that the shadow will reach the south-west coast. In A.D. 2142, totality may reach Dungeness. In A.D. 2151, Oppolzer's elements would give totality in London, but those of Hind, Maguire, and Johnson do not; their tracks are farther north. The eclipses of A.D. 2381, 2681, and 2726 are remarkable for long totalities. The latter seems to be a record for Europe, reaching 6 minutes. The Lizard will probably be within the shadow; the Channel Islands certainly will.

The following table gives the dates of all total eclipses that may reach the shores of the British Isles, the approximate hour, the sun's altitude and the duration on the central line. I have diminished the durations given by Oppolzer's and Schrader's elements by 0.2^m, since they use too large a diameter for the moon.

Date.	Hour.	Sun's alt.	Dur.
2081 Sept. 3	7 A.M.	18°	3.5 ^m
2090 Sept. 23	5 P.M.	6	2.8
2133 June 3	9 A.M.	40	3.5
2135 Oct. 7	8 A.M.	7	2.7
2142 May 25	9 A.M.	43	2.9
2151 June 14	6 P.M.	15	2.6
2160 June 4	6 P.M.	22	2.1
2189 Nov. 8	8 A.M.	8	2.5
2200 April 14	5 P.M.	17	0.4
2381 July 22	10 A.M.	48	5.0
2426 Sept. 2	8 A.M.	25	3.9
2442 April 11	9 A.M.	33	1.7
2545 April 12	5 P.M.	15	0.2
2600 May 5	6 A.M.	12	2.7
2681 June 8	2 P.M.	50	4.5
2726 July 21	11 A.M.	58	5.7
2808 Aug. 13	6 A.M.	8	0.3
2817 Sept. 2	4 P.M.	21	0.9
2864 Feb. 28	1 P.M.	29	2.8
2911 Aug. 15	2 P.M.	37	3.0
2927 Mar. 24	2 P.M.	31	3.0
2972 May 4	3 P.M.	37	3.8
2974 Sept. 7	1 P.M.	35	4.1

The central lines of 2081, 2090, 2726 pass respectively 70, 140, and 93 miles south of the Lizard; that of 2974 passes 44 miles north-east of Unst (Shetlands).

In the above list the eclipses of A.D. 2081, 2135, and 2189 illustrate the triple Saros; those of A.D. 2133, 2151, and 2142, 2160 the simple Saros; those of A.D. 2864, 2972 the sixfold Saros: the

intermediate eclipse in 2918 passes north of the Shetlands. Those of A.D. 2081, 2381, and 2681, also A.D. 2142, 2442, also A.D. 2426, 2726, illustrate the 300-year cycle: those of A.D. 2160, 2681 illustrate the 521-year cycle.

Taking the present list and Dr. Lockyer's together, there are two examples of a 2-year interval

FIG. 2.

between British totalities: A.D. 2133, 2135, and A.D. 2972, 2974; three of a 7-year interval: A.D. 878, 885, and A.D. 1133, 1140, and A.D. 2135, 2142; six of a 9-year interval: A.D. 1424, 1433, and A.D. 1715, 1724, and A.D. 2081, 2090, and A.D. 2133, 2142, and A.D. 2151, 2160, and A.D. 2808, 2817.

Meteorological Conditions in Relation to Eclipse Observations.

By R. CORLESS.

THE eclipse of the sun which will occur at about 5 h. 23 m. G.M.T. (6.23 A.M. summer time) on June 29 will appear total to observers stationed upon a strip of country 28 or 29 miles wide, of which the central line stretches from

Criccieth in North Wales to Hartlepool in Durham. The character of the country included in this strip is very varied. There are coastal areas on the Lleyen Peninsula and North Wales, in Lancashire and between Sunderland and Salt-

burn on the east coast; there are, on the other hand, the mountain peaks of Snowdon, Whernside, Penyghent, and many others; and there is a considerable gradation of hill, plateau, valley, and plain between these extremes.

It is worth consideration whether the climatological records suffice to indicate which type of country in the belt is likely to provide the most favourable weather conditions for viewing the eclipse. The question resolves itself into the identification of the places which, on the average, are most free from cloud, mist, and fog. The records do not furnish a direct answer to this question, because observations of cloud are not sufficiently numerous and well distributed along the belt to define with precision the average distribution of cloudiness. A consideration of other records, notably of rainfall, sunshine, and visibility, indicates, however, that the conditions which produce bad seeing are so different in character on different occasions, that it is better not to deal with averages, but to classify the various occasions into types, and to consider the physical conditions associated with different types.

A broad classification can be made into the following occasions:

- (1) When seeing is bad everywhere.
- (2) When it is variable.
- (3) When it is bad on the hills and good elsewhere.
- (4) When it is bad in the low-lying valleys and good elsewhere.
- (5) When it is good everywhere.

(1) Occasions when seeing is bad everywhere are most likely to occur when a widespread canopy of cloud is produced in a depression or region of relatively low barometric pressure. But they also occur in certain anticyclones where an inversion of temperature at a moderate height prevents vertical motion of air, and so favours the development of a layer of cloud just below the inversion. In the latter case the summits of mountains may be places from which a good view can be obtained.

(2) The condition in which seeing is variable and changeable is characteristic of a depression of less intensity than that of the previous case. Especially in the rear of the disturbance the weather may be showery, and bands of cloud may alternate with stretches of relatively clear sky.

(3) The third case, in which seeing is bad on the hills and good elsewhere, is in general due to the formation of persistent cloud on and above the hills as a result of the lowering of temperature in a current of rather moist air, which is forced upwards by the obstacle of the hills themselves. The clouds disappear on the lee side of the hills because the temperature of the air-current increases again in its descent after surmounting the crest. In this case a definite air-current is an essential part of the process, and as wind is detrimental to fog formation, mist and fog are not normally found at low levels.

(4) In this case seeing is bad in the low-lying valleys, in consequence of the development of mist or fog, but good elsewhere. This condition is characteristic of the early morning in anticyclonic, cloudless summer weather. It arises from the cooling of the ground by radiation to the clear sky during the previous night, which leads to the cooling of the surface layers of air by conduction. Conditions being anticyclonic, there is usually little or no wind, consequently the cold surface air flows into the valleys by gravitation. The temperature of this air continues to fall as the night progresses, until by daylight it is probably below the dew-point, and the cold air is co-terminous with a sea of fog with a flat, well-marked top, which is fatal to good seeing for observers enveloped in it. Above the fog the air is clear and cloud is usually absent.

(5) The fifth case provides the most favourable conditions for good visibility everywhere. It differs from the last in that fog is not formed in the valleys because air movement in the anticyclone is sufficient to overcome the tendency of the chilled surface layers to gravitate into the valleys. Mixing of the lower layers by turbulence takes place and prevents the temperature from falling to the dew-point. Meteorologically the two cases are not readily distinguished, but the results are very different to observers stationed in deep valleys.

In the absence of information as to the probable distribution of barometric pressure on the morning of the eclipse, the only practical conclusion that can be drawn is that it is advisable to avoid both high ground and very low ground. But on the day prior to the eclipse it should be possible, with the aid of the current weather map, to form an opinion as to which of the five general conditions of weather described above is likely to be experienced on the following morning.