under its eastern declivity, were overwhelmed with their unfortunate occupants, to the number of fifty or sixty, and, to quote the words of an epitaph in St. George's Churchyard descriptive of the event-

"The wind and sea its fury broke,
The wondrous works of God bespoke:
Man's dwellings levelled with the ground,
When some were killed and some drowned."

The grandfather of my informant fared worse still, for he, poor man, "was killed fust and drownded aterwards." I mention Leland's report in order to suggest that since his time the inroads of the sea and rivers must have reached flint-bearing strata more prolific than any before attacked.

The supply of flints at the present day is greater than the loss caused by attrition, and so the Chesil Bank is very gradually creeping up to the height it had acquired at the date of the "Outrage," when the ridge was equally steep on either side, and the present eastern expanse of pebbles had no existence.
Weymouth, April 2
Thos. B. Gi

THOS. B. GROVES

Flowering of the Hazel

ALTHOUGH in the vast majority of cases the male and female flowers of the hazel, as stated by Mr. Bennett in NATURE, vol. xi. p. 466, mature simultaneously on the same bush, with, I think, rather some tendency to begin the shedding of pollen I think, rather some tenuency to begin the shedding of policies before the expansion of the neighbouring stigmas; yet I have seen very striking exceptions to this rule, in the same sense as have been formerly recorded in NATURE. Thus, on March 5, 1874, I was astonished to find in a neighbouring copes a row of hazel bushes with beautifully expanded stigmas, their male catkins being still in a very undeveloped condition, and other bushes, very near those, had long lost their stigmas—the buds unfolding —while the male flowers were still shedding their pollen. Probably this exceptional "proterogyny" of the hazel is peculiar to individual bushes, and it is to be desired that such bushes may be observed in succeeding years.

Dr. H. Müller, in his admirable work on fertilisation of flowers by insects, states that he once observed many honey-bees collecting the pollen of the hazel, "but none of them ever sat down on a female flower." However, one can scarcely avoid connecting, in a Darwinian sense, the brilliant red colour of the stigmas with the occasional dichogamy and with the bees, often seen collecting the pollen of this shrub, at a season when there is scarcely any other pollen within their reach.

Frankfort-on-the-Maine, April 26 F. D. WETTERHAN

## OUR ASTRONOMICAL COLUMN

THE TOTAL SOLAR ECLIPSE OF 1715, MAY 3.—The circumstances of this eclipse, the last in which totality was witnessed in London, and of which Halley gave so full and interesting an account to the Royal Society, are very closely represented by the following elements, wherein the Greenwich corrections to the principal lunar motions have been incorporated with Leverrier's Tables of the

Conjunction in R.A. May 2, at 21h. 52m. 31'7s. G.M.T.

			V / //
R.A			
Moon's hourly motion in R.A.			38 29.8
Sun's			2 23.3
Moon's declination			16 16 30'4 N.
Sun's ,,			15 32 15.7 N.
Moon's hourly motion in Decl.			8 12·3 N.
Sun's ,,			0 44.5 N.
Sun's ,, ,, Moon's horizontal parallax			61 4.9 8.8
Sun's ,,		• • •	~ ~
Moon's true semidiameter	• • • •		16 38.7
Sun's ,,	• • •		12 21.3

The sidereal time at Greenwich mean noon, May 2, was 2h. 39m. 0'7s., and the equation of time 3m. 23s. additive to mean time. Hence the middle of general eclipse occurred at 21h. 36m. 46s.; the central line commenced in long. 46° 54′ W. and lat. 31° 58′ N., and ended in long. 129° 39′ E. and lat 54° 30′ N., and the middle of totality took place with the sun on the meridian in long. 31° 1′ E. and lat. 62° 21′ N., or on Lake Ladoga.

If we calculate directly from the above elements for the superstances.

If we calculate directly from the above elements for the

position of St. Paul's, we find totality commenced in the metropolis at 9h. 5m. 58s. A.M. on May 3, and ended at 9h. 9m. 19s., so that the computed duration is 3m. 21s. Halley observed the eclipse from the house of the Royal Society in Crane Court, Fleet Street: he made the duration of totality 3m. 23s., and the middle at 9h. 7m. 22s. mean time; and De Louville, of the French Academy of Sciences, who came over to observe the eclipse, and was with Halley at the time, found the duration of total darkness 3m. 22s., or only one second less than was noted by the latter. The calculation is therefore within 2 secs. as regards continuance of total eclipse, and only 17 secs. later than the observed time of middle, an agreement which has not often been exceeded in predictions of recent phenomena. Again, if by equations of reduction founded upon this direct calculation for St. Paul's, we deduce the circumstances for Greenwich, there results 9h. 6m. 27s. mean time for beginning of totality, and 9h. 9m. 39s. for ending, or a duration of 3m. 12s., which is in exact accordance with Flamsteed's observations.

The track of the shadow across this country will be pretty correctly given by the following figures:-

	North Limit.	Central Line.	South Limit.
Long.	Lat.	Lat.	Lat.
4° Ŵ.	52° 19′ 6	50° 37′8	48° 59′ •7
3	52 48 0	51 6°0	49 27 8
2	53 16 2	51 34 1	49 55 8
IW.	53 44 '2	52 2 1	50 23 7
0	54 12 1	52 29.9	50 51.6
ı E.	54 39.8	52 57 6	51 19 4

Halley concluded that the south limit passed over Cranbrook, in Kent, where "the sun was extinguished but for a moment:" our elements indicate a duration of only seven seconds, and therefore the limits must be assigned with considerable precision as well as the track of central eclipse. At Northampton, close to this track, the error of calculation is again only two seconds. At Plymouth it was supposed that the totality continued 4m. 30s., but it does not appear to have lasted more than about 4m. 6s. in any part of England, and the longest duration would fall on the Norfolk coast, about midway between Cromer and Wells.

Should any reader be desirous of further examining Halley's table of the circumstances of totality, printed in the Philosophical Transactions, 1715, the following equations of reduction will assist him :-

Cos.  $w = 45^{\circ}4600 - [1^{\circ}75533] \sin l + [1^{\circ}41097] \cos l \cos (L - 91^{\circ}28^{\circ}9)$  t = 21h. 33m.  $25^{\circ}9 + [2^{\circ}08660] \sin u + [3^{\circ}36371] \sin l - [3^{\circ}86117] \cos l \cos (L + 43^{\circ}21^{\circ}4)$ 

Here L, the longitude from Greenwich, is to be taken, positive if east, negative if west; l is the geocentric latitude, and t represents Greenwich mean time; the quantities within square brackets are logarithms.

In a future column we shall give particulars of the total solar eclipse of 1724, May 22, founded upon elements similarly derived. This phenomenon has an especial interest, as having been the last in which totality was observable in any part of England, and the subject of the description given by Dr. Stukeley in his "Itinerarium Curiosorum."

THE TRANSIT OF VENUS, 1631, DECEMBER 7.—It is known that Gassendi at Paris watched attentively during several days, despite of interruption from stormy weather, for the transit of Venus, which Kepler, on the completion of the Rudolphine Tables, had predicted for the 6th of December, 1631, and that his observations were unsuccessful, the first view of the planet upon the sun's disc being reserved for our illustrious countryman Horrox eight years subsequently. Gassendi was able to watch the sun occasionally on the 6th and during the whole morning of the 7th, and it now appears that he very narrowly missed being the first observer of the rare phenomenon of a transit of Venus. We have before us elements of the transit of 1631, carefully deduced from Leverrier's Tables of Sun and Planet. As regards the