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Hunt Institute was dedicated in 1961 as the Rachel McMasters Miller Hunt Botanical Library, an international center for bibliographical research and service in the interests of botany and horticulture, as well as a center for the study of all aspects of the history of the plant sciences. By 1971 the Library's activities had so diversified that the name was changed to Hunt Institute for Botanical Documentation. Growth in collections and research projects led to the establishment of four programmatic departments: Archives, Art, Bibliography and the Library.

Bolivia (Maize) COPY

H. Allman-Lewis.

Casilla 39
Cochabamba
Bolivia

April, 26, 1930.

The Secretary,
U. S. Department of Agriculture,
Washington, D. C. E.E.U.U.

Dear Sir:

Farming in Cochabamba Valley

Unfortunately no experimental stations have been started in this country and consequently farmers here are behind the times and are loth to make any changes.

The object of the present is to ask for help, which I can assure you will be greatly appreciated.

There are probably districts in the U. S. where conditions approximate to those obtained here, hence the help can be extended by sending bulletins covering crops and methods of cultivation and other suggestions likely to be applicable here.

Please advise cost of all pamphlets sent so that I can repay you or, if you prefer, address them to me care of the Banco Central, Cochabamba, to be withdrawn against payment of their value.

To enable you to do this, I append a description of this district, viz;-

Part of the district lies between 66 & 67 degrees W longitude and between 17 & 18 degrees S latitude.

Altitude above sea 8200 '.

Rainy season falls in the summer months. Rains begin at beginning of November and last till end of March or first ten days of April. January & February are normally the wettest months. An average yearly rainfall would be in the region of 24 inches. Both the beginning and ending of the rains are erratic from year to year as also their distribution, but far more rain falls in January & February than in all the other months.

The other months of the year are almost entirely without any rainfall whatever.

A very large proportion of all the rainfall occurs as heavy downpours during thunderstorms and consequently first floods everything and then runs off. This, however is not always the case.

Owing to the altitude there is a large daily variation of temperature but not so marked a variation between winter & summer. In winter the shade temperature at midday will be about 18 degrees centigrade and in summer about 21 or 22. In June and July there will be hoarfrost every morning and some mornings an eight of an inch of ice may be found on stagnant water, this will disappear at nine oclock.

Evaporation is great owing to the altitude.

Nights are always cool. In July and August there are high winds.

In the valley bottom irrigation is available and some sections can have fertile river silt run onto them. In the irrigated districts the principal crops are, in order of importance, Maize, alfalfa, potatoes, broad beans.

The first sowing of maize begins on September 22nd, when a dark seed, called "huilcaparu", is sown till the end of the month, and on till the middle of October when a lighter coloured seed called "concebida" is sown. After the third week in October a bright yellow seed called "aisuma" is sown. This last seed is the most prolific but lighter in weight than huilcaparu.

The huilcaparu will be sown on the damper and colder land.

The maize harvest is begun by cutting the maize and standing it in clumps in May. In June the cobs are removed after drying in the clumps. The stalks are fed to cattle.

The land is then irrigated and ploughed by oxen with American Pony & Blue Jay ploughs taking a cut of about 4". One man and one yoke of oxen to each plough. It is then cross ploughed with the native plough, which is merely a pointed beam shod with an iron point; this however, penetrates deeper than the American ploughs.
The land then lies open to the sun and air till the different sowing times approach, when it is again irrigated, ploughed & cross ploughed as above and then sown, in my case, with a doublerow maize planter, rows 32" apart and grains at about 6". After planting irrigation is withheld as long as possible and if it can be avoided altogether, so much the better as if continuous rains then follow the crop will be ruined.

But as this time is one of blazing sun day after day it is sometimes a difficult point to decide as a large proportion of the plants may dry up altogether in the meantime.

From the beginning of May till the end of October there will be cloudless skies most days, whereas in summer it is mostly cloudy with occasional clear spells.

On un-irrigated land, here called "temporal", a small & quick growing white maize called "uchuquillo" is grown as also wheat and barley; this land naturally lies at somewhat higher elevations round 9000'. Wheat does well, but is of poor quality lacking in gluten.

Everybody is growing maize on the irrigated land and consequently it has a bad market, whereas there is great demand for wheat of which there is a shortage.

It would therefore be good business to grow wheat on the lower lying irrigated land, but everyone says it cannot be grown successfully, alleging that the crop will be spoilt with "polvillo". They say this results when cold mists come down at night, which is a rare occurrence, happening only once or twice in a season.

Seed. Now therefore;- Can you suggest a wheat seed that would be successful under these conditions for growing in the irrigated section at 8200' altitude?

If so please kindly ask some first class dealer to be kind enough to write me quotations for the finest seed of the kind available. Then by cabling him I can secure seed in time for this years sowing in December or whatever other time you suggest.

Please also kindly send instructions as to preparation, sowing etc of this wheat.

I would also like the same dealer to quote for any other seed for other crops you may suggest as suitable and also for clover which I see you recommend to be ploughed under as green manure say every four years.

Alfalfa does very well here giving six or seven cuts if properly irrigated.

As regards maize, I believe the amount of the crops could be greatly increased and would request you to advise me as to your recommendations for similar conditions and especially the manner in which a farmer can better his own seed by selection, mentioning also what implements are most desirable for planting and cultivation of maize.

I am short of labour and intend to purchase probably a Diesal tractor as kerosene tractors, owing to the altitude, lose 25% of their power and consequently have to do all work in first speed with consequent high cost of fuel consumption. A supercharging diesel engine will get over this trouble, as well as using a low priced fuel.

Hence implements that will interest me will be those that can be handled by 20 effective brake H.P.

Malaria. There are, occasionally, a few cases of malarial fever in these parts, called locally "terciana".

It would be a great benefit therefore to all who live in these parts if the anopheles mosquito could be eliminated.

Under irrigation conditions it is practically impossible to avoid altogether stagnant water, no matter what care is employed by onesself as the Indian population cannot be brought to realize the importance of the matter.

I read, in a local paper, some weeks ago that an American investigator had made the wonderful discovery that a certain mosquito, a native I believe of Hawaii, was found to prey on and exterminate all other kinds of mosquitoes, including the dreaded anopheles, whilst being itself inocuous.

If this is so and this mosquito is now available I would request you to kindly inform me where I can obtain a few families with the view of introducing them to this district.

I need not add that no business will be made of them, but if one could be the means of eliminating terciana from any district that would be it's own reward and the thanks of everyone would be greatfully given to the discoverer of the new species of mosquito.

I have, I fear, taken up much of your time but you may be sure that the help you give will be appreciated by me and the results may be of benefit to the whole district.

Being an alfalfa district cattle could be bred if an expert market were available as other surrounding districts are also suitable, but for this I fear a "frigorifico" would be indispensable.

I am, Dear Sir,
Yours faithfully,

H. Allman-Lewis.

Bemente, see hatupa
Cachapa, see chumal.
Cachay. According to Arona the name of the transverse ridges or furrows that were made in cultivating the steep slopes. Holguin does not give this, but defines cachca as anything rough. See huachu.

Cahuir, see quihuani.

Calala. Defined by Holguin as a mixture of potatoes and barley meal used as a travel ration. Presumably made also with maize, unless the word is recent.

Callchay. The harvest, callchani, "I reap corn" (Markham), callchaypacha, the harvest season, (Holguin)

Camayoc. An official, or guardian of a public storehouse, camani, to measure grain.

Comcha "must be pronounced with m, because with n it means a great yard or the ward of a city."

(Garcilasso de la Vega. Hakl. v. 45 p. 357) J.G.

Camcha, or cancha. Maize toasted or parched. Cobo gives cancha, and Arona states that this is the form used at Lima, with anca as the corresponding word at Arequipa. In the interior valleys in the region of Ollantaytambo the word is hancca. Cancha blanca, a name for pop-corn, called in Spanish palomitas or confitesara. According to Ruiz and Pavon (1:47) the name camcha is also applied to parched seeds of milium nigricans, "maiz de Guinea." Karsten (1:39) gives the name canchi in connection with Metteniusia edulis, the seeds of which are an important article of food in the Cordillera de Santa Marta, Colombia.

Cancu. See zancu.

In the Vocabularies the Cuzco form of the word is rendered hank'a with cancha and hamca in Ayacucho, camcha and ancassa in Junin, camcha in Ancash, jamppi toncco in Aymara. Garcilasso says "camcha" - slip

Markham (Vocab.) gives ccaspa, toasted maize

Maize (Peru) Huaris.

The huaris, or "great ones," were the ancestors of the aristocrats of a tribe, and were regarded as specially favourable toward agricultural effort, possibly because the land had at one time belonged to them personally. They were sometimes alluded to as the "gods of strength," and were sacrificed to by libations of chicha. Ancestors in general were deeply revered, and had an agricultural significance, in that considerable tracts of land were tilled in order that they might be supplied with suitable food and drink offerings. As the number of ancestors increased more and more land was brought into cultivation, and the hapless people had their toil added to immeasurably by these constant demands upon them.

"The Myths of Mexico and Peru," - Lewis Spence, 1913. p. 296.

Sug. ari, etc names for chiefs among the Polynesians & this in turn the word aryan

Maize (Peru) Saramama.

Spirits which were supposed to be instrumental in forcing the growth of the maize or other plants were the mamas. We find a similar conception among many Brazilian tribes today, so that the idea appears to have been a widely accepted one in South American countries. The Peruvians called such agencies "mothers," adding to the generic name that of the plant or herb with which they were specially associated. Thus acsumama was the potato-mother, quinuamama the quinua-mother, saramama the maize-mother, and cocamama the mother of the coca-shrub. Of these the saramama was naturally the most important, governing as it did the principal source of the food-supply of the community. Sometimes an image of the saramama was carved in stone, in the shape of an ear of maize. The saramama was also worshipped in the form of a doll, or huantay-sara, made out of stalks of maize, renewed at each harvest, much as the idols of the great corn-mother of Mexico were manufactured at each harvest-season. After having been made, the image was watched over for three nights, and then sacrifice was done to it. The priest or medicine-man of the tribe would then inquire of it whether or not it was capable of existing until that time in the next year. If its spirit replied in the affirmative it was permitted to remain where it was until the following harvest. If not it was removed, burnt, and another figure took its place, to which similar questions were put.

"The Myths of Mexico and Peru," - Lewis Spence, 1913 - p. 295.

Maize (Peru) Huaca, Ccompa.

Whatever was sacred, of sacred origin, or of the nature of a relic the Peruvians designated a huaca, from the root huacan, to howl, native worship invariably taking the form of a kind of howl, or weird, dirge-like wailing. All objects of reverence were known as huacas, although those of a higher class were also alluded to as viracochas. The Peruvians had, naturally, many forms of huaca, the most popular of which were those of the fetish class which could be carried about by the individual. These were usually stones or pebbles, many of which were carved and painted, and some made to represent human beings. The llama and the ear of maize were perhaps the most usual forms of these sacred objects. Some of them had an agricultural significance. In order that irrigation might proceed favourably a huaca was placed at intervals, in proximity to the acequias, or irrigation canals, which was supposed to prevent them leaking or otherwise failing to supply a sufficiency of moisture to the parched maize-fields. Huacas of this sort were known as ccompas, and were regarded as deities of great importance, as the food-supply of the community was thought to be wholly dependent upon their assistance. Other huacas of a similar kind were called chichics and huancas, and these presided over the fortunes of the maize, and ensured that a sufficient supply of rain should be forthcoming. Great numbers of these agricultural fetishes were destroyed by the zealous commissary Hernandez de Avendaño.

"The Myths of Mexico and Peru," Lewis Spence, 1913 - p. 294.

Maize (Peru).

The essentially agricultural character of the ancient Peruvian religion is shown by the garden of gold that was a part of the chief sun temple at Cuzco.

