

READING 4-2

A. Candolle 1890. *Origin of Cultivated Plants*, p. 387–397 D. Appleton and Company, New York.

Maize – *Zea mays*, Linnaeus

“Maize is of American origin, and has only been introduced into the old world since the discovery of the new. I consider these two assertions as positive, in spite of the contrary opinion of some authors, and the doubts of the celebrated agriculturist Bonafous, to whom we are indebted for the most complete treatise upon maize.”¹ I used these words in 1855, after having already contested the opinion of Bonafous at the time of the publication of his work.² The proofs of an American origin have been since reinforced. Yet attempts have been made to prove the contrary, and as the French name, *blé de Turquie*, gives currency to an error, it is as well to resume the discussion with new data.

No one denies that maize was unknown in Europe at the time of the Roman empire, but it has been said that it was brought from the East in the Middle Ages. The principal argument is based upon a charter of the thirteenth century, published by Molinari,³ according to which two crusaders, companions in arms of Boniface III, Marquis of Monferrat, gave in 1204 to the town of Incisa a piece of the true cross... and a purse containing a kind of seed of a golden colour and partly white, unknown in the country and brought from Anatolia, where it was called *meliga*, etc. The historian of the crusades, Michaux, and later Daru and Sismondi, said a great deal about this charter; but the botanist Delile, as well as Targionitozzetti and Bonafous himself, thought that the seed in question might belong to some sorghum and not to maize. These old discussions have been rendered absurd by the Comte de Riant’s discovery⁴ that the charter of Incisa is the fabrication of a modern impostor. I quote this instance to show how scholars who are not naturalists may make mistakes in the interpretation of the names of plants, and also how dangerous it is to rely upon an isolated proof in historical questions.

The names *blé de Turquie*, Turkish wheat (Indian corn), given to maize in almost all modern European languages no more prove an Eastern origin than the charter of Incisa. These names are as erroneous as that of *coq d’Inde*, in English *turkey*, given to an American bird. Maize is called in Lorraine and in the Vosges Roman corn; in Tuscany, Sicilian corn; in Sicily, Indian corn; in the Pyrenees, Spanish corn; in Provence, Barbary or Guinea corn. The Turks call it Egyptian corn, and the Egyptians, Syrian *dourra*. This last case proves at least that it is neither Egyptian nor Syrian. The widespread name of Turkish wheat dates from the sixteenth century. It sprang from an error as to the origin of the plant, which was fostered perhaps by the tufts which terminate the ears of maize, which were compared to the beard of the Turks, or, by the vigour of the plant, which may have given rise to an expression similar to the French *fort comme un turc*. The first botanist who uses the name, Turkish wheat, is Ruellius, in 1536.⁵ Bock or Tragus,⁶ in 1552, after giving a drawing of the species which he calls *Fruentum turcicum*, *Welschkorn*, in Germany, having learnt by merchants that it came from India, conceived the unfortunate idea that it was a certain *typha* of Bactriana, to which ancient authors alluded in vague terms. Dodoens in 1583, Camerarius in 1588, and Matthioli⁷ rectified these errors, and positively asserted the American origin. They adopted the name *mays*, which they knew to be American. We have seen (p. 363) that the *zea* of the Greeks was a spelt. Certainly the ancients did not know maize. The first travellers⁸ who described the productions of the new world were surprised,

¹ Bonafous, *Hist. Nat. Agric. Et Économique du Maïs*, 1 vol. In folio, Paris and Turin, 1836.

² A. de Candolle, *Bibliothèque Universelle de Genève*, Aug. 1836, *Géogr Bot. Rais.*, p. 942.

³ Molinari, *Storia d’Incisa*, Asti, 1810.

⁴ Riant, *La Charte d’Incisa*, 8vo pamphlet, 1877, reprinted from the *Revue des Questions Historiques*.

⁵ Ruellius, *De Natura Stirpium*, p. 428, “Hanc quoniam nostrorum aetate e Graecia vel Asia venerit *Turcicum frumentum* nominant.” Fuchsius, p. 824, repeats this phrase in 1543.

