

Early Contacts of European Science with the Indian Corn Plant

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Among the problems laid on the doorstep of European science by the discovery of America none have had greater interest to the botanist than those connected with the well-known Indian corn plant. Its appearance on the scene caused at the time only a faint ripple of interest in the stream of western history; but it was ultimately to exert probably a greater economic influence than all the gold that the Spanish explorers hoped to find, and it has had no less botanical and historical significance. It has been particularly interesting to trace in detail the steps by which this plant first became known to Europe.

The story begins early in November, 1492. The little fleet of Christopher Columbus was anchored somewhere along the north coast of Cuba while small parties explored the country, trading with the natives, noting the peculiarities of the people and their surroundings, and accumulating samples of the resources of the region to be taken back to Spain. On Friday, the second day of the month, the Admiral had sent inland an exploring party of two Spaniards and two Indians, with instructions to return in six days. The two Spaniards were Rodrigo de Jerez and Luis de Torres, the latter a versatile linguist.

For some reason they did not remain six days, but, after going twelve leagues inland, returned to the ships on Monday night, November 5, and reported on what they had found. Among other things, they had seen a great quantity of a new kind of grain which the Indians called *mahiz*—but which the Spanish insisted on calling *panizo*, their name for millet—and from which a palatable kind of bread was made.

There is no further description of the plant, but, if the full import of this discovery had been realized, it would have been worth much more than the two or three lines devoted to it in the Journal of the voyage. This seems to be the first record of the Indian corn plant in the annals of Old World civilization.

As we read the old records, however, we find another statement which causes us to wonder if Columbus did not actually see the plant a few days earlier than this. On October 16, as he looked over the level, green fields of Haiti, he noted that this would doubtless be a good place for growing panic grass throughout the year. A later commentator¹ thinks that Columbus had already seen maize at this time and was speaking of it, but he may simply have meant that here would be a good place for growing the millet which he had known in Europe. This transfer of names of plants, by explorers who knew little botany, and at a time when

¹Las Casas (1875, ch. 42) says: "_____ y bien atinaba a la verdad, porque todo el año _____ o al menos dos veces, se sembrada y cogia el grano del maíz que aquí el Almirante llamaba panizo."

nomenclature was not well stabilized, is to cause endless confusion all the way along, and the bare name of a plant will by no means identify it. In view of the ambiguity of the record of October 16 we conclude for the present that the note of November 5 is the first mention of the plant in western history.

There had been earlier European visitors in America, and some authorities have entertained the idea that the corn plant was seen by at least one exploring party long before 1492. The old records of the Scandinavian explorations made nearly a thousand years ago mention "self-sown cornfields" and "new-sown" corn and state that, on one occasion, an "ear of corn" was found. Those familiar with the Icelandic language tell us, however, that the word translated "ear of corn" might as well mean "head of wheat," and there is a strong presumption that the plant which the Northmen saw was some wild grass more like the common cereals of Europe. Even if they reached a point as far south as Cape Cod, it is doubtful that the corn plant had migrated that far northeastward by that time. Moreover, the word "self-sown," if it means anything at all, practically eliminates corn, for it has never been found growing in the uncultivated state, and the bleak shores touched by these explorations would be one of the last places in the world where anyone would expect to find it growing wild.²

Then, there is another story to which we must pay our respects although it has less direct bearing on our immediate problem. A persistent idea breaks out from time to time that maize was known in China previous to the discovery of America by Columbus. Some have thought that it originated in Asia and made its way to America in ancient times; others grant that it is a native of America but was taken to Asia long before 1492.

In 1909 there was found in western China a kind of corn which seemed to differ from American varieties in many ways (Collins, 1909), especially in the physical texture of the endosperm; and these differences were cited as evidence of a long isolation of this variety. Curiously enough, this kind of endosperm has been found in at least four other grains of southeastern Asia, and, with few exceptions, it is absent from the same cereals in other parts of the world. Whether this is a rare coincidence or the result of some elusive single hidden cause is not known at present.

Several Chinese scholars state that there are in the old literature indisputable evidences that corn grew in China in ancient times; but these authorities are not botanists competent to identify the plant infallibly, and the references are vague and, in the modern sense, unsatisfactorily documented. Even though, as is often stated, the meaning of a Chinese character never changes, its application to a plant is no more exact than the author's understanding of the plant. There is also a strong suspicion that, in some cases at least, these reports are strongly colored by a national pride.

