

MAN & PLANTS

Imagine, if you will, what America was like when it was first discovered by man—and here we do not refer to such late-comers as Leif Ericson or Columbus. Men out of Asia were certainly the variable genetic source of human populations in America. Over millennia they came to the northwestern extension of the North American continent, and then by agonizingly slow stages spread their kinds southward and eastward, eventually reaching and passing the equator.

Finally, and perhaps not long before the coming of Europeans to America, they reached the southern tip of what we now call South America.

How long ago did the first men come to America, and what was it like around that part of America where they first touched? Scholars do not agree about the point in time past when the first men came across the Bering Strait, but a convenient compromise figure might be 25,000 years ago. During the period of migration—which may have continued up to a thousand or so years ago, thus spanning a very long time as measured in men's life spans—the northwestern region of North America (as well as adjacent Asia) must have been a formidable place with a climate unbelievably harsh during many thousands of these years as glaciers waxed and waned.

Man certainly brought nothing with him out of Asia, except his dogs. Hunting and fishing must have sustained him until finally he came to milder climates, and somewhat drier ones. In front of him was a great vacuum as far as man was concerned, the only pressure was from behind. Time passed and new cultures developed—the earlier ones based on the grazing animals rather than those of the sea. Eventually a seed-gathering economy developed, and as man got farther south and into the tropics, where large animals were and still are scarce, his economy changed to one based on plants.



The great Aztec market at Tlatelolco, A.D. 1515, exhibit in Hall 8, Field Museum.

Man had now progressed far enough in space and time that we may begin to look for a higher culture than those based on nomadic hunting and seed-gathering.

Somewhere along the route of this southward progression men—or probably women—discovered, perhaps by accident, that the plants whose edible portions they gathered grew better on their middens and in the enriched soils around their dwellings than in the wild places that were the plants' normal habitats. This discovery of the cultivation of plants for food

was, I think, the most momentous discovery of all time. Once the discovery was made, savagery was on the way out and the potential for civilization was present.

It is thought that about 8 square miles of land were required in a seed-gathering economy to sustain one man. On this basis the world could sustain a population of some 30 millions. The discovery of the usefulness and convenience of the cultivation of plants changed the whole outlook for man in America—and in the world, for that matter—and

permitted his uninhibited increase. When one man could produce food beyond the requirements of his family and have some left over for barter, someone else was freed from the never-ending daily chore of searching for food. Some men were then able to give thought to the betterment of their own condition and that of their fellow men.

Ancient high civilizations in America, as I conceive of them, developed in three regions: Mexico, Central America, and in the Andean region of northwestern South America.

What were the plants of America that were the basis for civilizations? I have called attention long ago to the coincidence that where ancient American civilizations were developed, there were plant foods that provided the essentials of a balanced diet. Basically, these plants could be as few as two: ideally the seeds of a grass, maize, which provided good and abundant carbohydrates; and the seeds of a plant that added protein to the diet, probably always a legume (bean family). Other kinds of plants added variety and vitamins—frosting to the cake if you wish—and we shall consider some of these in due course.

What were the (two) basic food plants upon which civilizations in America were developed and where did they come from? The answer to the first part of the question is easy—maize and beans—but to answer the second part is not so easy.

Maize and beans (there were two really superb kinds of beans) as we know them now, and as they were at the time of European discovery, were and are the results of thousands of years of selection. Essentially maize and beans are the creations of ancient men in America, men who were certainly not savages, and were not inferior in any way to European man at the time of discovery and the conquest—unless they were “inferior” in being less savage.

The origin of maize is still a controversial subject and one which was opened recently at a scientific meeting of the Society for Economic Botany here at the Museum. Dr. Hugh Iltis, of the University of Wisconsin, presented a paper, not yet published, in which he contended that corn is domesticated teosinte (*Euchlaena mexicana*) and differs from it not at all in any of its basic vegetative, floral, or genetic attributes. Dr. George Beadle has for the past three years been conducting tests of this hypothesis by means of large-scale experiments with hybrids of corn and teosinte. He will have an article about his work and conclusions in a future issue of the *Bulletin*. This concept is different from those previously published and one which must be considered. A small library has been written about maize, the world's most important cultivated plant, and the end is not yet!

Beans, the second component of a balanced diet, and one of the great civilizers, were and are abundant. Kidney beans or field beans (*Phaseolus vulgaris*), scarlet runner beans (*P. coccineus*), and lima beans (*P. limensis*) are the aristocrats of the beans of the world and they are all American.

The scarlet runner is, I think, to be found wild in Central America and it propagates itself without the intervention of man. I have seen wild beans in Central America that may be among the progenitors of the common kidney beans. The usual kidney beans are man's commensals and if left to their own devices will not persist. Lima beans are wild in much of tropical America, but the presumed wild progenitor differs much from the cultivated kinds, which, so far as I know, require man's help to persist.

These, like many another cultivated plant, have been selected for years, even millennia, by man to produce more or better food, and survival of the plant as a wildling was not a consideration

in the selection.

A host of other food plants have been bequeathed to us by the early Americans. We have found no important food plants not known to people of pre-Columbian time. Potatoes, sweet potatoes, cassava, pumpkins and squashes, tomatoes, avocados—vegetables that we all know and that are to be found in our markets every day of the year—all originated here. Of these, the sweet potato is one of very few plants of economic importance that were cultivated in the tropics of both hemispheres before the beginning of recorded history.

