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**FOOD, SOCIAL COSMOLOGY, AND MENTAL  
HEALTH: The Case of Sugar**

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This paper is being circulated in a pre-publication form to elicit comments from readers and generate dialogue on the subject at this stage of the research.

## INTRODUCTION\*

This paper takes as a starting point the reported high frequency of mental problems in industrialized countries today,<sup>1</sup> relating this to dietary factors and, in particular, to the large consumption of sugar which has prevailed for the last few decades. The influence of diet on people's mental health seems to become of increasing significance the more industrialized a country is. We are particularly concerned with the effects of refined foods, epitomized by white table sugar, since such foods only have been part of human diets for a brief period in evolutionary terms. There is growing evidence that sugar affects our nervous system in several ways: the metabolism of sugar requires vitamin B and chromium in order to be metabolized, and the literature also reports evidence that sugar upsets our calcium balance. We also know that an even level of blood sugar (glucose) is essential for our feeling of well-being and that we by eating refined sugar may upset this balance, resulting in various forms of mental disturbances. This paper will deal with these points in detail, both in order to test their validity and to arrive at a more complete picture of mental health problems in our part of the world.

Indicators of a deteriorating mental health situation in industrialized countries are found in statistics for suicide rates, in the increasing addiction to tobacco, alcohol, drugs, and sweets, in the craving for "snacks," in increasing crime rates, and in the rapid build-up of mental hospitals and psychiatric wards. Besides the high level of heart disease and cancer, mental health issues take a prominent place in present-day problems, replacing the historical role in our relatively recent past of diseases such as scarlet fever, whooping cough, measles, cholera, and dysentery.<sup>2</sup> As an illustration of how important mental

illness is in the industrialized countries, we may give some figures from Norway, where such problems are unlikely to be more prominent than in other, similar countries. Of the total population, about 1 per cent is likely to become schizophrenic during their lifetime, 6 to 7 per cent will become psychotic, and an estimated 10 to 20 per cent suffer from some kind of neurosis.<sup>3</sup> Long-term data indicate that the incidence of milder mental disorders (neuroses) in Norway has increased something like ten times during this century.<sup>4</sup> Swedes fare no better than we do: an estimated 50 per cent of all males and about one third of all women will experience a mental breakdown before the age of 60.<sup>5</sup>

## I. UNDERSTANDING MENTAL ILLNESS

Many explanations have been put forward to explain this sad state of affairs. Religious groups, even in modern-day Norway, sometimes ascribe mental disease to evil spirits having invaded the human body, the cure for which is exorcism, a not-too-fruitful approach.<sup>6</sup> There is no good reason to believe that there are more evil spirits around today than 100 years ago, especially since there are many more people and the rates of mental disease, if anything, have been going up. Then there is the school of inheritance ascribing mental illness to a poor genetic make-up. This school is not to be discounted entirely, even if it does not lend itself well to policy, except, perhaps, to Nazi ideologists. Cosmic forces may come into play and aggravate people's mental state in some instances ("lunatics" being a case in point), this also, however, being outside the reach of curative policy. Then we have the school of psychotherapy, ascribing poor mental health to experiences in early childhood, such as the lack of love and affection or frustrated needs in the anal, oral, or phallic stages of development. No doubt, these are important factors which we will not try to debunk. Neither will we challenge the important influence of peer groups, where our personality and psyche are finally shaped before reaching adulthood. However, these schools of thought do not seem to get to the root of the problem, in the sense of providing a cure for mental disorders. The institutionalization of mental care in the educational system (the training of psychologists, psychiatrists, social workers, etc.) and in the medical system (mental health clinics, asylums) may even serve to cover up or conceal the presence of deeper, underlying causes. Individual psychotherapy, for instance, does not prevent the endless stream of new patients, and in this way, such a curative approach may serve to maintain the status quo rather than getting at

the root problems. And some of the root problems may be found in the social structure surrounding us, in the culture, or in a deeper sense, in social cosmology. If, as Ivan Illich says, "The prevalence of sickness is blamed on life in an alienated society . . .,"<sup>7</sup> a preventive strategy would involve changing society instead of the "patients." However, this is a long-term process and will hardly be very useful for those now in need of psychiatric attention, be it in the form of psychotherapy or drug treatment, which may lessen the burden they do carry. One clue to social structure or culture playing an important role in lessening the burden for many mentally ill has been given by results from the World Health Organization's large cross-cultural schizophrenia study.<sup>8</sup> Although epidemiological studies "have indicated that the prevalence of schizophrenia and the affective psychoses is remarkably constant throughout the world,"<sup>9</sup> the WHO nine-country study indicates that psychiatric patients in poor countries show a quicker improvement in their condition than those in the North (East or West). Patients in the poorer countries also seem to have a lower rate of recurring illness. Attempts to explain these two factors include the closer social networks and the higher cultural acceptance of mental disease in poor countries than is the case in the highly industrialized corners of the world.<sup>10</sup>

An important aspect of a civilization's social cosmology (see chapter VI) is the relationship between people and nature, with other people and with the transcendental.<sup>11</sup> Mental disease and person-to-person relationships have been discussed above, and also our relationship to the spiritual world, if such a world does exist.<sup>12</sup> What remains is our relationship to nature, something which includes not only how we build industry and infrastructures in general, including what technologies to use, but also what we put in our stomachs, what we breathe, drink, and touch with our skin. Since such factors have been held responsible for a large number of diseases in contemporary overdeveloped societies,<sup>13</sup> it is probably not unreasonable to agree with Ivan Illich's statement that "for more than a century, analysis of disease trends has shown that the environment is the primary determinant of the state of general health of any population."<sup>14</sup> Although "we have no complete

explanation for the genesis of these changes," meaning the upsurge of "modern epidemics," such as "coronary heart disease, emphysema, bronchitis, obesity, hypertension, cancer (especially of the lungs), arthritis, diabetes, and so-called mental disorders,"<sup>15</sup> a large body of literature points to one important factor in explaining such diseases: the recent changes in our diets, and in particular, the large intake of refined sugar.<sup>15</sup> How this ties in with our view of food in general, and in this sense, with cosmology,<sup>16</sup> will be elaborated upon after a relatively detailed account of what happens to our body and mind when we include "empty calories" like sugar in our diet. Our relatively recent addition of large quantities of refined sugars, however, is not something which we predict will last for very long. A basic point in this paper is that sugar can be seen as a carrier of social cosmology, and that getting rid of sugar, accordingly, also means a shift in social cosmology. That the world presently is experiencing an exchange of cosmologies is illustrated by the renewed interest in nutrition and alternative medicine in the West, at the same time as China is starting a new "modernization period" involving, among others, the acceptance of Coca-Cola and McDonald hamburgers. It may be hypothesized that after this exchange of cosmologies we will enter into a period where a more global, universal type of cosmology becomes more prevalent, including, of course, the rejection of sugar as a dominant part of our diets and a more holistic view of food.

## II. SUGAR, A RECENT FACTOR IN OUR DIET

The use of refined sugar is a relatively recent addition to our diet, dating back only a couple of hundred years as far as general, widespread use is concerned. The sugar trade was important in the colonial period, where the triangular trade between Europe, Africa, and North America brought riches to the North and impoverishment to the South, thus laying the foundation for the present, old economic order.

No agricultural crop has brought such misery to the world as sugar. Sugar has ruined land from one end of the earth to the other. It was the prime vehicle for the spread of slavery. And sugar now is widely cited as a prime cause of disease.<sup>17</sup>

At the time, British, Spanish, and French traders were busily engaged in selling rum to Africans for the exchange of slaves, whom they took back to the West Indies for sale to plantation owners, taking back molasses for rum production to be peddled to addicted customers.<sup>18</sup> When sugar was introduced in Europe, the price was prohibitively high, one pound costing the equivalent of a year's salary for a working man. By 1662, one pound of sugar cost the equivalent of three dozen eggs in Britain, but two decades later, the price was only half as much.<sup>19</sup>

By 1815, the per capita sugar consumption in the United Kingdom had risen to about 33 kg, still relatively low, but after the mid-century, consumption exploded and rose eightfold to the present level of about 55 kg.<sup>20</sup> This development is paralleled in most industrialized countries, for instance in the United States,<sup>21</sup> although some countries such as Norway lagged somewhat behind (from about 3.5 kg per capita in 1850 to the present almost 42 kg [1979]).<sup>22</sup> It should be unnecessary to add that sugar today is one of the cheapest industrial products that the food industry can use and that this is one of the main reasons for



its high use,<sup>23</sup> in spite of its very clear negative impact on health. Another reason why people use sugar is, of course, that it gives many people a pleasant taste experience. Furthermore, the mystification of concepts such as "pure" (connoting innocence and goodness from a religious point of view)<sup>24</sup> and "natural," together with the subtle and often long-term delay in the manifestation of negative health effects,<sup>25</sup> have all contributed to making it very difficult to persuade people to reduce sugar intake. This paper, accordingly, will explore some of the less-known effects of a high level of sugar consumption, thus serving to strengthen policies directed towards its reduced use in the overdeveloped part of the world, at the same time as a warning is sent out to those countries where the consumption still is low.

### III. SUGAR IN THE METABOLISM

The sugar we are talking about in this paper is found in sugar cane or sugar beets: sucrose, which is refined to a 99.9 per cent purity. Thus, except for insignificant traces of iron,<sup>26</sup> regular table sugar contains nothing but energy in a concentrated form, i.e., not one single element necessary for the normal functioning or maintenance of the human organism. To quote John Yudkin,

. . . I can make two key statements that no one can refute: First, *there is no physiological requirement for sugar*; all human nutritional needs can be met in full without having to take a single spoon of white or brown or raw sugar, on its own or in any food or drink.

Secondly, *if only a small fraction of what is already known about sugar were to be revealed in relation to any other material used as a food additive, that material would promptly be banned.*<sup>27</sup>

Sucrose is a two-sugar molecule, a disaccharide. It is made available to the cells when it is broken down in our bodies to fructose and glucose, both called monosaccharides, the simplest forms of sugar that exist.<sup>28</sup> All sugar fragments needed for the body metabolism can be obtained from any normal diet, from more complex sugars such as starch, found in vegetables and fruits, or even from proteins, fats, or alcohols. When glucose or "blood sugar" is obtained through the modification of starches or proteins in whole foods, we also ingest many other nutrients which the body needs. This is not the case when part of the caloric intake is replaced by white sugar:

. . . nutritionally speaking, when one eats sugar he has incurred a "debt." Though he has met the need for carbohydrate, he owes himself a corresponding quantity of vitamins, minerals, fat, protein and fiber. The metabolism of sugar will proceed only through the use of all the accessory nutrients which are involved in its combustion. Vitamins,

minerals and even some protein and some fat molecules are all necessary.<sup>29</sup>

This nutrient "debt" has serious consequences in societies where the intake of sugar is several tens of kilos per capita per year and where groups of people at the same time are deficient in essential food constituents:

. . . as sugar eating becomes a habit, the supply of vitamins, fats and protein gradually becomes depleted, and such nutrients must be pulled from tissues somewhere in the body in order to continue support of the metabolic activities fueled by the sugar.<sup>30</sup>

When sugar supplies a large fraction of total caloric intake, we not only get the *direct effect* of robbing the organism of important nutrients, we also get an *indirect effect* in that it is replacing the intake of foods which contain many other nutrients we need, besides those which sugar affects directly. When we add that the food eaten in many industrialized countries on the average supplies a daily ration of 40 to 45 per cent of total caloric intake from fats<sup>31</sup> besides a 15 to 20 per cent caloric intake from sugar,<sup>32</sup> we often find about 60 per cent of the food deficient in valuable nutrients. Many of the remaining calories, moreover, are found in industrially processed foods which not only lack many essential minerals and vitamins but also contain chemical additives and residues from industrial pollution and agricultural biocides. Many meats eaten contain traces of hormones and antibiotics used in factory animal husbandry, all adding up to a diet with a significant potential of producing illness.<sup>33</sup> In this picture, sugar is seen as having a key role in triggering poor mental and physical health. It is not clear exactly how much of various vitamins and minerals sugar requires for its metabolism. It is clear, however, that many people, especially children and youth, but also groups of women and elderly, and lower-class people in general, in many industrialized countries are marginally or seriously deficient in certain vitamins of the B group, of calcium, iron, and other trace elements.<sup>34</sup> As many of these nutrients are essential to our physical and mental well-being, it is clear that a large sugar intake for such groups may have serious effects.