"One of the most remarkable monuments of the Peruvian civilisation was the Coricancha (Town of Gold) at Cuzco, the principal fane of the sun-god. Its inner and outer walls were covered with plates of pure gold. Situated upon an eminence eighty feet high, the temple looked down upon gardens filled, according to the conquering Spaniards, with treasures of gold and silver. The animals, insects, the very trees, say the chroniclers, were of the precious metals, as were the spades, hoes, and other implements employed for keeping the ground in cultivation. Through the pleasances rippled the river Huatenay. Such was the glittering Intipampa (Field of the Sun). That the story is true, at least in part, is proved by the traveller Squier, who speaks of having seen in several houses in Cuzco sheets of gold preserved as relics which came from the Temple of the Sun. These, he says, were scarcely as thick as paper, and were stripped off the walls of the Coricancha by the exultant Spanish soldiery."

"The Myths of Mexico and Peru," Lewis Spence, 1913. p. 261.

Wild Wheat Forms in Persia and Palestine.

Elucidate of the forms of wild wheat may be considered as the next step toward a better understanding of the orign and development of the domesticated forms of wheat. Aaronsohn's discovery of the wild wheat in Palestine has been followed very promptly by the finding of, or a closely related plant in Persia, as reported in Germany by Schultz almost simultaneously with the publication of a further account of the Palestine wild wheat in the United States. This account was based on studies made in Palestine in 1910 season in which the Persian wild wheat was collected.

Cook, O. F. Wild Wheat in Palestine, U. S. Dept. of Agriculture, Bureau of Plant Industry Bulletin No. 274, Sent to press, issued April 3, 1913.

Schulz, A. , Über eine neue spontane Eutriticumform: Triticum dicoccoides Kcke. forma Straubiana, Berichte der Deutschen Botanischen Gesellschaft, 31:226-230, Pl.X. Sent to press April 17, 1913. Issued May 29, 1913.

Though it may not be possible to accept any of the wild forms thus far discovered as the ~~represent~~ direct ancestors of the cultivated wheats, ~~for~~ it seems impossible to doubt that they are much nearer to the domesticated forms than any of the wild grasses previously known.

The interest attaching to the new wild forms remains almost the same, whether they be considered as ancestors standing behind the domesticated forms or as a parallel series of collateral relatives. In either case the wild plants afford the best indications that wex now have regarding the primitive characters and habits of the domesticated forms.

It was to be expected that any new contribution of fact to a question so old and so much controverted as that of the orign of wheat would be accepted with caution, not to say suspicion. Some writers like ----- have been charitable enough to suppose that Aaronsohn's claim, like so many others, rested on the finding of some domesticated wheat that had been scattered accidently or escaped from cultivation. In other words they are ready to assume, in spite of all the technical evidence, that Aaronsohn's wild wheat is only a form of

Domesticated wheat that happened to be found growing under conditions that allowed it to be mistaken for a wild plant. To one who has seen the wild wheat growing as dominant grass

Another way to obscure the importance of Aaronsohn's discovery of the Palestine wild wheat is to include it in the same class with the several other wild species of Triticum and Aegilops that has been put forward by previous writers as ancestors of the cultivated wheats, but subsequently rejected. This course is followed by Schulz in connection with his announement of the finding of another form of wild wheat in Persia. In attempting to distinguish the Persian plant from the wild wheat of Palestine, Schulz proposes, in effect, to dismiss Aaronsohn's wild wheat for consideration on the assumption that it is a hybrid between an Asiatic form of Triticum aegilopoides (Link) and Triticum dicoccoides Koenicke, ~~which is said~~ stated by Schulz to have been discovered by Kotschy in 1855.

Kotschy's relation tothe subject seems to have consisted in the accidental inclusion of a spikelet of the wild wheat in a specimen of wild barley, which seem to show that he had the plant before him, but failed to "discover" it, even to the extent of collecting a specimen. Koernicke, it is true, recognized Kotschy's as representing a new form of Triticum and finally named it as a variety of einkorn (Triticum monococcum var. dicoccoides), the matter was left in abeyance for many years, probably because of uncertainty of the orign of Kotschy's fragment, until Aaronsohn's persistant search was rewarded by the recognition of the plant in nature. The historical fact that the x varietal name dicoccoides belongs, according to the strict rules of taxonomy to the spikelet that Koernicke found in Kotschy's specimen of wild barley should not be allowed to mislead us regarding the nature of Aaronsohn's discovery.

It is not inconceivable that the wild wheat discovered by Aaronsohn may not have coincided absolutely with the form previously represented by the fragment in Koernicke's herbarium.

For Aaronsohn ascertained not only the existance of a wild wheat plant in Palestine, but also called attention to the wealth of forms. It is this polymorphic character that gives the plant its chief claim to our attention as a possible progenitor of our domesticated wheats, or of new forms of cereals that may be developed from it.

A plant without flexibility of form would be a very unpromising canidate, either as an ancestor of existing varieties of cereals or as a progenitor of new types.

Thus Schulz's assumption of the hybrid nature of Aaronsohn's wild wheat is misleading in two ways, first in the asserting on improved and apparently improbable relationship with einkorn, and second in disregarding the actual wealth of forms represented in the Palestine wild wheat.

Schulz's remarks that the hybrid seems to be locally more abundant than Triticum dicocoides only makes the gratuitious nature of his assumption the more apparent. Two wild species of plants that occupied the same area and producing hybrids more abundant than the parent forms would not be two species but would have fused long since into homogenous unity. It is a fact,now well recognized among students of geographical distribution of animals and plants, that species capable of free interbreeding do not occupy the same areas. Either geographical isolation or some other barrier of structure, habits, or season of breeding is necessary to the differentiation of natural specific groups of species in nature.

Some of the difficulties that stand in the way of a better appreciation of the discovery of the wild wheat may be ascribed to the very artificial classifications which have been used as the basis of the study of the cereals. It is easy to understand that a mind sufficiently grounded in the use of the highly conventional characters that are used for distinguishing species among the domesticated types of wheat would feel it necessary to reject and explain away as hybrids or otherwise, the wide range of characters manifested by the wild wheat. Indeed, it is only as we are willing to recognize the plant as something apart from and independent of the traditions of cereal classification that it becomes possible to get a better perspective of the general biôogical significance of a truly wild relative of our cultivated wheats.

Koernicke persisted to the last in treating the Palestine wheat asa a more taxonomic appendage to one of the cultivated wheats, at first of the einkorn wheat(Triticum monococum) and afterward of the emmer wheat(Triticum dicoccum), the second reference resulting in the absurdly tautological combination Triticum dicoccum dicoccoides.

It was for this reason that it seemed best to recommend, that the Palestine wild plant be accorded an independent status, at least provisionally, until its affinities with the domestic types of wheat can be more definitely determined. The suggestion was, therefore, that Koernicke's varietal name dicoccoides be left to find its place in the existing conventional system of classification with the domesticated wheats, and that the new polymorphic species of wild wheat made known by Aaronsohn's explorations be admitted to a normal outdoor status under a new specific name Triticum hermonis,.

One point in the geographical distribution of the species was definitely fixed by taking as the type of the species specimens collected at the upper limit of the plant on the slopes of Mount Hermon itself above the village of Arny. The form of the spikelets in Triticum hermonis is shown in a photograph reproduced in natural size as plate IX of Bulletin 274, Bureau of Plant Industry.

Whether this Mount Hermon form of the wild wheat coincides with that figured by Schulz as representing his "forma Kotschyana" may be difficult or impossible to determine from the characters used by Schulz in distinguishing the Syrian wild wheat from the Persian are extremely variable, even among the plahts that grow in the same locality. But in view of its earlier publication the name hermonis would have precedence over Kotschyana as a general specific or subspecific designation of the Palestine wild wheat, in distinction from that ofxother regions.

But without going outside of Palestine there are many local forms or subspecies that may be found worthy of separate naming, if an adequate study can be made. Two other forms of wild wheat illustrated in the same publication are widely different from Triticum hermonis as to be worthy of separate designation either as species or subspecies. Plate VIII shows the spikelets of a form found near Khan Jubb Yusef, northeast of the Sea of Tiberias.

This form which may be known as Triticum tiberianum differs from Triticum hermonis in having the spikelets much broader and more compact, the outer empty glumes as longer than the inner fertile glumes and densely covered with long hair, the awns relatively short robust and equal, and the glumes of the third flower projecting only slightly between the awns. Most of the spikelets of Triticum tiberianum contain two fully developed kernels, which occurs only rarely in Triticum hermonis and other forms with narrow spikelets and unequal awns.

Plate XIV and figure 2 of Plate XV, show another radically different form, with spikelets broader and more rounded at the sides than in Triticum tiberianum, but the outer glumes shorter than the inner and not clothed with hair. The awns are much longer and more slender, and are more widely separate and arcuate at base.

The third flower is well developed and the glumes are prominent between the bases of the awns. All of the normal spikelets except the last contain two fully developed seeds, and sometimes a third seed, when the middle flowers of the spikelet are perfect. The large size of the seed,is the most notable characteristic of this form, which is about twice as large as in other forms. The size and shape of the seeds are illustrated in text figure No.10 on P.46 of the same bulletin. Figures 5,8,9, and 11 illustrate other features of the same large-seeded form, which may be known as Triticum megnum.

Wild

To Cereal Investigations
Dorsett 9-18-1914

39227. Triticum sp. (F.H.B.No. 2769.)

From Bombay, India. Presented by Mr. Henry D. Baker, American Consul, who secured it from Mr. Frank Harrison, Bombay. Received September 11, 1914.

"Seeds of wild Kathiawar wheat, which is supposed to be the original parent of all wheats in the world, from the district of Kathiawar, on the west coast of India, north of Bombay, and in the Bombay Presidency." (Baker.)

"This wheat grows wild in Kathiawar, a very dry tract on the west coast of India, north of Bombay. It is said all wheats in existence can be traced back to this stock and that it spreads from India westward via Chaldea (Messopotamia) and Egypt, thousands of years ago. Natives who eat this wheat, declare it is more palatable and has a better food value than any of the modern varieties grown in India. It has great drought resisting properties and should do well in the arid tracts of the Southern States of America. Natives collect this wheat in the jungle, and separate it from the straw by treading, i.e. cattle are made to walk over it in a circle until the grain is separated from the straw. They then pass the grain through Hand Querns in order or get rid of the chaff or husk, which is very thick, we find however, that an Engelberg Rice Huller, as manufactured by the Syracuse Firm, will hull it in a most satisfactory manner." (Harrison)

Champus - In Ecuador a kind of fruit jelly made from moti of white maize ground with starch of white sweet potatoes and flavored with piña or naranjilla, the latter a small fruit borne ~~by a nat~~ in clusters ~~along the stalks branches main trunk~~ produced by a small native shrub, possibly a species of Solanum? (cf. N. 230)

Eng. Cachapa

U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF PLANT INDUSTRY,
OFFICE OF CROP ACCLIMATIZATION.

Copied Compared

Chala, or chhalla. Dry stalks and leaves of maize, corn-fodder, harvested in bundles and used extensively in Peru. Given by Arona as the original of chala, now considered as a Spanish word. The form challa is credited to Cuzco in the Vocabulario, chala in Ayacucho, Junin and Ancash, uiru in Aymara. An apparently related term is chaclla, rushes or rods for thatch, cornstalks being used sometimes. ~~(Refer to Guatemala name tasajo? meaning dry meat?).~~

for the dry leaves; also Challpa in Markham, Vocab.

Champa or chhampa, see taclla and tricti.

Champus see slip

Chamri. Ground into coarse grains. (Holguin) Also chamka chamka, anything half ground or merely broken. ChamKani, to break in grinding, but the same word means to clear a field of stones.

Chanca. Maize gods of clay, around Cuzco. (Markham, Vocab.)

See Conopa.

Chapu. Meal cooked with broth. Chapuni, to knead and moisten meal. (Holguin)

cf. Cachapa?

Chaquilpa, see taclla.

Chaquitaclla, see taclla.

Chaqque, or sarachaqque. Mashed maize, the kernels soaked in water and then mashed, said to improve the flavor.

