# ORIGIN OF CULTIVATED PLANTS.

## PART I.

### General Remarks.

## CHAPTER I.

### IN WHAT MANNER AND AT WHAT EPOCHS CULTIVATION BEGAN IN DIFFERENT COUNTRIES.

THE traditions of ancient peoples, embellished by poets, have commonly attributed the first steps in agriculture and the introduction of useful plants, to some divinity, or at least to some great emperor or Inca. Reflection shows that this is hardly probable, and observation of the attempts at agriculture among the savage tribes of our own day proves that the facts are quite otherwise.

In the progress of civilization the beginnings are usually feeble, obscure, and limited. There are reasons why this should be the case with the first attempts at agriculture or horticulture. Between the custom of gathering wild fruits, grain, and roots, and that of the regular cultivation of the plants which produce them, there are several steps. A family may scatter seeds around its dwelling, and provide itself the next year with the same product in the forest. Certain fruit trees may exist near a dwelling without our knowing whether they were planted, or whether the hut was built beside

them in order to profit by them. War and the chase often interrupt attempts at cultivation. Rivalry and mistrust cause the imitation of one tribe by another to make but slow progress. If some great personage command the cultivation of a plant, and institute some ceremonial to show its utility, it is probably because obscure and unknown men have previously spoken of it, and that successful experiments have been already made. A longer or shorter succession of local and short-lived experiments must have occurred before such a display, which is calculated to impress an already numerous public. It is easy to understand that there must have been determining causes to excite these attempts, to renew them, to make them successful.

The first cause is that such or such a plant, offering some of those advantages which all men seek, must be within reach. The lowest savages know the plants of their country; but the example of the Australians and Patagonians shows that if they do not consider them productive and easy to rear, they do not entertain the idea of cultivating them. Other conditions are sufficiently evident: a not too rigorous climate; in hot countries, the moderate duration of drought; some degree of security and settlement; lastly, a pressing necessity, due to insufficient resources in fishing, hunting, or in the production of indigenous and nutritious plants, such as the chestnut, the date-palm, the banana, or the breadfruit tree. When men can live without work it is what they like best. Besides, the element of hazard in hunting and fishing attracts primitive, and sometimes civilized man, more than the rude and regular labour of cultivation.

I return to the species which savages are disposed to cultivate. They sometimes find them in their own country, but often receive them from neighbouring peoples, more favoured than themselves by natural conditions, or already possessed of some sort of civilization. When a people is not established on an island, or in some place difficult of access, they soon adopt certain plants, discovered elsewhere, of which the advantage is evident, and are thereby diverted from the cultivation of

the poorer species of their own country. History shows us that wheat, maize, the sweet potato, several species of the genus Panicum, tobacco, and other plants, especially annuals, were widely diffused before the historical period. These useful species opposed and arrested the timid attempts made here and there on less productive or less agreeable plants. And we see in our own day, in various countries, barley replaced by wheat, maize preferred to buckwheat and many kinds of millet, while some vegetables and other cultivated plants fall into disrepute because other species, sometimes brought from a distance, are more profitable. The difference in value, however great, which is found among plants already improved by culture, is less than that which exists between cultivated plants and others completely wild. Selection, that great factor which Darwin has had the merit of introducing so happily into science, plays an important part when once agriculture is established; but in every epoch, and especially in its earliest stage, the choice of species is more important than the selection of varieties.

The various causes which favour or obstruct the beginnings of agriculture, explain why certain regions have been for thousands of years peopled by husbandmen, while others are still inhabited by nomadic tribes. It is clear that, owing to their well-known qualities and to the favourable conditions of climate, it was at an early period found easy to cultivate rice and several leguminous plants in Southern Asia, barley and wheat in Mesopotamia and in Egypt, several species of Panicum in Africa, maize, the potato, the sweet potato, and manioc in America. Centres were thus formed whence the most useful species were diffused. In the north of Asia, of Europe, and of America, the climate is unfavourable, and the indigenous plants are unproductive; but as hunting and fishing offered their resources, agriculture must have been introduced there late, and it was possible to dispense with the good species of the south without great suffering. It was different in Australia, Patagonia, and even in the south of Africa. The plants of the temperate region in our hemisphere could not reach these countries by

reason of the distance, and those of the intertropical zone were excluded by great drought or by the absence of a high temperature. At the same time, the indigenous species are very poor. It is not merely the want of intelligence or of security which has prevented the inhabitants from cultivating them. The nature of the indigenous flora has so much to do with it, that the Europeans, established in these countries for a hundred years, have only cultivated a single species, the *Tetragonia*, an insignificant green vegetable. I am aware that Sir Joseph Hooker[1] has enumerated more than a hundred Australian species which may be used in some way; but as a matter of fact they were not cultivated by the natives, and, in spite of the improved methods of the English colonists, no one does cultivate them. This clearly demonstrates the principle of which I spoke just now, that the choice of species is more important than the selection of varieties, and that there must be valuable qualities in a wild plant in order to lead to its cultivation.