⁶ Tragus, *Stirpium*, etc., edit. 1552, p. 650.

⁷ Dodoens, *Pemptades*, p. 509; Camerarius, *Hort*, p. 91; Matthioli, deit. 1570, p. 305.

⁸ P. Martyr, Ercilla, Jean de Lery, etc., 1516-1578.

at it, a clear proof that they had not known it in Europe. Hernandez,⁹ who left Europe in 1571, according to some authorities, in 1593 according to others,¹⁰ did not know that from the year 1500 maize had been sent to Seville for cultivation. This fact, attested by Fée, who has seen the municipal records,¹¹ clearly shows the American origin, which caused Hernandez to think the name of Turkish wheat a very bad one.

It may perhaps be urged that maize, new to Europe in the sixteenth century, existed in some parts of Asia or Africa before the discovery of America. Let us see what truth there may be in this.

The famous orientalist D'Herbelot¹² had accumulated several errors pointed out by Bonafous and by me, on the subject of a passage in the Persian historian Mirkoud of the fifteenth century, about a cereal which Rous, son of Japhet, sowed upon the shores of the Caspian Sea, and which he takes to be the Indian corn of our day. It is hardly worth considering these assertions of a scholar to whom it had never occurred to consult the works of the botanists of his own day, or earlier. What is more important is the total silence on the subject of maize of the travellers who visited Asia and Africa before the discovery of America; also the absence of Hebrew and Sanskrit names for, this plant; and lastly, that Egyptian monuments present no specimen or drawing of it.¹³ Rifaud, it is true, found an ear of maize in a sarcophagus at Thebes, but it is believed to have been the trick of an Arab impostor. If maize had existed in ancient Egypt, it would be seen in all monuments, and would have been connected with religious ideas like all other remarkable plants. A species so easy of cultivation would have spread into all neighbouring countries. Its cultivation would not have been abandoned; and we find, on the contrary, that Prosper Alpin, visiting Egypt in 1592, does not speak of it, and that Forskal¹⁴ at the end of the eighteenth century) mentioned maize as still but little grown in Egypt, where it had no name distinct from the sorghums. Ebn Baithar, an Arab physician of the thirteenth century, who had travelled through the countries lying between Spain and Persia, indicates no plant which can be supposed to be maize.

J. Crawford,¹⁵ having seen maize generally cultivated in the Malay Archipelago under a name *jarung*, which appears to be indigenous, believed that the species was a native of these islands. But then how is it Rumphius makes no mention of it. The silence of this author points to an introduction later than the seventeenth century. Maize was so little diffused on the continent of India in the last century, that Roxburgh¹⁶ wrote in his flora, which was published long after it was drawn up, "Cultivated in different parts of India in gardens, and only as an ornament, but nowhere on the continent of India as an object of cultivation on a large scale." We have seen that there is no Sanskrit name.

Maize is frequently cultivated in China in modern times, and particularly round Peking for several generations,¹⁷ although most travellers of the last century make no mention of it. Dr. Bretschneider, in his work published in 1870, does not hesitate to say that maize is not indigenous in China; but some words in his letter of 1881 make me think that he now attributes some importance to an ancient Chinese author, of whom Bonafous and afterwards Hance and Mayers have said a great deal. This is a work by Li-chi-tchin, entitled *Phen-thsao-kang-mou*, or *Pên-tsao-kung-mu*, a species of treatise on natural history, which Bretschneider¹⁸ says was written at the end of the sixteenth century. Bonafous says it was concluded in 1578, and the edition which he had seen in the Huzard library was of 1637. It contains a drawing of maize with the Chinese character. This plate is copied in Bonafous' work, at the beginning of the chapter on the original country of

⁹ Hernandez, *Thes. Mexic.*, p. 242.

¹⁰ Lasègue, *Musée Delessert*, p. 467.