Ccauni Markham (Vocab.) ~~from Ccaunis~~ "Half green maize stalks put to dry for fodder. When dry they are called challi."

chihuyltí

Paste of maize with butter and cheese, ~~cooked in a wrapping of~~ wrapped in a fresh maize leaves and ~~cook~~ cooked, for Palm Sunday - (Holguin)

~~Chicta~~ Payne gives it as a Mexican word, probably Otomi. (See Payne, Vocab., Vol. I.)

G1

Markham (Vocab.) gives Checchi, "roasted maize, chestnut color."

Checchi, or chhechi. Roasted maize ears, but has other meanings. Chhecchini, To toast or roast the ear of maize. Harshberger says that cherchi "signifies roasted maize". (Refers? to Brinton Am. Race, 205) ~~Not in~~ Markham ~~or Holguin~~. The word resembles charqui, dried meat which may be cognate with chaqui, foot or leg. ~~Markham (Vocab.) gives~~ See cȼaspa, ~~toasted maize~~.

Chequipa. ~~A polite or honorific name for chicha that is being drunk.~~ a polite way of inviting one to drink chicha. "Vamos a tomar chequipa". An expression heard at Ollantaytambo, ~~meaning let us go to drink~~ and drink ~~chicha in relation to chicha. Holguin has no such word or~~ Possibly related to chakaypi, meaning ~~at the~~ opposite, or at the right hand ~~of one~~.

Chhullpi. See chullpi.

Chicha. See acca. There is a Quichua word chicha, meaning sandals with thick soles, not the beverage made of maize. Cobo pointed out that chicha was not a Peruvian name, and supposed that it came from Santo Domingo, but it does not seem to have been recorded by the early writers on the West Indies. ~~But became~~ It was adopted very early as the general Spanish name for the fermented drinks found in use among the natives of America. Cobo refers to chicha made of oca, yuca, quinua, and molle in Peru, of algarrobo in Argentina, of strawberries, in Chili, of pine-apples, in Colombia, and of maguey, in Mexico. Middendorf states that chicha is made of barley in Peru, as well as of maize. See also chequipa, jora, vinapu, and mucou.

~~(Markham (Vocab.), ccanchi, a chicha jug.)~~ See Kaychi.

Chihuylti see slip

= duro, quebradizo (Middend. 388), not under Saxon

Chila. In the district of Cuzco and Ollantaytambo a name for hard maize or flint corn, equivalent to muru or muruchu, but chila considered the name of the hardest. The word does not appear in Holguin, and may not have been recorded before but is given by Middendorf as meaning hard or brittle, but though without reference to maize.

Chillpi. Husk of green maize that is dried for making meal. chochocca. The word may be related to chullpi, the Quichua name for sweet-corn, which presumably would be used for drying, but this is practiced very little in the region of Cuzco and Ollantaytambo. Chillpini, Husking the maize ear, pulling the husks apart. The word for husking the dry ears at the end of the season is tipini. See cocopa. chochocca, pacchu and ppanca

Chochocca. Ripe maize dried after being boiled. Markham writes "chochoca", and defines "Maize toasted and afterwards frozen". Holguin has chuchuka. "Maize cooked and dried in the sun, is like rice." Cobo, gives perhaps erroneously, gives this sense for the word cocopa, which Holguin applies to dried potatoes. The Vocabulario gives chochocca as the form

Choclla or chuclla. A small temporary hut in a maize-field, choza or chosita in Spanish, affording shelter and sleeping quarters for the watchman who is always stationed when the corn is husked in the field, away from the house.

choza,

used in Cuzco and Ayacucho, chuchuca in Junin, chuchuga in Ancash, and mutti in Aymara.

Megalithic Agricultural Terraces in Peru.

Agriculture was a highly developed art in ancient Peru. This is evident from the number of plants that were cultivated, the extensive irrigation works, the straightening of rivers, and building of artificial lands in the valleys, as well as by the terracing of the slopes of the mountains. The megalithic or cyclopean terraces are faced with huge blocks of stone, not reduced to regular shapes but fitted together with a perfection that appears incredible when described and amazing when seen.

From the Spanish conquest to the present time it has been supposed that these remarkable structures were built to serve merely as defensive walls or fortifications, but there are several considerations that destroy confidence in this traditional view. That some of the megalithic terraces were used for defensive purposes at the time of the conquest is as easy to believe as that other terraces built of smaller stones were used in the same way when occasion offered. There is nothing to indicate

special military advantages for the megalithic terraces, nothing to show that defensive motives governed the building of any of the terraces. Some of the ancient frontiers are marked by walls built in defensive situations, in narrow passes or even carried across rather broad valleys. Indeed, walls seem to be very much better than terraces for the purposes of primitive warfare, as well as much easier to build. But the megalithic structures were already very old. On account of their peculiar workmanship these structures are referred by archaeologists to a pre-Inca age, a period long before the conquest. Many things might have been forgotten, such as the very extensive terracing and construction of artificial lands in the eastern valleys. This appears to have been done in the megalithic period, and finds little or no mention in the Spanish historians(?).

That the megalithic terraces, including those of the finest workmanship, were built for agricultural purposes is shown by the nature and arrangement of the earth that was filled in behind the retaining walls. While the lower strata were of clay or of coarse rubble, the surface was covered with a thick layer of fine agricultural soil.

Another reason for looking upon the terraces as intended for agricultural purposes is that of the locationsin which they were placed, that is, on slopes with the best exposure to the north, where the maximum of heat could be secured. In a country where bright sunshine every day is the rule, reflection of the light and heat from the stones in the daytime and the retention of heat to be radiated at night, undoubtedly would have very favorable effects upon the growth of plants at the high altitudes where all of the megalithic terraces are located.

Sacsahuana (Sarmiento, Mark.trans., 104, ftnote)

"This great plain to the north-west of Cuzco, called Xaquixahuana, and Sacsahuana; is now known as Surita. Most of the early writers call it Sacsahuana. Sarmiento always places the word Caquia before the name. Capuchini is to provide, capuchic a purveyor. Hence Capuquey means 'my goods,' abbreviated to Caquey, 'my px property.' The meaning is 'my estate of Xaquixahuana.'"

For Mr. Cook

J.G.G.

Discussion seems rather far fetched!

over

Evidently does not refer to Sacsahuaman, the fortress. For this, see Sarmiento, Markh. trans., p. 152 ftn.

Compared

SACSAHUAMAN AN ARBORETUM?

Although huaman has been defined as "fort" (? in Markham?) this seems to have been done on the strength of the name Sacsahuaman itself, as meaning "old fort". The usual name for fort or stronghold is pucara. The Holguin dictionary not only fails to give huaman as meaning fort but says: "Sacsahuaman pucara, nom. The great Castle which the Inca had constructed for the security of the Capital of the Empire, Kusko," battlements formed of veritable boulders (rocas?) the heights? (almenas) which it crowns have holes and tubes which (internan) enter the interior of crest made into the fortress. With what object did they carry the air to the interior of the hill? The savants may answer". Of the origin or meaning of the name nothing is stated directly, but a theory is implied in the next word "sacsayhuaman, nom. Aguila real." But this seems to be inventing an appropriate meaning for sacsa to go with huaman, for there is nothing to show that sacsa or sacsay has any such meaning as royal in any other connection. But with the other interpretation of the nature of the structure such violent assumptions are necessary to account for the name. If instead of huaman meaning falacon we consider huamac, meaning novel, rare, or foreign, and instead of sacsa meaning "torn, ragged, worn-out, second-hand," the word sacha meaning tree or plant be considered, such a name as Sachahuamac becomes possible, with a meaning that is attached by us to botanical garden or conservatory.

(A) [insert on p. 2]

∴ Another etymological possibility even more direct is suggested by a

A word heard in the lower valley of the Urubamba, but not found in any of the dictionaries that were consulted. This is huambal or huamal the letter b usually not being recognized as present in Quichua, though admitted by Holguin in a few words, such as huallimbu, a kind of bread, and saballani, to split the points of the leaves of Furcrae for extracting the fiber. The meaning of huambal or huamal is a seed-bed or nursery for young plants, from which they are set out in the fields.

In view of what for other reasons now appears to have been the use of the fort , the name Sachahuamal would have been altogether appropriate, meaning a tree nursery or arboretum, a place where trees could be planted and carried through the tender seedling stages, an arboretum as we say.

With this view of the matter we are ready to consider the possible significance of a scrap of history handed down by a native writer, Salcamayhua, that the Inca Uira-ccocha, the builder of Sacsahuaman, "neglected all warlike pursuits," but employed himself chiefly in the building of houses and the planting of trees.

Copied

~~The Cyclopean Terraces Farming of Peru.~~

~~The~~ Megalithic Agricultural Terraces in Peru.

Agriculture was a highly developed art in ancient Peru. This is ~~shown not only by the building of~~ evident from the number of plants that were cultivated, the ~~construction of~~ irrigation ~~works, the straightening channels through the mountains~~, the straightening of rivers, ~~and building~~ leveling ~~and laying down~~ of artificial lands in the valleys, ~~and~~ the extensive terracing of as well as by the terracing of the ~~most~~ steep slopes of the mountains.

~~The intensive development of the art of agriculture in ancient Peru is shown most strikingly in the building of the megalithic terraces, which must have required an enormous amount of labor, as well as great skill in masonry and engineering.~~ ~~Huge~~ blocks of ~~granite~~ stone, ~~although~~ not reduced to regular shapes but ~~and laid without mortar, are~~ fitted together with a ~~degree of~~ perfection that appears incredible when described and amazing when seen. ~~attained by no other primitive people.~~

¶ ~~The purpose of these remarkable structures has been misunderstood.~~ ¶ From the Spanish conquest to the present time ~~they have been considered~~ it has been supposed that these remarkable structures were built to serve merely as defensive walls or fortifications, ~~but this view appears not is neither becomes untenable the nature and perfection of~~ ~~Indeed, it is not certain that they were being used for other than~~ ~~It may be~~ that ~~the~~ some of the terraces were used for defensive purposes at the time of the conquest, ~~since no~~ is easy to believe, ~~though it is plain that they could not have been very though~~ ~~reference to another use has been detected in the writings of the numerous Spanish historians.~~ But the megalithic structures were already very old. On account of their peculiar workmanship the megalithic structures are referred by archaeologists to a pre-Inca age, a period long before the conquest. Many things might have been forgotten, such as the very extensive terracing and construction of artificial lands in the eastern valleys. This appears to have been done in the megalithic period, and finds little or no mention in the Spanish historians(?).

[Left margin:] ~~but this assumption is not~~ but this assumption fails to explain either the but there are several considerations that render this ~~supposition~~ traditional ~~view appears~~ destroy confidence in this traditional view.

over

The ~~Cyclopean or Megalithic~~ megalithic or Cyclopean terraces ~~represent the~~ are faced with huge

Ms. of Mr. Cook.

Copied & compared

J.G.S.

9/26/17

Copied

but this affords no (c(?) ...

and no doubt many of the

as as that the other kinds of

terraces found the want was had

to the other terraces in the same

for as that other terraces served the

built of smaller stones

were used for the same way.

were would serve the were used in the

same way when occasion offered. The

fact There is nothing to indicate that the

but the megalithic terraces could serve

special military advantages for the

megalithic terraces, they are not

nothing that would give a they do not

they are not higher than

exceed the others in height!

nothing that would appear to explain the

would serve to explain

they are not built or suggest a

nothing in the way of to suggest as

an explanation for the extra labor.

nothing to show that the defensive

motives governed the building of the ancient

any of the terraces some of the walls were

frontiers are marked by walls built in defensive

built across some of the valleys,

situations, in narrow passes or across cutting

to as some of them carried for

miles over rough country and up

but there to keep even carried across

rather (?) the valleys but the terraces. It is the

it is plain that. Indeed, walls seem to

Necessary to reduce terraces of the land

but If Indeed As defensive walls were used for the purpose. Instead of

The purpose of defensive primitive warfare walls would be very

much better than the terraces for the purposes of primitive warfare walls

would be very

... for the purposes of primitive warfare, that

... much better than terraces for the purposes of

... it was expensive ... was an agricultural and not a military operation.