² For an evaluation of the controversy on this point see: Andrews (1913), Fiske (1891), Fernald (1910), Harshberger (1893).

The record most often cited is a picture and a short description published in an old Chinese work on natural history. The date is uncertain, possibly as late as 1597, long after Magellan's voyage.

The consensus of dependable authority today is that all these considerations are greatly outweighed by the definite evidences that maize is of American origin and that the agricultures of the two hemispheres were entirely separate in pre-Columbian times. (Laufer, 1907; Merrill 1930, 1933.) But we relish a spectacular story, and many a traveler, in no way qualified to pass judgment on such questions, has returned from China to tell us, on no better authority than some positive but wholly unsubstantiated statement, that we are all wrong about the idea that maize originated in America.

If we feel that Columbus should have said more than he did about maize on that November day in 1492, we should recall the nature of the man and his mission. He was not looking so much for new things as for a new route to things already known, and he spent a great deal of time on the first voyage attempting to identify the islands of the Caribbean region as outlying parts of the East Indies. Moreover, he and his followers were not the kind of men who would be expected to make correct evaluations of agricultural resources or to become enthusiastic about botanical curiosities; and probably no explorer in all time was ever perplexed by a greater wealth of new botanical material.

Then, there is the additional fact that we do not know exactly what Columbus did say about maize. He kept a journal with meticulous care and took it back to Spain; but the original, which would certainly be one of the most precious documents of all history, has been lost; and, as far as we know, there is no exact copy of it in existence. Several contemporary historians had access to the Journal and used it freely in their writing, sometimes quoting sections, but usually paraphrasing and adding other material from letters and conversation of sailors who accompanied Columbus. The writings of three men are outstanding. Columbus' son, Ferdinand, used the Journal in writing a biography of his father. Bartolomé de las Casas, who was with Columbus on the third voyage and later spent many years in Mexico, quoted the Journal freely in his extensive writings. And Peter Martyr, later to be official counselor in the court of the Emperor Charles V, combined parts of the Journal with a great deal of information gleaned from other sources when he wrote his famous Latin treatises known as the *Decades*.

Some of these accounts were begun very soon after the news of the great discovery trickled back to a select few connected with the Spanish court. Peter Martyr, for example, wrote the first book of the first Decade in the latter part of 1493 and the second book early in 1494 (Williams 1930, p. 817). But publication was delayed for several years. This was partly because of physical limitations, the art of printing being not yet a century old, and partly because Spain wished to withhold the great news until she had strengthened her position to exploit the newly discovered lands. Even when the first book of Martyr's first Decade was officially published in 1511, the crown was a little uncertain about the wisdom of the release, and, after a few copies had been printed, certain

changes were made, particularly the omission of a map. (Thacher 1903, 1:35-36).

This first book was revised and published again, at Seville, in 1516, and in it, in the midst of a miscellany of information about the plants, animals, minerals, physiographic features, and people of the West Indies, we find a significant statement, which has been translated as follows:³

"They make also another kynde of breade of a certayne pulse, called Panicum, muche lyke unto wheate ——— but ——— longer by a spanne, somewhat sharpe towarde the ende, and as bygge as a mannes arme in the brawne: The graynes whereof are sette in a maruelous order, and are in fourme somewhat lyke a pease. While they be soure and vnripe, they are white: but when they are ripe they be very blacke. When they are broken, they be whyter then snowe. This kynde of grayne they call *Maizium*."

Panicum et

ex frumēto quodā panico: cuius est apud insubres ⁊ granatēses hispanos maxima copia nō magno discrimine consistit. Est huius in appa longio: spiritama in acutuz tēdēs: lacertū fere crassitudine. Grana nūro ordine a natura cōfira. Forma et corpē pifum legumē emalatur. Albet acerba: vbi maturucrūt nigerrima efficiunt: fracta candore niuē crupcrāt: est apud eos aurū alicuius estimationis: nam auricul. arū toz

Fig. 1. Description of maize in the first book of Peter Martyr's first Decade, edition of 1511. From a copy of the book in the John Carter Brown Library, Providence, R. I. Although the name of the plant is not given, the text is otherwise almost exactly the same as in the edition of 1516, which does give its name.