In spite of the obscurity of the beginnings of cultivation in each region, it is certain that they occurred at very different periods. One of the most ancient examples of cultivated plants is in a drawing representing figs, found in Egypt in the pyramid of Gizeh. The epoch of the construction of this monument is uncertain. Authors have assigned a date varying between fifteen hundred and four thousand two hundred years before the Christian era. Supposing it to be two thousand years, its actual age would be four thousand years. Now, the construction of the pyramids could only have been the work of a numerous, organized people, possessing a certain degree of civilization, and consequently an established agriculture, dating from some centuries back at least. In China, two thousand seven hundred years before Christ, the Emperor Chenming instituted the ceremony at which every year five species of useful plants are sown—rice, sweet potato, wheat, and two kinds of millet.[2] These plants must

[1] Hooker, *Flora Tasmaniæ*, i. p. cx.
[2] Bretschneider, *On the Study and Value of Chinese Botanical Works*, p. 7.

have been cultivated for some time in certain localities before they attracted the emperor's attention to such a degree. Agriculture appears, then, to be as ancient in China as in Egypt. The constant relations between Egypt and Mesopotamia lead us to suppose that an almost contemporaneous cultivation existed in the valleys of the Euphrates and the Nile. And it may have been equally early in India and in the Malay Archipelago. The history of the Dravidian and Malay peoples does not reach far back, and is sufficiently obscure, but there is no reason to believe that cultivation has not been known among them for a very long time, particularly along the banks of the rivers.

The ancient Egyptians and the Phœnicians propagated many plants in the region of the Mediterranean, and the Aryan nations, whose migrations towards Europe began about 2500, or at latest 2000 years B.C., carried with them several species already cultivated in Western Asia. We shall see, in studying the history of several species, that some plants were probably cultivated in Europe and in the north of Africa prior to the Aryan migration. This is shown by names in languages more ancient than the Aryan tongues; for instance, Finn, Basque, Berber, and the speech of the Guanchos of the Canary Isles. However, the remains, called kitchen-middens, of ancient Danish dwellings, have hitherto furnished no proof of cultivation or any indication of the possession of metal.[1] The Scandinavians of that period lived principally by fishing and hunting, and perhaps eked out their subsistence by indigenous plants, such as the cabbage, the nature of which does not admit any remnant of traces in the dung-heaps and rubbish, and which, moreover, did not require cultivation. The absence of metals does not in these northern countries argue a greater antiquity than the age of Pericles, or even the palmy days of the Roman republic. Later, when bronze

[1] De Naidaillac, *Les Premiers Hommes et les Temps Préhistoriques*, i. pp. 266, 268. The absence of traces of agriculture among these remains is, moreover, corroborated by Heer and Cartailhac, both well versed in the discoveries of archæology.

was known in Sweden—a region far removed from the then civilized countries—agriculture had at length been introduced. Among the remains of that epoch was found a carving of a cart drawn by two oxen and driven by a man.[1]

The ancient inhabitants of Eastern Switzerland, at a time when they possessed instruments of polished stone and no metals, cultivated several plants, of which some were of Asiatic origin. Heer[2] has shown, in his admirable work on the lake-dwellings, that the inhabitants had intercourse with the countries south of the Alps. They may also have received plants cultivated by the Iberians, who occupied Gaul before the Kelts. At the period when the lake-dwellers of Switzerland and Savoy possessed bronze, their agriculture was more varied. It seems that the lake-dwellers of Italy, when in possession of this metal, cultivated fewer species than those of Savoy,[3] and this may be due either to a greater antiquity or to local circumstances. The remains of the lake-dwellers of Laybach and of the Mondsee in Austria prove likewise a completely primitive agriculture; no cereals have been found at Laybach, and but a single grain of wheat at the Mondsee.[4] The backward condition of agriculture in this eastern part of Europe is contrary to the hypothesis, based on a few words used by ancient historians, that the Aryans sojourned first in the region of the Danube, and that Thrace was civilized before Greece. In spite of this example, agriculture appears in general to have been more ancient in the temperate parts of Europe than we should be inclined to believe from the Greeks, who were disposed, like certain modern

[1] M. Montelius, from Cartailhac, *Revue*, 1875, p. 237.

[2] Heer, *Die Pflanzen der Pfahlbauten*, in 4to, Zurich, 1865. See the article on "Flax."

[3] Perrin, *Étude Préhistorique de la Savoie*, in 4to, 1870; Castelfranco, *Notizie intorno alla Stazione lacustre di Lagozza;* and Sordelli, *Sulle piante della torbiera della Lagozza*, in the *Actes de la Soc. Ital. des Scien. Nat.*, 1880.

