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# FARM PRACTICES INFLUENCING THE INCIDENCE OF MULTIPLE SCLEROSIS*

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Man's kinship with and dependence upon the soil are expressed by Dr. V. G. Simkovitch[1]:

"Go to the ruins of ancient and rich civilization in Asia Minor, Northern Africa, or elsewhere. Look at the unpeopled valleys, at the dead and buried cities, and you can decipher there the promise and the prophecy that the law of soil exhaustion holds in store for all of us... Depleted of humus by constant cropping, land could no longer reward labor and support life, so the people abandoned it. Deserted, it became a desert; the light soil was washed by the rain, and blown around by the shifting winds."

In the occurrence of multiple sclerosis in Germany, England, Northern Europe in general, and the United States where large amounts of inorganic, incomplete chemical fertilizers are used by farmers, in contrast to the absence of multiple sclerosis in China, Japan, and India where natural fertilizers or manures are used, nature presents us with a challenging fact.

Farm practices which influence the total quality of the crop and, in turn, the quality of man's food, are the concern of this paper. Thus,

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the soil as a source of man's food, especially the trace elements, becomes the physician's problem. The doctor must demand that the agriculturist produce a food that will meet the multiple protoplasmic needs for optimal growth, development and function. Prescribing a good diet is not enough. There is a very wide variation in the composition of fruits, vegetables, grains and meat, milk and eggs, when produced on different soils, in different sections of the country, on different farms, or even on different fields of the same farm. The Peckham Pioneer Health Service Centre in England discovered that feeding families in the Centre with ordinary, so-called balanced food diet bought from a shop was not enough. They were forced to grow the food themselves and to use not new methods but the ancient method of returning waste to the soil. Man's interference with the perfect balance between the natural processes of growth and decay may be largely responsible for the predicament of our malnutrition, in spite of adequate diet by the present standards.

A fertility that is optimal for the production of nutritional foods depends not only upon various elements, humus, physical structure, tillage, moisture, sunlight, but also upon the fauna and flora of the soil. Micro-organisms play an important part in making air nitrogen available to plants and in the decomposition of humus. Mycoorhizal fungi surround rootlets and stimulate metabolism as a living fungus bridge which connects soil and sap.[2]

In this discussion our interest centers in deficiency of the trace elements (iron, cobalt, copper, zinc, chlorine, sodium, magnesium, manganese, sulphur, silver, boron, nickel, aluminum, arsenic, fluorine, iodine) and all protoplasmic needs known and unknown that are influenced



by farm practices. The soil is being depleted of its fertility by large urban populations and industries. The maintenance of fertility is a farmer's problem, but the food that the American people consume is everyone's problem. Farm practices must protect and maintain this fertility in order that we may be able to buy quality foods that have the capacity to give optimal nutriment to our bodies.

The soil of England was being depleted in 1836 when Carswell[3] first noted a multiple sclerotic pons and cord, as an interesting neurological specimen. The soils of France were being depleted in 1839 when Cruveilhier[4] described the neuropathology of multiple sclerosis and gave two case histories. A few years later in France, Charcot[5] gave us a description of the clinical and pathological pictures of multiple sclerosis.

The soil of Germany was being depleted in 1840 when a chemist roughly "analyzed a human body."[6] He found calcium, nitrogen, phosphorus and potassium in addition to water. His crude methods showed the same elements to be present qualitatively in plants and animals, and he concluded that as long as these elements were replaced in the soil in generous quantities, neither plants nor people would suffer from malnutrition.

Thus, we see that multiple sclerosis, depletion of soil, and the introduction of inorganic chemicals, as a treatment for the soil were all introduced to man between the years of 1836 and 1840.

A century ago, the prevailing practice in agriculture was to take from the soil without adequate replacement of its store of minerals and humus. Cropping had become so intense in Germany, France and England that nature could not replenish the soil. The natural process of

laying down top soil was too slow. The introduction of inorganic chemicals resulted in quantity production of food. The incompleteness of the chemicals used, and their tendency to accentuate incipient deficiencies of certain other elements in the soil, is now being recognized by agricultural research.[7]

There have been many suggested causes for multiple sclerosis, but there has been no proven etiological factor to explain its incidence. Pathologically, it is a demyelinating disease, and there is some agreement that the acute lesions are characterized by perivascular infiltration, edema and local glial proliferation,[8] producing the coming and going of symptoms, exacerbation of the old and appearance of the new, resulting in a chronic degeneration of the nerve parenchyma.

