OUR ASTRONOMICAL COLUMN

THE DOUBLE STAR 2 2120.—In the notes to the last catalogue of measures of double stars of the late Rev. W. R. Dawes, he remarks with reference to Σ 2120, or, as it has been frequently called, Herculis 210 (Bode): "This object discovered by Struve is undoubtedly a binary system—the position varying in a retrograde sense, and the distance diminishing." Notwithstanding this positive opinion as to physical connection of the components by so high an authority in this department of practical astronomy, an examination of the path of the companion up to the latest published measures of the Baron Dembowski towards the end of 1870, or, it should be stated, through a period of observation fifteen years longer than that upon which the above opinion was expressed, does not support the presumed binary character of the object, but on the contrary, when the apparent fixity of the principal star is considered, shows pretty decidedly that the variation of angle and distance must be owing to proper motion of the smaller one. In fact we may represent the measures, from Struve's earliest in 1829, to Dembowski's in 1870,

by the following expressions:— $d \sin P = -1'' \cdot 6806 - 0'' \cdot 12044 (t - 1850'0)$ $d \cos P = +1' \cdot 7259 - 0' \cdot 10250 (t - 1850'0)$

which formulæ imply a secular proper motion of the small star amounting to 14"75 in the direction 226° o; they may doubtless be somewhat improved by complete discussion of all the measures, and perhaps some one of the astronomical readers of NATURE may be able to say how measures in the present year are represented.

D'Agelet, Bessel, and Struve have meridionally observed this star.

THE "MIRK-MONDAY" ECLIPSE, 1652, APRIL 7-8,-The following elements of this long-remembered eclipse are founded upon the same system of calculation which furnished so satisfactory an agreement between computation and observation in the eclipse of 1715, lately detailed in NATURE:

Conjunction in R.A. April 7, at 23h. 4m. 33s. G.M.T.

TD. A				7 19	.,	Y".	
R.A			***	17	42	14	
Moon's hourly motion in R.	Α.				33		
Sun's ,, ,,			***		2		
Moon's declination				8	24	17	N.
Sun's				7 :	31	40	N.
Moon's hourly motion in De	cl.				17	5	N.
					Ó	56 .	N.
Sun's ,, Moon's horizontal parallax					бо	16	
						9	
Sun's Moon's true semidiameter					16	25	
		•••	***		15	~	
Sun's ,,		***	111		÷,5	2/	
771		A -	maril 6	TOTAL Y	· h	Om	00

The sidereal time at mean noon April 8 was 1h. 9m. 20s., and the equation of time 1m. 38s. subtractive from mean The middle of general eclipse April 7, at 22h. time. 21m. 30s.

Hence the following points upon the central line in its track over the north of Ireland and Scotland:-

Long.	ŝ	25	W., Lat.	s°0	źı N.	Long.	4	8	w.,	Lat.	5 5 5	3	N.
,,	7	50		51	O	,,	2	47		73	56	28	
,,	6	3		53	0	**	I	20		"	57	54	
11	5	26		53	42								

At Carrickfergus, where Dr. Wyberd observed the eclipse as described in the "Philosophical Transactions," totality began at 22h. 8m. 34s. according to the above elements, and continued only forty-four seconds. At Edinburgh it commenced at 22h. 22m. 55s., the duration being 2m. 47s. with the sun at an altitude of 39°; and at Arbroath at 22h. 26m. 23s. with the same duration, these being local mean times. Probably there may be other accounts of this eclipse in existence than those commonly quoted when " Mirk Monanday" is referred to.

DIAMETERS OF THE PLANETS.—We give the following values of the apparent diameters of planets reduced to the mean distance of the earth from the sun and of their

true diameters in English miles, as being perhaps as reliable as any that can be assigned from existing data. They are founded in every case upon the measures which from observational circumstances appear to deserve the greatest weight, and in the reduction to true values the solar parallax is taken 8".875, and Clarke's diameter of the earth's equator is adopted. It would of course be idle to attempt to offer final numbers, where the difficulties attending observations and the differences between the results of the most experienced and favourably-circumstanced observers are so considerable.

	27	Willes.	
Mercury		2,850	
Venus		7,550	
Mars	9.305	4,150	
Jupiter, Equat	197.47	88,200	Compression 15.54
,, Polar	184'76	82,500	15.24
Saturn, Equat			
,, Polar	148.50	66,300 (Compression 1
Uranus	68.57	30,600	7 = -
Neptune	67.26	30,050	

In fixing upon the apparent diameters of the bright planets it has been desired to adopt values which shall represent the actual arc values that are presented by the true diameters at the earth's mean distance. Many observations would assign larger values, but undoubtedly less trustworthy for computing real dimensions. As is well known, preference in such case is to be given to double-image over wire-micrometer measures, yet even if we confine ourselves to the former mode of observation we by no means secure great consistency of results.

SOLAR HEAT AND SUN-SPOTS

THAT the rainfall of certain parts of the earth tends to vary periodically with the sun-spots has been shown with considerable probability by Messrs. Meldrum and Lockyer, and Prof. Köppen * has detected a similar tendency in the temperature of the atmosphere, most distinctly shown (as might have been anticipated) at stations in the tropical zone. † These discoveries indicate that there is at least some ground for the truth of Sir W. Herschel's surmise, that the heat emitted by the sun undergoes a periodical increase and decrease, con-currently with the varying disturbance of the solar atmosphere, as evidenced by the number of spots and prominences on his surface. But except Mr. Joseph Baxendell, who has published two papers on the subject in the fourth volume of the Transactions of the Literary and Philosophical Society of Manchester (new series), I am not aware that anyone has attempted to investigate the more direct evidence afforded by observations of the black-bulb thermometer.

Mr. Baxendell's work was based on the observations of the Radcliffe Observatory at Oxford, and a series made at Eccles by Mr. Mackereth; the two series extending over the years 1859-66. He did not attempt to institute a direct comparison of the recorded radiation temperatures with the number of the sun's spots, a proceeding which would probably have failed to lead to any definite result in English latitudes and in so cloudy a climate; but took as the first term of his comparison the ratio existing between the excess of the maximum radiation over the maximum air-temperature in the shade, and that of the mean air-temperature over that of the wet bulb, or the dew point deduced therefrom. His conclusion was to the effect that the sun's heat undergoes a distinct periodical variation, coinciding with and directly as that of the spots.

* Zeitschrift der Oesterr. Gesellschaft für Meteorologie. Vol. viii. Nos. 16

* Zeitschrift der Oesterr, Geseilschaft für Meteorologie. Vol. viii. Nos. 16 and 17.

† It is to be noticed as a remarkable fact that Prof. Köppen finds the epochs of maximum and minimum temperature to correspond (not as might be expected from the results of the present investigation with the maxima and minima of sun-spots respectively), but approximately with the opposite phases; the maximum of temperature (in the tropics) preceding the minimum of the sun-spots by 0'9 of a year, and the minimum of the former the maximum of the latter by 0'x year.