¹¹ Fée, *Souvenirs de la Guerre d'Espagne*, p. 128.

¹² *Bibliothèque Orientale*, Paris, 1697, at the word *Rous*.

¹³ Kunth, *Ann. Sc. Nat.*, sér. 1, vol. viii. p. 418; Raspail, *ibid.*; Unger, *Pflanzen des Alten Ägyptens*; A. Braun, *Pflanzenreste Ägypt. Mus. in Berlin*, Wilkinson, *Manners and Customs of Ancient Egyptians*.

¹⁴ Forskal, p. liii.

¹⁵ Crawford, *History of the Indian Archipelago*, Edinburgh, 1820, vol. i.; *Journal of Botany*, 1866, p. 326.

¹⁶ Roxburgh, *Flora Indica*, edit. 1832, vol. iii. p. 563.

¹⁷ Bretschneider, *Study and Value*, etc., pp. 7, 18.

¹⁸ *Ibid.*

the maize. It is clear that it represents the plant. Dr. Hance¹⁹ appears to have based his arguments upon the researches of Mayers, who says that early Chinese authors assert that maize was imported from Sifan (Lower Mongolia, to the west of China) long before the end of the fifteenth century, at an unknown date. The article contains a copy of the drawing in the *Pên-tsao-kung-mu*, to which he assigns the date 1597.

The importation through Mongolia is improbable to such a degree that it is hardly worth speaking of it, and as for the principal assertion of the Chinese author, the dates are uncertain and late. The work was finished in 1578 according to Bonafous, in 1597 according to Mayers. If this be true, and especially if the second of these dates is the true one, it may be admitted that maize was brought to China after the discovery of America. The Portuguese came to Java in 1496,²⁰ that is to say four years after the discovery of America, and to China in 1516.²¹ Magellan's voyage from South America to the Philippine Islands took place in 1520. During the fifty-eight or seventy-seven years between 1516 and the dates assigned to the Chinese work, seeds of maize may have been taken to China by navigators from America or from Europe. Dr. Bretschneider wrote to me recently that the Chinese did not know the new world earlier than the Europeans, and that the lands to the east of their country, to which there are, some allusions in their ancient writings, are the islands of Japan. He had already quoted the opinion of a Chinese savant, that the introduction of maize in the neighbourhood of Peking dates from the last years of the Ming dynasty, which ended in 1644. This date agrees with the other facts. The introduction into Japan was probably of later date, since Kaempfer makes no mention of the species.²²

From all these facts, we conclude that maize is not a native of the old world. It became rapidly diffused in it after the discovery of America, and this very rapidity completes the proof that, had it existed anywhere in Asia or Africa, it would have played an important part in agriculture for thousands of years.

We shall see that the facts are quite contrary to these in America.

At the time of the discovery of the new continent, maize was one of the staples of its agriculture, from the La Plata valley to the United States. It had names in all the languages.²³ The natives planted it round their temporary dwellings where they did not form a fixed population. The burial-mounds of the natives of North America who preceded those of our day, the tombs of the Incas, the catacombs of Peru, contain ears or grains of maize, just as the monuments of ancient Egypt contain grains of barley and wheat and millet-seed. In Mexico, a goddess who bore a name derived from that of maize (*Cinteutl*, from *Ciatli*) answered to the Ceres of the Greeks, for the first-fruits of the maize harvest were offered to her, as the first-fruits of our cereals to the Greek goddess. At Cusco the virgins of the sun offered sacrifices of bread made from Indian corn. Nothing is better calculated to show the antiquity and generality of the cultivation of a plant than this intimate connection with the religious rites of the ancient inhabitants. We must not, however, attribute to these indications the same importance in America as in the old world. The civilization of the Peruvians under the Incas, and that of the Toltecs and Aztecs in Mexico, has not the extraordinary antiquity of the civilizations of China, Chaldea, and Egypt. It dates at earliest from the beginning of the Christian era; but the cultivation of maize is more ancient than the monuments, to judge from the numerous varieties of the species found in them, and their dispersal into remote regions.

