The word salt in this account follows the general usage that it means sodium chloride, as used in cooking and on the roads in winter. Salt is made up of 40% sodium and 60% chloride.

For five million years our ancestors ate a diet to which no salt was added. Although nowadays such a diet would be considered very low in salt, this was the diet of all mammals during evolution, to which they were thoroughly adapted. Humans like other mammals relied on the small amounts of salt naturally present in food to provide enough to regulate the amount of fluid in the body. Very powerful mechanisms for conserving salt within the body were developed. The addition of salt to food began comparatively recently, about 5000 years ago, after which most populations became increasingly addicted and humans then had the problem of getting rid of the excess.

Salt became the most important industrial object of trade and the economic foundation of several empires. It was used by authoritarian governments to control their people and as the main source of tax revenue. Its cultural and religious ramifications became deeply embedded in the social pattern of many civilisations.

Our consumption of salt is now 10 to 20 times greater than 5000 years ago and it comes mainly from processed food. As the human body had become geared to conserve salt it found it difficult to dispose of this relatively sudden (in evolutionary terms) increase in salt intake. The result was a general rise in blood pressure. Those who had the greatest difficulty in getting rid of the excess salt had the greatest rise. A rise in blood pressure, however, damages the arteries and is the major cause of strokes and heart attacks, the commonest causes of death throughout the world.
Salt addiction

Pre-history

Humans are genetically programmed to eat what these days would be considered to be a very low salt diet, that is to say one which contains only one-tenth of the 10 grams now consumed daily in most parts of the world. The rise in salt intake was due originally to a multiplicity of changes but it was mainly related to salt’s magical property of preserving food. It was then reinforced by an acquired addiction for salt which is now maintained, in large part, by the consumption of processed foods. The increase in salt intake is responsible for a widespread rise in blood pressure throughout the world. Until 7.5 to 4.5 million years ago, fruit was the main constituent of the diet of mammals. Later, when the human and ape lines diverged, the human line, our ancestors, began to eat a modest amount of meat until 1.8 to 1.6 million years ago when Homo erectus began to consume more meat. These hunter–gatherers lived in areas where there were large numbers of grazing animals. The tools they used were principally to process the game caught. The large accumulations of animal remains found in archaeological sites indicate that they ate a great deal of meat. Eventually their diet consisted of 50% meat and 50% plants. The salt and potassium content of vegetables consumed by modern hunter–gatherer communities is known; and if it is assumed that the content of the minerals in the wild animals our ancestors hunted was the same as in present–day beef and lamb, the daily intake of salt in palaeolithic times was under 1 gram (g) of salt per day. Because of the large consumption of vegetables and fruit, the potassium content of the diet was then about 16 times greater than the salt intake. Potassium is of interest because, in contrast to salt, it appears to lower the blood pressure. In comparison to our hunter–gatherer ancestors, salt intake is now about 10 times greater, while potassium intake is considerably less and lower than that of salt.
Salt addiction

A herbivore (the buffalo) allured to a salt lick being attacked by a carnivore (the lion) which is indifferent to salt.

The effect of agriculture

The consumption of salt began to rise between 5000 and 10,000 years ago when the combined effects of over-hunting, climatic changes and particularly of population growth led to a wave of agriculture creeping across Europe from the Middle East at about one kilometre (km) a year. That salt intake increased at this time is suggested by the observation that languages before Greek and Sanskrit – the older of the Indo-European languages – had no word for salt. During the first few thousand years after the advent of agriculture, the intake of meat declined and the proportion of vegetable food in the diet increased by up to 90%. It is not clear why, therefore, the increase in salt intake, associated with this spread of agriculture, occurred. Some estimates suggest that these early farmers consumed as much salt as their hunter–gathering ancestors. Even if these calculations are erroneous and the salt content in some areas was so low that it approached that of herbivorous animals, the craving for salt that this would induce is unlikely to have accounted for more than a small rise in salt intake. Plants contain very little salt so that herbivores,
in contrast to carnivores, may suffer from salt deficiency and will travel miles to salt licks. But the amount of salt consumed by herbivores from salt licks is modest and there is no evidence that their total salt intake exceeds that of the carnivores, the salt needs of which are satisfied by the salt contained in meat and blood. Carnivores do not search for salt but they do frequent salt licks in the hope of making a meal of a salt-seeking herbivore.