~~who~~ ~~refuted to have been~~ builder of
~~it was credited with~~
~~erection~~ Saesahuaman
the ~~building~~ of ~~Sac~~ the
~~of fortress, was~~ ~~interested in~~
~~the planting of~~ ~~the passage~~
~~trees, plant~~
~~is~~ not a warlike sovereign,
but was interested in ~~the planting~~
of trees and ~~the but building~~
~~of houses~~ all warlike
"neglected ~~Does~~ but was
pursuits." ~~building of houses~~
~~remembered as~~ ~~active in the building of trees,~~
~~and the planting of~~ accord
"~~His chief employment~~ ~~is~~ native
~~according to~~ Salcas the ~~dr~~ ~~& his~~
~~Salcamayhua~~
~~historian~~ ~~the~~
~~chief employment~~ himself was chiefly in the
but ~~was~~ employed houses and the
building of
planting of trees.

In view of what no fen other reasons ~~has been~~ a now appears to have been the use of the fact the name Sachahuamel would have been altogether appropriate, ~~a place where trees could~~ ~~a tree nursery, a place~~ ~~or arboretum~~ ~~where means~~ ~~or tree~~ nursery or means a tree place where arboretum / a place and trees could be planted and ~~the~~ ~~ones~~ tender as we say, carried ~~through~~ the arboretum are no ~~such~~ stages x // With this view we are ready of ~~the~~ matter to consider the possible significance of a scrap of ~~mere~~ history handed down by ^ a native writer, ~~the~~ to Salcamayhua, ~~an~~ that the Inca Uira-ccocha, ~~who~~ the

This is ~~huambal or~~ huamal ~~or~~ huambal, ~~the be which might~~ or huamal the letter b usually ~~as~~ not being recognized ~~by most or~~ as present in Quichua, though [illegible] admitted by Holguin in a few words, such as huallimbu, a kind of tree, and saballani, to split the points of ~~cabuya~~ ~~leaves, Furcrea~~ the leaves of the Furcrae for extracting the fiber — The meaning of ~~huamal~~ or huambal or huamal is ~~a nurse seed~~ [illegible] a seed-~~plant a nursery~~ bed or nursery for young plants, ~~set~~ from which they are set out in the fields, ~~the~~

~~Sacha~~huamal

to go with ~~huamar~~

Sacsa, for there is nothing to show that Sacsay ~~sacsa~~ or

~~means royal in or~~ has any such meaning

~~any~~ ~~he~~ as royal in any other connection. But

~~the~~ ~~necessity~~ of recognizing ~~the structure~~ ~~nature of the~~ the other interpretation

with the other interpretation of the structure of the nature of the ~~no~~ ~~much better the~~ assumptions

~~a~~ ~~no~~ such violent to account for the we necessary ~~[illegible]~~

name. ~~[illegible]~~ ~~corrupted into~~

~~A word easily~~

~~It is~~ ~~In~~ If instead of huaman ~~meaning~~ falcon we consider ~~the meaning~~ ~~more germane~~

or of huamac, something ~~more~~ meaning novel, rare, or foreign, and ~~the word~~ instead of sacsa

meang ~~old~~, "torn, ragged,
~~out~~ worn-out, second-hand",
~~but~~ the word sacha means
tree or plant & be considered,
~~we have the~~ it ~~becomes~~
~~possible A~~ such a name as
Sachahuamac becomes
possible, ~~means~~ ~~[tree] Tree~~ meaning
~~plant or~~ ~~a~~
~~express~~ ~~the thing which we~~
with a meaning that is allocated
~~have~~ ~~attach~~ ~~to~~ ~~conservatory~~ to or conservatory.
by us the garden or
botanical garden ~~for tree or~~
another ~~possibility~~ possibility to even
etymological possibility is suggested
~~suggested~~ more direct ~~earlier~~ ~~heard~~ in the ~~tree~~ ~~Easter~~
by a word ~~heard~~ is Ollantaytambo used
~~low~~ used at the lower valley Oxford
~~used~~ in the Urubamba, but not
the ~~accented~~ in any of the dictionary?
not were consulted

veritable boulders (rocas?) the
heights? (almenas?) which its
crowns have holes and tubes
which (internan) enter the interior of
~~the~~ crest made into the
fortress - with what object did
they carry the air to the
interior of ~~the~~ hill? ~~Let~~ "
the savants may answer"
~~But to~~ ~~But~~
~~But this~~ ~~does~~
~~the the the distinction~~ of the
~~The next word app~~ meaning
origin or ~~etymology~~ is stated
of the name ~~nothing~~ ~~the next~~
~~but~~ directly, but in the
a theory is implied in
next word "Sacsayhuaman, nom.
aguila real". ~~This~~ ~~accom~~ But
~~this~~ seems to be inventing a meaning for

Sacsahuaman an Arboretum?,

Although huaman has been defined as "fort" (? or Markha?) this seems to have been done on the strength of the name Sacsahuaman itself, as meaning "old fort." ~~Beyond~~ ~~this there~~ The usual name for fort or stronghold is pucara, ~~and~~ the Holguin dictionary ~~says~~ ~~does no~~ not ~~Sacsahuaman~~ only fails to ~~give~~ give huaman as meaning fort but ~~enters~~ says "Sacsahuaman ~~the name~~ pucara, nom. ~~of~~ the great Castle which the Inca had constructed ~~to~~ for security of the Capital of ~~his~~ the ~~Empire~~ ~~Cuzco~~ Kusko." ~~(Cuzco)~~ battlements formed of

3 be secured. In a country where ~~all of~~ bright sunshine every day is the rule, the ~~absorption of heat reflection wo radiation of heat from the~~ reflection of the light and heat from the stones in the daytime and ~~the radiation of heat at night from the stones that had~~ the retention of heat to be radiated at night ~~to~~ would undoubtedly have very ~~dis~~ favorable effects upon the growth of plants at the high altitudes where ~~the~~ ~~m~~ all of the ~~stored~~ megalithic terraces are located.

~~does not~~ finds little or no mention in the Spanish historians.

That the megalithic terraces, including those of the finest ~~structure~~ ~~did~~ ~~were constructed for~~ built workmanship were ~~constructed for~~ agricultural purposes ~~is evident~~ is shown by the nature and arrangement of ~~nature of the construction~~ ~~fact that the~~ the earth that was filled in ~~to~~ was put ~~earth behind them~~ behind the [illegible] ~~in place for~~ retaining walls. ~~which~~ While the lower strata were of clay or of coarse rubble ~~with a~~ the surface was covered with a thick layer of fine agricultural soil.

Another reason for looking upon the terraces as intended for agricultural purposes is ~~the~~ ~~that~~ of the locations in which they were placed, that is on the slopes ~~facing the north~~ with the best exposure to the north, where ~~get~~ the maximum of heat could

2)

On account of their ~~very different &~~ peculiar workmanship the megalithic structures are ~~not~~ referred by archaeologists ~~to what is~~ to a pre-Inca age, a period ~~antecedent to~~ ~~preceding the far back of the~~ ~~than the~~ ~~c farther back~~ before the conquest. ~~that~~ long ~~preceding~~ ~~might have been many things~~ ~~forgotten. Thus &~~ ~~Whether used &~~ Many things might have been forgotten, such as

~~The Incas. There are reasons to~~ ~~The~~ Incas appear ~~to have been~~ ~~a more military~~ ~~the ensl~~ very extensive terracing ~~of the easte~~ and ~~building~~ construction of artificial land ~~in the easter~~ valleys. ~~also have~~ Thus appears to have been done ~~occurred~~ in the megalithic period, and

~~Megalithic Architecture~~

Megalithic Agricultural Terraces

The ~~most~~ extensive development of the art of agriculture in ancient Peru is shown most strikingly in the ~~building of the~~ huge buildings of the megalithic terraces, which must have required an enormous amount of labor, as well as great skill in masonry and engineering. Huge blocks of granite, ~~of irregular~~ although not regular in shape, are reduced to regular and laid without mortar, nevertheless fitted together with a degree of perfection attained by no other primitive people.

The ~~purpose~~ agricultural of these remarkable
structures has been misunderstood.
From the ~~time of the~~ Spanish
conquest ~~until~~ to the present time
they have been ~~looked upon~~ considered
as ~~forts or~~ fortifications
defensive walls or fortifications
~~especially the It is very~~
~~understand how the Spaniards~~ they a purpose
~~Incidentally no doubt~~
which some of them were
Indeed, it is not certain that they were ~~used for~~
~~served any other~~
being used for other than defensive
purposes at the time of the conquest,
or the Spanish historians since no
~~mention of the food be~~ reference to
another use has been detected
in the writings of the numerous
Spanish historians. ~~At atlant~~
~~It is certain, however, that the megalithic~~
~~megalithic~~ But the
structures were ~~above of many~~

perf

Guarango. The ~~native~~ Quichua name & applied to Acacia farnesiana, and similar leguminous trees, one of which is ~~described~~ mentioned by Cobo as ~~used extensively~~ in connection with the agriculture of the Pacific Coast. The dried leaves ~~being appl~~ collected in deep ... fertilizer, and as a means of protecting the crops from injury by alkali, as alfalfa is now being used in the orange-groves of California. See mahamaes.

growing abundantly in the dry coast districts where the system of planting maize and other crops in artificial depressions was practiced.

Maize words

Guarango ~~to~~ the native name ~~of~~ ~~several~~ of Acacia farnesiana and

~~species~~ and similar of leguminous trees, ~~is one of~~

~~which~~ one of which ~~was~~ is described

by Cobo as ~~furnishing~~ used extensively

in connection with the agriculture of

the Pacific coast, the leaves being

applied as fertilizer and as a means

~~of avoiding injury~~ of protecting the

crops from injury by ~~at~~ alkali, as

alfalfa is now being used in ~~California~~ the orange-groves of California.

See Mahamaes

size, some being round or square, but and many of these 100 to 200 paces across,
and but most of them long and narrow, one noted extending for as much as half a league. Sometimes the larger ones were divided by ridges of sand, which was piled up around the borders as a fence or barrier to keep out intruders. Some of the excavations were two or three estados in depth, but others less.

Maize words

Copied

Mahamaes. Artificial ~~pits~~ hoyas, in Spanish
depressions or pits, for planting
maize or other crops in ~~dry~~ and
~~regions, ~~ ~~espec~~ districts
~~dt along the~~ especially along
the coast, where moist soil
~~could be foun~~ could be found
underneath the dry sand. ~~The~~
~~most~~ ~~those of the district of~~ Cobo
~~Ch~~ ~~two districts~~ ~~Chil~~
~~gu~~ describes those of Chilca and
Villacuri as famous in his day,
the former close to the sea, the
latter ~~at a distance~~ four or
five leagues inland. Pieces of the
small fish were ~~use~~ planted with
maize at Chilca, and in other
~~leav~~. places ~~the~~ leaves of the ~~l~~ ~~use~~ fertilizer,
guarango tree were ~~collecte~~ used for ~~this~~
~~and especially~~ As a means of avoiding injury from alkali
a ~~thick~~ 'dressing' of ~~these leav~~ guarango leaves was applied every two
the depressions varied greatly in ~~size~~ shape and
in three years.

Maize words

perf. ppn

Mahamaes. Artifical sunken gardens ~~depressions or pits~~, in Spanish hoyas, for planting maize or other crops in arid districts, especially along the Pacific coast of southern Peru, where most soil could be found underneath the dry sand. Cobo describes the mahamaes of Chilca and Villacuri as famous in his day, the former close to the sea, the latter four or five leagues inland. Pieces of small fish were planted with the maize at Chilca, and in other places leaves of the guarango tree were used for fertilizer. As a means of avoiding injury from alkali a dressing of guarango leaves was applied every two or three years. The depressions varied greatly in shape and size, some being round or square, and ~~many of these~~ often 100 to 200 paces across, but most of them long and narrow, one noted by Cobo as extending for half a league. Sometimes the larger mahamaes were divided by ridges of sand, which was piled up around the borders as a fence or barrier to keep out intruders. Some of the excavations were ~~two or three estados in depth~~, but others less. ~~from 12 to 18 feet~~ (12 to 18 feet)

The word is not found in the Quichua dictionaries and may belong to one ~~have been borrowed from the~~ be borrowed from the language of one of the coast tribes that were conquered by the Incas.

