Multiple Sclerosis and Schizophrenia: Some Comments on Similarities in their Spatial Distributions

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It is always stimulating to watch the pieces of a challenging jigsaw puzzle fit into place. The preceding paper fills yet another intellectual gap and permits logical speculation about the slowly emerging picture. One of the early pieces of the puzzle appears to have been put into position by Campbell, Crow and Lang (1960) when they drew attention to the fact that multiple sclerosis was most common in regions where goitre was endemic. This association was further confirmed by the present author (Foster, 1987; 1988a) who showed that, in addition, in the United States, multiple sclerosis and goitre were both commonest in areas where soils were low in iodine.

Why this may occur is now becoming clearer. In 1976, Dip emphasized the striking positive correlation between the world distribution of the consumption of dairy products and the incidence of multiple sclerosis. Similarly, Swank and Pullen (1977) noted that in Europe, "two parallel and little mixed cultures based on food have evolved. These are the "beer-butter" and "wine-oil" cultures. The first extends across northern Europe (Scandinavia, Germany, Holland, Belgium, northern France, northern Switzerland and the British Isles) and has become the mode of life in the United States and Canada. The second predominates in the Mediterranean area (Spain, Italy, southern France, southern Switzerland and Greece) and stretches to the Middle East and North Africa. The beer-butter culture corresponds geographically to the area of high incidence of multiple sclerosis and vascular disease; the wine-oil culture corresponds to the area where these conditions have a low incidence." Even within some individual countries multiple sclerosis incidence appears to be elevated in dairying areas. In Norway, for example, Swank and his colleagues (1952) have established that the illness has been far less common in coastal fishing regions than in interior agricultural communities. There appears, therefore, to be mounting evidence to suggest that multiple sclerosis is somehow linked to dairy produce consumption.

How drinking milk could result in high rates of this disease did not become obvious, however, until 1984 when Warren described a series of experiments conducted at the Hannah Dairy Research Institute, Ayr, Scotland. When goitrogens were fed to cows it was discovered that they produced milk with a very low vitamin A content. Clearly, where soils are naturally lacking in iodine, or when lactating cows are fed goitrogens such as cabbage, rape or mustard, their milk will also be vitamin A deficient. Warren (1984), further argued that the situation worsened when the cow's fodder was selenium deficient, since this trace element was needed to protect vitamin A from peroxidation. This is turn may explain Schalin's (1980) claim that multiple sclerosis is very common in Europe in areas of selenium depleted soils. Warren (1984) concluded that when newborn infants were fed such vitamin A deficient cows milk, for approximately six months, they became at risk of subsequently developing multiple sclerosis. This was particularly true if the milk had been diluted with water.

Although the causes of multiple sclerosis, therefore, may have been identified, it is not yet apparent why this disease has a spatial association with schizophrenia. However, this author has recently attempted to quantify relationships between the incidence of schizophrenia in the United States and 221 environmental variables

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(Foster, 1988b). The strongest positive correlation was found to be between schizophrenia and the distribution of selenium deficient fodder crops ($r = 0.58497$, $p = 0.0001$). It is possible, therefore, that multiple sclerosis is common in selenium deficient regions because its absence decreases the vitamin A content of cows milk. Schizophrenia may frequently occur in the same areas because of the negative impact of low selenium intake on prostaglandin production (Foster, 1988b).

In addition, the strongest negative correlation was found to be between schizophrenia and sunlight ($r = -0.57024$; $p = 0.0001$). Iodine is generally lacking in the soils of heavily glaciated areas and, therefore, its levels tend to decline away from the equator. One might expect, therefore, that both multiple sclerosis and schizophrenia will be uncommon in regions where sunlight levels are elevated. The former because it appears to be an iodine deficiency disease, the latter because in some way it may be linked to low sunlight exposure (Foster, 1988b). This may also help to explain similarities in their spatial distribution patterns.

Multiple sclerosis and schizophrenia both have genetic components (McAlpine, Lumsden and Acheson, 1972; Shield, 1975). However, it is possible that what is actually inherited is an inability to effectively absorb certain trace and bulk elements through the digestive tract or to efficiently utilize them. Such a problem, in turn, may increase an individual's susceptibility to various deficiency diseases including, perhaps, multiple sclerosis and schizophrenia. That is, both illnesses may be in part genetic and in part geochemical.

Swank and Pullen (1977) have argued that "the characteristics of multiple sclerosis appear not to have been recognized or described by ancient or medieval physicians. This would be peculiar if the disease had existed during these times in anything like the frequency and form of today. The earliest case history is found in the diary of Augustus d'Este written at the beginning of the nineteenth century." Similarly, according to Torrey (1980) schizophrenia was uncommon before 1800, but its incidence increased rapidly in both Europe and the United States during the nineteenth century. It would appear, therefore, that both multiple sclerosis and schizophrenia are relatively new diseases, their rise being associated with the industrial revolution. Whether this implies that changes in child rearing, diet, industrial pollution or other social and economic changes are implicated in both illnesses is unclear.

However, despite the complexity and remaining uncertainties, the evidence is suggestive that selenium deficiency plays a significant role in the etiologies of both multiple sclerosis and schizophrenia. Fortunately, it will soon be possible to test this hypothesis further since selenium is now being added to most fertilizers being used in Finland. It will eventually become apparent, therefore, whether higher soil selenium has any significant effect on the incidences of these illnesses. If so, a very significant additional piece of the jigsaw puzzle will fall into place.

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