

meter embedded in paraffin or celloidin. Since the object moves in a horizontal plane along the arc of a circle, it has the advantage that the sections are flat. The rocking microtome is similar in general construction to the instruments manufactured in previous years, but with improvements in details; it will cut sections 0.002 to 0.024 mm. in thickness from paraffin-embedded objects up to about 12 by 20 mm. in diameter. The freezing microtome has been specially designed for use in operation work. The thermometers, which give continuous automatic temperature records extending over a considerable period, are of the electrical resistance type, and consist essentially of a bulb containing a coil of platinum wire joined by connecting wires to a recorder. The record consists of a series of dots on the chart-paper, impressed every minute or half-minute as is desired.

Two correspondents have forwarded further suggestions for picture-hanging wire in reply to the letter under that title published in NATURE of May 19 last. The first relates to the use of single-strand enamelled phosphor-bronze wire of No. 18 B.W.G. This has

been found satisfactory for pictures of moderate weight. The other method, similar to that described in NATURE of May 26, p. 395, is to use ordinary copper bell wire 0.055 in. to 0.02 in. in diameter. Pictures varying in weight from 1 lb. to 50 lb., using two wires for the heavier pictures, have been hung successfully with it. The need for straightening the wire carefully is emphasised in both letters, and the advisability of avoiding sharp bends at the edges of hooks is mentioned.

MESSRS. W. HEFFER AND SONS, LTD., Cambridge, have in the press a work, to be published in three parts, entitled "Dates and Date Cultivation in the 'Iraq,'" by V. H. W. Dowson, of the Agricultural Directorate of Mesopotamia. The three sections comprising the work will deal respectively with the cultivation of Basra date palms and the marketing of the fruit; statistics and details of the experiments from which the average yield of date gardens per acre is adduced; and the varieties of date palms found at Basra. Part iii., which will be illustrated, is promised for the coming autumn.

Our Astronomical Column.

PONS-WINNECKE'S COMET.—Mr. W. F. Denning writes:—"On May 28 this comet was conspicuously visible in a field-glass. The comet is at present situated in the Milky Way amongst the stars of Cygnus, and is moving to the south-east at the rate of about $3\frac{1}{2}^\circ$ per day. It is increasing in apparent brightness, and may possibly come within naked-eye vision at the middle of June. The latest observations prove that the comet is farther from the earth than was expected, and that at perihelion it will be about 2,000,000 miles outside the terrestrial orbit. Perturbations by Jupiter in 1918 have altered the cometary path and lengthened the period of revolution. There may be a meteor shower on the nights from June 27 to 30, but the conditions are such that the display may not be a very brilliant one. Observations should be carefully made at the period mentioned, and it is fortunate that the evening sky will be free from moonlight."

SPECULATIONS ON THE FORMATION OF SPIRAL NEBULÆ.—M. Alex. Véronnet contributes an article on this subject to the *Comptes rendus* of the Paris Academy of Sciences for April 18. He examines the effect that would result from the impact of the two components of a binary system. He shows that the energy produced by friction at their surfaces is the most important factor, and that a mass equal to that of Jupiter might produce by impact with the sun a temporary increase of light amounting to twelve magnitudes. Radiation-pressure would then expel the heated particles with high speeds, and the revolutionary movement of the stars would give a spiral formation to the scattered particles. The author seeks thus to explain the phenomena both of novæ and of spiral nebulæ. He concludes that the latter would undergo a rapid evolutionary transformation (in the course of a few centuries). It would seem, however, that the larger spiral nebulæ are on too grand a scale to be the product of the impact of a mere pair of stars. The hypothesis is, however, worth considering in relation to such nebulæ as that which was revealed round Nova Persei by the light of the outburst, and Hubble's variable nebula in Monoceros

M. Véronnet quotes the results obtained by Mr. Van Maanen, from photographs taken at intervals of several years, on the movements going on in certain nebulæ. These showed an outward tendency, agreeing with M. Véronnet's conclusions.

The nebula round Nova Persei had evidently been present, though unseen, before the outburst, and the suggestion had already been made that it might be the product of a former impact of the same two bodies that caused the outburst of 1901.

THE COMPANION OF α HERCULIS.—In the course of a paper on "Seven Spectroscopic Binaries" (*Astro-physical Journal*, April) Mr. R. F. Sanford announces that the fainter star of this well-known pair is a spectroscopic binary with a period of 51.6 days, only one spectrum being visible. He further announces that the radial velocity of the centre of gravity is -37.2 km./sec., whereas that of the principal star of the visual pair is -32.2 km./sec. Mr. Sanford concludes from this that the visual pair is only an optical one, the components not being physically connected. The following considerations, however, appear to show that this conclusion is unwarranted:—

The chance of two unconnected stars of magnitudes 3.5 and 5.5 being within $5''$ of each other and having the same proper motion of $3''$ per century in the same direction is so small as to be absolutely negligible. Moreover, the assumption of physical connection does not involve an unreasonable value of the masses. The spectroscopic parallax of component B is $0.018''$ and the angular separation $4.7''$, or 260 astronomical units (if unforeshortened); a joint mass equal to that of the sun would give a relative velocity in a circular orbit of 1.84 km./sec. The actual relative velocity is 5.0 in the line of sight and 1.6 at right angles, the position angle having altered by 6° in eighty years. The combined velocity is 5.25, giving a joint mass of $(5.25/1.84)^2$, or 8.14 times that of the sun. We know of many greater stellar masses; for example, in a paper by Herr P. Hügeler in *Astr. Nach.*, No. 5098, the masses of the components of α Herculis are calculated to be 7.43 and 2.84 in terms of the sun.