My observation has been in agreement with other neurologists in regard to the conditions that precipitate and influence exacerbation of this illness, namely, pregnancy, infections, inorganic chemicals, trauma, strains and stresses, exposure, vaccines, marriage, emotional upsets, lumbar punctures, and gross dietary restrictions. There is one common feature in all of the various things which precipitate the attack, increased demand on the body.

It follows that these factors can only precipitate the illness in individuals who are vulnerable. The geographic distribution of the incidence points out those who are relatively protected and those who are candidates for multiple sclerosis when hit with sufficient force by a precipitating factor.

## WHO ARE THE VULNERABLE?

Multiple sclerosis, though thought by many physicians to be rare, and almost unheard of by the public, caused 1,301 deaths in the United



States in 1944 as compared with 1,361 deaths from infantile paralysis and 2,045 deaths from pernicious anemia.[9] Multiple sclerosis is both less recognized by the physician and more crippling to the patient than infantile paralysis. In the New York City area in the first 46,875 selectees examined, 29 were found to have multiple sclerosis while 734 had tuberculosis, 170 had diabetes, and 8 had pernicious anemia. During 1933 a study of chronic illnesses in 113 New York hospitals revealed 1,050 cases of multiple sclerosis, and 551 cases of pernicious anemia among a total of 573,623 cases. A survey in Switzerland disclosed 36 multiple sclerosis cases per 100,000. In one locality there were 70 per 100,000. A survey in England and Wales showed 16 per 100,000.[10]

In order that we might have a better concept of the incidence of multiple sclerosis in the United States, I obtained, through the courtesy of the U. S. Department of Public Health, the statistics on the number of deaths that occurred in each state during the year of 1944. I also obtained this data on infantile paralysis and pernicious anemia during the same year for comparison.

MULTIPLE SCLEROSIS

| Year | Country | No. deaths | Rate |
|---|---|---|---|
| 1942 | U. S. | 1,388 | 1 per 100,000 pop. |
| 1943 | U. S. | 1,399 | 1 per 100,000 pop. |
| 1944 | U. S. | 1,301 | 1 per 100,000 pop. |
| 1931-1942 | Survey of Baltimore | | 11.8 per 100,000 pop. |

Table 1

There is the high urban and low rural incidence of the disease. Contrary to the general impression, it is shown that multiple sclerosis is not rare in the Southern states. I believe there

MULTIPLE SCLEROSIS

| Year | City | Incidence |
|---|---|---|
| 1918 | Philadelphia | 23 per 100,000 registrants examined |
| 1918 | Boston | 10 per 100,000 registrants examined |
| 1918 | New York | 13 per 100,000 registrants examined |
| 1918 | Chicago | 10 per 100,000 registrants examined |

Table 2

MULTIPLE SCLEROSIS

In World War I registrants for the draft, there was an incidence of 10 per 100,000 cases examined.

In 1918 there was an urban rate of 12 per 100,000 and rural rate of 8 per 100,000 registrants examined.

Table 3

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE NEW ENGLAND STATES

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| Maine | 1.5 | 0.0367 | 2.7 |
| New Hampshire | 3.3 | 2.2 | 3.1 |
| Vermont | 1.6 | 0.645 | 2.58 |
| Massachusetts | 1.4 | 0.42 | 1.8 |
| Rhode Island | 1.8 | 0.014 | 1.3 |
| Connecticut | 1.21 | 0.57 | 0.999 |

Table 4



is a tendency for the prevalence of multiple sclerosis to be in direct ratio with the number of neurologists in the respective states. I have seen patients from every Southern state east of

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE MIDDLE ATLANTIC STATES

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| New York | 1.29 | 2.8 | 1.4 |
| New Jersey | 1.07 | 1.39 | 1.1 |
| Pennsylvania | 1.18 | 1.26 | 1.8 |

Table 5

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE NORTH EAST STATES

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| New England | 1.557 | .5355 | 1.78 |
| Middle Atlantic | 1.2025 | 2.021 | 1.512 |

Table 6

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE EAST NORTH CENTRAL STATES

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| Ohio | 1.3 | 1.29 | 2.0 |
| Indiana | 1.8 | 0.89 | 2.29 |
| Illinois | 1.053 | 0.52 | 2.24 |
| Michigan | 1.43 | 0.87 | 2.09 |
| Wisconsin | 1.69 | 1.09 | 2.89 |

Table 7

the Mississippi. These figures are on the low side due to diagnostic error and intercurrent infection's being recorded as the cause of death in patients with multiple sclerosis.

