

pupillary adjustment. For the former, the focussing is done separately for each eye by rotation of the eye-pieces, controlled by a scale for future setting. Although at first this may appear more inconvenient than the usual double screw motion of both tubes, this is not found to be the case during continued usage, and the makers are enabled to introduce the very desirable feature of making the prism cases quite dust and moisture proof, which is almost impossible when sliding tubes are employed. As issued, the magnifying power is 6, and the field of view about  $7^\circ$ . With respect to the varying opinions as to the best arrangement of the object-glasses for stereoscopic effect, Messrs. Leitz have decided that the advantages of placing them further apart than the pupillary distance are questionable, and so the object-glasses are fitted at the same interval as the eye-pieces. The binocular is made of a specially strong light metal, the weight being only 12 oz. without case. We can without hesitation speak very highly of the optical performance of this instrument. The definition is remarkably crisp, and the image very achromatic and quite sharp up to the edge of the field of view.

A GENERAL INDEX to the annual volumes, sixteen in number, published by the Geological Survey of Canada since 1884, has been compiled by Mr. Frank Nicolas and issued at Ottawa by the Geological Survey. The index runs to 1014 pages, and contains about 180,000 references. It should prove of great service to investigators anxious to refer expeditiously to the annual volumes of the Canadian Survey. The present catalogue, combined with the index previously published, and dealing with the publications from 1863 to 1884, forms a complete means of reference to the English edition of the volumes issued by the Geological Survey of Canada.

#### OUR ASTRONOMICAL COLUMN.

RADIAL VELOCITIES OF NINETY-NINE STARS.—The largest single contribution to line-of-sight work yet made appears in No. 5, vol. xxvii., of the *Astrophysical Journal* (pp. 301-24, June). The results were obtained by Prof. Küstner and Dr. Zurhellen, at the Bonn Observatory, during the years 1903-7, and include the provisionally determined velocities of ninety-nine stars of the second and third spectral types down to the fourth visual, or fifth photographic, magnitude.

A three-60°-prism spectrograph by Töpfer, giving a well-defined spectrum between  $\lambda\lambda$  4150 and 4500, was employed, the temperature being automatically controlled by electric means; at H $\gamma$  the linear dispersion is such as to give 15.2 tenth-metres per millimetre.

Although the present values for the radial velocities are only provisional, it is expected that they will not be greatly modified in the final definitive results. In addition to fifteen previously known variable velocities, the ninety-nine sets of results include those for three other stars,  $\delta$  Tauri,  $\epsilon$  Böötis, and  $\mu$  Pegasi, the radial velocities of which are suspected to be variable. The comparison spectrum employed in each case was that of the iron arc, Kayser's values of the wave-lengths being taken; Rowland's values were taken for the stellar lines. As the observations included some 7500 complete measures of about forty-four different stellar lines, Prof. Küstner expects that their discussion will provide good exact values for the relative wave-lengths of the latter, and also indicate their dependence on the type. In discussing the determination of the constant correction, due, first to the absolute errors of the wave-lengths adopted, and, secondly, to the personal and instrumental errors, Prof. Küstner considers as invalid the control usually obtained from plates exposed on the sun, moon, or larger planets. He believes that a source of light, of precisely known radial velocity

and as similar as possible to the star, should be observed, and suggests the employment of the brightest minor planets or of Jupiter's satellites for this purpose. After many experiments, and at Dr. Zurhellen's suggestion, he employed spectrograms of the bright isolated peaks seen at the moon's terminator, and found the results to be satisfactory. These indicate that a small negative correction of about -1.0 km. should be applied to the results now published. Of the constant radial velocities determined, that of  $\eta$  Cephei, -85.98 km., is the largest.

THE OBSERVATION OF COLOURED STARS.—In No. 4252 of the *Astronomische Nachrichten* (p. 57), Herr Osthoff discusses at some length the changes of the colour perception of the eye, and shows that these changes depend upon the physiological condition of the observer as well as upon the intensity of the colour of the observed object and upon the instrument used. A table containing the results of his own observations between January, 1894, and November, 1898, shows the variation of the difference between his estimates of colour and the catalogue colour of the stars observed; other tables show the variation of the eye's colour-perception for red and yellow stars respectively, and it appears that the eye is more uncertain in estimating the red than the yellow. The importance of this fact in observing the magnitudes of coloured variable stars is pointed out. There is some indication of a periodical change in the individual eye, but the observations are not sufficiently numerous to establish this.

PHOTOMETRIC OBSERVATIONS OF EROS.—During the period September, 1907, to January, 1908, Dr. Paul Guthnick made a number of photometric observations of Eros at the Berlin Observatory, and now publishes and discusses the results in No. 4249 of the *Astronomische Nachrichten* (p. 1, vol. clxxviii.). From his discussion he is unable to establish with certainty the existence of any short-period light-variation. On plotting the light-curve, taking into account the phase-variations, and trying periods of 5.24h., 5.28h., and 5.32h., he obtained a negative result. It appears certain that during the greater part of the opposition any short-period variation was imperceptible.

THE PHOTOGRAPHY OF VERY FAINT SPECTRA.—The expedient of slightly fogging plates on which it is proposed to photograph faint objects is generally known, but is apparently not so generally adopted. Having recently employed this procedure very successfully in the photography of faint spectra, Mr. R. W. Wood, of the Johns Hopkins University, describes his method and results in No. 5, vol. xxvii., of the *Astrophysical Journal* (p. 379, June). The curve representing the action of light on a sensitised plate is at its commencement flat, but after reaching a certain point it begins to rise much more rapidly; Mr. Wood's supplementary exposure carries the darkening of the plate to this point, so that the radiations he is wishing to photograph commence their action at that part of the curve where a given exposure is much more effective in producing density than if it were applied alone. By a judicious use of the method he has succeeded in reducing the exposure, necessary to produce a certain density, by one-half. The preliminary exposure needed is very small; with a gas flame turned down until the yellow tip was but 3 mm. or 4 mm. high, four seconds at a distance of about two metres was found to be sufficient.

#### JULY AND AUGUST METEORS.

THE meteoric season of July has again returned, bringing with it all the interesting associations attached to this period in previous years. Early Perseids will now be occasionally seen with their rapid flights, and leaving streaks upon their paths, but they will be directed from the southern region of Cassiopeia instead of from the place  $45^\circ + 57^\circ$ , as at the maximum epoch on August 11-12. Many long-pathed and slow-moving Aquarids will also be noticed from the point about  $330^\circ - 10^\circ$ , and this display generally develops its richest features near the end of July, on about the 28th to 30th.