The addition of salt to food

It is probable that the most important factor which increased the intake of salt by humans was the discovery that meat and other foods could be preserved by putting them into concentrated salt solution. Nomads hunted their meat, killed it and ate it within a few hours. When the wild herds migrated, the nomads moved with them. The immobility of farmers, tied to their fields, made it much more difficult for them to acquire fresh meat. There was a need to preserve food during the winter, which was essential for their survival. Preservation was achieved by soaking meat in brine. Salt permeates food and makes bacterial life impossible. Salt preservation was used in Egypt by at least 2000 BC. It is not known when it started. Even if, before being eaten, the salted meat was soaked in fresh water to remove the excess salt, it would still have been very salty. It is now known that highly salted
food suppresses the salt taste receptors in the mouth so that natural foods become insipid and unappetising.

It is probable that the craving for salt developed in this way. Salt would then have been added to unsalted food to bring it up to the same concentration as that of the preserved food.

The addiction for salt must also have been exacerbated by its increasing availability. The change from a nomadic to an agricultural way of life gave rise to settled communities, between which trade began to flourish. Salt became a precious article of commerce. About 1000 years ago, salt intake in the western world had risen to about 5 g per day. It continued to rise until the nineteenth century when, in Europe, it was about 18 g per day. In the sixteenth century in Sweden, when there was a high consumption of salted fish, Allwall calculated that the daily salt intake rose to 100 g per day. It is probable that a worldwide reduction to an average of 10 g a day during the twentieth century was due to the introduction of refrigeration.

All the evidence suggests that the rise in salt intake during the past 5000 to 10,000 years was due not only to its increasing availability but also to a change in the preparation of food. It was not due to a worldwide intrinsic and unexplained rise in physiological need and therefore our present high intake of salt is not, as some would argue, appropriate and ‘normal’. On the contrary, there is ample evidence that this massive increase in salt intake was, and continues to be, physiologically superfluous and that the persistent need to get rid of it is a dangerous burden.

In support of the evidence that the intake of salt in humans is influenced by considerations other than their physiological needs, there is Kroeber’s anthropological investigation among native American tribes in western North America. North of a sinuous line, which begins at the mouth of the Columbia in Canada and then runs in a south easterly direction across Oregon and California into Nevada, ‘there were virtually no exceptions to the rule that salt was eaten everywhere to the south and not eaten everywhere to the north of the line’. This difference did not appear to be due to the prevalence of sea food, a meat diet or a warmer climate. It was concluded that whether or not salt was used, it was in most instances a social custom, in other words, ‘culture’.

Populations who continued to eat a low salt diet

There are numerous examples of small populations, scattered throughout the world, which because of their isolation from the western juggernaut,
recently ate, or continue to eat, a low salt diet. The first is mentioned in the *Odyssey*. The inland habitants of Epidurus did not know of the sea’s existence and had no use for salt. The well being of these populations confirms that there has been no increase in physiological need. In some of these areas the salt intake is known with some accuracy, in others a low intake can be inferred from the diet and particularly from the population’s distaste for salt. Populations in which low intakes of salt has been assessed relatively accurately by measuring the daily urinary excretion of salt include the inhabitants of highland regions of New Guinea, certain Solomon Island societies, the Yanomamo Indians of Northern Brazil and Southern Venezuela, the Samburu nomadic warriors of Northern Kenya and the Kung Bushmen of Northern Botswana. The salt intake of these tribes varies from an average of about 0.05 to 2 g of salt per day. There is no indication that they are less healthy than populations who consume an average of 10 g per day and, on the contrary, there is some evidence that they are more fit—they certainly have less cardiovascular disease. The New Guinea highlanders, whose average salt intake is below 0.5 g per day, have been shown to perform better than Royal Australian Airforce personnel and about the same as British Commonwealth divisions in Korea on the physical criterion of an endurance standard, such as the Harvard Pack Test.

There are other populations in which the salt intake has only been calculated from the dietary history, but in most of these an habitual low intake of salt can also be inferred from their inveterate aversion to salt. Numidian nomads and certain Bedouins who feed on fish and roasted meat never eat salt with food. The Bedouins think that it is ‘ridiculous’ to do so. The salt intake of Icelanders at one time was very low, in that their only source was the large amounts of meat they ate and the blood they drank of the game they killed. They considered salt to be an ‘invitation to gluttony’. Stefansson, who in 1921 lived among Eskimos, at first found it difficult to do without salt. He described his addiction to salt as if it were a narcotic substance that he had had to forego:

*It was here [among the Eskimos] that I learned from experience what I already knew theoretically that [added] salt is not necessary for health and that the desire for it disappears in about three months when one does without it.*

Three months later he found that meat boiled in salt water was most unpleasant. Eskimos who had not been in contact with Western civilisation had a strong dislike for salt and would even avoid food in which there was so little salt that Stefansson was unable to detect its saltiness.
Denton, an Australian doctor who has carried out the most extensive investigation into what influences the appetite for salt, points out that,

All the nomadic tribes of Northern Russia and Siberia refrained from salting their food, not because it was lacking — salt beds, outcrops and salt lakes abound in these regions — but because these people live by hunting and fishing and show a marked aversion to salt.