A yet more remarkable proof of antiquity has been discovered by Darwin. He found ears of Indian corn, and eighteen species of shells of our epoch, buried in the soil of the shore in Peru, now at least eighty-five feet above the level of the sea.²⁴ This maize was perhaps not cultivated, but in this case it would be yet more interesting, as an indication of the origin of the species.

¹⁹ The article is in the *Pharmaceutical Journal* of 1870; I only know it from a short extract in Seemann's *Journal of Botany*, 1871, p. 62.

²⁰ Rumphius, *Amboin.*, vol. v. p. 525.

²¹ Malte-Brun, *Géographie*, i. p. 493.

²² A plant engraved on an ancient weapon which Siebold had taken for maize is a sorghum, according to Rein, quoted by Wittmack, *Ueber Antiken Maïs*.

²³ See Martius, *Beiträge zur Ethnographie Amerikas*, p. 127.

²⁴ Darwin, *Var. of Plants and Anim. under Domest.*, i. p. 320.

Although America has been explored by a great number of botanists, none have found maize in the conditions of a wild plant.

Auguste de Saint-Hilaire²⁵ thought he recognized the wild type in a singular variety, of which each grain is enclosed within its sheath or bract. It is known at Buenos-Ayres under the name *pinsigallo*. It is *Zea Mays tunicata* of Saint-Hilaire, of which Bonafous gives an illustration, pl. 5, *bis*, under the name *Zea cryptosperma*. Lindley²⁶ also gives a description and a drawing from seeds brought, it is said, from the Rocky Mountains, but this is not confirmed by recent Californian floras. A young Guarany, born in Paraguay on its frontiers, had recognized this maize, and told Saint-Hilaire that it grew in the damp forests of his country. This is very insufficient proof that it is indigenous. No traveller to my knowledge has seen this plant wild in Paraguay or Brazil. But it is an interesting fact that it has been cultivated in Europe, and that it often passes into the ordinary state of maize. Lindley observed it when it had been only two or three years in cultivation, and Professor Radic obtained from one sowing 225 ears of the form *tunicata*, and 105 of the common form with naked grains.²⁷ Evidently this form, which might be believed a true species, but whose country is, however, doubtful, is hardly even a race. It is one of the innumerable varieties, more or less hereditary, of which botanists who are considered authorities make only a single species, because of their want of stability and the transitions which they frequently present.

On the condition of *Zea Mays*, and its habitation in America before it was cultivated, we have nothing but conjectural knowledge. I will state what I take to be the sum of this, because it leads to certain probable indications.

I remark first that maize is a plant singularly unprovided with means of dispersion and protection. The grains are hard to detach from the ear, which is itself enveloped. They have no tuft or wing to catch the wind, and when the ear is not gathered by man the grains fall still fixed in the receptacle, and then rodents and other animals must destroy them in quantities, and all the more that they are not sufficiently hard to pass intact through the digestive organs. Probably so unprotected a species was becoming more and more rare in some limited region, and was on the point of becoming extinct, when a wandering tribe of savages, having perceived its nutritious qualities, saved it from destruction by cultivating it. I am the more disposed to believe that its natural area was small that the species is unique; that is to say, that it constitutes what is called a single-typed genus. The genera which contain few species, and especially the monotypes, have as a rule more restricted areas than others. Palaeontology will perhaps one day show whether there ever existed in America several species of *Zea*, or similar Graminae, of which maize is the last survivor. Now, the genus *Zea* is not only a monotype, but stands almost alone in its family. A single genus, *Euchlaena* of Schrader, may be compared with it, of which there is one species in Mexico and another in Guatemala; but it is a quite distinct genus, and there are no intermediate forms between it and *Zea*.