(From Payne's History of the New World, vol. 2, pp. 547-48)

"The stage of progress represented by the Inca people is probably too remote, and our knowledge of it too imperfect, to permit of our estimating it with any approach to accuracy: but no one can follow the authorities without being convinced that the degrading despotism of Peru reacted with fatal certainty on the characters of those who exercised it, and that the Apu-Ccapac-Incas were by habit and policy brutal and sanguinary tyrants. Compared with them the cannibal chiefs of Anahuac appear almost in the light of polished and civilised rulers. In general aspect the culture of Peru was of a lower grade than that of Mexico. The Quichua-Aymara stock, if not absolutely inferior in mental capacity to the Nahuatlacan, was inferior to the latter in mental cultivation. Probably its advancement was of more recent date; its success in domesticating the llama rendered material welfare independent of renewed effort; in the colder climate of the Peruvian plateau the brain was perhaps more sluggish, and the comparatively monotonous aspect of nature communicated to it a fainter stimulus. The most conspicuous

deficiencies in Peruvian progress, when compared with the Nahuatlacan, are the absence of any continuous reckoning of the divisions of time, although denary arithmetic was highly cultivated, and the solstices were regularly observed as indications of the recurring seasons; the want of any application of imitative art to other purposes than the decoration of pottery and the fabrication of rude solid figures of men and animals; and an intense materialism in religion, which adopted nearly all natural things as objects of veneration, although it recognised spirits as unseen causes of natural phenomena, and admitted a first cause or general creator, whom the current opinion placed on a higher footing than the greatest of all natural huacas, the Sun. The ingenious time-reckoning of the Mexicans, their elaborate pinturas, and the conventional symbolism which their pictographic system was gradually developing--a symbolism which promised, at some distant date, to produce a true syllabary-- were intellectual achievements to which Peruvian advancement affords no parallel. Yet when the compar-

atively recent origin of Peruvian culture is borne in mind, it might plausibly be contended that there is little, after all, to choose between the two. Thanks to the llama and paco, and to the great abundance of both animals in their wild state, the Peruvians were free from the organised cannibalism which is the great reproach of Mexico. Their theology, though it demanded human sacrifices, was simpler and more rational. Under far greater geographical difficulties, they established a stable government over a vaster territory than that subject to the dominant pueblos of Mexico; and its organisation, considered either from the military or the administrative point of view, was more complete, and probably not less efficient, than that devised by the Nahuatlacâ, although it fell to pieces more quickly, as will appear in our next Book, before the Spanish invaders."

(End of extract)

(Harshberger, Maize: A Botanical and Economic Study, in Contributions from the Botan. Lab., Univ. of Pa., Vol. 1, Phila., 1897)

	Tortilla	Ear	Grain	Unripe
1 Huasteca	bacam	guai	isis	ajam
2 Maya	vuaj	nal	ixim	nal
3 Chontal	"	"	"	chojno
4 Tzental	"	"	"	ajan
5 Tzotzil	"	----	"	"
6 Chanabal	"	jal	"	"
7 Chol	"	"	"	sal
8 Quekchi	vua	"	"	och
9 Pakonchi	vuic	"	"	rexjal
10 Pokomam	"	"	"	ajm
11 Cakchiquel	vuay	"	"	iiz
12 Quiche	vua-lej	"	"	rexjal
13 Uspantica	vua-lej	"	"	cux
14 Ixil	----	"	"	matzinjal
15 Aguateca	vua	"	"	xeba
16 Mame	----	"	"	----

CORN - (Culture among the Paez Indians).

About Palm Sunday (Domingo de Ramos), i. e. sometimes between March 15th and April 15th, is the date set for corn seeding. In the old Paez calendar, the moon which falls within that period was called txind-âte, that is, mes de sementeras or seeding moon.

The seeds have been selected from the previous crop, and kept on the ears, protected by the husks. No attention is paid to the separation of the several varieties; it is even asserted that the crop is fuller and more abundant when care is taken to mix together all varieties. Maiz de año and maiz temprano however, are not sown at the same time. It is a curious fact that the maiz de año, which takes more time to ripen its ears, is sown after the short seasoned variety.

The field, unless a new one, has been prepared by pulling out the remains of the preceeding crop and the weeds, and burning them. Sowing is cooperative, i.e. the owner of a field invites his neighbors and friends to help, expecting to return the invitation. Armed with sharp pointed sticks and provided with a mochila of seed, they start in a line from the foot of the piece of land to be planted, with just enough space between them to have free movements. Thus they progress rapidly up

hill, making holes at 40 to 50cm. distance and putting from six to ten kernels in each hole, that is covered by a stroke of the foot.

When the short seasoned maize is apout 40cm. high, it gets a thorough weeding after which the yearly yellow, capio (soft corn) and chulpe (sweet corn) are planted between lines, as are also beans, mejicanos, zapallos, etc. After that, the field is left alone until there is something to pick.

The short season corn ripens in about six months and is harvested about August, the larger part of the crop being eaten fresh. The año, capio and chulpe need about 300 days to complete their season, i.e. they are ready to pick about Christmas. A A second regular crop of the short seasoned variety is planted in September and picked up in February.

After each crop, the field is left alone for one or two years.

Varieties

CORN

"The variety cultivated at Buga (Cauca), produces enormous ears, with compressed, white and translucent kernels, and covered with deep purple husks. It is a precious variety worth the while being introduced in Europe".

Ed. André, Tour du Monde, 1879, 1, p.128.

CORN - (General characteristics of varieties, etc,).

In Colombia, maize is cultivated from sea-level up to about 2500m. - The varieties of the Flint group called maiz de ano and maiz temprano, are planted over the whole altitudinal range, with probable variations in characters, length of season, etc, which have not yet been thoroughly investigated.

Capio, a Soft Corn, and chulpe, the native Sweet Corn, are mountain varieties and it is said that when planted in the tierra caliente they grow viciously but give only imperfect ears. They also are long seasoned, 300 days being the average length of time between planting and harvesting.

The maiz de ano has higher stems (about 20 nodes or 5 to 6 m.) than the maiz temprano and has almost always adventicious roots up to the seventh node and even higher. It gives one or two ears in poor location and up to five ears in very rich soil. The first, or highest ear, appears on the sixteenth, fifteenth or fourteenth node. it is scarcely necessary th say that it is called maiz de ano on account of its long season.

The sulphur yellow variety is characterized by the purple coloring of its stems, sheaths and tassels, the latter being much darker, The cobs are also purple, or

purplish.

The yearly white is slender, pale green with purplish tinges on stems and sheaths. Tassels green, more or less tinged with purple. Silk purplish. It generally bears only two ears, the uppermost developing first.

All observed varieties are protrandrous. None of them have suckers.

Sometimes the husks of the short seasoned varieties develop small stiff leaves, about 15cm. long and more or less perpendicular to the ear.

According to the natives, there is no exterior difference between the capio and chulpe varieties.

In the kernels of each group, temprano, ano, chulpe and capio, all variations of color, viz. white, yellow, bluish, purple and black, are found, and , in consequence of the continous mixing of varieties, it is difficult to meet with a purely bred ear

One of the most interesting varieties of maize met with in the Southwestern part of Colombia is the Chocosito, or Choco small corn, raised on the Pacific coast, some distance north and south of Buenaventura.

That region is characterized climatically by the very large amount of its rainfall, distributed all year over, to the detriment of agriculture. In the section vi-

sited by me, the soil once ridden from its vegetation becomes practically a swamp, and is soon covered with Eleocharis and a very few other species belonging to the same vegetation type. No agriculture, in the usual signification of the word, would be practicable, except on the gravelly permeable banks of the rivers.

In the forest, on account of the larger evaporation, the soil is relatively dry, and keeps so while protected ageinst the direct access of the rainwater. For that reason, the natives plant their corn in the forest and under the trees, after having made away with the underbrush.

The seed is sown broadcast and very thick, for many kernels will rot, and others be destroyed by birds and small rodents, before germinating. Then the trees are felled on the plantation, that is left to itself until harvesting time.

The few plants that succeed in their hard fight for life develop long, slender, crooked, vine-like stems, that find their way through, and are supported by, the layer of brush formed by the dead branches of the trees. Strage to say, that maize is exceedingly prolific, giving from 2 to 5 small 22-rowed ears, densely covered with diminute kernels of the Flint type.

I obtained only two varieties, both of Flint Chocosito, but was told that there also a chocosito of the capio, or Soft Corn type.

CORN. (Origin of Maize).

In the Cauca Valley there is a tradition according to which the flint Corn varieties were imported from North. Two kinds, which however I could not obtain, are called respectively Yucatan and Cuba, and are said to have been imported from these last countries about two hundred years ago.

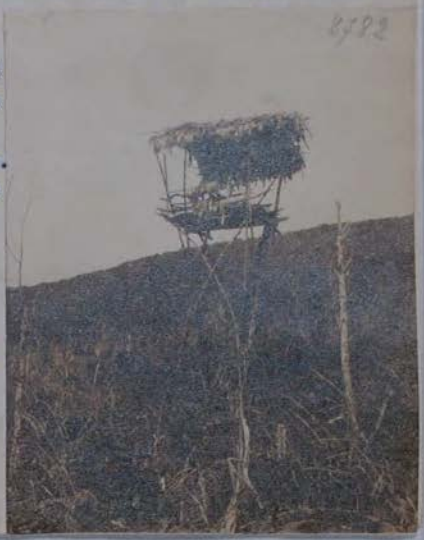
As far as I know, all South American native varieties of corn belong to the Soft and the Sweet Corn groups.

CORN - (Protection of crop against birds and large animals).

The Paez Indians build on high poles in the middle of their corn fields small watch-huts, in which children spend their days, once at a time, during the last ripening period of the crop. Now and then their shouts are heard or the eye is attracted by their waving old rags at the end of a long pole, to scare away the flocks of parriquits that lay siege to the grain. At an earlier stage, the same hut is used by the elder men as a lookout from which they easily discover and shoot the deer that are so fond of the green maize.

Another contrivance for the same purpose is the uaska, long cable made of vines tied end to end. One extremity of the cable is tied to some tree or post across the field, while the other is at the house near by on the opposite side.

The cable is lowered so as to permit a general



shaking of the maize stems. Other times the cable is suspended higher, and old rags, bunches of grass, or other scare-crws are hanging from it. Now and then durring day-time the women in the house give a few lively shakes to the cable, shouting at the same time to the top of their voices.

Protective characters.

CORN. (Color protection against weevils)

On a "Capio morado" ear (Co 24), with about 40% of the kernels bored by weevils, none of the 28 white kernels scattered among the purple ones were attacked, and most of the reddish purple, i.e. lighter purplish colored kernels, were also spared. The question now is whether color has any value as to protecting corn against the attacks of weevils.

CORN. ("Aco", a kind of Corn Meal)

Aco is a very fine ground corn meal, to which there are added sugar, cinnamon, and small portions of wheat, cebada, and lentejas flour. The Indians and mixed arrieros and peasants of Southern Cauca (Pasto, Telembi, etc) use it as staple-food in their travels, mixing it with water or chicha. It is said to be of agreeable flavour and very nutritious.

CORN. - ("Muti", or "Mote" , a kind of Corn gruel).

Muti is a Kechua word applied to a meal prepared with the black corn. This is boiled whole, going thus through a kind of wet popping, then peeled and made into gruel.

CORN - Uses among the Paez Indians

To prepare masa or dough, the corn is put in water to soak until it is quite soft Then it is easily separated from the shell and ready to be used for several meals. Although the water is generally renovated every day, the mass is rotten in a very short time.

