

## GRASSES AND MAN\*

Human life has been and is more dependent upon grasses than upon any other group of living things.

### GEOLOGIC GRASSLAND AND PRIMITIVE MAN

The Miocene epoch is characterized by the formation of extensive grassland areas which replaced the swampy vegetation of the preceding epochs. It also presents a world-wide prevalence of the ancestors of most grass-eating (herbivorous) mammals. These animals, by contrast with their weak-toothed and short-limbed ancestors, possessed long-crowned and strong teeth adapted for grinding grass and relatively long feet adapted for running over hard and dry grassland in search of water and to escape from enemies. The abundance of grass favoured the multiplication of the herbivorous mammals. This in turn furnished an increased food supply for flesh-eating (carnivorous) animals, and, as a consequence, these also increased in number. The grasses were thus the controlling influence in the Age of Mammals.

The human importance of this fact is that primitive man was obliged to follow these animals—his almost exclusive food supply—as they wandered from grassland to grassland. Even after he domesticated certain of the mammals—the horse, ox, sheep, goat, pig and dog—he continued to be a nomad because he still had to herd these animals from one favourable grassland to another. Virtually all primitive men were characterized by this wandering life until certain of them, in various parts of the earth, observed that several of the grasses which their animals ate produced seeds which were not only edible food but were capable of remaining so for a considerable time. Man, in other words, discovered that he could store good food for himself. Thus man ceased to be dependent entirely for his food upon his animals, which in turn fed upon the pasture grasses. The cereal grasses became a direct portion of man's diet and furnished him with some nourishment which he could obtain by staying in one place.

By thus becoming a grass-eater, man changed his life from that of a nomad to that of a settler. This change was tremendously important for mankind of all times. There have not been any beginnings of civilization apart from agriculture. The earliest known agriculture was the cultivation of the cereal grasses, which resulted in the conservation of the human energy formerly wasted in roaming, in a sense of ownership, in the development of tools and appliances from various metals, in periods of leisure time during which thought, language, literature and art could make their first appearance in human life, in the beginning of settled and social life, and, in fact in the introduction of most aspects of civilization.

Every known primitive civilization was built directly upon one or another of the cereal grasses, sometimes supplemented with pasture grasses.

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\* By Morris Halperin, University of California, in *The March Scientific Monthly*, 1933.

## CIVILISATION IN ASIA

In Japan, millet and rice were cultivated since primitive times.

Human life in China, in the Indian Archipelago, in the Malay Peninsula and in the Philippine Islands was dominated by rice.

The primary food of the Aryans in northern India consisted of rice. Barley and sugar cane were also used extensively. The Aryans had pasturelands on which they grazed their animals which furnished meat and the means of transportation. Guests and gods were honoured by being seated on grass mats. To their gods they offered up roasted grain (probably barley) and cooked rice.

The Proto-Nordics were an entirely pastoral people. They were nomadic and followed grasslands in Central and Western Asia. The invasions of the Huns, Tartars and Mongols were motivated by the necessity of finding new grasslands for their animals.

In Persia wheat was the chief constituent of human diet.

In Babylonia, about 3100 B.C., land was paid for by bronze and by grain. At about 1400 B.C., there was an appliance for ploughing the land and sowing the seed of grain in the same operation. In 450 B.C., the Historian Herodotus wrote; "the soil is peculiarly adapted to grain; no fruit trees are grown; only barley, wheat and millet are grown."

In the palace of the King of Iberia stood gold and silver vessels filled with barley juice.

The Hebrew patriarchs were shepherds of animals on grasslands. Joseph in his first dream, saw "sheaves of grain." Moses promised the Hebrews that "He (God) will put grass in your fields for your cattle." Nearly all of the religious sacrifices included a grass eating animal or grain of the cereal grasses. The story of Ruth is built around barley and wheat. There are numerous other references to grasses in the Bible.

## CIVILISATION IN AFRICA

In Egypt, wheat and barley were cultivated by 4000 B.C. In the Egyptian "Book of the Dead," King Osiris states: "I am Osiris. I live as Grain. I grow as Grain. I am Barley." The Pharaoh of Joseph's time, in his first dream, saw seven fat cows grazing in the meadow grass, and his second dream pertained to "seven ripe and seven thin ears of grain" (probably barley).