This is the first printed account of the plant in which the identifiable name *maize* is applied to it. In modern botanical literature it has sometimes been regarded as the first published account. The edition of 1511, however, gives essentially the same account, except that it omits the last sentence (Fig. 1).

An earlier edition of the book, published in 1504 in the Venetian dialect, and apparently without the author's permission, has been searched for reference to maize, but without success, unless the following passage is thought to be significant: "certain red grains of different colors, more sharp than the peppers we have."⁴

Perusing the record a little farther back, we come to another account whose significance seems to have been overlooked alike by botanists and historians. It must bring us near the end of our search for the first published record, for it appeared probably not more than two years after the discovery. When a part of the ships of Columbus' second voyage started back to Spain on February 12, 1494, one of them carried a letter, written by one Guglielmo Coma, describing the newly discovered lands. This letter, combined with some material from other sources, was published as a single document by Nicolo Syllacio late in 1494 or early in

³ Richard Eden's translation (Arber, 1885, p. 67).

⁴ Thacher's translation (1903, 2:488) of the following (p. 459): "certi grani rossi de diversi colori pin acuti del peure che noi habiano."

1495.⁵ Through this unauthorized little "scoop" its few readers received the first public news of the great discovery. In speaking of the food of the Indians, Coma (or Syllacio) says:⁶

"There is here, besides, a prolific sort of grain of the size of a lupin, round like a vetch, from which when broken a very fine flour is made. It is ground like wheat. A bread of exquisite taste is made from it. Many who are stinted in food chew the grains in their natural state."

**Subter. Porum semina fecunda et multifida ne in nostro orbe de-
siderarentur: in hispaniam translata sunt. Est praeterea secundum se-
mentis genus: magnitudine lupini: ciceris rotunditate: farina pro-
dit effracto tenuissimo polline: teritur ut frumentum: panis conficit
sicut saporis. multis quibus tenuior: vicus: grana maderibus. *Ma-*
rini fructus: pira odora abunde: sylvestribus pomis rami curvati: vni-
*bractylus: lucid religiosi. Nulla iniuria semina nouere: lolium vicium***

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Fig. 2. Description of a plant which is almost certainly maize. From the Coma-Syllacio letter of December, 1494. Apparently the first printed reference to the plant. Copied from Thacher.

What could this have been but Indian corn? Moreover, this passage and the text immediately preceding and following it read so much like Peter Martyr that it is evident that they had a common origin. This suggests one of two interesting possibilities: the Coma-Syllacio letter represents a still earlier theft of Martyr's thunder, or Martyr's account of maize was based upon observations made on the *second* voyage rather than on the first as has ordinarily been supposed. From differences readily discernible between the editions of 1511 and 1516 and the spurious edition of 1504 it is evident that, although Martyr may have written the first draft of the first book in 1493, he made changes in the manuscript from time to time, and it is conceivable that he incorporated in the two officially published editions material taken from the Coma letter. Whatever the truth of this may be, the fact remains that we have in the Coma letter a published account of the maize plant which antedates by some seventeen years the one usually cited as the first.

Following the introduction of corn into Europe by the Spanish and other explorers at the end of the fifteenth century, it quickly spread through the countries where it could be grown profitably. It was soon recognized everywhere as a botanical curiosity, and its agricultural possibilities began to be investigated and put to use.

Western Europe was an interesting place at this time. The spirit of scientific investigation was just coming out of a sleep of more than a thousand years. A few investigators still searched the pages of Theophrastus, Aristotle, Dioscorides, and the Plinys for answers to their questions about such New World plants as maize, tobacco, and the potato,

⁵ According to Thacher (1903, 2:218). Williams (1930, p. 817) gives December 13, 1494, as the definite date of publication.

⁶ Thacher's translation. For the original Latin, see Figure 2.

but they found nothing satisfactory. They had at last to admit that here were things which had been previously unknown. To get anywhere, they had to use their own eyes and to believe what they saw. This new philosophy was most stimulating.