He describes how C. von Ditmar, an explorer and mineralogist who lived among several nomadic tribes in Siberia,

enjoyed making them taste the salted foods which he used, so that he could watch the grimaces of repulsion which this simple seasoning provoked. These people did not, however, show any great delicacy of taste. Normally they ate a remarkable mixture made up from fish heaped in huge silos which decayed at leisure waiting for the moment of consumption. The Russian government, wishing to improve these repugnant and unhealthy feeding habits, taught the people the art of preserving fish by salting it, and established for this purpose salt works near the tribal encampments and delivered salt to them at a very low price. The obedient population complied. They salted the fish but did not eat it.

The Finns used to eat milk and meat, the use of salt was unknown and there was no word for salt in the language. When agriculture and salt consumption spread into the west of Finland they used a German word for salt.

The induction of addiction

In humans

In 1950, Holmberg, an American anthropologist who lived with the Siriono Indians in Bolivia, gives a revealing account of how easy it is to induce an addiction for salt. Salt was unknown to the Siriono living under aboriginal conditions. Holmberg introduced salt to some Indians for the first time and they expressed a distaste for it.

By using small quantities in cooking, however, they soon developed a craving for it. In some instances this craving [once the Indians had become accustomed to eating salt] has become so great as to become an important factor in establishing and maintaining friendly relations with the whites.
Salt addiction

The chimpanzee, phylogenetically the closest species to humans.

By conditioning Siriono Indians to eat salt, a nearby American cattle rancher was able to maintain peaceful relations with them for about 10 years.

In chimpanzees

Addiction to salt has also been induced, though inadvertently, in a colony of chimpanzees, the species phylogenetically closest to humans. Under normal circumstances, in the wild, chimpanzees eat a vegetable and fruit diet which has a low salt and high potassium content. This colony of chimpanzees in San Antonio, Texas, however, were for many years fed, in addition to fruit and vegetables, 1–2 kilograms (kg) of biscuits per day that had been specifically manufactured for monkeys and which provided a salt intake of about 6–12 g per day – the same high unsuitable intake as in humans. These biscuits also provided a potassium intake of 6–11 g which, however, was
appropriate. One presumes that the high content of salt was due to the prevailing assumption that because the average intake of salt in humans is around 10 g per day this therefore was a normal intake for chimpanzees and that, as they are our nearest relatives, and are near our weight, their ‘normal’ intake of salt must be the same. An attempt to change the diet to one more suitable for chimpanzees was unsuccessful. The chimpanzees were given biscuits identical to the original ones except that they contained a low salt content (0.5 g per day). They refused the low-salt biscuits and rapidly lost weight. The point of this story is not that the chimpanzees lost weight when they stopped eating a high-salt diet but that they had become so addicted to the taste of a high-salt biscuit that they found the taste of a low-salt biscuit so repellent that they preferred to do without.

Addiction and hedonism

In view of these examples of aversion to salt in human populations on low salt diets, it is interesting that Richter in a treatise on salt appetite in mammals states that, ‘there is a universal liking for salt, a primitive attraction to salt. So far we have not found any instance of a definite aversion to salt’. Denton similarly suggests that because there are salt-specific taste buds and a propensity in animals to ingest salt over a certain concentration range they therefore must have an innate liking for it – an hedonistic characteristic which he thinks may have been useful for survival during evolution when salt was scarce. This, however, is not in line with the observation that carnivores only come to salt licks to eat the herbivorous animals and not the salt. We would suggest that the aversion for salt exhibited by low-salt eating populations demonstrates that humans have no innate liking for salt and that, on the contrary, hedonism for salt is an acquired characteristic, a state of salt addiction for an intake far exceeding physiological requirement. But hedonism and addiction are well known companions.

Over the years a few individuals, some of them decidedly cranky, have tried to stem the established addiction. Jonathan Swift in Gulliver's Travels (1726) makes Gulliver comment that ‘Our frequent use of salt is nothing but a luxury’ and subsequently he is converted to doing without it. At about the same time, Robert Burton in The Anatomy of Melancholy stated that among its dietary causes ‘Common experience finds salt and salt meats to be great procurers of this disease . . .’. In 1851, Dr. Arthur Howard published a volume entitled Salt, the Forbidden Fruit or Food.