When mote is prepared, i. e. when it is desired to simply shell the kernels without causing their disgregation, ashes are used. The well peeled kernels are thoroughly washed, and then lightly boiled in water. This is the mote.

The water used to wash the shelled corn is whitish on account of the suspended starch. It is collected in shallow recipients and left to repose. The very fine starch thus obtained is made into pap for the younger children, or gruel for sick people. The remaining water, which still contains some glutinous substance, is left to ferment and is drunk .under the names of birimbí or aúnche.

Maize-gods of Mexico (Spence, Myths of Mexico and Peru, New York Thomas Y. Crowell Co., n.d., 85)

A special group of deities called Centeotl presided over the agriculture of Mexico, each of whom personified one or other of the various aspects of the maize-plant. The chief goddess of maize, however, was Chicomecohuatl (Seven-serpent), her name being an allusion to the fertilising power of water, which element the Mexicans symbolised by the ~~serpent~~ serpent. As Xilonen she typified the xilote, or green ear of the maize. But it is probable that Chicomecohuatl was the creation of an older race, and that the Nahua new-comers adopted or brought with them another growth-spirit, the "Earth-mother," Teteoinnan (Mother of the Gods), or Tocitzin (Our Grandmother). This goddess had a son, Centeotl, a male maize-spirit. Sometimes the mother ~~also~~ was also known as Centeotl, the generic name for the entire group, and this fact has led to some confusion in the minds of Americanists. But this does not mean that Chicomecohuatl was by any means neglected. Her spring festival, held on April 5, was known as Hueytozoztli (The Great Watch), and was accompanied by a general fast, when the dwellings of the Mexicans were decorated with bulrushes which had been sprinkled with blood drawn from the extremities of the inmates. The statues of the little tepitoton (household gods) were also decorated. The worshippers then proceeded to the maize-fields, where they pulled the tender stalks of the growing maize and, having decorated them with flowers, placed them in the calpulli (the common house of the village). A mock combat then took place before the altar of Chicomecohuatl. The girls of the village presented the goddess with bundles of maize of the previous seasons harvesting, later restoring them to the granaries in order that they might be utilised for seed for the coming year. Chicomecohuatl was always repre-

munity then approached the teocalli (pyramid of sacrifice), and, its summit reached, the victim was stripped to a nude condition, the priest plunged a knife of flint into her bosom, and, tearing out the still palpitating heart, offered it up to Chicomecohuatl. In this manner the venerable goddess, weary with the labours of inducing growth in the maize-plant, was supposed to be revivified and refreshed. Hence the name Xalaquia, which signifies "She who is clothed with the Sand." Until the death of the victim it was not lawful to partake of the new corn.

The general appearance of Chicomecohuatl was none too pleasing. Her image rests in the National Museum in Mexico, and is girdled with snakes. On the underside the ~~xx~~ symbolic frog is carved." ~~THExAMERICAN~~

The Offering to Centeotl

During her last hours the victim sacrificed at the Xalequis wore a ritual dress made from the fibres of the aloe, and with this garment the maize-god Centeotl was clothed. Robed in this he temporarily represented the earth-goddess, so that he might receive her sacrifice. The blood of victims was offered up to him in a vessel decorated with that brilliant and artistic featherwork which excited such admiration in the breasts of the commoisseurs and aesthetes of the Europe of the sixteenth century. Upon partaking of this blood-offering the deity emitted a groan so intense and terrifying that it has been left on record that such Spaniards as were present became panic-stricken. This ceremony was followed by another, the nitlcapoloa (tasting of the soil), which consisted in raising a little earth on one finger to the mouth and eating it. "

sented among the household deities of the Mexicans, and on the occasion of her festival the family placed before the image a basket of provisions surmounted by a cooked frog, bearing on its back a piece of cornstalk stuffed with punded maize and vegetables. This frog was symbolic of Chalchihuitlicue, wife of Tlaloc, the rain-god, who assisted Chicomecohuatl in providing a bountiful harvest. In order that the soil might further benefit, a frog, the symbol of water, was sacrificed, so that its vitality should recuperate that of the weary and much-burdened earth.

The Sacrifice of the Dancer

A more important festival of Chicomecohuatl, however, was the Xalaquia, which lasted from June 28 to July 14, commencing when the maize plant had attained its full growth. The women of the pueblo (village) wore their hair unbound, and shook and tossed it so that by sympathetic magic the maize might take the hint and grow correspondingly long. Chian pinolli was consumed in immense quantities, and maize-porridge was eaten. Hilarious dances were nightly performed in the teopan (temple), the central figure in which was the Xalaquia, a female captive or slave, with face painted red and yellow to represent the colours of the maize-plant. She had previously undergone a long course of training in the dancing-school, and now, all unaware of the horrible fate awaiting her, she danced and pirouetted gaily among the rest. Thou Throughout the duration of the festival she danced, and on its expiring night she was accompanied in the dance by the women of the community, who circled round her, chanting the deeds of Chicomecohuatl. When daybreak appeared the company was joined by the chiefs and headmen, who, along with the exhausted and half-fainting victim, danced the solemn death-dance. The entire com-

Haiti, Savanne Carre Aug 22, 1924

Zea mays

Slender stalks chiar of this type of maize, also in British Hond.

Canary Is type from Haiti?

Maiz. (Vivian .Peru.-146-)

The finest maize of the world is grown in Peru.

It is an indigenous product ,cultivated in all parts of the country up to a heigh of 11,500. ft.,

Three and occasionally four crops are reaped annually.

The finest quality is grown in Cuzco ,where the grains are of the size of large beans.

Maize.

The Indians of Alta Vera Paz have numerous varieties of corn and separate names for some of them, words which have no other signification. Others are named "yellow corn", "black corn", etc.

Guat. 1904, No.2, p. 195.

Maize.

Maize is evidently a permanent crop in the vicinity of San Pedro Carcha and Coban. About San Pedro is an almost continuous corn-field, and probably has been for many generations. The locations of such centers of population depends no doubt among primitive peoples on the special productive power of the soil. It is doubtful if these fields are burned about Carcha. They are all about the houses which would make burning difficult, and are extensively fenced to keep out cattle.

Guat. 1904, No.2, p.277.

CORN.

CULTURAL POINTS TO BE NOTED IN THE FIELD.

Altitude. Nature of land used (forest. 1, 2, or 3 year growth) Nature of soil. Distribution and amount of rainfall. Date and season of planting. Date and season of harvesting. Preparation of the ground. How planted? i.e. hills, rows, level or elevated. Distance. Number of kernels per hill. Number of stalks allowed to stand. Is seed pure or mixed either accidentally or intentionally. Prevalence of drought or heavy rains during growing season. Prevalence of high winds. Grown in connection with other crops? Method of gathering? How stored? Purpose for which it is particularly adapted. Enemies or diseases.

Corn-.

About Cajabon is a "black corn with slender dark purple stalks. Said to stand the rain better than other varieties and hence planted in rainy season.

Secanquim-Cajabon, 24. April 1904.

Guat. 1904, No.1. p. 119.

Zea.

The yield of corn about Secanquim is expected to be about 1 fanega (100 pounds) per cuerda about 1/9 of an acre. The yield of the variety grown on the lowland at Las Tinajas near Panzos is greater, and the corn a larger variety, according to Mr. Bird.

April 7, 1905. Sepaculte.

Guatemala, 1905. No. 1. p. 64.

If ear is formed by suppression of branches of tassel, the condition found in Zea ramosa must be taken as intermediate..... metaphanic variation, but this does not explain apparent absence of central spike. An embryonic abortion of the central spike that was to form the ear might result in forcing out of branches lower down, perhaps this might be brought to experimental proof.

Selection of corn for long seeds has limits in drying out capacity, unless special precautions for artificial drying are used. Peruvian corn suffers much in this way.

Making the rows very close maybe undesirable. Ears look better but drying out is likly to be hindered. The space element is not very important, in comparison with having the corn come through in good condition.

Zea mays
Corn

The truth is that the white man's methods and the white man's variety of corn are alike unsuited to the southern conditions.

3ea map
Maize

Milo bad crop, being discarded by careful farmers; stays in land. Injures subsequent crops. Chinese corn should be tested, judging from behavior at San Antonio.

Zea Mays

Corn

Navajo one facter of greater efficiency in making more use of lower leaves, which do not function much in ordinary tall growing late varieties, where lower leaves die or are hidden below dense shade before the crop season is reached. Thus most of the assimulation of food materials for the crop must be done by upper leaves instead of by those near the ground, in ordinary tall kinds of corn. But the Navajo corn also has the upper leaves larger than in ordinary kinds and thus save something in the building of one or two extra joints that bear only small leaves at the top of the stalk in ordinary kinds of corn.

Zea Mays

Corn

Shiprock, 9-11-13, p. 20.

Navajo corn with tassels apparently adapted for shedding pollen from dry period of time. Strong control axis with crowded flowers like hairy Mexican. Also tassels only partly exserted, probably protecting lower flowers through long period.

Zea mays

Corn

Shiprock, N. M. 9-10-13, p.19

Leaves have band of smooth tissue at base covering the node. Corresponds to the pulvinus as specialized portion of leaf. Sometimes colored red when sheath is not. Lines of chlorophyll from sheath proper disappear, when this zone is reached. Outer surface not ribbed, as on sheath above, but more strongly ribbed on the inside. Sometimes hairy?

Zea mays

Corn

Special characters of Navajo corn. Very long central spike of tassel, (up to 47 cm.). Very long upper leaf. Very large broad leaves in proportion to size of plant and size of leaves maintained nearer to top of plant.

Variety must be considered as extremely efficient if production be considered in relation to size of plants, which is very low and compact and able to grow in very close formation. Suckers abundantly even when hills are only 2 feet apart in rows 4 feet apart.

All degrees of redness on sheath leaves, husks stalks and tassels Ear saved: Kernels dark red and cob earstalk very large. In one plant veins of pulvinus dark red but sheaths, stalks and tassels green. Plant stiff and rather tall. Only one sucker. Husks red at base. Such a feature might be useful as distructive varietal character. Endless diversity of stature foliage and ear characters shows that any number of distinct strains might be developed.

Another color peculiarity. Large band of deep red on outer margin of pulvinus not confined to veins. Midrib also tinged with red and husks pink. Rather tall single stalk plant, no suckers. Ear with only slight trace? of pericarp color. Aleurone much varied. (Ear saved. C. F. Collins measurements).

Reddist plants, with sheaths, midribs and husks dark red, seem to be inferior and infertile.

Greatest possible diversity in earliness or relative maturity at this date (Sept. 10). Many plants with all ears mature and husks , while next hills will have all the ears still green. Important to have uniformity in this respect in so that field can be harvested and avoid rotting of ears

and worm injuries which are much worse on the late maturing ear, though ripe ears are also suffering. Plants grow close and keep air moist.

One object to secure materials for testing inheritance of various characters, earliness, lateness, color texture, etc. not necessarily the same as in other types. Indications of dominant white Aleurone. Some ears with very little trace of blue, where many neighboring plants largely blue.

3 ea maize

~~Corn~~ (Chinese)

Apparently good crop at San Antonio. Many naked small ears on sucjers, some with tassels and some without. When grown close together like sorghum each stalk matures small ear. Yield must be considerable. For early cutting and shedding like sorghum might be useful crop in dry climate. Many plants still alive.

Zea mays

Corn (Indians) Indio, Cal. insert p.46

Within a few years native culture of corn at Palm Springs and around Indio has been abandoned.

Zea mays

Corn (Native Varieties of Indian corn in the Southwestern States) Los Ang.Cal.9-26-13,p.32

General paper on this subject desirable to open subject of utilization of native varieties already well adapted to special conditions in some parts of southwestern states. Corn grown in tropical America under much greater range of natural conditions. Indian corn culture of New Mexico and Arizona affords another striking illustration of wide range of adaptation possible for the corn plant. Illustrate adaptive characters by tropical cultures and examples of adaptation. System of culture of Indians should be outlined, and advantages in securing pollination, protection against wind etc., especially in early stages of growth.

