THE SIGNIFICANCE OF SEDENTARIZATION IN THE HUMAN HISTORY

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ABSTRACT This paper discusses a basic ecological process of the transition from nomadic hunter-gatherer life to sedentary life of food producers in human history. Through examining from an ecological viewpoint the value of starchy seeds, which comprise the most important food resource of both contemporary and prehistoric hunter-gatherers, and the demerits of sedentary life, it is concluded that a food producing sedentary life may have been a second choice of prehistoric hunter-gatherers for coping with the population increase and food crisis which began about ten thousand years ago. It is also suggested that food producing economy may have been a by-product of sedentary life.

Key Words: Sedentary way of life; Starchy seeds; Soil enrichment; Population pressure

INTRODUCTION

Man was born in Africa five million years ago, and had spread to all areas of the earth, with the exception of the South Pole, by 10 thousand years ago, at which point man could not increase its population by spatial spread. But as man continued to increase in number, the population density rose sharply. In this light, sedentarization and the start of cultivation are the most important elements of the process of population density increase. This paper deals with the correlation between sedentarization and the advent of cultivation.

STARCHY FOOD AS SECOND CHOICE

By the end of the late Paleolithic period, man could be found in all five continents. There was no more virgin land where man could propagate. This coincided with global weather changes. Man was experiencing a condition that potentially threatened its existence.

Man in the middle latitudes had started to utilize starchy seeds as one of the major foods, such as wild wheat, acorn, chestnut, and water chestnut, around 10 thousand years ago. These starchy seeds were to become some of the most important foods for man. However, there is no evidence that man prior to that time had utilized these seeds as a major food. This constitutes a major change in food habit in the history of man. Gathering the starchy seeds is an easy task for man, but the small seeds are invariably covered by a hard shell that need to be

removed, and then the seeds need to be cooked to be digestible. Considering the complex cooking processes of wheat, rice, and other seeds, the starchy seeds are an extremely inconvenient food item. In contrast to other, easily cookable foods, such as meat or potato, which require only an open fire and some knives, the starchy seeds require several times as much time and energy as well as cooking utensils. For man before 10 thousand years ago who frequently moved in camps, the starchy seeds were extremely undesirable and low-value foods.

Jiro Tanaka (1971) has studied the subsistence activities of the San and pointed out that although the hunter-gatherers possess detailed knowledge about various edible flora and fauna, they usually utilize intensively only a few of the excellent food items that happen to be available, and only utilize foods of lesser value when the other foods are scarce. Such a food-gathering strategy is common among animals as well.

Late Paleolithic societies of mid-latitude Eurasia were supposed to have specialized in hunting. These societies, similar to those of wolves and tigers, selectively utilized herbivores that were nutritious, easily cookable, and digestible from among the vast resources available throughout their territories. Such luxuriant utilization of the environment was possible only with sustained low human population density, matched with high population density of their game. With man's increasing population density and climate change that lead to smaller territory and lower resource density, the pressure became greater for man to choose among the second and third choices. From the end of the late Paleolithic period to early Neolithic period, man started to utilize fish, shellfish and starchy seeds in the forested areas of Europe, West Asia, and Japan. This can be seen as the beginning of second- and third-best resource utilization. It must be understood that at this time, man living in the mid-latitude forest environments faced a food crisis that did not allow them to pursue the food choice strategy for the best foods.

SEDENTARIZATION

Sedentary societies appeared around the same time as the utilization of starchy seeds began. The Jomon societies of the Japanese archipelago and the Natuf societies of West Asia are among the sedentary societies that sprouted in the mid-latitude forest environments around 10 thousand years ago. Just as it is now difficult for us to realize that starchy seeds are inconvenient to eat, so it is difficult for us sedentary people to realize the drawbacks associated with sedentarization.

Researchers have often dealt with the process of sedentarization without understanding the true nature of the sedentary way of life. The stereotypical thinking has been that technical progress of subsistence made possible the efficient acquisition of foods, which in turn made it unnecessary to be nomadic, or possible to be sedentary. Such a scenario is undoubtedly based on the mindset peculiar to sedentary people, that man must have chosen sedentarization whenever it was possible. It is hard for us to imagine that man used to be nomadic because they were blessed with a resource abundant environment.

Nomadic hunter-gatherer societies moved their camps for various reasons (Nishida, 1984):

1. Sanitation
   (a) shelter from wind, floods, and extreme weathers
   (b) waste and excrement disposal
2. Resource acquisition
   (a) acquisition of food, water, and materials
   (b) trade
   (c) communal hunting
3. Social factors
   (a) conflict resolution among camp members
   (b) avoiding enemy attack
   (c) to go to ceremonial sites
   (d) knowledge exchange and visiting acquaintances
4. Physiological factors
   (a) satisfying physical and psychological urges
5. Cognitive factors
   (a) putting past traumas
   (b) leaving behind corpses

Nomadic people not only move camps to acquire food, but to gain a better environment for daily life and to abandon the ominous sites of death and misfortune. They abandon all that became undesirable by leaving their camps and moving to a much more amenable site. This is the most basic life strategy of the nomadic society. By contrast, sedentarization brings with it undesirable factors such as endo- and exo-parasites, deposits of corpses, waste, and excrement. Disputes must be resolved and extreme climates weathered.