Multiple sclerosis could not well be a deficiency disease in the usual concept. The Chinese caloric intake is from 2,000 to 2,500 per day. The Chinese diet is deficient in calcium, in vitamins, proteins and fats. Yet the Chinese do not have sclerosis of their nerves, their blood vessels, blockage of their veins or hypertension. They do not have kidney or gallstones. They have a limited food supply, but this food is better suited to meet man's body needs as evidenced by the

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE WEST NORTH CENTRAL STATES

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| Minnesota | 1.64 | 1.48 | 2.24 |
| Iowa | 2.27 | 0.76 | 3.17 |
| Missouri | 1.005 | 0.373 | 2.15 |
| North Dakota | 1.92 | 0.38 | 1.73 |
| South Dakota | 1.7 | 0.56 | 2.6 |
| Nebraska | 1.54 | 0.85 | 2.56 |
| Kansas | 0.96 | 0.602 | 3.97 |

Table 8

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE NORTH CENTRAL STATES

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| East North Central | 1.325 | 0.9056 | 2.267 |
| West North Central | 1.487 | 0.76 | 2.66 |

Table 9



absence of degenerative diseases, in spite of the high incidence of infectious diseases. Their limited supply of food is grown by farmers who do not use inorganic chemicals which, in the light of present knowledge, tend to disturb the chemical balance of the soil and, in turn, to disturb the mineral and chemical content of the

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE SOUTH ATLANTIC STATES

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| Delaware | 0.806 | 2.125 | 2.125 |
| Maryland | 1.005 | 1.256 | 0.603 |
| District of Columbia | 1.085 | 1.447 | 0.036 |
| Virginia | 0.65 | 2.086 | 0.93 |
| West Virginia | 0.475 | 1.41 | 1.35 |
| North Carolina | 0.484 | 1.212 | 0.484 |
| South Carolina | 0.333 | 0.79 | 0.508 |
| Georgia | 0.27 | 0.473 | 0.765 |
| Florida | 0.85 | 0.45 | 1.25 |

Table 10

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE EAST SOUTH CENTRAL STATES

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| Kentucky | 0.52 | 1.92 | 2.56 |
| Tennessee | 0.25 | 0.57 | 1.5 |
| Alabama | 0.296 | 0.445 | 0.519 |
| Mississippi | 0.254 | 0.406 | 0.914 |

Table 11

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE WEST SOUTH CENTRAL STATES

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| Arkansas | 0.294 | 0.294 | 1.0 |
| Louisiana | 0.391 | 0.522 | 0.522 |
| Oklahoma | 0.872 | 0.41 | 1.538 |
| Texas | 0.336 | 0.8157 | 0.929 |

Table 12

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE SOUTH

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| South Atlantic | 0.589 | 1.145 | 0.793 |
| East South Central | 0.3306 | 0.8417 | 1.38 |
| West South Central | 0.426 | 0.623 | 0.96 |

Table 13

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE MOUNTAIN STATES

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| Montana | 1.304 | 1.956 | 1.304 |
| Idaho | 0.43 | 1.72 | 0.215 |
| Wyoming | 1.28 | 0.427 | 0 |
| Colorado | 2.36 | 2.19 | 1.05 |
| New Mexico | 0.206 | 0.823 | 0.823 |
| Arizona | 0.52 | 0.174 | 1.22 |
| Utah | 0.689 | 0 | 0 |
| Nevada | 0 | 0.767 | 0 |

Table 14



crops and, thus, affect the health of the animals that feed on the crops. The Chinese do not have multiple sclerosis.

What evidence is there that absence or insufficiency of trace elements affect plants and animals?

