

equation, will serve to determine the values of  $v$  and  $t$  for any particular case, and are sufficient for the purpose. The author gives several numerical applications of this theory, which appears to be of general application in the selection of speeds in plain and internal work.

THE *Engineering Magazine* for October contains an article on the forests of the United States, by Mr. Leonard Lundgren. Before the coming of the white man these forests covered an area of about 800 million acres, and contained about 5200 billion board feet of lumber. Fire has destroyed as much timber as has been utilised for industrial purposes, and as much again has been wasted through poor logging and milling operations, and through clearing land for agricultural purposes. The forests at present cover an area of 550 million acres, and contain about 2900 billion board feet of lumber. Seventy-six per cent. of this is owned privately, 21 per cent. is held by the United States in the national forests, and 3 per cent. is on other public lands. The annual cut is approximately 43 billion board feet; at this rate, if there were no new growth and the present demand were maintained, the timber supply would last about sixty-five years. It is reasonable to expect that all agricultural lands, cultivated or uncultivated, will ultimately be placed under crops that will give the greatest economic return. Some of the lands now under cultivation will unquestionably revert to forest. Through reducing the per capita consumption (at present amounting to 260 cubic feet of wood per inhabitant), protection against fire, and increasing the natural growth per acre by the practice of forestry, it is probable that a balance between production and consumption will eventually be reached by the force of natural economic laws. In Saxony, where forestry has been practised for many years, the annual production is 93 cubic feet per acre. Forestry is practised in the United States on Government and State lands only, and the estimated annual production is 12 cubic feet per acre.

MESSRS. CONSTABLE AND CO., LTD., 10 Orange Street, London, W.C., inform us that they now publish in this country, at 6s. 6d. net, Prof. L. T. More's "The Limitations of Science," reviewed in the issue of NATURE of September 2 last (vol. xcvi., p. 3).

#### OUR ASTRONOMICAL COLUMN.

THE ANDROMEDA NEBULA.—According to a notice in the September Journal of the Royal Astronomical Society of Canada, a determination made at Mount Wilson of the radial velocity of this nebula indicates a recessional motion of 329 km./sec. from measures of nine lines. The spectrogram was obtained on five consecutive nights during last November (thirty-four hours' exposure), by means of a small slit spectrograph at the primary focus of the 60-in. reflector. There is stated to be no evidence of either bright lines or rotational displacement.

A LONG-PERIOD SPECTROSCOPIC BINARY.—Mr. J. B. Cannon has made a determination of the orbital elements of  $\mu$  Persei, a spectroscopic binary having the somewhat long period of 284 days. The spectrum is of the solar type, and a number of lines being avail-

able for measures, a good determination of velocity could be made. Forty-eight plates secured during 1913-15 were measured, and combined to give 0.11 normal places, the velocity-curve coming out very nearly symmetrical. A range of velocity of 41 km. is indicated, whilst 39 km. was found from seven Lick spectra.

SUN-SPOTS AND TEMPERATURES.—In continuation of the statistical investigation of the question of seasonal variations of weather Dr. Gilbert T. Walker publishes (Memoirs of the Indian Meteorological Department, vol. xxi., part xi., p. 61) a paper giving the correlation coefficients of sun-spots with temperature for a large number of stations generally distributed over the earth's surface. A paradoxical defect of temperature associated with times of maximum sun-spots is revealed for a large number of stations, more especially tropical. An area of positive coefficients, however, stretches from the Arctic over the western parts of Europe.

THE UNION OBSERVATORY.—Circulars Nos. 26 and 27 have recently come to hand. The first of these gives details in continuation of the investigation by blink-microscope of the variable stars in the region of  $\eta$  Argus. A table is given showing the results of special search for known variables not picked up in the first survey. The variability of a star (R.A. 10h. 9m. 36s., declination  $-58^{\circ} 24.3'$  (1875), announced last year by Dr. A. W. Roberts, is confirmed.

In the other circular Mr. J. Voûte gives the results of measures of sixty-seven double stars, employing the Bosler-Salet inverting prism to eliminate systematic errors in the measurement of position angles. The instrument used was the 9-in. Grubb refractor. It was specially desired to obtain experience of the working of the method under additional instrumental conditions in extension of measures made at Leyden and at the Cape. In this process the position-angle is determined as the mean of measures made before and after inverting the field by means of a prism. The present results are in good agreement with the Leyden series, amply supporting the favourable opinions regarding the method.

A message from the observatory, dated October 7, informs us that a 12th magnitude star, with a proper motion of  $5.1''$  a year, has been found with the blink apparatus. Full particulars will be given in a forthcoming Union Observatory Circular. The place of the star is (1900) R.A. 14h. 22.9m., declination  $-62^{\circ} 2'$ .

THE ORBIT OF B.A.C. 5890.—A noteworthy spectroscopic investigation of this binary system has been made by Mr. F. H. Parker at the Dominion Observatory, Ottawa (*Jour. Roy. Astr. Soc.*, Canada, September). The reductions are based entirely on pairs of measures made on plates showing spectra of both components. Nineteen such plates were secured at Ottawa, but the dispersion only sufficed to separate the lines near primary maximum. However, one of three Lick spectra showing double lines was taken near apastron, thus fortunately bridging the gap. The measures of the Canadian plates were grouped into five normal places, those from the Lick plates giving three additional points. The photographic magnitude of the star is 4.9, the spectrum being of the F type, and the lines are described as "broad." The masses of the components are very nearly equal (25:24). The period is 26.27 days, whilst the eccentricity has the rather large value 0.49. This is not altogether exceptional, for, curiously enough, binaries having periods 12-30 days yield an average value of 0.462, according to the data recently collected by Dr. Sven Wicksell.