## *Blood Sugar and Mental Health*

In order to be physically and mentally fit, the body constantly needs energy in the form of sugar in the blood. The blood-sugar level must be kept within relatively narrow limits to provide energy for cellular actions and for the brain. A too-high level of blood sugar (glucose, also called dextrose or grape sugar) is normally corrected for when the pancreas secretes insulin which makes the glucose available to the cells, where excessive glucose either is stored for future use in the form of glycogen, or when the stores are filled, in the form of fat.<sup>35</sup> A condition of too-high sugar level is called hyperglycemia and in a chronic stage, this situation is usually caused by the diabetic condition. Diabetes mellitus is by many considered to be caused primarily by a too-high sugar intake.<sup>36</sup> When we digest sucrose, it splits into glucose and fructose, the former requiring insulin to be made available to the muscle cells for the metabolic processes. Glucose is absorbed in the blood very quickly and activates the pancreas to produce insulin in order to regulate the level of glucose to an optimum. But with frequent demands put on the pancreas to produce insulin whenever the blood-sugar level shoots up after the ingestion of large amounts of refined sugars, an eventual exhaustion of the pancreatic cells may take place, or one may get an inefficiency of insulin-promoting action in the cells.<sup>37</sup> If the level of insulin in the blood becomes too high, as may be the case if a diabetic takes a too-high dosage of insulin to correct for his hyperglycemic state, a state of too-low blood-sugar level, or hypoglycemia, sets in.

In diabetic persons the blood-sugar level remains high after meals containing carbohydrates and, since the body does not tolerate a too-high level of blood sugar, excess sugar is excreted in the urine. A relative overabundance of glucagon relative to insulin may prevent the body from storing up glycogen for reversion to glucose, and, according to Palm,

When the body has lost sugar in the urine and used up the remainder, the deficiency of glycogen prevents the stress response from re-establishing the required blood sugar level. This is hypoglycemia.<sup>38</sup>

If a low blood-sugar level persists, a severe state of stress develops, giving rise to emotional instability in the form of depression, anxiety, irritability, and hot tempers. Eventually, if a diabetic does not ingest some quickly absorbed sugars (glucose or sucrose) or is given glucose intravenously, symptoms such as blurred or double vision, severe headache, mental confusion, and eventually coma may set in, ultimately resulting in death.<sup>39</sup> The diabetic condition, in the physiological effects resulting from the hypoglycemic state, may therefore be associated with a deterioration in mental health, thus paralleling the associated mental health problems experienced in about 20 per cent or so of many chronic diseases.<sup>40</sup>

But not only people who are diabetic will experience fast changes in their mood as a result of eating sugar. Even if the diabetic condition has increased in frequency by a factor of 20 to 30 during the last century in industrialized countries,<sup>41</sup> it still only affects a few per cent of the population.<sup>42</sup> Most of us, however, will at some time have experienced the effects of a rapid change in blood sugar when too-large quantities of sucrose- or glucose-containing foods are eaten, or when sugar is taken in carbonated drinks, in tea, coffee, etc. Since people ordinarily react to too-high blood-sugar levels by inducing the pancreas to rush the blood with insulin so as to tuck away glucose in the form of glycogen or fat for future energy use, all people who eat average amounts of industrial sugar will experience large variations in the blood-sugar level. Normally, the drop in blood sugar caused by action of insulin is followed by a gradual increase in the glucose level through the action of glucagon or adrenalin,<sup>43</sup> so as to restore our normal state of alertness and mental equilibrium. However, in some cases,

if the blood sugar concentration is not raised by adrenalin and the hypoglycemic condition persists, various psychiatric and nervous system malfunctions may develop. Outburst of temper, extreme depression, motor deficits, hallucinations, and all of the symptoms of certain psychotic illnesses may develop.

. . . the nervousness which accompanies the first mobilization of adrenalin leads to compulsive eating in some persons, compulsive drinking of alcohol in others, hyper- or manic activity in some, and psychological withdrawal in others.

Such behavioral characteristics seem to support the contention that the victim is attempting to accommodate the deficiency of the blood sugar and the high concentration of adrenalin by changing his mode of behavior.

. . . At times of stress smokers increase their consumption of cigarettes . . . nicotine mimics the action of adrenalin . . . nicotine is a stimulant drug. The same is true for those people who drink prodigious amounts of coffee . . . in some way they feel better adjusted if they get the stimulation of the caffeine which, like nicotine, supports the action of adrenalin.<sup>44</sup>

Thus, we understand how the eating of sugar not only leads to sugar addiction in some persons<sup>45</sup> but also, in other cases, to excessive consumption of tobacco, caffeine, or alcohol. In fact, many people who have poor dietary habits are addicted to many different stimulants, while a well-balanced diet often seems to be associated with "addiction" to only one thing: good food.<sup>46</sup> The tolerance for sugar varies from person to person, but as a general rule, one can safely claim that the higher the average sugar intake in a population, the more people will experience what William Dufty has called "sugar blues":

Multiple physical and mental miseries caused by human consumption of refined sucrose. . . .<sup>47</sup>

Persons unable to handle sugar, Dufty says, experience such things as:

Fatigue, nervousness, depression, apprehension, craving for sweets, inability to handle alcohol, inability to concentrate, allergies, low blood pressure!<sup>48</sup>

These effects may be explained not only by the variations in blood sugar, but possibly also by the fact that sugar deprives the nervous system of important vitamins and minerals, in particular vitamin B, calcium, and chromium.

#### *The Role of Vitamin B*

Vitamin B is not a single vitamin, but a whole group of vitamins having to a large extent complementary functions in our metabolism. About 25 B vitamins have been identified, although sometimes the identification was discarded either because the newly-discovered vitamin was not

considered essential or because it was identical to others which already had been identified.<sup>49</sup> Of importance here is that vitamin B is needed for the proper functioning of our nervous system and that the lack of vitamin "B complex" can lead to serious mental disorders. As mentioned above,<sup>34</sup> not only has the population in industrialized countries experienced a reduction of vitamin B intake during this century, but sugar has taken up an increasing part of our diets. According to the German nutritionist, Dr. O. Bruker, research on vitamin metabolism has conclusively shown that:

the breaking down of sugar without the presence of thiamine, riboflavin, pantothenic acid, niacin, and biotin, all belonging to the vitamin B complex group, is not possible, or that . . . the consumption of sugar is equivalent with an increased need for these vitamins. . . .

The danger of sugar lies not so much in its own poverty of vitamins and minerals, but in its effect as a vitamin consumer; the higher the sugar consumption, the higher the vitamin need and consumption, respectively.<sup>50</sup>

It has been estimated that for every 1,000 kcal of sucrose which is eaten, the order of 0.5 mg of vitamin B<sub>1</sub> (*thiamine*) is needed for the metabolic processes.<sup>51</sup> With a recommended daily allowance (RDA) of 1 mg per day, it is easy to see how a person with a borderline intake of thiamine can become deficient.<sup>52</sup> Several clinical experiments have been described in the literature in which subjects have been put on a diet deficient in thiamine, or where sugar has been added to an otherwise ordinary diet.<sup>53</sup> The result from one such experience was an observed change in the personality after about 8 to 12 weeks of dieting on a restricted thiamine intake (about 0.45 mg per day, half the RDA):

All subjects became irritable, depressed, quarrelsome, unco-operative and, without knowing why, fearful that some misfortune awaited them.<sup>54</sup>

The subjects were reported to have been physically and mentally well-balanced when they were given the RDA of thiamine. Interestingly enough, all subjects in this study had previously been treated for psychiatric illness, but had been considered recovered. Since thiamine requirements seem to vary from person to person, it may be that "such persons might . . . be especially susceptible to the effects of a lower

intake of thiamine."<sup>54</sup>

Vitamin B<sub>2</sub> (*riboflavin*) is also important for the normal functioning of our nervous system, the skin, hair, etc., but since this vitamin has been shown to be synthesized by intestinal organs which then supply what is needed, riboflavin deficiency seems to be very rare.<sup>55</sup>

Vitamin B<sub>3</sub> (*niacin*) deficiency has been related to a serious disease called pellagra, one to rival scurvy and beri-beri in its severity. Pellagra is often connected with symptoms involving the nervous system:

In mild cases they may be only weakness, tremor, anxiety, depression and irritability. In the more severe and acute cases, however, there is a more dramatic disturbance, with the classical signs of acute psychosis.<sup>56</sup>

The importance of niacin in our diet has been confirmed by the successful use of this vitamin in "mega-doses" for the treatment of schizophrenia,<sup>57</sup> and one orthomolecular psychiatrist states with conviction that:

If all the vitamin B<sub>3</sub> were removed from our food everyone would become psychotic within one year. This pandemic psychosis would resemble pellagra and it would resemble schizophrenia. . . . this illustrates vividly what does happen to one to two percent of our population.<sup>58</sup>

Finally, it should be mentioned that niacin has been claimed to help regulate blood-sugar levels in hypoglycemic patients, something which further underlines the connection with vitamin B and sugar consumption.<sup>59</sup>

Another vitamin of the B-group is vitamin B<sub>6</sub> (*pyridoxine*), the deficiency of which seems to cause "symptoms similar to those of thiamine and niacin deficiencies, and it can produce a sort of depression."<sup>60</sup> Also, pyridoxine seems to be related to women's hormonal balance,<sup>61</sup> which again seems to be connected to a high sugar intake.<sup>62</sup>

Two other vitamins of the B-group that are related are labelled B<sub>12</sub> and *folic acid*, respectively. A deficiency of B<sub>12</sub> (either from a too-low level in the food or from a deficient absorption rate) may lead to cases of pernicious anaemia.<sup>63</sup> This disease is clearly related to poor



mental health:

. . . mental symptoms are present in most cases of pernicious anemia. There is often irritability or refusal to cooperate in treatment, paranoid thinking, confusion especially at night and a failing memory. . . . it has been demonstrated that psychiatric symptoms may occur long before anemia or neurological problems appear.<sup>64</sup>

Vitamin B<sub>12</sub> is also used in megavitamin treatment, besides niacin, vitamin C, folic acid, zinc, and pyridoxine (B<sub>6</sub>).<sup>65</sup> It seems that folic acid and vitamin B<sub>12</sub> somehow overlap in their biochemical roles.<sup>66</sup> Deficiency of folic acid is associated with mental illness, as samples of psychiatric patients have shown over 80 per cent to be deficient, the most common symptoms being indifference, withdrawal, lack of motivation, and depression.<sup>67</sup>

*Pantothenic acid* also belongs to the vitamin B-group. In experiments with rats, it has been demonstrated that a deficiency of pantothenic acid leads to greying of the hair, growth inhibition, haemorrhaging, and destruction of the adrenalin glands.<sup>68</sup> As we remember from the discussion above, the adrenalin glands are important in producing a hormone necessary for increasing the blood-sugar level, so as to avoid prolonged hypoglycemia. And, as Rudolph Ballantine says,

The adrenalins are involved . . . in the response to stress, whether that stress is physiological, emotional, psychological or all three.<sup>69</sup>

A final vitamin in the B-group which is known to have an impact on our psychological state is *biotin*, the lack of which has been found to cause "fatigue, depression, nausea, pains and lack of appetite."<sup>69</sup>

We do not claim that all the different vitamins of the B-complex are directly related to sugar consumption in the sense that sugar depletes the body stores of these vitamins. But there can be no doubt that when sugar is replacing otherwise wholesome foods, borderline or (for some people) significant deficiencies in the intake of these vitamins can occur. And as we shall see in part IV below, when important sources of vitamin B, such as grains, are milled into white flour, a diet

consisting of white bread and a large sugar component is very unlikely to provide the necessary vitamin B.

#### *Calcium in Our Nervous System*

Although about 99 per cent of the calcium in the body is found in the teeth and bones, calcium also has an important function in the transmission of messages along the body's nervous system.<sup>70</sup> Calcium deficiency may be related to a lack of vitamin C or D in the diet, as these vitamins have been shown to facilitate calcium absorption.<sup>71</sup> However, surveys undertaken in the United States in 1968 indicated that almost one-third of the population was calcium-deficient,<sup>72</sup> while a West German survey concluded that in no age groups was the calcium supply in the food up to recommended standards.<sup>73</sup> Calcium deficiency, accordingly, should be taken seriously, a point which is further underlined when experimental evidence indicates that sugar literally robs the body of calcium.<sup>74</sup> During a period of ten years, A. Katase and 40 collaborators studied the effects of sugar on different animals, as they wanted to control the clinical evidence that youth with a high sugar consumption developed certain "bodily weaknesses." Laboratory experiments with young rabbits fed only 2-4 grams of sugar per kilo body weight per day (equivalent to 40-60 grams for a child weighing 20-30 kilos) showed after 146 days:

. . . large pathological changes in the whole skeletal system in the form of bone softening, bending, cracks, and fractures. The bone substance became so weak that one easily could cut it with a knife. In addition, one observed a pathological growth in the parathyroid gland, something which clearly points back to the interruption of the calcium balance.<sup>75</sup>

The parathyroid gland promotes the removal of calcium from the bones, something which particularly seems to be a problem with women after their menopause has set in, when many hormonal reactions in the body undergo changes.<sup>76</sup> Many hormones, as discussed above, play a role in the working of our nervous system. Besides being able to cause osteoporosis (softening of the bones), ostemalacia (another type of bone softening), and rickets, calcium deficiency also causes increased irritability.<sup>77</sup> Some patients suffering from psychiatric depressions,

when given effective treatment, show a shift in their calcium metabolism,<sup>78</sup> so that more calcium is retained by the body. This underlines the importance of sufficient calcium absorption in order to avoid mental imbalance.<sup>79</sup>

It is interesting to note that hypoglycemic persons on high-protein diets require more calcium than others, as they excrete calcium in the urine.<sup>80</sup> As we remember from the discussion above (page 8), the hypoglycemic condition may be caused by too-high sugar consumption. Another factor linking a high sugar consumption with calcium loss is that the pathological condition of diabetic coma, where there is a build-up of some compounds called ketones (which can be used as fuels but which tend to over-accumulate in diabetics), leads to an increase in the acidity of the body fluids. According to Palm, for the body to be able to get rid of the ketones,

. . . the body must expend base (alkali). To obtain these ions, the potassium, sodium, calcium, and magnesium of the cells are drawn out of the tissues. . . . In a diabetic this acidity, which accompanies the loss of ions with the loss of sugar into the urine, leads to disruption of the nervous system, dehydration, circulatory collapse, kidney failure, stupor, coma and finally death.<sup>81</sup>

We do not have sufficient biochemical insight to explain how sugar taken by normal persons may lead to calcium loss or to a possible lack of various vitamins and other minerals, but one clue given is that sugar is extremely acid-forming in general,<sup>30</sup> topping the list of acid-forming foods, according to Müller.<sup>82</sup>

#### *Vitamins, Trace Elements, and Environmental Pollution*

In a polluted environment, what we eat is of particular importance, as various vitamins and minerals seem to have a protective effect against many forms of pollution. Calcium, for instance, seems to prevent storage of *lead* in the bones and can also block the poisonous effects of cadmium.<sup>83</sup> The use of lead in gasoline as an "anti-knock" agent has had serious implications for health -- especially that of children -- in urban areas. In an average US city, for instance, as many as one in

four children are estimated to be intoxicated with lead.<sup>84</sup> The effects of lead poisoning can be severe:

Hyperactivity, temper tantrums, withdrawal, crying for no good reason, fearfulness, loss of affection, listlessness, refusal to play and other emotional and behavioral problems in children have been linked with lead toxicity. . . . If exposure to lead continues long enough, there can be damage to the brain with decreased intelligence and a tendency to epilepsy and psychiatric problems.<sup>85</sup>

Researchers have hypothesized that there may be a link between lead poisoning in youth and youth delinquency, especially the more violent and irrational forms of crime,<sup>86</sup> something which must be considered a reasonable assumption, in view of the known effects of lead on our nervous system.

*Cadmium* became world-famous in connection with the Japanese pollution tragedy around 1970,<sup>87</sup> when it became known that a group of residents in the city of Toyama had contracted a crippling disease labelled *itai-itai byo* (meaning, literally translated, ouch-ouch disease). This disease proved to be the results of pollution from a lead- and zinc-mining operation which spewed out cadmium, which was transported by the local river to the farmers' rice paddies. The link with calcium was here clearly established, as it was found that those most vulnerable either were people deficient in calcium or women under frequent stress from pregnancies or menopause. Several other vitamins and minerals are also involved in the calcium-cadmium-lead balance: *vitamin E* (found in wheat germ) has a protective effect against these two heavy metals,<sup>88</sup> *iron* seems to reduce the absorption of lead,<sup>89</sup> and so does *chromium*,<sup>90</sup> while *zinc*<sup>91</sup> and *selenium*<sup>92</sup> protect against many of the toxic effects of cadmium.

As discussed on page 8 above, the refining of sugar means that many of the mentioned vitamins and minerals are removed,<sup>26</sup> so that white sugar has no protective effect. Replacing 100 grams of sugar with the same calories from whole wheat flour, for instance, would give us an additional 4 mg of iron, 49 mg of calcium, and a significant fraction of daily vitamin B needs,<sup>93</sup> thus better enabling us to cope with the

inescapable pollution of our daily existence.

Of the metals mentioned above, *chromium* may be the most important link with sugar, since sugar seems to need chromium for its metabolism.<sup>94, 90</sup> Chromium is needed for the production of an enzyme-like substance which is necessary for an adequate production and utilization of insulin, which, among others, is needed to lower the blood-sugar level. If no chromium is present in our diets, we are likely to develop symptoms of diabetes, with increased sugar levels in the urine, etc.<sup>95</sup>

Another link with sugar can be found in *manganese*, a deficiency (or an extreme excess) of which has been connected with "poor reproductive capacity, schizophrenia, and Parkinsonism."<sup>96</sup> Manganese is concentrated in wheat and in green leaves, in the shoots and in seed in general, all being whole foods which often are replaced by sugar, fats, and industrially processed food of lesser quality.

A final issue related to sugar has to do with its direct impact on our dental health and, as we shall see, an indirect effect on our mental health.<sup>97</sup> Industrialized societies have often found that instead of cutting down on sugar consumption, one can use *fluoride* compounds as a prophylactic. However, since fluoride is a major industrial pollutant,<sup>98</sup> and a very poisonous one at that,<sup>99</sup> adding sodium fluoride tablets to our diets or putting various fluoride compounds in the drinking-water will increase the probability that some people will develop symptoms of fluoride poisoning. Fluoride is also taken up through food or from contact with the skin, and in serving to protect itself from the toxic effects, the body combines ingested or stored calcium and magnesium with fluoride, thus neutralizing the toxicity before the compounds are either stored or excreted. Given the known toxicity of fluoride and the key role calcium and magnesium play in our nervous system, it is not surprising that symptoms of fluoride poisoning include reduced mental health in the form of chronic fatigue, depression, excessive nervousness, loss of mental acuity, and inability to concentrate, etc.<sup>100</sup> Fluoride poisoning may therefore illustrate an indirect effect of a laissez-faire attitude towards sugar — had per capita sugar consumption been cut to a few

kilos per year, dental health would have been good enough to avoid all thoughts of introducing such potentially harmful prophylactics.

*Some Implications*

The eating of large amounts of sugar has many direct and indirect effects on our metabolic system which are too complicated to be cured by a step-wise addition and manipulation of trace elements, vitamin supplements, etc., in our daily diets. A more rational and far safer approach would be to eat the right things in the first place, thus giving people a good basis for securing health as defined by the World Health Organization (WHO):

. . . a state of complete physical, mental and social well-being, and not merely the absence of disease or infirmity.<sup>101</sup>

Of course, changing our conception of food is not enough to fulfil the utopian health goal set forth by WHO, but it would be a good start for a preventive cure for many of our "civilization diseases." A different attitude to sugar also would imply that we change our view of the desirability of refining foods in general and, in particular, perhaps, of another important food, the flour in our daily bread.

IV. REFINED FLOUR — A SUGAR PARALLEL

In his excellent account of the historical development of bread-making technology, Ross Hume Hall gives an indicator of general health in a population by demonstrating how the eating of more or less refined flour shows up in dental caries rates.<sup>102</sup> The figure reproduced below gives some evidence for such a claim, which seems quite reasonable on account of what we now know concerning the distribution of nutrients in grain.