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE PACIFIC STATES

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| Washington | 1.718 | 1.61 | 0.99 |
| Oregon | 1.44 | 1.78 | 2.37 |
| California | 0.741 | 1.294 | 0.49 |

Table 15

INCIDENCE OF DEATH PER 100,000 POPULATION OF THE WEST

| | Multiple Sclerosis | Poliomyelitis | Pernicious Anemia |
|---|---|---|---|
| Mountain | 1.153 | 1.178 | 0.727 |
| Pacific | 0.991 | 1.41 | 0.78 |

Table 16

MULTIPLE SCLEROSIS

| China | Incidence |
|---|---|
| Estimated population 450,000,000 | 0 per 100,000 population |

Rural population 90 per cent.

Urban population 10 per cent.

Table 17

Beeson[11] writes

"The recent increase of interest in the distribution of nutritional trouble in plants and animals is a natural sequence to the earlier work of diagnosing and classifying these troubles and their symptoms."

He gives three United States maps: first, of the occurrence of boron and manganese deficiencies in plants; second, of the occurrence of copper, iron, magnesium and zinc deficiencies in plants; and third, of the occurrence of mineral nutritional diseases in animals, namely, cobalt, copper and iron, causing nutritional anemias, calcium and phosphorus causing bone diseases, selenium toxicity and grass tetany.

The 1943 report of the Administrator of Agricultural Research[7] discussed the soil-plant nutritional relationship.

"Cattle in areas where cobalt is deficient in native plants become gaunt owing to loss of appetite, become listless and anemic; the hair coat becomes rough and the skin is scaly. After extended exposure to the deficiency, muscular atrophy develops and death occurs. In North Carolina cobalt deficiency is accompanied by a low manganese content of the forage while in Massachusetts the iron content is low. These multiple deficiencies have prevented a normal development of dairy and beef cattle. Trouble with sheep and dogs also occurs in North Carolina in those areas where the soil is depleted of certain trace elements."

A survey was made of pastures and hay lands in the Northeast where an ailment in cattle, called grass tetany, has been reported to be associated with intensive fertilization with nitrogen, potash and phosphate.

What is the relationship of mineral imbalance in soil, plants, and animals to multiple sclerosis? Ferraro[12] with repeated administration of potassium cyanide rather regularly produced pathologic changes characteristic of multiple sclerosis. Other chemicals such as injection of sulfanil-



amide have been followed by encephalomyelitis.[13] Carbon monoxide poisoning has precipitated a progressive multiple sclerosis.[14]

The chemical substances such as sulfanilamide, potassium cyanide, lead, arsenic, arsphenamine, carbon monoxide and nitrous oxide have been found to disturb the structure of the central nervous system and produce pathology closely resembling post-infectious encephalomyelitis. In animals that live on food from soils depleted of some elements such as cobalt, manganese, iron, et cetera, or from soil over-fertilized with nitrates, potassium and phosphates, evidence of central nervous disease is found.

"The fertilization may possibly have accentuated incipient deficiencies of certain other elements in the soil. Preliminary results with new technics developed by the laboratory to study the effects of fertilizer and soil treatments on the mineral content of food and forage plants indicated that the amounts present in minute quantities in both hay and green vegetable crops are affected by liming and fertilization practices. On the basis of these results it seems possible that modifications of liming and fertilization practices may result in an increased content of some of the essential elements in soils and in the foods."[7]

Thus circumstantial evidence points to the fact that unbalanced chemical fertilizers, either too much or too little, or in the wrong combination of minerals, interfere with the soil's ability to supply the necessary chemical elements for healthy plants and animals.

"The plant needs varying amounts of different elements, much of one, little of another; for example, cotton as a general rule needs at least 36 pounds of nitrogen, equivalent to 225 pounds of natural nitrate per acre. Natural nitrate contains a large amount of nitrate nitrogen, 16 pounds per 100, but application of 100 pounds per acre would not be adequate to correct the nitrogen deficiency of the soil as measured by the requirements of the cotton plant. On the other hand, "saltsick" (an anemia) of cattle feeding on certain

pasture land in Florida is prevented by addition of a trace of cobalt to the fertilizer treatment. Application of a little zinc oxide per tree, or driving one small zinc-covered nail in the orange tree, controls the mottle-leaf disease for a period of several years."[15]

Composts of vegetable matters and animal manure contain all of the known elements contained in the human cell and likely many other factors needed by the human cell that are as yet unknown to the biochemist. Thus, natural manures have the potential capacity to give to the depleting soils a complete fertilizer, while the chemical fertilizer is an incomplete food supply for the plant and will continue to be until we perfect and advance our knowledge of micro-biochemistry. Therefore, full quality food can be raised only on virgin soil and on soil that has been replenished by the refuse from all of its produce, both plant refuse and animal refuse.

