glass and fall on the photographic plate at the camera end to one side of the collimator. In order to avoid the faint reflection spectrum the grating is retained in its position at right angles to the incident beam, but the mirror is slightly twisted. Thus a pure spectrum of considerable dispersion is obtained. Mr. Stuart has constructed such an apparatus by the judicious use of 20*s*., the achromatic lens, 2 in. in diameter, costing 3*s*. 6*d*., and the grating 10*s*. 6*d*.

KHEDIVIAL OBSERVATORY, HELWAN.—Two bulletins, Nos. 8 and 9, from this observatory indicate the useful astronomical work that is being accomplished in Egypt. The first gives an account of the method adopted and the results obtained in determining the astronomical positions of El Daba'a, Mersa Malrûh, Baqbaq, Sollûm, and Siwa. The work was carried out by Messrs. E. B. H. Wade and H. Knox Shaw.

The second of the two bulletins contains the results of the first three years (1909–11) of nebular photography with the Reynolds reflector obtained by Mr. H. Knox Shaw. It is stated that during this period the instrument was constantly undergoing alterations and repairs, so that some of the plates are not so good as they might be. Nevertheless, some of them afford considerable information as to the structure of some nebulæ not hitherto photographed. The table gives the new general catalogue numbers, the positions for 1900 and remarks, and four plates, each containing four or more reproductions, conclude the publication. Attention is directed to the advantage of making drawings of the smaller and less brilliant nebulæ from the negatives, a method which is capable of reproducing the general form of the nebula almost as accurately as any photographic reproduction.

THE DEVELOPMENT OF THE PARASITE OF INDIAN KALA-AZAR.

IN a recent memoir with the above title,[1] Captain W. S. Patton gives a detailed account of investigations carried on by him in Madras upon the development and transmission of the parasite of Kala-azar, commonly known as *Leishmania donovani*. As the result of numerous experiments with various blood-sucking insects, the author concludes that the transmission of Indian Kala-azar from man to man is effected solely by bed-bugs of the genus Cimex, and finds that the parasite develops as readily in *C. lectularius*, the species common in Europe, as in the Indian species, *C. rotundatus*. The development observed by the author takes place entirely in the digestive tract of the bug, and is in the main as follows.

The bug takes up the parasite from an infected person in the leishmanial form, that is to say, as the familiar "Leishman-Donovan body," contained either within white blood-corpuscles or in macrophages, in the peripheral blood. After being ingested by the bug, the parasites remain in an unchanged condition for some thirty-six to forty-eight hours. The earliest developmental changes in the gut of the bug may take place while the parasite is still enclosed in a leucocyte or after it has been set free by disintegration of the host-cell, and consist of an increase in the size of the parasite, with enlargement of its trophic and kinetic nuclei. As growth proceeds, the parasites may multiply by binary fission.

The next event in the development of the parasite is the formation of a flagellum, which takes place from the third to the fifth day after the last feed of infected blood. A young, growing parasite may, without dividing, become elongated and spindle-shaped, and acquire a flagellum; or it may first multiply by binary fission, after which each of the two daughter individuals acquires a flagellum; or the parasite may go through a process of multiple fission, in which the two nuclei, trophic and kinetic, divide each into eight or more, and as many flagella grow out, with subsequent division of the body into a number of flagellated daughter-individuals. However the details of the process may vary, the final result is the same, and by the fifth day the parasites, considerably increased in number, have the form of long, actively moving flagellates of the Herpetomonas type, familiar to all those who have studied the development of the parasite in artificial cultures ever since these changes were first discovered and described by Rogers.

About the sixth or seventh day the flagellate parasites are observed to be attaching themselves by their flagella to the intestinal wall of the bug. When thus attached, the body of the parasite slowly rounds up and at the same time it divides; the smaller forms thus produced divide again, and meanwhile the flagellum becomes shorter, and finally disappears altogether. The result of these changes is that the parasite reverts again from the herpetomonad phase to the form of the small, non-flagellate leishmanial body, distinguished by the author as the "post-flagellate" phase, though it does not appear to differ in any essential detail from the initial "preflagellate" leishmanial form, but is described as having a distinct envelope ("periplast"). The post-flagellate stage in the bug begins about the eighth day, and is completed by the twelfth.

According to Captain Patton, this post-flagellate stage represents the final stage of the development of the parasite in the bug. He

[1] Scientific Memoirs by Officers of the Medical and Sanitary Departments of the Government of India. No. 53, "The Development of the Parasite of Indian Kala-Azar." Pp. v+38+1 plate. (Calcutta: Government Printing Office, 1912.) Price 1*s*. 2*d*.