Fruits of temperate regions were few in America and, with the possible exception of our native grapes, none is of very great importance. The old saying “as American as apple pie” is not really appropriate, because apples are Old World fruits. Let's change the expression to “as American as pumpkin pie,” a traditional food for a traditional American holiday.

Except for pineapples, tropical fruits native to America are relatively little known in our markets. The grandest of all tropical fruits—citrus fruits, bananas, dates, figs, and the mango—are all from the Old World.

Plants important in our daily lives are not only those that provide food. A mere listing of the kinds of things that are derived from plants will bring to mind many that we use daily. There are fibers (cotton is the most familiar of them); forest products (wood, cork, the paper which you are holding); rubber and latex; gums and resins (the list of ingredients on your next can of soup may contain a gum); essential oils are in perfume; many kinds of oils and fats and waxes for literally thousands of food and industrial uses; sugars and starches; medicinal plants (a few, like quinine, of really great importance, but literally thousands have played a part in folk medicine from ages past down to today). Don't

forget the antibiotics, the miracle drugs of our day; and insecticides from plants, which cause little permanent damage to the biosphere. Then there are the fumitories and masticatories (like tobacco), many of which are under a cloud today; the narcotics—opium, pot (marijuana), and coca (cocaine), the only important narcotic of American origin. Among the spices everyone uses, the only important ones of American origin are the sweet and the hot (red) peppers.

Beverages which are made from plants include coffee and tea from the Old World; and cocoa and *maté* from America. Cocoa beans were used in Mexico from ancient times like currency, a measure of value in barter. The plants from which alcoholic beverages are made are multitudinous.

My colleagues in the Society for Economic Botany have raised the questions whether or not ornamental plants are economic or useful plants, and whether or not its journal should include articles on ornamentals. I feel that they are both economic plants and useful plants and that the world and the garden around your door would be a less interesting place without them. But then I am prejudiced, for the native orchids of the Americas have always been my special love.

Dr. Franz Schwanitz wrote in 1957 in his *Die Entstehung der Kulturpflanzen* (*Origin of Cultivated Plants*) that cultivated plants alone made it possible for 2.5 billion people to populate the globe. Fifteen years later, with probably well over 3.7 billion people populating the same globe, the major food source is still cultivated plants, but the supply is being strained in many parts of the world, even as it was in 1957. In the year 2000, the population of the world is projected to be some 6.4 billion persons. If the projection holds true, it will be due to much improved food plants and more efficient agriculture. Conversely, if the projection does not hold true, it could

be because of insufficient food production from constantly shrinking land resources.

Last year a terrible storm blew out of the Bay of Bengal and inundated the fertile low-lying delta of the Bengal River. Perhaps as many as 500,000 people lost their lives in that disaster. It would seem that no man in his right senses would take his family to live on the Bengal River delta, for natural disasters are common events there. The fact is that man in that overpopulated portion of the world really has no choice. To grow the food to keep alive, he plays Russian roulette of necessity.

Although most plants that we use for food are ones that were selected or bred for special purposes by man long ago, some of the plant foods we collect or harvest have changed very little or not at all as the result of man's attention. The sap of the sugar maple is still collected and boiled down to make one of the prized delicacies of our larder. Wild, or Indian, rice, once an important food of North American Indians, is an expensive delicacy, now used for gourmet dishes and often as a special accompaniment to a Thanksgiving dinner. Wild raspberries and blackberries are still gathered—and both have given rise to cultivated forms which it is easy to trace back to the progenitor. Cranberries, another of the delicacies often used for Thanksgiving dinner, differ hardly at all from the wildlings that are still gathered. The fruits of the prickly pear cactus, called *tuna*, are gathered and to be found commonly in markets in Mexico and even now and again in Chicago. Algae from the sea are collected along the shores of much of the world either as food or industrial plants. The forest preserves around Chicago each spring and fall are invaded by connoisseur gatherers of wild native mushrooms.

Even today the gathering and breeding

of wild plants to produce better useful plants is going on and will continue to go on. Two recent examples will suffice to indicate the trend. We owe the large and luscious blueberries that in recent years have become commonplace in our markets to the persistence of Dr. Frederick V. Colville, who took the native blueberry and through selection and breeding produced a plant which has become an important crop in America. We owe to the vision of Dr. B. Y. Morrison the glorious Glen Dale Azaleas, surely some of the finest ornamentals in a group of plants known for their beauty.

The United States Department of Agriculture has for many decades now had a broad program of exploration for and introduction of potentially useful plants. The program has been eminently successful over the years. A recent and on-going project is the screening of a vast number of plant species in the hope that components in some may be found useful for the treatment of cancer in man.

Look again at the useful plants around you, treasures from all the world. Can you imagine Italian cuisine without tomatoes? They were not in Europe before the time of Columbus. Brazilians think that their mangoes were always there—but they are Asian. Spring without tulips—can you imagine it? Tulips in endless variety are largely due to Dutch perfectionists.

We do classify plants in different ways for different purposes, such as "useful" versus "ornamental." One kind of classification I would not like to try to apply would be "necessary" versus "unnecessary." In one way or another almost any plant could be useful. And who would have the hubris to assert that plant X is quite unnecessary to the third planet from the sun, let alone to its human cargo?

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