The natural phenomenon that nature has presented for us of multiple sclerosis occurring here and not there, of its occurrence only in places where incomplete, commercial fertilizers are used in farm practices, presents for our consideration an experiment that has been carried on for over a hundred years. The subjects and potential subjects run into the millions. In order that we may have a limit to our geographic research, let us again take China, which has an estimated population of 450,000,000 people and is 90 per cent rural, and Germany, which, as greater Germany, had an estimated population of 79,000,000 people, with a rural percentage much smaller than China but which cannot be ascertained exactly. The time element in this experiment goes back a century. I do not think statisticians could question the number nor the time of this experiment. The Chinese



farmer uses natural manure to produce his food; the German farmer uses inorganic chemical fertilizer to produce his food.

In 1840, von Liebig introduced the practice of applying inorganic material to the lands as fertilizer to replenish the depleted soils of Germany. This practice spread rapidly, and it became customary to apply mainly nitrates, potassium, phosphorus and lime. This incomplete fertilizer provided the major needs of the soil but overlooked the minor needs, minor though equally vital to the soil. On the other hand, in China the agricultural practice of intensified farming demanded that the depletion of these soils be prevented. For centuries the Chinese have returned to the land the refuse of the products of the soil and the manures of animals including man. In Germany, before the war, multiple sclerosis was second only to syphilis in causing pathology of the nervous system. In China multiple sclerosis is such a rarity that authorities, such as Snapper and others, state that it is non-existent.

Where soils are depleted of certain minerals, biologists tell us of deficiency disease in plants, and they have found that very small amounts of the proper minerals added to the soil will eliminate the deficiency disease. For instance, in New Zealand, there was a soil-deficiency of cobalt in the grasses that made the pasture, which in turn caused the sheep to become paralyzed. The application of three or four pounds of cobalt per acre prevented the deficiency of the grass and eliminated the bush paralysis in the sheep.

In spite of our present knowledge of chemistry and of chemical fertilizer, we have not developed a technic to determine the minute traces of iron, cobalt, copper, boron, zinc,

chlorine, sodium, magnesium, manganese, sulphur, and perhaps many other chemical substances that are needed by plants. It is true that plants can grow without these trace elements, but in order for them to give a complete optimal diet to the animals that feed on them, they must be grown on a soil that is completely fertile. Until we develop further knowledge of soil and plant chemistry, reliance can be placed only in the natural manures that give a more complete and balanced fertilization.


## SUMMARY

We have a story of depleted soil. Man has attempted in the western world to correct this by the use of a few chemicals, inadequate to meet the full needs of plants and animals as they represent only a few of protoplasm's mineral needs. These chemicals have the capacity to disturb the mineral balance and the natural fauna and flora of the soil. People whose food comes from soils fertilized with chemicals appear to have more vascular diseases and more degenerative diseases. Multiple sclerosis is a degenerative disease. Its clinical characteristic of acute or subacute onset, with symptoms that improve or disappear, points to involvement of the circulation.

People who are fed on food produced by incomplete, inorganic fertilizers appear to be more liable to circulatory disease, more liable to central nervous system circulatory disease, more liable to vascular contrictions and dilatations, more liable to perivascular infiltration and to edema in the nervous system and to local glial proliferation due to disturbed mineral balance in their bodies and their blood streams. Therefore, when greater demands (the precipitating factors of multiple sclerosis) are put on their vulnerable bodies, these people develop the syndrome of multiple sclerosis.

The conclusion, thus, is indicated that the incomplete fertilization program carried on in Germany, England, Europe and the United States is contributing largely to the inadequacy of the quality of the diet, with deficiency of trace elements and unknown factors, contributing to and being largely responsible for the presence of multiple sclerosis in what appears to be ever-increasing incidence in the occidental world. It is also indicated that the use of complete and natural manures in the oriental world may be the factor in producing a more adequate diet, thus, explaining the orient's freedom from multiple sclerosis and some of the other degenerative diseases.


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