In other parts of Africa, civilization was based on another group of grasses, the sorghums. Barley and millet were also important articles of food.

## CIVILISATION IN EUROPE

In what is now Switzerland and northern Italy, the chief crops cultivated by the Lake-dwellers were barley, wheat and millet. Wheat was cultivated in Hungary during the Stone Age. The Macedonians when invading Asia became familiar with the cereal grasses grown there and introduced them into their own country as food-crops.

In Rome the first known reaper was invented in connection with the harvest of grain. Polenta, a porridge made from barley, was fed to gladiators who were called *hordeari* from *hordeum*, the Latin name for barley. The word "cereal" is from the Latin "*cerealia*" which were grain festivals in honour of the goddess Ceres.

The Lithuanians, Germans, Celts, Gauls, Illyrians, Thracians (in modern Hungary) and Numantians (in modern Spain) ate millet, barley and wheat, and drank beverages made from these grains.

### CIVILISATION IN AMERICA

The physical, social and religious life of the Mayas, Aztecs, Incas, Guatemalans, Peruvians and other American peoples was based on maize or Indian corn.

The early settlers in America brought with them from Europe seed of rye, wheat, oats and barley, and planted these for crops as early as 1625.

### OTHER ASPECTS OF CIVILISATION

The calendar came into existence as a matter of necessity connected with cereal agriculture. Nomadic life required no calendar; the natural division of time into day and night was sufficient. But the cultivation of the cereals, to be successful, required a calendar according to which planting and other agricultural operations could be performed at the time found by previous experience to be best. In the earliest Babylonian calendar, the names of eight of the twelve months of the year refer to grain. In the Egyptian calendar, certain of the names of the months also refer to cereals "Sprouting of the Grain", "Making and Watering Barley," "Ripe Grain," and "Lady of the Granary."

The earliest problems in various branches of arithmetic concerned grasses—their agriculture, their conversion into flour and loaves of bread, and their distribution to the labourers. Some of the beginnings of geometry were likewise related to grasses—the measurement of the areas of grain fields and the consideration of various forms—cylinder, rectangle, or parallelopiped—as the most economical shape for granaries. What was probably the very beginning of astronomy was the institution of observing the moon as a basis for performing the steps in the cultivation of the cereal grasses at certain times. (Many people, even in civilized countries in this century, plant seeds of crops according to the moon.)

There were a few plants other than grasses which were cultivated before historic times, e.g., the soybean, datepalm, hemp, flax, peach, apricot and grapevine. In no case, however, was any civilization dependent upon any of these plants, whereas every known civilization has been made possible and necessary by the cultivation of one or another of the cereal grasses.

### CHARACTERISTICS OF THE GRASSES

The grasses are apparently ideal pasture-plants because, instead of growing as other plants do, at the tips of the leaves which are eaten off by the grazing animal, grasses grow at the joints, the lowermost of which are generally inaccessible to the animal's mouth and are therefore uninterrupted in their growth. This explains, too, the ability of lawn grasses to continue providing a turf in spite of frequent cutting.

As food for man, a cereal grass produces each year a large yield of edible, storable and transportable food, containing a great deal of nutriment for its volume. The grasses, in addition, grow in a greater variety of conditions of climate and of soil than do any other large plants. Grasses are the chief plants which possess all the characteristics in the right proportion for constituting man's basic food.

## USES OF GRASSES

### *Food*

Bread is still the "staff of life." Breadstuffs, furnishing the sole or chief food of most of mankind, are made from grasses.

As for meat, it is true almost literally that "all flesh is grass." Animals feeding on grasses furnished beef, mutton, pork and poultry, and such by-products as milk, cream, butter, cheese, oil, eggs, wool and leather.

Most of the world's supply of sugar is made from the grass, sugar-cane. Molasses is made from sugar-cane and sorghum. Beers and similar beverages are made by fermenting the seeds of grasses—maize, barley, rice, bamboo, millet and others.

Grasses, in the form generally consumed by man, are deficient in both minerals and vitamins and must be supplemented, if growth and health are desired, by fruits and vegetables.

## BUILDING MATERIAL AND LAND RECLAMATION

Where the bamboos grow, they constitute the material out of which houses, furniture and scores of other construction objects are built. Grasses are used in the tropics to build huts and tree-houses.

