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CONDUCT AND THE WEATHER.¹

By EDWIN GRANT DEXTER, Ph. D.

The paper under the title given above, of which this present article is an abstract, is an attempt to demonstrate by empirical methods a causal nexus between weather states and human activities. That such a relation exists has been popularly recognized for centuries, and, as scientific investigation is for the most part but a more exact determination of what has been common belief, so this study partakes largely of the nature of a quantitative measurement of what had been, at least, qualitatively suspected.

A writer in one of the British magazines some years ago very aptly said:

There are many persons who are simply victims of the weather. Atmospheric influences play upon them as the wind plays upon the strings of an aeolian harp, with the difference that the latter never utter discords in reply. A leaden sky weighs upon them with a crushing weight, and suggests all manner of unpleasant anticipation. Then the gloomy side of life comes out. The bitter sayings of friends are remembered. The old groundwork of forgotten quarrels is remembered. Uneasy questions arise with regard to the future. One gets tired of life. A sort of indefinite dread is the general mental influence, a faint continuation of the superstitious fancies which mark the childhood of nations and men.

Yet modern science is not satisfied with the mere knowledge of the existence of such influences. Is the cause capable of analyzation into components, each of which may contribute in its peculiar way to the indicated result? To this our answer is "yes." Those states and conditions, mutations and changes in our cosmical environment to which we give the name weather, do not form a unit, but a composite. The various meteorological conditions, ringing in as they do combinations innumerable, are the ever-changing elements of the cause whose relation to human conduct and emotions we are attempting more definitely to define. It is, for the most part, a study of those weather components and their discernible relations to human activities of which this paper treats. The problem carried on is twofold: First, the tabulation and discussion of replies to questions sent to nearly two hundred teachers of all grades from the kindergarten to the high school, superintendents of asylums and reformatories, and wardens of prisons and penitentiaries; second, an inductive study of several hundred thousand data, comparing the occurrence of data of the various classes studied, under definite meteorological conditions, with the normal prevalence of those conditions.

The study was made for the cities of New York, N. Y., and Denver, Colo.

The data considered were taken from the various public records of those cities and consist of misdemeanors in public schools and in penitentiaries, arrests for assault and battery (males and females considered separately), arrests for insanity, the death rate, suicides, clerical errors in banks, and strength tests in the gymnasium of Columbia University. A period of more than ten years is covered, and something over 400,000 data considered.

As a basis for this study, the mean temperature, barometer, and relative humidity, the total movement of the wind, the character of the day, and the precipitation, as recorded at the office of the United States Weather Bureau for each day of the period covered are used.

¹Conduct and the Weather, an inductive study of the mental effects of definite meteorological condition. Monograph-supplement No. 10 to the Psychological Review. pp. 104.

The occurrence of bad deportment in schools and in penitentiaries, of assault, and of the other classes of data, are then compared with these meteorological conditions, and the exact weather upon which they are most prevalent, determined. These relations are shown by means of tables and more than 150 curves.

From these meteorological records, a normal prevalence of definite readings of all the conditions was computed, and this, taken as the *expected* occurrence of the data of conduct for each of those conditions. That is, if it was found that 10 per cent of the days of the year studied had a mean temperature of between 70° and 75° the law of numerical probability would lead us to expect that same percentage of assaults, suicides, etc., to have occurred under that temperature if conditions of heat had no influence. If 15 per cent did actually occur we have a right to infer that great heat increases their number, as indeed, was found to be the case. The relation of *expectancy* to occurrence is shown by curves for all the meteorological conditions and for the various characterizations of the day, with some interesting results.

PRESSURE.

It is shown that for barometrical conditions of low pressure both for New York, N. Y., and for Denver, Colo., the data of nearly all the classes was above the normal expectancy, corresponding deficiencies occurred for high readings of the instrument. When we consider that the average difference in the actual height of the barometric column for the two places is about five inches, nearly five times as much as the variation for either city, it would seem probable that the seeming effect of the barometer is due to other conditions which vary concomitantly with it, and not to the actual density of the atmosphere. If storms were the influencing factor, variations in occurrence would show upon the barometer because of the relation between them and atmospheric pressure without the latter having had more than a secondary effect.

TEMPERATURE.

For now these hot days is the mad blood stirring.—*Shakespeare.*

This quotation from Romeo and Juliet may, perhaps, be taken as an epitome of the results shown by this condition. There are no exceptions to the fact that excessive heat is accompanied by an increase in occurrence. Generally speaking, this increase is somewhat gradual from the lowest temperatures to a point varying for the different curves, but uniformly somewhere between 65° and 80°, at which the increase is very much more rapid. For suicide alone a similar excess is noted for very low temperatures; and this fact may, perhaps, be accounted for by the increased misery such conditions bring to those who are not properly housed.

Although the occurrence of the data studied shows this gradual increase with the heat, the maximum is reached at temperatures of between 80° and 85°, where a very marked decrease is noted. For instance, assaults by women as reported by the New York, N. Y., police, reached an excess of 100 per cent, or double the normal number for temperatures between 80° and 85°, while above that point the numbers fall to 33 per cent less than the normal. This dropping off for the highest temperatures ever experienced is shown for the other classes of data, and is undoubtedly due to the physical impossibility of offensive action under such conditions.

RELATIVE HUMIDITY.

The curves for relative humidity may be divided into two general classes: Those showing a decrease of occurrence as the humidity increases, and those which show no marked

tendency either way. To the former class belong cases of assault, of insanity, and misdemeanors in the penitentiary; to the latter, death, suicide, and errors in banks. No class of data studied shows an excess, unless it be a slight one for the last named, for high humidity. This fact is, I believe, rather surprising, for it seems to be a prevalent opinion that occurrences of the nature considered are excessive upon humid days. Indeed, it is so certain that under such conditions we, in some indefinable way, feel ourselves out of our normal balance that I should be inclined to doubt the correctness of a single curve; but with six curves (including that for the schools), based upon the results of nearly 100,000 data, all showing the same trend, we can hardly doubt their validity.

The seeming effects of low humidities for Denver, Colo., were shown to be very great for readings below 30 per cent. Five and six times the normal amount of disorder was experienced both by police and teacher.

Wind.—The effects of the wind upon the emotional states of the various classes of individuals as disclosed by this study have been something of a surprise. In spite of the fact that we so frequently hear people deploring conditions of considerable movement, and asserting that the wind "makes them nervous," the curves taken as a whole fail to show that high winds for the climate of New York, N. Y., have any effect disastrous to mental quietude. In fact, these effects seem to be the reverse, for in spite of many fluctuations, increasing as the data for the groups become less, the general tendency of the curves is downward as they show increasing velocities from the 100–150 mile group.

Some interesting effects were shown for condition of calm. For daily movements of the wind of less than 100 miles, without exception, all classes of disorder showed marked deficiencies of occurrence. Assaults and misdemeanors in the public schools were nearly 60 per cent below the normal, and the behavior of the insane under such conditions showed their quieting influence. This effect was hypothetically accounted for by reference to the peculiar composition of the atmosphere in large cities where the movement of the wind is not sufficient to bring about proper ventilation. Dr. J. B. Cohen has shown (see Smithsonian Report, 1895, p. 573) that the proportion of carbonic acid in the atmosphere of the center of the city of Manchester, England, averages nearly three times, for some observations more than four times, that in the outskirts. Although he makes no reference to the fact, it would seem probable that the differences which he found existing for different observations, may have been due to differences in circulation of the atmosphere. Certainly, when the movement was very violent, such variation could hardly exist between city air and that of the country. Recognizing the importance of oxygen and the disastrous effects of carbonic acid gas to the metabolism of life, it would not seem strange if the conditions shown by the curve were influenced by the varying quantities of these gases.

Character of the day and precipitation.—The effects shown for these meteorological conditions seem to be contrary to popular opinion upon the subject. On clear days, which are free from precipitation, both the school teachers and the police have the most trouble in keeping order. Suicide is also shown to be excessive under those conditions.

In conclusion, the whole problem of conduct is referred to that of surplus energy. It is argued that during those meteorological conditions which are most energizing, deportment is at its worst, while during devitalizing conditions active disorder is less prevalent. In other words, that active disorder is, in some sense, the safety valve to surplus energy, which must make itself evident in some form of activity, and that the form taken is likely to be disastrous to the discipline maintained by the teacher and the policeman.