For the reactions of this embryonic modern science to the corn plant, we turn next to the outstanding botanical publications of the sixteenth and seventeenth centuries, the *Herbals* of Fuchs, Ruellius, Bock, Dodoneus, Matthioli, Tabernaemontanus, Parkinson, Gerard, and many others. These treatises were, in a way, the precursors of our modern local, state, and regional floras; but they were less technical, usually included much fuller discussions of the history, properties, and uses of plants, and frequently wandered off into almost meaningless philosophical rambles.

The first mention of maize in the strictly *botanical* literature was in a little-known herbal by Jerome Bock, in 1532, and it was again mentioned by Ruellius in 1536; but it was the publication of the first picture of the plant, and a better description, in the first edition of Fuchs' herbal, in 1542, which brought it clearly to the attention of the scientific public and gave it a permanent place in the literature of science.

It would be an interesting thing to trace the history of the plant through the various editions of numerous herbals for a period of two hundred years or more, but this would take us quite beyond the limits of our present undertaking and would call for the examination of many highly prized volumes in widely scattered libraries.⁷ A few examples will have to suffice.

The uniformity of many of the accounts of maize and the repetition many times over of obvious errors indicate that it was common practice for authors to copy or adapt earlier descriptions and that few of them had any first-hand knowledge of the plant. It seems likely that some who included it in their herbals had never even seen it, and the published illustrations justify the inference that the artists were sometimes no better off.

The early authors recognize maize as a member of the cereal family and describe it as a kind of wheat or millet. They usually give reasonably good descriptions of the roots, stem, leaves, and tassel and then hasten to add that, although the tassel is similar to the inflorescence of some of the other cereals, it does not produce grain. The ear is recognized as a unique structure, having no homologue in the other cereals, and it and the surrounding husks are usually described in fairly accurate detail.

Maize stands all alone among the cereals in the variety of color of its grains, and, as would be expected, this is noted by all the early writers. They observe that the silks and staminate flowers also vary in color, and some state that these organs are of the same colors as the grains on the same plant. This entirely erroneous idea was so plausible that

⁷ For the opportunity of examining a large number of the *Herbals*, I am greatly indebted to the libraries of the University of Notre Dame, the American Philosophical Society, the Philadelphia College of Physicians and Surgeons, and the University of Pennsylvania.

apparently no one thought of challenging it although evidence to the contrary was there before their eyes all the time; and we find it in the works of various herbalists for more than a century.

Several of the herbals give an account of an Indian method of planting corn which is apparently not extant in the ordinary run of American travel literature of that time. The following is a translation of the story as it occurs in the works of Matthioli, Durante, Dalechamps, and Tabernaemontanus, between 1540 and 1630:

"The Indians plant this seed, which they call *Malitz*, in the following manner: Many of them go into the field at the same time and arrange themselves in a straight line; and then, with a pointed stick in the right hand, they make a hole in the ground and straightway, with the left hand, place in each hole five or six grains, closing the hole with the foot so that the seed will not be eaten by the parrots. And so, measuring off distances one step at a time, they fill the entire field with seed as they move across it."

The origin of this story was a puzzle for a time, but it seems to have been told first by Oviedo in his account of the West Indies, parts of which were available to European scholars early in the sixteenth century.⁸

In the literature of these early days there is much disagreement as to the economic value of maize. Some regard it as the equal of wheat for food and say that good bread is made from the meal; others say that it is inferior to the other cereals and to be recommended only in case of extreme necessity or for those doing the hardest kind of work. The use of corn meal for making mush or porridge was known, but in the herbals examined there is no mention of green corn as a food, although the early explorers very generally speak of its use in this way by the Indians.

Corn bread is cited as the cause of various digestive ailments, and, when it is used exclusively for any considerable time, it is said to produce "grosse blood which breedeth itches and scabbes." So the problem of vitamin deficiency in an all-corn diet is at least as old as the use of the plant in Europe. In general, the herbalists regard it as a suitable food for livestock rather than for man.

In many of the early accounts there lingers the idea that the corn plant came from western Asia and that it should be possible to reconcile its characteristics with the writings of Pliny or others of the Classical period. This is reflected in such names as Turkish corn, *Triticum Bactrianum Plinii*, *Milico Indico Pliniano*, *Fruentum Turcicum*, *Triticum Turcicum*, *Fruentum Asiaticum*, and Turkish wheat. Europe still had a confused picture of the New World in relation to the Indies which had long been known, and it is a fact that usage with regard to the names of things often lags far behind knowledge of the things themselves. We still call a certain bird a turkey although we have known for more than four hundred years that it is American in origin.