For the reclamation of useless or troublesome types of land, grasses are the leading plants. Beach grass is the pioneer for reclaiming sand-dunes in the temperate regions of the world. Cord ("Rice") grass (*Spartine* spp.) is the prime plant used to reclaim mud-flats and tidal estuaries. Both of these plants are used notably in North America and in Europe. For reclaiming alkali lands for agricultural utilization, several grasses are the best adapted plants known.

## GRASSES IN THE LANDSCAPE

Grass lawns render houses and other buildings attractive. Parks owe much of their beauty and probably all of their utility to grass. Golf courses and athletic fields are grass turfs. Some grasses are used as ornamental plants in gardens, e.g., bamboo, pampas grass, zebra grass, quaking grass and "gardener's garters."

## MISCELLANEOUS USES

A small portion of the world's supply of paper comes from grasses. "Straw" hats are made from the stalks of various grasses. Whisk-brooms and sweeping-brooms are manufactured exclusively from a grass known as broom corn. The standard feed for birds is the seed of canary grass. Fishing-rods, and the vaulting poles used in Olympic games, are the stems of bamboo.

Corn stalks yield furfural, which is used as a solvent in resins and lacquers, and as a preservative in veterinary embalming material. Corn-starch is used in the stiffening and finishing of textiles, as a finisher and filler in the manufacture of writing-paper, as a stiffener in laundry work, and as a constituent of baking-powder, pies, puddings, soap, paints, adhesive substances and asbestos products.

The bamboos furnish cooking and other domestic utensils, musical instruments, hats, smoking-pipes, clothing and literally hundreds of other every-day needs of millions of people living in the tropics.

The grasses cause more hay fever than probably any other group of plants. Although constituting one of the largest families of plants, the grasses contain hardly any poisonous representatives, only the stunted or second growth of the sorghums being poisonous to animals.

### EXTENT OF GRASSLANDS

Grassland is the prime form of vegetation on the great plains and prairies of North America, on the savannahs and pampas of South America, on the veldt covering immense areas of Africa, on the enormous steppes of Russia, Siberia, China and Manchuria, on the grasslands of Australia and New Zealand, and on the lesser grassland areas distributed elsewhere on the earth's surface.

Much land is covered with cultivated grasses. For example, Indian corn is grown in the United States on over 100,000,000 acres, a greater area than that of California. Similarly, rice, wheat, barley, millet, oats, sorghum, sugar-cane, bamboos and pasture grasses cover very large areas of the earth's surface. In all probability, grasses occupy a greater portion of the dry surface of the earth than all artificial and other natural formations combined.

Grasses grow in the Arctic regions, where they constitute approximately one fourth of all the flowering plants and are more numerous than any other single family of large plants. Grasses grow, by contrast, in the hottest portions of the tropics. They are found at sea-level and on the highest mountains, in the open and in shade, on plains and on hillsides, in water and in sand, in forests and in deserts, on alkali soils and on acidic soils. In fact, grasses are found, often to a dominant extent, in any environmental condition in which plants can grow.

The family of grasses contains a larger number of individuals than all other families of large plants combined.

### VALUE OF GRASSES

The most valuable crops in the world are grasses—the cereals, sugar-cane, bamboo and hay. Statistics do not include the grass on ranges and pastures which is consumed directly by animals without going into commerce, where its value can be recorded. In the United States, maize, hay, wheat, barley, oats and rye have an annual worth of about six Billion dollars.

### SUMMARY

The geologic Age of Mammals was, in large measure, made possible by the formation of grasslands.

The almost exclusive food supply of primitive man was the meat of the animals which lived upon grass or which preyed upon grass-eating animals. Early man was a nomad, following these animals from one grassland to another.

Every known civilization had its beginning in the cultivation of one or another of the cereal grasses.

At present, grasses furnish all the bread-stuffs and most of the meat and sugar consumed by man. They also supply housing material for millions of people in the tropics.

Grasses are adapted for growth in a greater diversity of environmental condition than are any other large plants. Probably the greatest portion of the earth's dry-land surface is covered by grasses.

In general, human existence and civilization have thus far been very closely related to the natural and agricultural importance of grasses.