Wittmack has made some curious researches in order to discover which variety of maize probably represents the form belonging to the epoch anterior to cultivation. For this purpose he has compared ears and grains taken from the mounds of North America with those from Peru. If these monuments offered only one form of maize, the result would be important, but several different varieties have been found in the mounds and in Peru. This is not very surprising; these monuments are not very ancient. The cemetery of Ancon in Peru, whence Wittmack obtained his best specimens, is nearly contemporary with the discovery of America.²⁸ Now, at that epoch the number of varieties was already considerable, which proves a much more ancient cultivation.

²⁵ A. de Saint-Hilaire, *Ann. Sc. Nat.*, xvi. p. 143.

²⁶ Lindley, *Journ. of the Hortic. Soc.*, i. p. 114.

²⁷ I quote these facts from Wittmack, *Ueber Antiken Maïs aus Nord und Sud Amerika*, p. 87, in *Berlin Anthropol. Ges.*, Nov. 10, 1879.

²⁸ Rochebrune, *Recherches Ethnographiques sur les Sépultures Péruviennes d'Ancon*, from an extract by Wittmack in Uhlworm, *Bot. Central-Blatt.*, 1880, p. 1633, where it may be seen that the burial-ground was used before and after the discovery of America.

Experiments in sowing varieties of maize in uncultivated ground several years in succession would perhaps show a reversion to some common form which might then be considered as the original stock, but nothing of this kind has been attempted. The varieties have only been observed to lack stability in spite of their great diversity.

As to the habitation of the unknown primitive form, the following considerations may enable us to guess it. Settled populations can only have been formed where nutritious species existed naturally in soil easy of cultivation. The potato, the sweet potato, and maize doubtless, fulfilled these conditions in America, and as the great populations of this part of the world existed first in the high grounds of Chili and Mexico, it is there probably that wild maize existed. We must not look for it in the low-lying regions such as Paraguay and the banks of the Amazon, or the hot districts of Guiana, Panama, and Mexico, since their inhabitants were formerly less numerous. Besides, forests are unfavorable to annuals, and maize does not thrive in the warm damp climates where manioc is grown.²⁹ On the other hand, its transmission from one tribe to another is easier to comprehend if we suppose the point of departure in the centre, than if we place it at one of the limits of the area over which the species was cultivated, at the time of the Incas and the Toltecs, or rather of the Mayas, Nahuas, and Chibchas, who preceded these. The migrations of peoples have not always followed a fixed course from north to south, or from, south to north. They have taken different directions according to the epoch and the country.³⁰ The ancient Peruvians scarcely knew the Mexicans, and *vice versâ*, as the total difference of their beliefs and customs shows. As they both early cultivated maize, we must suppose an intermediate point of departure. New Granada seems to me to fulfil these conditions. The nation called Chibcha which occupied the table-land of Bogota at the time of the Spanish conquest, and considered itself aboriginal, was an agricultural people. It enjoyed a certain degree of civilization, as the monuments recently investigated show. Perhaps this tribe first possessed and cultivated maize. It marched with Peru, then but little civilized, on the one hand, and with the Mayas on the other, who occupied Central America and Yucatan. These were often at war with the Nahuas, predecessors of the Toltecs and the Aztecs in Mexico. There is a tradition that Nahuatl, chief of the Nahuas, taught the cultivation of maize.³¹

I dare not hope that maize will be found wild, although its habitation before it was cultivated was probably so small that botanists have perhaps not yet come across it. The species is so distinct from all others, and so striking, that natives or unscientific colonists would have noticed and spoken of it. The certainty as to its origin will probably come rather from archaeological discoveries. If a great number of monuments in all parts of America are studied, if the hieroglyphical inscriptions of some of these are deciphered, and if dates of migrations and economical events are discovered, our hypothesis will be justified, modified, or rejected.

²⁹ Sagot, *Cult. des Céréales de la Guyane Franc. (Journ. de la Soc. Centr. d'Hortic. de France, 1872, p. 94).*

³⁰ De Naidailac, in his work entitled *Les Premiers Hommes et les*

³¹ De Naidailac, ii. P. 69, who quotes Bancroft, *The Native Races of the Pacific States.*