High efficiency of this type of corn to be recognized, in smaller size of vegetative parts in comparison with the ear. Also adaptation of adverse conditions, in that ears are formed even though plants are kept very small. Reduces transpiration and thus subject to less danger from drought. Competition of plants in early stages may mean greater tendency to fruitfulness as in cotton, and to earliness.

Zea mays

Corn (Pima) Sacaton, Ariz. 10-4-13, p. 57

Planted by woman following the plow and dropping the corn in the furrow. Hence often one stalk in a place a foot or two apart. But now customary to plow all the land planted to corn. But also said to plant whole handfuls in hills. Mr. Hudson has noticed no red ears in Pima corn. Mostly white and yellow, sometimes dark dull blue.

Tassels very varied often 6 in exsertion, often more. Often few branches (2-3) often many (10)12). Central spike not so much enlarged as in Navajo and Hopi etc. Often not much exceed branches. Well grown plants 5-8 ft. high, occasionally higher. Occasional plants with dull reddish leaves and sheaths, but ears yellow and white.

Pimas do not clean their corn fields from weeds. Land is irrigated, plowed and planted, then harvested. Take only 40-45 days to make the crop. Most of the stalks do not sucker but when suckers do occur they are usually short and bear grain in the tassel or small terminal ear cultural tassel. Lack of sucking tendency perhaps most striking difference from the North American type. Slenderness of stalks, even at base of plant correlated with small size of ear also striking difference from northern types.

Zea mays

Corn (Pima) Sacaton, Ariz. 10-4-13, p. 56

Rather slender narrow leaved type, taller than Hopi, etc. and with smaller ears, borne higher up. Hudson has noticed that it can be planted much deeper than eastern corn.

Deep planting may be secret of system of planting in July, to get away from high temperatures that seem to interfere with late planted corn in the East. Hence long mesocotyl to be expected in Pima corn as male.

Hudson considers Mexican June corn planted late as the best best corn for Sacaton. Pima corn has only small ears, much smaller than Hopi, Zuni and Navajo.

Hudson would like to get some of the small Brownsville corn with the long husks. Birds and worms the serious menace to corn here. Pima corn extensively eaten by birds. Eat it all up as in place seen at Sacaton.

Hudson anxious to undertake corn experiments to ~~xx~~ any extra, practical problem to improve corn production in Indianlands in Gila Valley.

Zea ramosa Greenville, Texas. 9-11-16. p. 134.

Example of metaphanic variation. Infloresences of both sexes branched.

Zea Mays (Cuzco)

"I have to report that the Cuzco corn did not mature any seed, in fact, did not silk. The plants grew very large and tall but did not tassel until the middle of September"

(Extract from letter from Miss Lulu Berry, R. 6, Vinton, Iowa, under date of December 8, 1917. Miss Berry's letter referred to "Cereal Investigations", December 17, 1917.)

scabbed. It growes vpon canes or reedes; every one bears one or two mazorcas, to the which the graine is fastened, and although the graine be bigge, yet finde they great store thereof, so as in some mazorcas I have told seven hundred graines. They must plant it with the hand one by one, and not very ~~think~~ thicke; it requires a hote and moist ground, and growes in great abundance in many places of the Indies. It is not strange in those countries to gether 300 Fanegas or measures for one sowen. There is difference of Mays as there is of wheat, one is great and very nourishing, another small and drie, which they call Morocho.* The greene leaves and stalks of Mays is a good foode for their mules and horses, and it serves them for straw when it is dried; the graine is of more nourishment for horses then barley; and therefore, in those countries, they vse to water their horses before they eate, for if they should drinke after, they would swell as when they eat wheat. Mays is the Indians bread, the which they commonly eate boiled in the graine hote, and they call it Moti,* as the Chinese and Japanese eate their rice sodden with the hote water. Sometimes they eate it baked. There is some Mays round and bigge, as that of Lucanas, which the Spaniards eate roated as ~~xxxxxxxxxxxxxxx~~ a delicate meat, and it hath a better taste then toasted beans. There is another kinde of eating it more pleasant, which is, to grinde the Mays, and to make small cakes

* Muruchu is "hard" in Quichua.

*Mutti, boiled maize.

of the flower, the which they put in the fire, and then bring them hote to the table. In some places they call them Arepas. They make also round bowles of this paste, and so trimme them that they continue long, eating it as a dainty dish.

The Indians also make a certaine kinde of paste of this flour mixt with sugar, a kind of biscuits which they call melindres. . . . The Spaniards and Indians eate this Mays boyled and roasted for daintinesse, when it is tender in the grape like milke; they putte it into the pot, and make sauces that are good to eate. The buds of Mays are very fatte, and serve insteede of butter and oyle; so as this Mays at the Indies serves both for men and beasts, for bread, wine, and oile. For this reason the Viceroy Don Francisco de Toledo saide, that Peru hadde two things rich, and of great norishment, which were Mays, and the cattell of the countrey. In truth, he had reason, for these two things did serve them as a thousand.

I will aske sooner than I can answer it, whence Mays was first carried to the Indies, and why do they call this profitable graine in Italie, Turkie graine? for in trueth I do not finde that the Antients make any mention of this graine, though that millet (that Plinie writes to come from the Indies into Italie, tenne yeares before he didde write it) hath some resemblance unto Mays, for that it is a graine, as he saies, that growes in reede, and covers it selfe with the leafe, and hath the toppe like haires, being very fertile; all which things agree not with millet. To conclude, God hath imparted to ev'ry region what is needefull. To this continent he hath given wheate, which is the chiefe nourishment of man; and to the Indians he hath given Mays, which hath the second place to wheate, for the nourishment of men and beasts."

in the Vilcanote Valley the water is salty. Also in the lower valleys as at Ollantaytambo the water is not considered good and the use of chicha is considered desirable on this account. Might easily precipitate undesirable compounds from the water.

A few cornfields along river below Guayaquil, and more on hillsides behind the city.

relation to wide range of conditions in which corn is raised –
Occupation of cold Pacific coast by people from cold table-lands

Zea mays (Quichua maize words) SS Almirante, 8-27-15, p. 618.

The vocabulary of a plant shows in general how important the plant is, the estimation in which it is held, or the uses to which it is put. The more people handle it and the more things they do with it the more names are likely to be developed. Some words ought to be included in maize vocabulary that are also applied to other plants, such as chocra. May have been chiefly maize at first, if corn were cultivated before the Andean root crops were undertaken. Ricardo says chucjcha for the corn silks, parhuay?for the tassels. From his point of view the use of chicha has relation to the nature of the water supply. Also the supply of maize. Very little chicha used at his native place Santa Rosa. Water considered good there with many springs of fresh water. But

Here Payne suggests that "the herdsmen of the Collao" may have derived their first supplies of maize "from the tribes to the east, and that they founded colonies in the eastern valleys in order to grow maize. Payne has two centers of maize - culture, in Central America and Paraguay. Reports also p. 361 tradition of introduction of maize among Indians "southward of Quito". In the language of the Muyscas of New Granada maize was known by its Guarani name (aba). Considered as indication of drivation from tribes who had migrated northward. Payne would connect all the maize-growing regions of South America into one group with its center in Paraguay. But why Paraguay? No center of domestication there?

Zea mays SS Almirante, 9-2-15, p. 632.

Predominance of cassava and other root-crops in West Indies would indicate that maize followed instead of preceding in that quarter. Traditions of coming if maize general in northern Mexico would be against origin there or in adjacent region. Enormously developed Peruvian vocabulary and primitive methods of using may be taken as indication of long possession if not of fundamental character for Peruvian agriculture. Important to trace Peruvian maize vocabulary further south. Potato claimed to be of southern origin. This also important to verify. Payne (History 1:356) takes it as absolutely proven that maize came from Mexico. Payne refers to tradition of introduction of maize among the Mayas. Also refers p. (358) to "tunicated maize of Paraguay" Also p. 360.

Maize (Acosta, Hist. Inds., 1:228 et seq.)

" . . . and forasmuch as plants were chiefly created for the nourishment of man, and that the chiefe (whereof he takes his nourishment) is bread, it shall be good to shew what bread the Indians vse, and whereon they live for want thereof. They have, as we have heere, a proper name, whereby they note and signifie bread, which at Peru they call tanta, * and in other places by an-

*Tanta is the Quichua for bread.

other name. But the qualitie and substance of the bread the Indians vse differs much from ours; for we finde not ~~that~~ they had any kinde of wheat or barly, nor any other kinde of grain which they vse in Europe to make bread withall: insteede whereof they vsed other kindes of grains and rootes, ~~xxxxxx~~ amongst the which Mays holds the first place, and with reason. In Castile they call it Indian wheat, and in Italie they call it Turkey graine. And even as wheat is the most common graine for the vse of man in the regions of the old world, which are Europe, Asia, Affrike, so, in the new found worlde, the most common graine is Mays, the which is found almost in all the kingdomes of the West Indies, as at Peru, New Spaine, in the new kingdome of Granada, in Gautimala, in Chile, and in the Tierra Firme. I do not finde that in old time, in the Ilands of Barlovente, as Cuba, Santo Domingo, Iamaica, and S. Juan, [Puerto Rico] that they vsed Mays. Now they use more the Yuca and Casavi, whereof we will presently intreate. I do not thinke that this Mays is any thing inferiour to our wheat in strength nor substance, but it is more hote and grosse, and engenders more bloud, whereupon they that have not bin accustomed ~~xxxxxxxx~~ therevnto, if they eat too much, they swell and become

Zea Mays (names) Venezuela.

Conuco in Venezuela - chacra.
Chicura in Venezuela - pointed stick used in planting corn or cotton.

Zea Mays

~~Sacaton~~ (Pima) Mesa, Ariz. Oct. 7-13, p.59

Midsummer and later plants of Pima corn at Sacaton gives roasting ears in 40 or 45 days from seed. Earlier plantings take more time. Late plantings now about 1 ft. high. Expected to tive roasting ears in two or three weeks.

Marshall says tassels earlier than Sta Ana and Sta Rosa corn. Ears mildew in the fall after weather is cold.

Introduction to Peruvian corn paper note maize and potatoes the most important acquisitions to human welfare resulting from discovery of America, but not fully appreciated or utilized as yet. Not sure that we have best varieties or use them the right way. Maize used in tropical American countries in ways unknown to us, and raised under wider range of natural conditions for tropical lowlands and arctic table lands.

Cuzco corn represents another distinct type as different from other corns as they are from each other. Not flint, dent, sweet or popcorn. More like some of the corn cultivated by the Indians but not adopted by us - Tuscaroras? Grown instead of sweet corn. Is Golden Bantam a sweet or a starch corn? But Cuzco is of very soft texture of a mealy starch. Use as a vegetable not as a cereal in our sense. We consider maize as a substitute for Old World cereals. Cuzco still less like these, except in being more like wheat in being starchy.

Compare kernals of Cuzco with some recognized variety - perhaps same as in Geographic Magazine - size, weight, specific gravity, texture softest of starch corns? Easily crushed by the teeth. Not so hard as a dry chestnut, and of pleasant flavor. Better than Spanish or Japanese chestnuts? Large kernals mean less waste in pericarp. Texture of pericarp less firm, so that causes no difficulty in eating. Represents another vegetable, but one that can be kept dry. Might be compared with lima beans, but liable to prove more generally acceptable, if found possible to grow it.

Specialization of leaves of pistillate inflorescence shared with teosinte, but teosinte not specialized to same extent. In florescences not monoecious, though the flowers are. How is this condition described? Perhaps photos of teosinte should be introduced to show how distinct corn is.

Refer to Zea tumeata as supposed primitive type, but probably abnormal. Not well adapted to servive - certainly not in moist climate. Parallel case ? in Triteum polenicum. Teosinte much more branched. Branches not shortened, that is the primary, but the secondary? What is branching habit of teosinte?