[4] Much, *Mittheil d. Anthropol. Ges. in Wien*, vol. vi.; Sacken, *Sitzber. Akad. Wien.*, vol. vi. Letter of Heer on these works and analysis of them in Naidaillac, i. p. 247.

writers, to attribute the origin of all progress to their own nation.

In America, agriculture is perhaps not quite so ancient as in Asia and Egypt, if we are to judge from the civilization of Mexico and Peru, which does not date even from the first centuries of the Christian era. However, the widespread cultivation of certain plants, such as maize, tobacco, and the sweet potato, argues a considerable antiquity, perhaps two thousand years or thereabouts. History is at fault in this matter, and we can only hope to be enlightened by the discoveries of archæology and geology.

## CHAPTER II.

### METHODS FOR DISCOVERING OR PROVING THE ORIGIN OF SPECIES.

1. *General reflections.* As most cultivated plants have been under culture from an early period, and the manner of their introduction into cultivation is often little known, different means are necessary in order to ascertain their origin. For each species we need a research similar to those made by historians and archæologists—a varied research, in which sometimes one process is employed, sometimes another; and these are afterwards combined and estimated according to their relative value. The naturalist is here no longer in his ordinary domain of observation and description; he must support himself by historical proof, which is never demanded in the laboratory; and botanical facts are required, not with respect to the physiology of plants—a favourite study of the present day—but with regard to the distinction of species and their geographical distribution.

I shall, therefore, have to make use of methods of which some are foreign to naturalists, others to persons versed in historical learning. I shall say a few words of each, to explain how they should be employed and what is their value.

2. *Botany.* One of the most direct means of discovering the geographical origin of a cultivated species, is to seek in what country it grows spontaneously, and without the help of man. The question appears at the first glance to be a simple one. It seems, indeed, that

by consulting floras, works upon species in general, or herbaria, we ought to be able to solve it easily in each particular case. Unfortunately it is, on the contrary, a question which demands a special knowledge of botany, especially of geographical botany, and an estimate of botanists and of collectors, founded on a long experience. Learned men, occupied with history or with the interpretation of ancient authors, are liable to grave mistakes when they content themselves with the first testimony they may happen to light upon in a botanical work. On the other hand, travellers who collect plants for a herbarium are not always sufficiently observant of the places and circumstances in which they find them. They often neglect to note down what they have remarked on the subject. We know, however, that a plant may have sprung from others cultivated in the neighbourhood; that birds, winds, etc., may have borne the seeds to great distances; that they are sometimes brought in the ballast of vessels or mixed with their cargoes. Such cases present themselves with respect to common species, much more so with respect to cultivated plants which abound near human dwellings. A collector or traveller had need be a keen observer to judge if a plant has sprung from a wild stock belonging to the flora of the country, or if it is of foreign origin. When the plant is growing near dwellings, on walls, among rubbish-heaps, by the wayside, etc., we should be cautious in forming an opinion.

It may also happen that a plant strays from cultivation, even to a distance from suspicious localities, and has nevertheless but a short duration, because it cannot in the long run support the conditions of the climate or the struggle with the indigenous species. This is what is called in botany an *adventive* species. It appears and disappears, a proof that it is not a native of the country. Every flora offers numerous examples of this kind. When these are more abundant than usual, the public is struck by the circumstance. Thus, the troops hastily summoned from Algeria into France in 1870, disseminated by fodder and otherwise a number of

African and southern species which excited wonder, but of which no trace remained after two or three winters.

Some collectors and authors of floras are very careful in noting these facts. Thanks to personal relations with some of them, and to frequent references to their herbaria and botanical works, I flatter myself I am acquainted with them. I shall, therefore, willingly cite their testimony in doubtful cases. For certain countries and certain species I have addressed myself directly to these eminent naturalists. I have appealed to their memory, to their notes, to their herbaria, and from the answers they have been so kind as to return, I have been enabled to add unpublished documents to those found in works already made public. My sincere thanks are due for information of this nature received from Mr. C. B. Clarke on the plants of India, from M. Boissier on those of the East, from M. Sagot on the species of French Guiana, from M. Cosson on those of Algeria, from MM. Decaisne and Bretschneider on the plants of China, from M. Pancic on the cereals of Servia, from Messrs. Bentham and Baker on the specimens of the herbarium at Kew, lastly from M. Edouard André on the plants of America. This zealous traveller was kind enough to lend me some most interesting specimens of species cultivated in South America, which he found presenting every appearance of indigenous plants.

A more difficult question, and one which cannot be solved at once, is whether a plant growing wild, with all the appearance of the indigenous species, has existed in the country from a very early period, or has been introduced at a more or less ancient date.

For there are naturalized species, that is, those that are introduced among the plants of the ancient flora, and which, although of foreign origin, persist there in such a manner that observation alone cannot distinguish them, so that historical records or botanical considerations, whether simple or geographical, are needed for their detection. In a very general sense, taking into consideration the lengthened periods with which science is concerned, nearly all species, especially in the regions lying outside the