In such light, sedentarization can be understood not as the history of factors that made it possible, but as the history of factors that made the nomadic way of life impossible. Starchy seeds require efficient cooking methods, utensils (stoneware, earthenware, baskets), and facilities (hearth, drying sheds and storage space), and big amount of harvest must be stored. Heavy utensils, set facilities, and stored food inconvenience nomadism. The choice for starchy seed utilization means, therefore, at once that of abandoning nomadism.

The above scenario has shown how man in the mid-latitude forest environments of about 10 thousand years ago adapted to the deterioration of the environment resulting from population increase and climate changes by opting for the lesser choices in both their way of life and food utilization. Man has continued to sharply increase population density, and it is an ecological principle that quality of life will deteriorate when population density increases beyond a certain point.

SEDENTARIZATION AND CULTIVATION

In sedentary societies, all acquired resources need to be transported to the villages. Sedentary societies tend to progressively shorten this transport distance. In fact, the early sedentary societies of prehistoric Japan and West Asia utilized far more food resource than those societies that preceded them. Utilizing a wider range of resources enabled villagers to acquire more resources in closer proximity to the villages with shorter transport distances. This lead to more intense utilization of proximate resources than what was the norm in a nomadic life.

Such pressure for intensive proximate resource utilization along with more omnivory associated with sedentarization was an important step toward cultivation.

There is another important necessary factor for the advent of cultivation that rose from sedentarization. Sedentary villages influence the surrounding flora by clearing forests, stomping on the ground, and disposing waste and excrement far longer than in nomadic societies. These continuous human influences inevitably turn the surrounding forest into secondary vegetation as well as enriching the soil.

Archeological sites of Jomon period villages, the first sedentary societies of the Japanese archipelago, have often produced seeds and charcoal from primary forest species as well as those from the secondary forest. Villages were immediately surrounded by secondary forests, beyond which there were the primary forest. Chestnut is the most frequently found food from the Jomon sites. Its timber was used as firewood and building material. Chestnut trees thrive in abundant sunshine, and are supposed to have grown densely in the secondary vegetation induced by man, which made it all the more convenient for man to utilize the seed and timber. Such symbiosis between the village and the surrounding vegetation is the basic definition of cultivation.

SOIL ENRICHMENT

Sedentary peoples invariably consumed most of the acquired resources in the village and disposed of them in the forms of waste and excrement in the surrounding area. Here is an estimate of soil enrichment for a village composed of 5 families of about 30 members.

First, it is possible to estimate the area of secondary vegetation where frequent human activity occurred from the spread of earthenware in archeological sites of the Jomon village. For example, in the Nishida site in Ibaraki Prefecture, the distribution of earthenware was investigated along a transect extending straight out from the residential area. Earthenware was most frequently common along the transect of 50 m, but scarce beyond 150m. This indicates that village waste and excrement would most likely be concentrated within the 50 m radius in an area of about 8000 square meters. The secondary vegetation with high human activity surrounding the village provided food, firewood and timber for man to consume. Here, soil nutrients are depleted, yet also replenished through the disposal of waste and excrement. Therefore, the mineral deposit from consuming resources acquired

beyond the secondary vegetation surrounding the village contributed to soil enrichment.

In a simple calculation, 400 calories per day per person consumed from game from beyond the secondary vegetation will result in soil enrichment of the secondary vegetation with essential minerals. Biomass of 400 g of game roughly equals 400 calories, and the model village will consume about 4380 kg/year of game. This amounts to 44 heads of deer and boar weighing 100 kg, caught a head per week. The biomass of these animals has about a total of 5% minerals, consisting of 3% calcium, 1% phosphate, and 0.3% potassium. This amounts to 131 kg of calcium, 44 kg of phosphate, and 13 kg of potassium per year that are spread as minerals around the village through consumption of game from hunting and fishing.

Supposing the minerals were deposited throughout an area of 8000 square meters surrounding the village, the amounts can be compared to those contained in fertilizer required for the contemporary Japanese chestnut farm of an equal area, where 48kg of phosphate and 96 kg of potassium are used and produce about 2,000kg of chestnut a year. The model Jomon village would have had a similar amount of phosphate, a mineral that is easily depleted. Because the minerals contained in the harvested chestnuts in the contemporary farm never return to the farm soil, the Jomon village would have had far more abundant amounts of minerals deposited in the surrounding area.

CONCLUSION

Sedentarization involves both clearing the surrounding forests and enrichment of the soils. Consequently, the area surrounding the villages turn into fields. Early cultivation was tantamount to utilizing the vegetation in these soils. Because sedentary societies seek resources in proximity to the villages, the process is continuous and constant. However, this applied only to societies in the forested environment, and not where the environment was hostile to vegetation, such as that of the whale-hunting Inuits, and where flora was not at all utilized as food.

Early cultivation saw a great decrease in the cost involved in acquiring resources, and promised constant harvests. Villagers needed to venture out no farther than the immediately surrounding areas to seek food and to learn of the coming harvest. Transportation of the harvest was kept to a minimum, and because the animals of the forest near villages was kept at bay, man had an advantage over them in the competition for food acquisition.

This paper has described the ecological mechanism for the advent of cultivation through sedentism in the forest environment. This mechanism is the theoretical foundation for the simultaneous global evolution of cultivating societies, as well as that for the possibility that sedentary animals other than man may have also developed cultivation.

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