Figure 1 demonstrates with clarity that poor dental health has something to do with what we eat, something which again affects not only our physical well-being (poor nutrition may lead to deformed jawbones besides rotten teeth<sup>97</sup>) but our mental state as well. Interestingly enough, the fall of poor dental health towards the end of the Roman

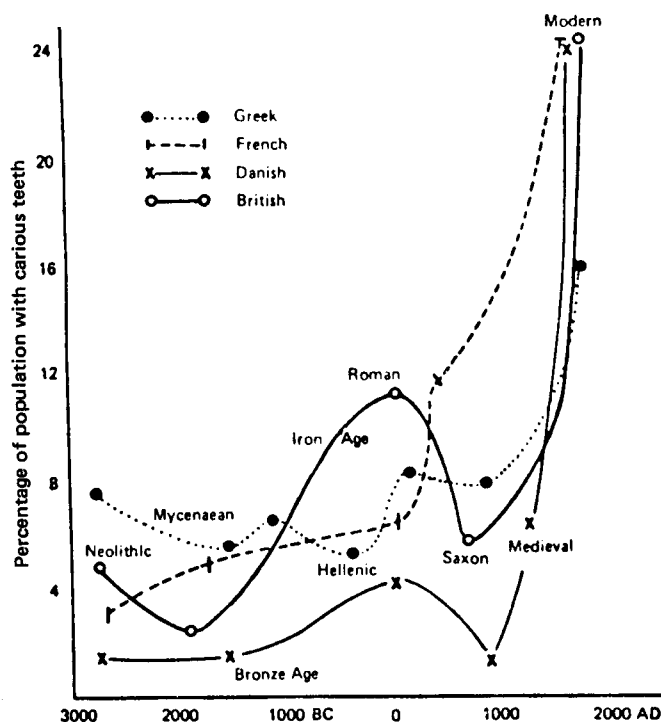


FIG. 1. Dental Caries Rates from Neolithic Times to the Present

(Source: C. Wells. "Bones, Bodies and Disease: Evidence of Disease and Abnormality in Early Man." Vol. 37, *Ancient People and Places*, edited by G. Daniel. Thames and Hudson, London, 1964.)

empire has a parallel in the West of today, indicating perhaps not only that an improvement in health in general may take place, but also that a shift in the dominant social cosmology is taking place.

In most grains, most of the vitamins and in particular, the B-group, is concentrated in the outer layer of the kernel. The inner part of the wheat, the so-called endosperm, only contains about 3 per cent of the thiamine (B<sub>1</sub>), 6 per cent of the pyridoxine (B<sub>6</sub>), 43 per cent of the pantothenic acid, and 32 per cent of the riboflavin (B<sub>2</sub>).<sup>104</sup> When wheat is milled to flour, part of the outer layer of the grain is taken out to produce a whiter flour which also is more durable. The lower the extraction rate (what remains in the flour after milling), the more the important vitamins are lost, something which is shown by Figure 2 below.<sup>105</sup>

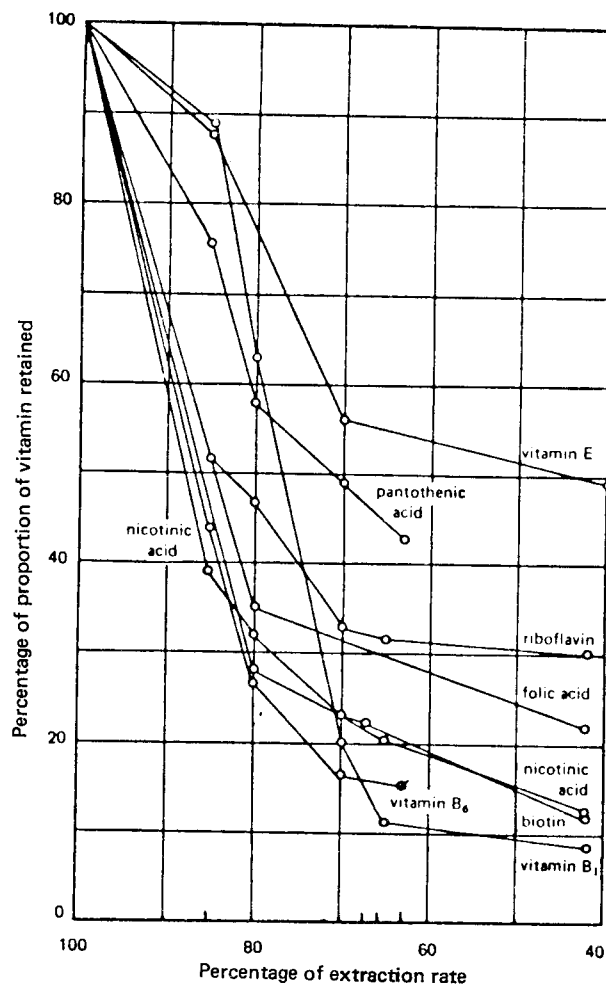


FIG. 2. Relation between Extraction Rate and Proportion of Total Vitamins of the Grain Retained in Flour

(Source: W.R. Ackroyd and J. Doughty. "Wheat in Human Nutrition." Food and Agriculture Organization of the United Nations, Rome, 1970, taken from T. Moran. *Nutr. Abstr. Rev.*, 29:1, 1959.)



Even if the US flour of 72 per cent extraction has been "enriched" with some of the lost vitamins, not everything which has been taken out during the milling process is added.<sup>106</sup> Experiments with animals have shown the superiority of coarser flours over white flour,<sup>107</sup> although there seems to be an upper limit to extraction where no significant health effects are achieved.

Some people who are not well adapted to whole wheat flour may have problems with a flour containing above 90-95 per cent of the grain, since the outer coating contains most of the phytic acid which "could bind and carry away minerals such as calcium, zinc, iron and so forth."<sup>108</sup> A clear goal with respect to flour, therefore, would be to gradually raise the extraction rate to at least 90 per cent for all flour used in lighter breads, which, incidentally, is exactly what has been done in India for several thousand years.<sup>109</sup> Since a less-refined flour stores less well than flour of lower extraction rates, this also would be an argument for establishing a more decentralized milling system for grains, thus strengthening local self-reliance in food.<sup>110</sup>

After having looked at some of the problems involved in milling and extracting only part of the grains for flour production, we should be able to appreciate the even larger problems involved in refining sugar cane or beets into white sugar. Here the "extraction rate" is not nearly as high as for flour, being only 10-15 per cent.<sup>28</sup> And important nutrients are not only lost by 45-80 per cent, but by 100 per cent! In the case of sugar, it does not really matter whether it is refined to 100 per cent or 96 per cent purity (raw sugar) - the marginal difference in favour of brown sugar is so insignificant that the eating of the latter still causes a nutrient debt.<sup>111</sup> Therefore, an important goal would be to reduce by as much as possible the consumption of industrial sugars, learning to live with less sweets. For sweetening purposes, using dried or fresh fruits is a better alternative. Some people also recommend the use of honey, which contains about 50/50 of glucose and fructose, together with only a small amount of sucrose. But due to its relatively marginal content of minerals, vitamins, and protein, together with its cariogenic effect, only moderate amounts are recommended.<sup>112</sup>

When it comes to an upper limit on sugar consumption, we should keep in mind individual variations in tolerance and the composition of our diets as a whole. Accordingly, most experts would agree that a long-term average consumption of 5-6 kilos per capita per year is a tolerable level,<sup>113</sup> while a maximum tolerable upper limit for any one person could be as high as 25 kilos.<sup>114</sup>

V. THE GOAL: A HEALTH-PROMOTING DIET FOR ALL

Since people's nutritional needs are assumed to be the same, regardless of race or geography, we here shall discuss some basic principles for how one, through food policies, may improve people's health.<sup>115</sup> Within these general guidelines, of course, there is ample room for individual variations, for taking account of cultural preferences or climatic variations, etc. In Norway, for instance, the traditional use of sea-food and the good climate for potatoes would make such foods self-evident as an important part of most people's regular fare. But in general, any diet should include generous amounts of fresh fruit and vegetables, especially green ones, together with whole grains and some pulses, if local conditions make this possible. In this way our protein, caloric, fibre, vitamin, and mineral requirements can best be assured:

If these [foods] form a significant portion of [the] diet, 50-75%, then [one] is assured of sufficient quantities of vitamin A, C, D and E and all of the B vitamins except B<sub>12</sub>. Small amounts of milk or eggs comprising as little as 5% of the diet would take care of this latter problem.<sup>116</sup>

The only problem with vegetarian diets besides vitamin B<sub>12</sub> may be vitamin D, which, however, easily can be assured by taking small amounts of cod liver oil or by occasional exposure to sunlight. A necessary but not sufficient list of universal dietary recommendations would involve the following.

1. *Giving preference to fresh versus stored foods*, since storage reduces the quality of foods (loss of vitamins, taste, changed texture, etc.).<sup>117</sup> This would mean encouraging increased self-sufficiency of foodstuffs from the individual gardener and up to the national level.<sup>118</sup> This would not apply especially to sugar, since refined sugar can store

indefinitely, as opposed to many other cash-crops grown in third-world countries, such as bananas or other tropical fruits.<sup>119</sup>

2. *Keeping as low down on the processing chain as possible*, preferring raw to cooked food when appropriate,<sup>120</sup> fresh to canned or frozen, whole grains to flour (and in particular, white flour), unrefined sugar to white sugar (or, preferably, sweet fruits or honey), unpeeled (potatoes) to peeled. The rationale for such recommendations is well-established, since processing of food in general means not only taking out many valuable nutrients, but also adding undesirable elements such as sugar or chemical colouring or flavouring agents, etc.<sup>121</sup>

This is also an argument for local self-sufficiency, since the less complex the processing of foods, the larger will the possibility be that one may use local knowledge and technology to prepare it. A low degree of processing would to a large extent eliminate large-scale, centralized food-processing plants, would make elaborate packaging for long-term transportation unnecessary, and would do away with the need for global marketing of standard products. If sugar cane was not turned into white sugar, the world sugar trade would be drastically reduced, thus liberating vast tracts of land for food production for local communities. In sugar-importing countries it would mean an upsurge in local cultivation of sweet fruits (peaches, plums, dates, figs, etc.), an increase in production of sucrose substitutes (sorbitol, fructose, etc.) and local bee farming, but also, in some cases, attempts at growing sugar beets for local sugar production. Altogether, however, prices for sugar would rise dramatically, something which would reduce consumption to a more moderate level.

3. *Consume food as low on the nutritional chain as possible*, so as to avoid the accumulation of toxic elements through the food chain,<sup>122</sup> but also to increase the availability of primary calories for human consumption.<sup>123</sup> This is primarily an argument against eating meat made on the basis of fodder edible for humans or grown on land fit for growing plant foods. Also remember that a high-meat diet, especially when eaten in connection with large amounts of sugar - i.e., the typical

North American diet<sup>124</sup> -- is particularly bad for people's health.

In conclusion, what we should be aiming at is to develop a society in which more people are able to grow their own foods, distribute it in their own local communities, and also be able to eat it themselves, fresh from the garden. What we would like to see more of, in other words, is the combined role of producers-distributors-consumers working in small production cycles outside the reach of the large food and chemical companies' control. The diets recommended would in themselves lay the foundation for improved physical and mental health, even in today's polluted world.<sup>125</sup> But the realization of such goals would also lead to an improved environment as more and more people shifted away from mass-produced, chemically treated foods. In doing so, the western development model and its implicit assumptions or social cosmology would be challenged, i.e., the changing conception of food would go hand in hand with a general change in our development thinking.

