number of tornadoes annually per State and per unit area. The table shows that even in the so-called tornado States, the probability that any area of 100 miles square will be visited by a tornado in any year, is generally less than certainty, or unity, or less than 100 per cent. If these large areas be divided up into 100 smaller ones of 100 square miles each, or 10 miles square, then the probability that *some one* of these will be visited by a tornado within a year is less than 1 per cent, but the probability that *any specific one* of these smaller areas will be so visited is only the hundredth part of 1 per cent per annum, or 1 per cent per century. Within such a smaller area of 10 miles square the destructive path of the tornado, when it finally comes, will probably cover less than 25 square miles, so that the probability that *some one* of the 100 areas of 1 square mile will be struck is less than one-fourth of 1 per cent per century; but for *any specific area* or farm of 1 square mile the probability is much less than one-sixteenth of 1 per cent per century. In fact, the probability that a given house will be destroyed by a tornado is less than the probability that it will be destroyed by lightning or fire.

THUNDERSTORMS AT EUSTIS, LAKE COUNTY, FLA.

The voluntary observer (Mr. H. W. O. Margary) at Eustis, Fla., sends a detailed record of the thunderstorms at his station during June. His location is about 28° 45′ N., 81° 40′ W; altitude 60 feet above Lake Eustis, which is supposed to be 120 feet above sea level; the range of his horizon is quite large, being most restricted on the south side by heavy timber, but to the eastward there is no known limit, as he has observed lightning belonging to storms far beyond the coast line, and, in one case, as far away as the Bahamas, 250 miles, on which occasion the lightning appeared like a small segment of a circle rising from 3° to 7° above the horizon. To the westward his horizon is level over the low swamps, lakes, and river valleys. The view in all directions is entirely uninterrupted for distances ranging between 2 and 7 miles.

With these ample surroundings the temptation to make a minute study of thunderstorms is very great; but, of course, elaborate work in this direction at only one isolated station loses a great deal of the value that would attach to it if similar records had been kept by other observers distant a few miles from the central station. Mr. Margary's record shows that thunder was heard on the 2d, 3d, 4th, 5th, 6th, 7th, 12th, 13th, 14th, 15th, 16th, 21st, 22d, and 24th, or, in all, fourteen days, on all which occasions it is presumed by him that the storm was within 3 or 4 miles of his station. Some details of these storms, especially the azimuths at which they appeared and ended, when compared with similar observations at neighboring stations, will eventually give the exact location and path of the center. Other data can be at once used to give us, for instance, the hours of the day at which thunderstorms occur most frequently, or the diurnal curve of frequency. Thus, during June, at or near Eustis, the prevalence of thunderstorms within each hour of the day seems to have been as follows:

Midnight to 1 a. m.	1	Noon to 1 p. m.	0
1 a. m. to 2 a. m.	0	1 p. m. to 2 p. m.	2
2 a. m. to 3 a. m.	1	2 p. m. to 3 p. m.	2
3 a. m. to 4 a. m.	2	3 p. m. to 4 p. m.	2
4 a. m. to 5 a. m.	1	4 p. m. to 5 p. m.	4
5 a. m. to 6 a. m.	2	5 p. m. to 6 p. m.	1
6 a. m. to 7 a. m.	0	6 p. m. to 7 p. m.	1
7 a. m. to 8 a. m.	2	7 p. m. to 8 p. m.	2
8 a. m. to 9 a. m.	2	8 p. m. to 9 p. m.	3
9 a. m. to 10 a. m.	0	9 p. m. to 10 p. m.	1
10 a. m. to 11 a. m.	0	10 p. m. to 11 p. m.	1
11 a. m. to noon	0	11 p. m. to midnight	1

As no cyclonic storms visited Florida during this month, it is evident that the special frequencies between 3 a. m. and 9 a. m., between 1 p. m. and 5 p. m., and between 7 p. m. and 9 p. m. must all be determined by the alternation from warm sunshine at midday to cool radiation at night.

So far as we can make out from this record, which was apparently not prepared for the purpose of a study from this point of view, the thunderstorms appeared six times in the northwest, five in the north, two in the northeast, two east, three in the southeast, two in the south, three in the southwest, one in the west. The direction of motion of the storms in their paths is not easy to make out from the records at a single station, but, so far as can be gathered, the prevailing motion is from the southwest to the northeast. Mr. Margary especially notices a few storms that "came up with the wind," while the general rule was that they should "come up against the wind," and, as the wind is usually northeast, this would also indicate that the thunderstorms advanced from the southwest toward the northeast.

MECHANISM OF THUNDERSTORMS.

The advance of a storm against the wind may be interpreted as favorable to that view of the origin and structure of thunderstorms that has lately been so fully elaborated by E. Engelenburg in his memoir on the "Aerodynamic Theory of Thunderstorms," published in the XIXth volume (1896) of the Selections from the Archives of the Deutsche Seewarte. According to this view (which has been frequently expounded by the Editor since 1871) a thunderstorm is the result of the overturning of a considerable mass of the lower atmosphere, by which cool and especially dry air descends and runs under and pushes up warmer, moister air, which latter, after losing a small percentage of its moisture as rain, and a good deal of its heat by radiation from the clouds, becomes in its turn again the heavier, and descends beneath other moist air. This process of descent and ascent constitutes a vertical rotation around a horizontal axis, and will continue indefinitely until the rolling mass of air comes into regions where the topography of the ground or the presence of very dry air or very cold air near the ground as in the early morning hours, breaks up the thermodynamic process that is essential to the storm's automatic propagation. In the course of this rotation around a horizontal axis, it may occasionally happen that the rotation which is never strictly vertical, becomes considerably inclined, and the winds become so severe that the storm is spoken of as tornadic; but the true tornado with its funnel-shaped cloud is not to be considered as belonging to this class of thunderstorms. Beside the rolling thunderstorm, which advances broadside forward, there is another class of storms to which the tornado and the waterspout belong. In this class of storms the motive power is found in the buoyancy of a great cumulus cloud under whose center the lower air ascends because it is pushed upward into the region of abnormal low pressure within the cloud. Another class of thunderstorms includes those formed by air that is pushed upward by being blown against obstacles such as mountains, these often have no special internal maintaining power and may soon die away.

FREQUENCY OF THUNDERSTORMS.

We have received from Mr. H. H. Moore, voluntary observer at Windsor (five or ten miles north of Hartford, Conn.), a record of the number of days on which thunder has been audible; it embraces all days on which thunderstorms were heard by the observer without regard to the distance of the storm. Mr. Moore's record can be thrown into the following tabular form so as to give the average for each month of the year: