

RELATION BETWEEN NATURAL MAGNETIC FIELD INTENSITY AND THE INCREASE OF
PSYCHIATRIC DISTURBANCES IN THE HUMAN POPULATION

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Presented at the International Conference on High Magnetic Fields
Massachusetts Institute of Technology
Cambridge, Massachusetts
November 3, 1961

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The literature of bioclimatology is replete with attempts to relate psycho-physiological disturbances in the human population with various physical parameters of the environment⁽¹⁾. Recently considerable interest is being expressed on the possible effect of air ionization in this regard⁽²⁾. Relatively few papers of note have been published on the possible relationship of magnetic fields to these parameters^(3,4). Two major objectives have been raised to all of these studies. First, the mechanism of action is completely unknown since no known physiological system exists to be influenced by such physical parameters. Second, the naturally occurring magnitude of change in the physical parameter is generally much less than that noted resulting from common, manmade disturbances (e.g., the magnetic and electrical fields produced by 60 cycle A. C. electrical power).

Within the past few years, however, evidence has been presented which has a direct bearing on the validity of these objections regarding particularly geomagnetic force fields. The presence of free radicals, semi-conductors, and conduction bands has been demonstrated in a variety of physiologically important systems⁽⁵⁾. Some evidence has been presented for an organized neural control system in vertebrates based upon similar solid state direct current flow in elements of the central nervous system^(6,7,8). This system has furthermore been observed to correlate with certain behavioral changes in the human⁽⁹⁾. The presence of such charge transfer based systems would provide a mechanism whereby environmental force fields could exert an influence upon the organism. If the system influenced by such physical force fields was itself responsible for any aspect of behavior, then some behavioral effect would be noticeable. Some observations have recently been reported indicating that organisms do respond to such fields. Certain marine fish demonstrate a remarkable sensitivity to magnetic and electrostatic fields, apparently by a system sensing the presence of direct current potentials as low as $0.04 \mu\text{V}/\text{cm}^2$.⁽¹⁰⁾ Humans have been shown to sense the presence of low density UHF (radar) fields⁽¹¹⁾, and

protozoa demonstrate orienting responses to low frequency electromagnetic fields⁽¹²⁾. Many organisms demonstrate biological cycles of activity linked to the cyclic variation in environmental force field patterns and influenced by local application of low magnetic field intensity⁽¹³⁾.

In the physical science knowledge has also increased leading to the concept of much more complex force field interrelations both planetary and solar-terrestrial in scope. Short period fluctuations in the magnetic field have theoretically the greatest probability of being the physiologically active portion of the geomagnetic environment. While the exact origins are in doubt, the presence of diurnal variations, magnetic storms, and high frequency fluctuations have been demonstrated⁽¹⁴⁾. The resultant electrical currents occasionally reach magnitudes amply high enough to produce disturbances in delicately balanced biological charge transport systems⁽¹⁵⁾.

A statistical study relating a simple index of geomagnetic activity to a gross index of psychological disturbances over a long period of time, appeared to be a logical method of preliminary investigations. In view of the widespread nature of geomagnetic disturbances, data gathered at two geographically distant points offered the possibility of obviating local effects such as air ionization, etc.

As a pilot study, the daily magnetic intensity (K-Sum) determined at Fredricksburg, Va., was correlated against the daily rate of psychiatric admissions to two hospitals in Syracuse, N. Y. for a period of approximately 4 years. It was realized that the data used had several inadequacies. The K-sum is a gross index of geomagnetic activity that is only loosely related to short period fluctuations⁽¹⁶⁾. In addition, the K-sum is probably related to other nonmagnetic geophysical parameters such as cosmic ray flux and electrostatic fields. The rate of patient admissions is governed by such factors as the availability of beds and the disposition of the examining physician. Nevertheless, a statistical analysis of the data produced interesting results.

The daily data was tabulated on IBM punch cards and subjected to various correlations. Correlations on a day-to-day and a small number of various phase-shift combinations thereof, showed very low levels of correlation, although all were positive and statistically significant.

However, when the K-sums for 30 consecutive days, and the admissions for the same 30 day period were handled as blocks of data, higher order correlations were obtained. A sliding scale of 1 day, giving 1391 consecutive data points, was utilized. The coefficients of correlation, etc, for non-linear relationships proved to be 0.27 and 0.26. The probability of obtaining such a relationship by chance alone is less than 1 in a thousand. These results would suggest that a relationship does exist between the incidence of psychiatric disturbances in the human population and some geophysical parameter coupled with the magnetic field. It appears likely that a more ambitious program based upon broader data gathering procedures, both clinical and physical, would reveal the identity of the responsible geophysical parameters and make possible controlled laboratory studies.

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