## VI. THE COSMOLOGICAL DIMENSION

Alvin Toffler talks about "the hidden code of Western civilization," referring to the last three hundred years of industrial development.<sup>126</sup> Important elements of this "hidden code" were six dicta ruling the social and economic organization of society: the increasing degree of *standardization* (of methods, operations, measurements), *specialization* (as an example, there now are more than 20,000 different occupations in the US), *synchronization* (of time and movement), *concentration* (of people, economic activities, education), *maximization* (of size, GNP, profits), and *centralization* (of capital, decision-making, power). Such logic permeating throughout society has had profound implications for our relationship to food, where the US fast-food sector serves as an example of one extreme with, perhaps, China at the other end.<sup>127</sup> In the US the standardized Kentucky Fried Chicken or McDonald's hamburger can be had almost anywhere with the universal Pepsi or Coke, served at any time during the night or day by specialized sales outlets. The "food" is produced in gigantic farming operations and central fast-food factories geared for maximum growth and concentration of capital and power, and international affiliates and sister-firms are synchronized to deliver the same "food" in Bangkok, Singapore, Paris, or Stockholm. The same logic has made it possible to divide food into its single components and present each of them for sale as food: chemically pure sugar for its "cheap energy," protein tablets "to build an athletic body," vitamin pills "for every ill," and vegetable oils and unsaturated fats for the "cholesterol-conscious." At the same time as our food has been split up and marketed in its separate components, the giant food companies do their best to make taste preferences universal and, in particular, make people like sweet tastes. The reason why sugar is so popular with multinationals in the food-processing business is its low

price (due to exploitation of labour and large-scale monoculture farming), transportability, and appeal to our senses. One favourite item for world-wide sales is soft drinks, now marketed by the large soft-drink companies as a sign of "modernity" and "progress" in poor countries:

But is it possible to find a product that the poor will want and that can be priced within the reach of millions while still producing a profit large enough to support the big advertising budget necessary to make the poor want it? Nothing fits this description better than soft drinks. The ingredients cost little — they're basically sugar and water. Yet the poor can be made to think of soft drinks as symbols of the good life.<sup>128</sup>

The price poor countries pay to become part of the "Pepsi generation" is not small:<sup>129</sup> sugar consumption jumps up, and in its wake follows a drastic increase in previously non-prevalent physical ailments and mental problems. Whenever poor farmers switch to Coke and stop taking their traditional fruit juices, poverty is increasing at the same time as export dependency goes up. The marketing of soft drinks is a bridge-head for a more universal acceptance of western values and beliefs, working as a spearhead for cultural imperialism<sup>130</sup> — like the missionaries in the early days of colonialism. This maldevelopment is eagerly fuelled by major western lending institutions like the World Bank, which in 1978 allocated US\$221 million for investments in cash crops such as vegetables, sugar, and cashew nuts. In fact,

Cane sugar has become another Bank favorite. Visiting Indonesia, we learned that the Bank is bankrolling (so far to the tune of \$50 million) the rebuilding of the sugar mills built by the Dutch colonizers. Unfortunately, local farmers do not want to raise sugar in part because they say they can make twice as much cultivating rice. According to *Wall Street Journal*, sugar mill officials are "forcing the unhappy farmers to grow cane at gunpoint."<sup>131</sup>

Because of the seasonal nature of sugar-cane harvesting, unskilled and poorly organized labour can be hired at low cost. It is no wonder that sugar is found in almost any imaginable industrial food, from ketchup and mustard at one end to jams and jellies at the other. Sugar is even added to some meats, is found in canned vegetables, bread, and salad dressings, and, of course, is highly concentrated in doughnuts and cakes,

sweets, chocolates, soft drinks, and instant tea.<sup>132</sup> When the eating of such foods has become a habit, western insight is there to help: specialists in dental care, aided by a polluting and health-threatening industry (fluoride emitters such as phosphate fertilizers and the aluminium and steel industry), eagerly promote fluoridation of drinking water, and the universal use of fluoride tablets, mouth rinses, and toothpastes.<sup>133</sup> And medical expertise from the industrialized world lends a helping hand in building institutions to take care of the new "civilization diseases" following in the wake of "modernization." It all hangs together, not as some kind of conspiracy, but rather in the logic of western expansionism guided by the dominant social cosmology of the Occident.

But in order to understand how the West functions, we need to go beyond Toffler's six points, to the much deeper dimensions of cosmology as suggested by Johan Galtung.<sup>134</sup> These include:

1. *Social space*, where the West since the beginning of the modern period (around 1400) has seen itself as the natural centre of the world, while the non-West represents the periphery. As during Roman times, the periphery was something which legitimately could be conquered, moulded into accepting western ideas and thoughts, in order to provide the centre with proper status and riches. This view is today epitomized by the large food corporations, penetrating every corner of the world with baby milk formula, Coca-Cola, Pepsi, and fast foods – even, as mentioned, beginning to penetrate the food-conscious Chinese culture!

2. *Social time*, where the western idea of progress enters, after the fall from paradise, the period of dark ages, enlightenment, and the present day of crises with hopes for new progress in the future. With food, the idea of "modern nutrition" is seen as representing "progress" to the world's poor, with "soft drinks as symbols of the good life"<sup>128</sup> and artificial mother's milk the ultimate in "modern nutrition" for the world's new-born poor.

3. *Epistemology*, or the principles guiding the production of knowledge,



with the western atomistic, deductive thinking, where seeing only parts and not the whole of any problem is predominant, leading to specialization ad absurdum. This view is penetrating regions which have had a more holistic, dialectic view on food, where qualities such as taste and aroma and mystical or sensual experience prevailed. Such conceptions now tend to be replaced by RDAs of protein, vitamins, and trace elements, with the importance of each constituent part determined by nutritional expertise educated in western universities.

4. *Person-nature relationships*, where nature is seen as being inferior to people, as something we can use and exploit to please our own senses. The feeling of standing above nature probably lies behind the inhumane treatment of animals in mass-production factories, where animals spend a short, miserable life, force-fed with high-protein, high-antibiotic, and hormone-laden fodder, in order to produce cheap meats for the world's rich.

5. *Person-to-person relationships*, also being vertical, where power-holders of centre countries feel that they are within their rights when exploiting poor labourers of the South, producing cheap sugar, tropical fruits, coffee, or tea for luxurious stimulants or snacks in the bourgeois West.

6. *People and the transcendental*, where the idea of a singular god above all living creatures prevails, a personified, omnipresent, and omniscient god, who stands for the good, fights evil forces, and promises eternal life to those who believe and a trip to Hell for those who doubt. And since the western god is white and pure, so will the positive image thus gained reflect on refined sugar, flour, or even the sales of detergents and soap, mechanisms which certainly operate, if not consciously, at a subconscious level within our culture.

One should easily be able to appreciate how the western social cosmology is reflected in the way we look at and treat foods, and how this may be used by the sugar industry. As Ross Hume Hall has illustrated in his excellent book (see the chapter, "White Is Beautiful"), there is a

parallel in history to the present-day cosmological dimensions of food:

A basic receptivity to technologic advances in food processing existed in Roman civilization. It is not the purpose of this study to analyze the psychology of Roman society, but there must have been something deep-rooted in that culture which persists today. White was associated with goodness, purity, nobility, birth: white flour was associated with refinement, higher standards of living, snob-appeal, etc.<sup>135</sup>

At the time he refers to, refined sugar was not yet invented, and when introduced to Europeans several hundred years ago, sugar was prohibitively expensive. Today, however, sugar is one of the cheapest ways in which one may provide bulk calories, giving a firm basis for increased profits, the more sugar people can be made to ingest. In addition, sugar is something on which people may be "hooked," making it in several ways much more versatile than white flour.

It remains to be seen whether sugar will become a dominant part of the food-conscious Chinese culture with its Oriental social cosmology, in many ways being the antithesis to much of what the West is founded on. The Oriental holistic, dialectic epistemology would lend itself poorly to McDonalds or Coke, although as mentioned earlier, the first moves in that direction have been made.<sup>136</sup> In the Chinese food tradition,

Taste, appearance, smell and texture of food are important; so is its sound. When bitten, a bamboo shoot must not only be crisp on the tongue, but also on the ear. . . . For glorious soup, any turtle will not do. It should have fourteen squares on its shell. For Chiang Ching's porridge, millet grown in her own home town must be found; her melons were flown in from Sinkiang.<sup>137</sup>

For people trained in the Oriental tradition, food could never be just a piece of calorie to be gulped down between TV programmes: it is an important part of the culture. Food preparation means labour-intensive activities which are meaningful, creative, and artistic, activities which involve a high level of knowledge. Thus food serves to establish identity and satisfies many needs when consumed: the need for togetherness, for social interaction, for aesthetic experience, for sexual and sensual purposes. In other words, food is not something satisfying nutritional needs only, it encompasses a broad spectrum of the human

being.<sup>138</sup> Therefore, a hypothesis in this paper would be that the Orient has a much larger built-in resilience against sugar addiction than the Occident, meaning that mental health problems aggravated or triggered by excessive sugar consumption will be found to a much lesser degree outside of the West. Furthermore, the important changes we now see taking place in the West — Toffler's Third Wave or, in the GPID sense, a shift towards a more Oriental social cosmology expressed by the Green Wave<sup>139</sup> will have a profound impact on how and what we eat, at the same time as the western food habits penetrate the non-West.

## VII. CONCLUSION: SOME NOTES ON STRATEGIES

This paper has explored some possible relationships between sugar and mental health. Although a main thrust has been at the biochemical/physiological level, a holistic approach would defy its purpose if it did not include a wider scope. Cosmology is clearly a factor in shaping our food habits and in giving us a resilience or easy acceptability to certain food habits which may prove hazardous to health. However, by staying too much within a sociological tradition, we would tend to over-emphasize the cultural and social aspects of food. When it comes to addiction to sugar, there seem to be several physiological mechanisms operating. It is not enough to blame capitalism, conformity pressure, and corporate advertising for the high level of sugar consumption. Using sugar *in itself*, merely through the biological pathways of sugar in our bodies, will ensure addiction in many people. As a parallel to this, one has found that smokers are no more nervous wrecks than others; they often became addicted to nicotine because smoking made them want to continue smoking.<sup>140</sup> And alcoholism may not always be caused by lack of love in early childhood: it can come about as a consequence of habitual drinking at the social level for a long period of time, or even as a consequence of poor nutrition. As discussed above (page 10), many forms of addiction have a common denominator, i.e., a too sugar-laden diet, leading to nutritional imbalances and hypoglycemia, this in itself often triggering misuse of other stimulants.

But what we are attacking in this paper is more than the consumption of sugar. At the root of the problem we find social cosmology, where the Occidental view of food during the past century has led us into the present "Pepsi generation." But what kind of strategy will succeed in reversing such a trend? Can we mobilize people for a struggle against

the dominant social cosmology per se? We believe not. For a strategy to be successful, it requires some degree of operationalization -- there must be something tangible which people understand and can do something about. Sugar is one such area, anti-fluoridation campaigns something else, energy policies a third important field where something can be done at the micro level (by individuals, in local communities). This may be one reason why so many movements today are concerned with issues like food, energy, health, and religion at the local/individual level, instead of fighting the global arms race or world hunger. These are areas where something can be done here and now, by most people, provided that they have some basic knowledge. This paper is an attempt at establishing some of the factual knowledge about sugar, how it relates to mental health, and how it can be linked with other areas, such as pollution and imperialist practices: in short, its impact at the macro level. The argument is not that everybody should engage themselves in the area of diet reform. Which area should be of concern must be evaluated by those active in the political struggle in each country. Important factors such as when (the idea of "ripe time") and to whom costs and benefits will accrue as a consequence of realizing the stated goals must be made explicit, and the gradual steps leading towards the goal must be outlined.

This paper has made the case for considering in any strategy to improve people's mental health a change in nutritional habits, and in particular, a substantial reduction in sugar consumption. In the introduction to this paper we discussed many of the other factors influencing our mental health. However, they all have something in common, namely that they are not so easy to do something about as sugar or food in general. And they basically all can be incorporated within the existing social cosmology. In this lies a contradiction: namely that dietary reform is easy to imagine, at the same time as the implications for our society are likely to be very substantial. And this is precisely why legislators do not do anything about sugar, but resort to all kinds of other regulations which affect industrial interests only to a very minor degree.<sup>141</sup> If the industrialized countries managed to limit the per capita sugar consumption to five kilos per year it would mean the

literal obliteration of the chocolate, sweets, and soft-drink industry. World trade in sugar and sweetened canned goods would be cut drastically, a large bulk of our medical and dental establishment would be made superfluous, and much of the food-processing industry could be dismantled. It would be far-fetched to assume that such a goal could be achieved without a mass movement at the micro level, a movement which not only sought improved health for individuals, but which wanted to challenge the basic assumptions underlying the logic of large-scale sugar addiction, namely the social cosmology of the expansionist West.

## NOTES

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1. An account of mental problems in Norway is discussed under the chapter "Identity Needs" in Poleszynski (June 1980). A more general discussion of the "identity crisis" in industrialized countries has also been presented by the author (October 1980).
2. See discussion by Illich, pp. 24-25.
3. Estimated by the Norwegian psychiatrist Nils Rettersdøl: for reference, see Poleszynski (June 1980, p. 28).
4. Personal communication by Dr. Assen Jablenski, Mental Health Division, WHO. According to Norman Sartorius (1974), "there are at least 100 million people in the world suffering from some form of clinically recognisable depression who could benefit from qualified help."
5. *Aftenposten*, 28 November 1978.
6. Exorcism has recently been used in Norway, where a psychiatric patient, after having sought medical assistance, gave a vivid account to the mass media of how she had been pressured into exorcism by a group of zealous priests. According to Charlotte Dickinson Moore, the interpretation of things not understood has, since earliest times, been ascribed as being "a punishment by the spirits or a warning from the gods . . . the Old Testament describes the mental tortures of a man possessed by the forces of evil when, because of his disobedience, he was forsaken by God." Her paper gives a good overview of the different schools of thought on neurosis, with respect to both aetiology and cure.
7. See his discussion on pp. 173 and 174, where he says that

advanced industrial societies have a high stake in maintaining the epistemological legitimacy of disease entities. As long as disease is something that takes possession of people, something they "catch" or "get," the victims of these natural processes can be exempted from responsibility for their condition. They can be pitied rather than blamed for sloppy, vile, or incompetent performance in suffering their subjective reality; they can be turned into manageable and profitable assets if they humbly accept their disease as the expression of "how things are." . . . An advanced industrial society is sick-making because it disables people from coping with their environment and, when they break down, it substitutes a "clinical" prosthesis for the broken *relationship*.

8. See Sartorius et al. (1977 and 1978) and WHO's *Public Health Papers*.
9. See Baasher et al., Introduction, p. 1. Also note that there is evidence that "rural communities have their full share of psychiatric disorder," and that "there is no evidence beyond the anecdotal that any society, whatever its living conditions, is free from mental illness." See WHO, *Public Health Papers*, pp. 35-36.
10. Further studies to test some of the hypotheses about possible cultural and social factors explaining the finding that "schizophrenic patients in the centres in developing countries (particularly in Ibadan and Agra) had a better course and outcome on all variables than the schizophrenics in the centres in the developed countries" have been undertaken, according to Sartorius et al. (1977), p. 540.
11. Social cosmology is here seen as the deeper stratum of culture in a given civilization, an underlying organizing substratum which is seen as natural and normal, and therefore is not being questioned. In other words, social cosmologies are seen as relatively stable through time and a change of cosmology as something dramatic, indicating that deep changes are taking place in the history of a civilization. For further reference, see some of Johan Galtung's writings on the subject.
12. We leave this question open, referring the searching reader to Schumacher's excellent book.
13. See Poleszynski (June 1977) for a discussion of problems and diseases encountered in overdeveloped societies. Norman Sartorius (1974) links a predicted increase in the prevalence of depressive disorders to, among other things, "the currently raging epidemic of excessive medicaments consumption," among them being various hormone preparations and oral contraceptives.
14. See Illich, p. 25.
15. A large literature has given clinical, epidemiological, and experimental evidence that an excessive sugar intake can be linked with heart disease, cancer, ulcers, obesity, arthritis, varicose veins, diabetes, bone softening, dental caries, the destruction of inner organs, shortened life span, a general weakening of the body's defence mechanisms, various forms of mental disease, etc. Some of



the literature on this topic is listed in the references under Ballantine, Bruker, Cleave, US Senate, Dufty, Hearing, Karström, Mayer, Müller, Null and Null, Palm, Rodale, Yudkin, and Aas and Falck.

16. A preliminary attempt at linking food and social cosmology in a dichotomization of two views of food (a western versus an eastern view) was made by the author in August 1977, at the Norwegian University of Agriculture at Ås.
17. Ridgeway, p. 34. For a very vivid account of the role of sugar through the colonial period, also see Dufty, pp. 31-41.
18. The exploitation of sugar workers continues to this very day. According to Lappé and Collins, "when the price of sugar on the world market increased severalfold a few years ago, the real wage of a cane cutter in the Dominican Republic fell to less than it was 10 years earlier; . . . it was not enough to buy an adequate amount of food" (p. 222). According to the same authors, monocultures still dominate the economies of many former sugar colonies: "In Guadeloupe over 66 per cent of the arable land produces sugar cane, cocoa, and bananas. In Martinique over 70 per cent is planted with sugar cane, cocoa, bananas and coffee. In Barbados, 77 per cent of the arable land grows sugar cane alone" (p. 42).
19. See Dufty, p. 37.
20. Cleave, p. 7. Doyal, p. 86, gives the same figure for 1977.
21. See US Senate, p. 28, for US sugar consumption figures.
22. Figures are from Central Bureau of Statistics, Oslo, calculated by Aas and Falck Andersen, p. 14. For recent statistics on sugar and various foods consumed in Norway, see Statens Ernæringsråd.
23. The high price elasticity for sugar was demonstrated in 1974/75, when sugar prices in Norway (which imports 100 per cent of all sugar consumed) multiplied several times. As a consequence, consumption dropped to 34 kilos per capita in 1974 and to below 30 kilos per capita in 1975, but when prices later reverted to "normal," consumption again rose to above 40 kilos per capita per year.
24. This argument is expanded in chapter VI, "The Cosmological Dimension." It is especially the Christian tradition that divides the world into "evil" and "good" forces, as either one or the other, instead of a mixture of the two. Similarly, things in our culture are often seen as "pure" or "dirty"; women tend to be categorized either as virgins ("pure," like Mary) or whores, and our society puts a premium on whiteness (sheets, handkerchiefs) and cleanliness (of the body, especially the sexual organs), looking down upon dirt, filth, and disease, and even natural body smells.
25. According to Cleave, some diseases stemming from too-high sugar intake take as much as 20-40 years to manifest themselves (diabetes, ulcers, varicose veins, heart disease), while others can take a very short time (dental caries).

26. According to Appendix F in Altman, 100 grams of white sugar contains only about 0.1 milligram, compared to a daily need of about 10 and 18 milligrams for men and women, respectively. According to Botten, p. 1411, refined sugar contains traces of chromium, but only 12 per cent of the quantity found in unrefined sugar (20 versus 162 millionths of a gram per kilo).
27. Yudkin, p. 5.
28. See "The Metabolism of Foods," pp. 68-82 in Palm. The chemical formula for sucrose is  $C_{12}H_{22}O_{11}$ , which is found in a concentration of about 13 per cent in sugar cane and 16 per cent in sugar beet (Aas and Falck).
29. Quoted from Ballantine, p. 59.
30. See Ballantine, p. 60. Null and Null (pp. 32-33) give a detailed account of what happens when sugar is consumed:  
 Trying to restore an acid-alkaline balance to the blood, the metabolic system draws sodium, potassium, and magnesium from various parts of the body, and calcium from the bones. . . . Glutamic acid and other B vitamins are actually destroyed by the presence of sugar in the stomach . . . carbohydrates are incompletely metabolized, leaving residues such as lactic acid. These poisons accumulate in the brain and throughout the nervous system, where they deprive cells of oxygen. Eventually, the cells die, the result being that the body degenerates and becomes more susceptible to disease.
31. The daily fat intake in countries such as Norway, Sweden, Denmark, West Germany, Great Britain, and the US is of the order of 133-168 grams per capita per day, representing up to 1,500 kilocalories from fat alone, according to NLVF, p. 89.
32. "Dietary Goals" (1977) shows an average of 18 per cent for the US, while Norwegian figures are about 15 per cent during recent years. In the average British diet, sugar provides about 20 per cent of total calories, according to Doyal and Pennell, p. 86. In addition, refined flour may add another 10 per cent of total caloric intake, thus increasing the caloric intake from sub-standard foods to about 70 per cent of the total.
33. See Null and Null for a thorough review of this problématique, and also the excellent works by Ross Hume Hall and Chris Wardle.
34. *Ernährungsbericht*, pp. 3-5 and 64-65, demonstrates this clearly with respect to vitamin B, calcium, and iron. According to Doyal and Pennell, p. 86, "the introduction of steel roller milling made possible the mass consumption of white bread . . . the poor lost a large proportion of the fibre in their diet, as well as about one third of their vitamin B<sub>1</sub> intake, and up to half of their daily iron." Rodale (p. 31) quotes sources from the mid-1960s in the US documenting dietary deficiencies in children: "Four out of ten are lacking vitamin A, three out of ten do not have adequate vitamin C" (from a survey of over 3,000 Oklahoma schoolchildren).
35. Insulin (secreted by the pancreas) and adrenalin (from the adrenalin glands) are two hormones, or chemical messengers, which

act to trigger the chemical reactions in cells. The pancreas also secretes another hormone, glucagon, which, like adrenalin, helps release glycogen from the liver to raise the blood glucose level. The liver can store a total of 100 grams of glycogen with the help of insulin, "enough to provide up to twenty-four hours' worth of carbohydrate" (Palm, p. 77).

36. See Cleave, chapter VII, "On the Causation of Diabetes," for an excellent diachronic and synchronic analysis of the occurrence of diabetes; Yudkin on "Sugar as a Cause of Diabetes" (pp. 113-121); and Palm, "Diabetes, the Other Sugar Metabolism Disorder" (pp. 179-189), for a detailed physiological explanation of how diabetes develops.
37. The description here is somewhat simplified and there are several forms of diabetes, not all being conclusively linked with sugar. Adult onset diabetes has to do with the cells developing insensitivity to insulin, while juvenile diabetes is a condition of deficient insulin production. According to Botten, p. 1411, adult onset diabetes can improve by adding chromium to the diet -- note also that sugar depletes the body of chromium.
38. See Palm, p. 181. Sam E. Roberts, M.D., estimated in 1968 that there were at least 25 million and possibly 50 million severe hypoglycemics in the US. See Rodale, p. 83.
39. A diabetic coma can also be caused by a diabetic taking an overdose of insulin, hence the name "insulin shock" for this condition. See Palm, pp. 186-187.
40. According to Norman Sartorius (1974), "cardiovascular disease, collagen diseases such as rheumatism, gastro-enterological diseases, and cerebrovascular and other neurological disorders have been shown to be associated with depressive illness in as many as 20 per cent of all cases." This does not prove causality.
41. Deutsche Gesellschaft für Ernährung (1976), p. 107.
42. The frequency of diabetes in industrialized countries at the turn of the century was about two per thousand of the population, while the report cited above (see pp. 119-122) refers to large samples of the population where more than 9 per cent were found to have too-high sugar levels in the urine; and in one sample only 69 per cent had the certainty of having normal values. The latest German report (1980), p. 2, estimates the frequency of diabetes in Germany to be 3-5 per cent.
43. The adrenalin glands secrete two kinds of hormones which act in the same way, *adrenalin* and *non-adrenalin*. These hormones are activated by stress situations in daily life, either by the stresses of hypoglycemia or by a situation of fear, anxiety, or anger. Besides assuring an increased level of glucose in the blood, adrenalin causes the whole metabolism to increase. The red-blood count goes up and adrenalin increases the heart beat and constricts the arteries, thus rushing more blood to the muscles and brain. Some researchers feel that the stresses of daily life itself may aggravate a diabetic condition or even be its primary cause. For

a discussion of these issues, see McQuade and Aikman, pp. 58-60 and 108-109, and, of course, the very detailed Palm.

44. Palm, pp. 86-87.
45. According to Ballantine, p. 484,  
one can temporarily escape from the tremulous, weak, hypoglycemic state by simply having another dose of sugar! This immediately relieves the symptoms or, at least, decreases their severity. But relief is short lived. Besides, the next time around, the feeling is worse, and the amount of sugar required to stop it is more. This picture has led some to term heavy sugar use an "addiction." If so, it is a hidden addiction, since many people are unaware of the connection between their periodic feelings of restlessness, irritability and tiredness and their habitual use of sugar.
46. Good food in this connection meaning unprocessed, whole foods, as a general rule. It seems generally true that people who eat such foods are less inclined to overeat, smoke or drink to excess, or develop other addictions. One argument supporting such a claim is that, when the body gets everything it needs, it will not crave more food to fill in the "gaps," nor will it require stimulants to cover up deficiencies in nutrition.
47. From the foreword to *Sugar Blues*.
48. See Dufty, p. 70. Also see Rodale, p. 9, who categorically claims that a low blood-sugar condition caused by excessive sugar intake "leads to a disturbed mind, or a condition close to insanity."
49. Ballantine, p. 169.
50. Translated by the author from Bruker, p. 11.
51. The estimate is given by Carlton Fredericks, Ph.D., in *The National Health Federation* (1966), p. 149. For a detailed biochemical explanation of how carbohydrates affect vitamin B<sub>1</sub>, see Bruker, pp. 13-17.
52. Fifty kilos of sugar consumed per year represent over 550 kcal per day, meaning that an extra 0.28 mg, approximately, of thiamin is required in the diet every day of the year if deficiency is to be avoided. For comparison, one half cup of whole wheat flour (120 grams) contains about 0.66 mg of thiamin and 400 kcal, while one cup of black walnuts (126 grams) contains 0.28 mg but 790 kcal, according to Altman's appendix on "Food Values."
53. According to Carlton Fredericks, "at Mayo Clinic, in 1943, they created nervous breakdowns in human beings by that simple process." See *The National Health Federation*, p. 149 referred to above.
54. Ballantine, pp. 172-173. Similar examples are given by Bruker.
55. Ballantine, p. 177. Also see Bruker, pp. 22-26.
56. Ballantine, p. 177. Also see Bruker, pp. 26-28.
57. Ballantine, p. 181. Megavitamin doses means supplying up to several hundred times the daily requirement.

58. Quoted in Ballantine, p. 514, originating from Dr. A. Hoffer in *Orthomolecular Psychiatry*, pp. 202-203. According to Ballantine, Hoffer gained experience from a Canadian who had been a prisoner of war in World War II and had developed a combination of pellagra, beri-beri; scurvy, and other deficiencies, as well as a large weight loss, curing himself by, among others, taking 200 times the RDA of nicotinic acid (vitamin B<sub>3</sub>).
59. Ballantine, p. 181, actually referring to the earlier work by Pfeiffer, who here connects chromium deficiency, impaired glucose tolerance, and niacin: "Some schizophrenics respond to extra niacin and many schizophrenics have impaired glucose tolerance. . . . Do large doses of niacin make trivial amounts of chromium more effective?" See pp. 126-133.
60. Ballantine, p. 185.
61. Ballantine, p. 183. Also, "oral contraceptives, again probably because of a disruption in hormonal balance, seem to somehow create a pyridoxine deficiency, and this is often associated with depression. In these cases, response to pyridoxine is especially good." See p. 185.
62. Clinical evidence by Carlton Fredericks indicates that women with a tendency to develop tumors of the breast (cystic mastitis) can be cured by taking them off processed carbohydrates (sugar): "The ratio in the estrogen and estriol changes towards the level which the AMA [American Medical Association] says protects against cancer of the breast." *The National Health Federation*, pp. 157-158.
63. Ballantine, p. 185: "Any food which is strictly of plant origin, not fermented and free of all bacteria and insects, will be found to contain no vitamin B<sub>12</sub>."
64. Ballantine, p. 187.
65. Ballantine, p. 517. Vitamin C has been used in the treatment of such diverse problems as the prevention of arteriosclerosis, prickly heat, polyps and schizophrenia. . . . [There is] evidence that Vitamin C exerts some protective effect in those who have been exposed to toxic levels of heavy metals like lead and experimental animals exposed to cadmium . . . also against such toxins as pesticides and such food additives as nitrates whose use [has] been associated with cancer. [See p. 201.]
66. "This overlap involves the synthesis of DNA, the complex protein chain which is the basic substance of chromosomes and which carries the genetic coding that governs the cell's metabolism." Ballantine, p. 188.
67. Ballantine, p. 189.
68. Ballantine, p. 191. For a more detailed account of this vitamin's significance see Bruker, pp. 28-30.
69. Ballantine, p. 193. (Biotin is destroyed by a protein in raw egg white, according to this author.) Bruker, pp. 30-31, mentions the same effects of biotin deficiency as this author.

70. Yates, p. 18.
71. Other factors influencing calcium uptake must also be considered, and there are large variations in individual requirements. "Lactose enhances calcium absorption in animals, and apple juice seems particularly appropriate for humans," according to Ballantine, pp. 228-229.
72. Pfeiffer, p. 90.
73. See *Ernährungsbericht*, pp. 4-5 and 64.
74. "Often, so much calcium is depleted that the result is brittle, easily fractured bones, and soft teeth susceptible to decay," according to Null and Null, p. 32. Also see Bruker, pp. 43-45: "Zucker als 'Kalkräuber.'"
  75. Translated by the author from Bruker, p. 44.
  76. "It has been estimated that such softening of the bones, called osteoporosis, is a major orthopedic disorder in about one out of four women who have passed menopause." See Ballantine, p. 226.
  77. Pfeiffer, p. 90; also, on the same page: "Calcium is of further interest in mental disease since intravenous injections were used in the early 1930s to produce lucid intervals in some schizophrenics. . . . Only one out of five patients responded."
  78. Pfeiffer, pp. 92-93. The treatment lowers the blood serum calcium level.
  79. "Calcium has also been found to be helpful for some people who are troubled by anxiety and feel 'like a bundle of nerves.'" Ballantine, p. 231. "If the body does not get enough calcium, the entire neuromuscular system goes haywire," according to Yates.
  80. Pfeiffer, p. 92.
  81. See Palm, p. 186. For a biochemical explanation of fat metabolism in the hypoglycemic state, see pp. 184-187.
  82. Müller, pp. 20-21, gives a list of acidic and basic foods, made by the German nutritionist, Dr. Heupke, where white sugar is assigned the value -80. Other acidic foods are beef, eggs, and veal, while, for instance, chick peas, olives, and figs are basic. Examples of relatively "neutral foods" are grains, milk, potatoes, and vegetables.
  83. Yates, pp. 21 and 20.
  84. Ballantine, p. 234.
  85. Ballantine, p. 235, adding that estimates put "nearly one hundred thousand American children who live and play in areas with heavy traffic . . . in need of treatment for lead poisoning." Also see Waldbott's detailed chapter on lead poisoning, pp. 141-150.
  86. Bryce-Smith; also see review by Olav Albert Christophersen, "Blyforgiftning og ungdomskriminalitet" [Lead poisoning and youth delinquency], *Dagbladets kronikk*, 28 September 1977. Also see Rodale, who links youth delinquency and criminal behaviour with hypoglycemia.