Many of the herbals are well illustrated with woodcuts, a quality which will be more appreciated if we recall that photographic methods

⁸ Book 7, chapter 1. See Oviedo (1851, p. 263).

of platemaking were unknown and each figure had to be patiently cut by hand. The first published figure of maize, in Fuchs' quarto herbal of 1542, is one of the best. For scientific accuracy and artistic quality it was not greatly surpassed during the herbal period, and it would not seem much out of place in a modern publication (Fig. 3).

Color printing in the modern sense was, of course, impossible at this time; but it was apparently intended that the pictures in some of the herbals should be hand-colored after they were printed. In some



Fig. 3. Illustration from Fuchs' Herbal of 1542. To the best of our knowledge at present, this was the first published picture of maize.

copies of Fuch's work, the grains of one partially exposed ear have been colored with zones of blue, yellow, and red, and the author apparently intended that they should be, for he says:

"This picture shows, in one sheath, grains of four colors, although, of course, any one ear would have all the grains of one color, yellow, purple, red, or whitish. We explain this lest the picture be misleading."

If the color had been applied to individual grains, with less regularity of arrangement, the author's apology would not have been neces-

sary, for, contrary to his opinion, and, at that time, to all reason, it is possible for all these colors to appear naturally in a single ear.

When the Spanish found the corn plant in the West Indies and took it to Europe, they called it *mays* or *maizium*, these being the Spanish equivalents of the name applied to it by the Indians.⁹ But the Spanish were not in a position of scientific leadership, and the plant was introduced to European science chiefly by way of the herbals and the gardens of Germany, England, France, and Italy; and, in the absence of the direct influence of the native name, its derivatives received less favor than they deserved.

The herbals use various forms of the word *maize*, but they give preference to names based on the Latin *Frumentum* or *Triticum* or the Anglo-Germanic *Korn*. The English word *corn* has long been used in a generic sense for all kinds of cereals, or specifically for the commonest grain crop in any one locality, and in this case the use of the existing term was expanded, and maize was called *Indian corn*. It is to be regretted that the name *maize* was not universally adopted in English-speaking countries, as it has been in parts of continental Europe and in Latin America. It is simple enough for easy adaptation and so specific that its meaning is usually clear.¹⁰ But these are not the criteria which determine what names are to be given to things, and we shall continue to call the plant *corn*, *Indian corn*, or *maize*, as dictated by the sensibilities of our readers or hearers or by the desire for variety.

As we come to the end of the herbal period, some 250 years after the discovery of America, the people of Europe still knew very little about the plant of which we speak. They had accepted it when it was brought to them and were finding uses for it in places where it could be grown, but it had not greatly stimulated their imaginations, and there was still much prejudice against its use as a food. They had grown it as a curiosity in their gardens and had pictured it, described it, and given it a name; but botanically it was still almost as much of a puzzle as ever. European science never did, up to this time, quite get the idea that here was a new and extremely interesting plant, worthy of independent consideration, and not merely something to be leaned against the accumulated mass of information about wheat and oats and rye. The colonist and the explorer, amazed at the broad fields of the plant in America and fully aware of the part that it had played in the development of great civilizations, were far ahead of their European scientific brothers in grasping its significance.

American science, in the meantime, was taking the plant at its face value. Practical men, such as Thomas Hariot, Captain John Smith, and the Mayflower company, recognized its value, adopted and improved the Indian methods of cultivation, and were investigating and extending its uses. And Colonial scholars, such as Cotton Mather, James Logan, and Paul Dudley, were sifting Indian lore for botanical and historical

⁹ The questions raised by Wiener (1920, 1:118-125) about the origin of certain words used by Columbus seems to have been pretty well answered by Williams (1930). For a discussion of the world *maize*, see pp. 830-832.

¹⁰ The name has, unfortunately, been applied to some of the sorghums.

information and making experiments on the flowering, pollination, and hybridization of maize and reporting their results to an indifferent Royal Society in London. In these ways an important groundwork was being laid for the prominent role which maize was to play in the modern era of agriculture and botany which was just then beginning.

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