87. See Waldbott, pp. 171-175.
88. "Heavy metals like lead and cadmium . . . act as catalysts in the oxidation reactions. Air which is polluted with the frequently occurring combination of ozone, oxides of nitrogen, cadmium and lead, is especially reactive, and puts extra demands on protective antioxidants such as vitamin E." Ballantine, p. 214.
89. Ballantine, p. 236.
90. Ballantine, p. 239. The carcinogenic properties of some chromium compounds are discussed by Waldbott, p. 215.
91. Ballantine, p. 251.
92. Ballantine, p. 255, warning that, "compared to many of the other trace elements, it has a relatively narrow range between what is essential and what is toxic." Too much selenium may, for instance, increase dental caries rates, and "there may be an increase of degenerative diseases of the nervous system." Botten, p. 1411, warns that the selenium intake of Norwegians may be suboptimal.
93. Altman, Appendix F. To get 400 kcals from whole wheat flour one would require about 120 grams.
94. See Mayer; also Waldbott, p. 215: "Chromium, a trace element essential for sugar and fat metabolism, is necessary for the action of insulin." Also see Ballantine, p. 239. Botten, p. 1411, reports that adult onset diabetes is improved by adding chromium, and evidence points to a deficiency in chromium intake in US diets.
95. "Experiments with animals on a chromium-free diet have shown symptoms of diabetes, with sugar in the urine," according to Ballantine (p. 238), giving as reference the same researchers as Waldbott above (note 94). Or, to put it differently: "Chromium, a trace element, is essential for glucose and lipid metabolism as a result of its role in the ternary complex of insulin/chromium/membrane sites." See Newman et al.
96. Ballantine, pp. 241 and 242: "Schizophrenic patients have been treated using manganese supplements and have in some cases been definitely improved."
97. Ballantine, p. 20, reports a study showing a very clear association between poor dental health and lowered IQs and personality disturbances, besides deformities in the facial bones and an increased incidence of tuberculosis. This, of course, is not related to the fluoride issue.
98. See pp. 160-171 in Waldbott, or "Uses of Fluoride" in Waldbott, Burgstahler, and McKinney, pp. 22-26. More than 50 industries emit fluoride into the environment, the major ones being manufacturers of aluminium, steel, phosphate fertilizer, enamel, and pottery, glass and brick makers, and those involved in the separation of uranium isotopes, etc.
99. The most toxic compounds, according to the late Dr. Kaj Roholm, are hydrogen fluoride (HF), silicon tetrafluoride (SIF), hydrofluoric acid (aqueous, HF), and hydrofluorosilic acid (H<sub>2</sub>SIF<sub>6</sub>). Very toxic

also are sodium fluoride (NaF), ammonium fluorosilicate ( $(\text{NH}_4)_2\text{SiF}_6$ ), and sodium fluorosilicate ( $\text{Na}_2\text{SiF}_6$ ), while cryolite ( $\text{Na}_3\text{AlF}_6$ ) and calcium fluoride ( $\text{CaF}_2$ ) are classified as only "moderately toxic." See Waldbott et al., p. 88. Sodium fluoride is about 2,500 times more soluble in water than calcium fluoride.

100. See "List of Major Symptoms" of chronic fluoride poisoning in Waldbott et al., p. 393.
101. From the WHO Constitution, quoted in "Promoting Health in the Human Environment," p. 17.
102. See "The History of Bread," pp. 10-21. The connection between decayed teeth and poor health is discussed by Ballantine: see note 97 above.
103. This point has been taken up by Galtung, Heiestad, and Rudeng (1978/79 and 1980).
104. Hall, p. 12.
105. From Hall, p. 30.
106. According to Hall, p. 32, "white bread enriched with thiamine, riboflavin, niacin, iron, and sometimes calcium has been marketed for 30 years." But the "refining of flour can drastically change the content and proportions of other vitamins, minerals, protein and even in some cases, toxic contaminants. Zinc and cadmium, for example, are both found in wheat." The former is essential, while cadmium is toxic, but zinc is found in the outer layers and cadmium in the centre of wheat. "Milling, then, selectively removes the zinc, while leaving the cadmium so that the zinc/cadmium ratio is reversed." See Ballantine, p. 72.
107. Some animal experiments are referred to by Ballantine, p. 74, and Hall, pp. 29 and 31.
108. Ballantine, p. 74.
109. "The Indians continue, as they have done for thousands of years, to quietly grind their flour with stone mills and sift out the coarsest 5%, producing a bread both wholesome and digestible. It seems likely that this process approaches the ideal, and there is no reason why modern steel roller mills could not be adapted to produce a similar product." Ballantine, pp. 74-75.
110. According to Hall, p. 20: "The germ of the wheat contains oils, consequently whole-wheat flour tends to go rancid when stored. . . . The germ and aleurone layers also contain a major portion of the food value of the wheat, and whole-wheat flour will attract bugs and rodents looking for a nutritious food supply." This could be used as an argument for local milling of grain, even at the household level, on the basis of whole grains, which can be stored for many years.
111. See Altman, p. 158, and Yudkin, pp. 32-37.
112. Altman, p. 158, Palm, p. 93, and Ballantine, pp. 61-62, the latter warning against heated honey: "Because of the complexity of the carbohydrates and other substances in honey, it is delicate



- and easily damaged so that any heating should be avoided." Karstöm, p. 75, is enthusiastic about honey: "In addition, honey contains some vitamins and certain enzymes which stimulate the heart. As all enzymes are destroyed by temperatures above 60°C, one should never dissolve honey in boiling water. . . . Already Hippocrates, father of the medical profession, . . . claimed that 'the use of honey guarantees a long and happy life'" (translated by the author from Swedish).
113. In the US Senate Hearing in 1973, Dr. Aharon M. Cohen from Jerusalem stated: "We recommend cutting down to a minimum the carbohydrate intake." This translates to a 90 per cent reduction in the US, down to about 13-14 lb per capita per year, compared to the goal of limiting consumption to 25 kg stated by the US Senate, December 1977. Yudkin, p. 22, recommends avoiding sugar completely, using honey instead if a sweet taste is required.
  114. According to South African Dr. George Campbell, "no prudent preventive nutritionist can possibly let his nation take more than 70 pounds-per-head-per-annum, and it is highly likely that 50 pounds is a maximum desirable limit." See "Hearings," p. 15. Yudkin has made the point that not all people consume the average amount of sugar. Teenage boys seem to be the group with the highest consumption, while some people hardly eat sugar at all. The most glaring example quoted by Yudkin was a boy who ate more than 6½ lb per week, almost 350 lb per year (157.5 kg) — about three times the national average. See Yudkin, pp. 42-44.
  115. See "Scientific Nutrition" by Altman, pp. 99-132, or Ballantine, "Toward a Universal Diet," pp. 280-283.
  116. Ballantine, p. 221.
  117. This refers not only to loss of vitamins but also to taste. Large-scale processing of food in centralized factories also involves freezing and reheating, which destroys vitamins, and "essential minerals leak into the cooking water." See Hall, p. 49. With respect to sugar, the raw cane juice ferments and therefore cannot be transported over long distances, while chemically pure white sugar can store for indefinite periods of time. As a general rule, whole foods in their natural state are not well adapted to long-time storage and long-distance transportation, while their constituent parts (minerals, vitamins, carbohydrates, proteins) can be extracted and sold world-wide.
  118. For a discussion of the concept and politics of self-reliance, see Johan Galtung's two papers on the subject (nos. 35 and 44, 1976).
  119. As a general rule, industrialized countries try to perform most of the processing near the large markets, thus maintaining control over trade and price conditions. Examples of this are found in chocolate production, freeze-drying of coffee, packaging of tea, feeding of chicken and beef on protein fodder, and all sugar-laden products made in non-sugar-producing countries (such as Norway), like chewing-gums, soft drinks, and candies.
  120. The advantages of raw foods in healing many common diseases are

well known today, as shown by Karström, pp. 171-181. He describes one experiment where the same food was eaten for a prolonged period of time, but where the food was taken either raw or cooked: "But as soon as the same amount of food was eaten cooked, the whole syndrome of hunger showed up." However, some foods (like beans) are made easier to digest by cooking, while others can be preserved well and made more tasty if cooked. See Ballantine, "Cooked versus Raw," pp. 409-422.

121. Hall is a primer on this topic; see also the instructive article by Zaratzian (1977).  
Feingold, p. 16, has shown conclusively that almost half of all children with "excessive physical activity coupled with lack of concentration and learning difficulties" (having hyperkinesis-learning disability, H-LD) can be cured if taken off food with chemical additives. This underlines how important food is in determining mental health.
122. According to Commoner, p. 41, "when a new man-made organic substance is synthesized with a molecular structure that departs significantly from the types which occur in nature, it is probable that no degradative enzyme exists, and the material tends to accumulate." Such accumulation takes place with a lot of chemicals, one prime example being "if the concentration of DDT . . . in the soil is 1 unit, earthworms living in the soil will achieve a concentration of from 10 to 40 units, and in woodcocks feeding on the earthworms the DDT level will rise to about 200 units" (p. 35). Also see "People or Pesticides - A Life and Death Battle" in Null and Null.
123. The quest for meat-rich diets in overdeveloped countries, combined with the use of the market mechanism for food distribution and uneven land ownership in most poor countries, leads to the replacement of traditional food crops by feed crops. When given to animals, fodder loses 90 per cent of its caloric value in the conversion process. How all people could be fed in today's world is analysed by Lappé and Collins.
124. See Ballantine's description of "The Modern American Diet," pp. 285-289, where he shows that "the typical American menu" with its "appeal on meat, salt, sugar and artificial additives" becomes low on "vitamins, minerals, essential amino acids, essential fatty acids and bulk," but excessive with respect to "total calories, . . . empty calories, . . . total fat, saturated fat, cholesterol, refined sugar and salt."
125. According to Ballantine, p. 273, "a number of studies have shown that pollutants, contaminants and toxic chemicals are less harmful to the body when they are taken along with natural fruits, grains, vegetables and so forth."
126. See Toffler, chapter 4, pp. 63-76: "Breaking the Code."
127. See Warner and the discussion by Poleszynski (8-13 August 1977).
128. Lappé and Collins, p. 330.

129. "The sugar, artificial coloring and flavoring in soft drinks are an important factor in producing sleeplessness, nightmares, and behavioral disturbances," says Dr. Ben F. Feingold, quoted by Goulart, who gives a detailed account of the many health hazards involved in consuming large quantities of soft drinks.
130. The complete domination of western values and products was observed by the author on his recent visit to Argentina and Paraguay, where in particular Asunción was replete with Pepsi and Coca-Cola advertising, interspersed with whisky commercials and any imaginable consumer item from Japan, the US, or Western Europe. Also see Lappé and Collins, pp. 330-333, on this topic.
131. Lappé and Collins, pp. 397-398.
132. Null and Null, p. 39, give a long list of foods with sugar added, documenting that "the food industry uses it as a filler to replace some more expensive ingredients." Sugar is even added to tobacco.
133. See Frederick B. Exner on the "Economic Motives behind Fluoridation," p. 67, etc., in *The National Health Federation*, where he explains how the aluminium and other industries and the sugar interests found each other in the joint promotion of fluorides against caries. Also see Waldbott et al. on this issue.
134. For several of his works on this topic, see references listed below.
135. Hall, p. 14.
136. See mimeograph by Johan Galtung (April 1980).
137. Warner.
138. See discussion in Johan Galtung's 1979 mimeograph on "Food, Health, and Energy Development."
139. See Poleszynski and Wemegah and Irvine, Miles, and others (forthcoming, 1981), but also Galtung, Heiestad, and Rudeng, for a comparison between the change in cosmology taking place at the end of the Roman empire and that of today in the West.
140. For an exhaustive exploration of why people smoke, see "The Behavioral Aspects of Smoking," part 2 of *Smoking and Health*. Note, for instance, that "just over half of the 50 or so studies in this review show smokers to have slightly poorer mental health than non-smokers, the remaining studies show no relationship between smoking and neuroticism." Chapter 18, p. 7.
141. This problématique is analysed by Hall: see in particular pp. 77-79. One example from Norway would be the large emphasis on regulating the fat content of foods and the composition of saturated versus unsaturated fats, as elaborated in NLVF.

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