Santa Rosa Peru has large heavy ears, with rather deep kernels. Second generation planting has most of the plants very large, but bearing one or two ears. The number of leaves is too large to be considered as normal and the plants are probably abnormal in size, but their behavior appears better than the Cuzco type, at least in the present year which is considered abnormally warm.

With such examples as the above in mind it does not appear that the problem of acclimatization is essentially different from cotton, some types being much better adapted than others, and some altogether refractory. The behavior of hybrids also appears essentially similar, with the possible exception of the lint characters which show more detericration in the later generations, whereas in corn the seed characters are mostly considered.

Tepic corn from Mexico has very large seeds, next largest to Cuzco. Also a soft starchy corn. But ears much larger than Cuzco. In fact Cuzco produced only very small abnormal ears in season of 1917.

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Maize (China).

J. Gonzales de Mendoza's History of the Great and Mighty Kingdon of China.

This book was first printed in Spanish, in 1585, in Rome. An English version was published in 1853 by the Hakluyt Society. Mendoza, an Augustine monk, had himself never been in China. He depends mainly upon the accounts furnished by Martin de Herrada, a monk of the same order, who had been taken, in 1575, by a Spanish ship from Manila to the Chinese port of Ts'uan chou fu (prov.of Fu kien), where he was allowed to spend three months. The vegetable productions observed there by him were Chestnuts, large Melons, a kind of plum called leechias (Nephelium Litchi) of an excellent gallant taste. Of cereals cultivated there he notices, besides Wheat, Barley, Millet, "the plant called Maize, which constitutes the principal food of the Indians in Mexico". This latter statement, made at so early a date, has a peculiar interest for us, for Maize is not indigenous to China and has been introduced to that country since the discovery of America.

Tea (China).

Joannis Petri Maffei. Bergamatis, e Soc.Jesu, Historiarum Indicarum Libri XVI. 1589. Florentiae.

# # # # #

"Caeterum ex herba quadam expressus liquor admodum salutaris, nomine Chia calidus hauritur, ut apud Japonios: cujus maxime beneficio, pituitam, gravedinem, lippitudinem nesciunt; vitamque bene longam, sine ullo terme languore traducunt". Here we find, it seems, the earliest mention made by European writers of Tea

(Cha in Chinese).

Trigault. De Christiana Expeditione apud Sinas suscepta ab Soc. Jesu. Ex P. Matthaei Ricci commentariis. 1615.

# # # # #

There is in China a shrub the leaves of which are boiled into a famous beverage much used by the Chinese, Japanese and other nations conterminous to China. They call it Cia. Its use among the Chinese does not seem to be of very old date; for in their most ancient books no hieroglyphic character is found to designate the cia. The leaves are gathered in spring and dried in the shade. They drink this decoction almost continually. (Tea. Compare above Maffeus).

History of European Botanical Discoveries in China. Bretschneider. Vol. I. 1898. p. 10.

ones. The leaves are about a foot and a half broad and four feet long among the leaves there arises a stem producing a hundred or more smal plantains, or twenty-five or upwards of large ones. This is a tender tree; it does not yield fruit more than once, and requires a year; from the roots other plants shoot up; if the fruit is ripe they pluck it, but if not they cut the tree down, and by putting it into a hot place the fruit soon ripens and becomes yellow; the skin is t ick as the blade of a knife, the rest is all pulp; in flavor they incline to sweet

Benzoni, New World, Hakluyt, p.86-88. 1565.

Bionomy.(Maize)

The growing season of corn comes as we all know during our warm summer months, when as a result of our longer days the air and the soil even in our states, become more heated than in the tropics themselves, and more continuously. There may be intervals of cool weather of course, but during these the corn makes little or no growth, and if the temperature goes too low the plants are killed. It may be that some varieties can stand more cold than others, but of this we have not begun to take account. The all-important practical point is that the corn shall take the fullest possible advantage of the heat and bring its crop to maturity as early as possible or within the period set by our short summer of the northen states. In the south the requirements are very different and altogether more like the tropical lowlands. Earliness is still desirable, of course, but there is no such acute necessity as in the north, and the intervals of cold which may be of use to a variety of corn bred for centuries in the arid elevated regions of Mexico may be altogether lacking so that the plants may suffer from the tropical decline of many of our temperate species.

Guatemala, 1905. No. 3. p. 398.

Mr. Knowles states that sweet corn in La Paz has very fine flavor.

Maize. Sicuani, Peru, 4-14-15, p. 170.

Corn fields killed by slight frost that did not injure potatoes or habas, in the valley above Sicuani.

Killing of corn-fields by frosts that do not injure the potatoes or the habas marks this crop as being of tropical or sub-tropical origin and as definitely limited to localities that have a warm season long enough to mature the seed. The valley above Sicuani, about half way to Aguas Calientes marked the limit of corn cultivation in this district. Corn fields now dead that were alive and fresh a few days ago.

Zea mays SS Limari, 8-23-15, p. 606.

Perhaps worth while to publish a collection of Quichua maize words, showing nature of their acquaintance with the plant. Better to arrange them alphabetically for ease of reference.

Zea S.S. Huasco, 3-26-15, p. 112

Excellent corn fields at all stages of development between Callao and Lima. Willows pollarded, only common tree along roads and fields.

Zea mays

Lima, Peru, 6-17-15, p. 597

Corn at all stages about Lima, as in March.

Zea mays SS Limari, 8-23-15, p. 606.

Cob called coronta at Lima, marlo and maslo not known.

Agriophyllum gobicum. (Cereal) (China)

Agriophyllum gobicum, Bunge. This salsolaceous plant, called sulkher by the Mongols, is of great importance to the inhabitants of Ala shan and may be called, without exaggeration "the gift of the desert". It occurs also in Ordos, in the eastern part of the Central Gobi and in Tsaidam, but is nowhere cultivated. It is an annual prickly saline plant, which grows on the bare sand, generally near the borders of sandy wastes devoid of vegetation. It has very long roots, attains a height of 2, rarely 3 f., blossoms in August and in September produces small seeds yielding an agreeable and nutritious food. The crop of sulkher is best after a rainy summer. In a drought it withers and then the Mongols of Ala shan fare badly the whole year round. To obtain the seeds the Mongols gather the plant and thrash it on the bare clay, patches of which often occur in the midst of the sands. The seeds are first roasted over a slow fire, then pounded in a mortar, when they produce a very palatable flour, which is boiled in tea. The sulkher plant serves as excellent food for domestic animals: horses, camels and sheep are all very fond of it. The numerous sand grouse (Syrrhaptes), which in winter pass from the north to Ala shan, feed upon the sulkher. Prz.I, 157,373; III, 441,442 (the plant figured); IV, 364. The traveller sent seeds to the Bot. Garden St. Petersburg. They germinated, the plant formed leaves, but then withered.

History of European Botanical Discoveries in China. Bretschneider.

Vol. 2, 1898. P.988

Potentilla. (Root crop).

Potentilla anserina, Lin. is a common plant in the mountains of Kan su and on the Upper Huang ho where it is called djuma and supplies edible tubers, which are dug up by the Chinese and Tanguts in autumn and spring. These tubers are washed, dried, and then boiled in water, and eaten with butter, salt or rice. They taste something like beans or young potatoes. Przewalski and his travelling companions found the djuma very palatable. The blind rats (Siphneus) and the ear-pheasant (Crossoptilon auritum) feed on these tubers. Prz. I, 234, III, 344,362.

History of European Botanical Discoveries in China. Bretschneider. Vol. 2, 1898, p. 991.

Stachys tuberifera. (Root crop) (China)

There is a species of Stachys much cultivated in N. China, and especially near Peking for its small edible tubers, which the Chinese call kan lu. After having in vain attempted to introduce this useful vegetable into cultivation in Europe - the tender tubers always got rotten during the voyage through the tropics - I finally succeeded, in 1882, in transmitting to the Societe d'acclim., Paris, a package of these tubers, among which 5 or 6 seemed to show vitality. Mr. A. Paillieux, the energetic Vice-President of the Society then took up the cultivation of this interesting plant, and in the spring of 1882 first planted the surviving tubers in the garden of his estate "Crosnes" near Villeneuve St. Georges. He was successful, and a number of tubers have been produced, he transplanted them in 1883, when each plant again yielded 300 tubers. After this unexpected success, Paillieux began to grow the plant on a large scale, and a few years later provided the Paris market with these relishable tubers, which he made known under the name of "Crosnes". Their culture is of the easiest, the plant growing without much attention and being very prolific. It was soon found to be a real acquisition as a vegetable, and is now extensively grown, not only in France, but also in England, Germany, North America.

The tubers, consisting of nodes marked by buds or eyes, are borne at the ends of underground branches or stolons, exactly as in the potato. In their appearance they resemble somewhat a turbinated snail shell. The cultivated plant very seldom produces flowers. The original wild plant, which is common near Peking

and flowers, never produces tubers.

The tubers of St. tuberifera are highly nutritious. They contain 8 times as much nitrogen as a potato of the same weight, and a large quantity of a corbohydrate called Galactan, which is more digestible than starch, being allied to dextrin (Gard. & For. 1897, 70).

History of European Botanical Discoveries in China. Bretschneider. Vol. 2, 1898, p. 1059.

Sage. (China and Japan).

I may observe that in Valmont de Bomare's "Dictionaire d'Hist.nat.", 1791, article 'Sauge', a curious statement referring to the Dutch Tea trade is found. We read there (source of information not given) that our common sage (Salvia officinalis) is highly valued by the Chinese and Japanese and that the Dutch use (or used) to gather this plant in South Europe and take it to the Chinese, accepting in return the Chinese Tea. For one chest of sage they received from two to three chests of Green Tea. I have in vain tried to find a corroboration for this statement elsewhere.

History of European Botanical Discoveries in China. Bretschneider. Vol. I. 1898. p. 25

Maize (Celebes)

UNITED STATES DEPARTMENT OF AGRICULTURE,
BOTANICAL INVESTIGATIONS AND EXPERIMENTS,
TROPICAL AGRICULTURE,
WASHINGTON, D. C.

The To Ala [woodmen] live in caves ~~in which are frequent in~~ in which the wild and forest-covered mountains of Amontjong are rich, plant a little maize, are monogamous, do not lie, can count only one, etc.

The writers bribed a local rajah, ~~to~~ who detained some members of the tribe for his inspection. Considered very primitive savages—

Sarasins, P. & F. "Neue Reise in Celebes." in Globus - 82 - p. 269
See planting of maize among "Toffia" tribe - [A primitive tribe about which comparatively little is known. What was the origin of the maize?]

(over)

Maize. Plantains.

Wine.

"Since I have treated of the making of bread, I ought also to describe their making of wine, espefially that from maize.

The molandaie, taking a quantity of grain that seems to them sufficient for the wine (or chichia) intended to be made, and having ground it, they put it into water in some large jars, and the women who are charged with the operation, taking a little of the grain, and having rendered it somewhat tender in a pipkin, hand it over t o some other women, whoes office it is to put it into their mouths and gradually chew it; then with an effort they almost cough it out upon a leaf or platter and throw it into the vase with the other mixture, for otherwise this wine, or rather this beverage, would have no strength. It is then b i boiled for three or four hours, after which it is taken off the fire and left to cook, when it is poured through a cloth, and is esteemed good in proportion as it intoxicates, in the same way as if people drank real wine.

They also make wines of other kinds, of honey, of fruits, and of roots, but these do not intoxicate as the first does. They ahev a great many plants that produce a sort of wild grapes, and their berries are like the slo es that grow among thorns, with black skins; but from the stone being large and surrounded by pulp, they do not make wine of them. There are s me trees that produce olives, but smelling horribly and tasting worse. And they have other fruits in abundance, such as houi, plantains, pines, guaiave (guevas), mamei (mammee apples), and guanavana (sour-sops); the houi are like (Canary) plums, with a large stone and little fruit; when ripe they are yellow. Its tree is large, the leaves small and taste a cid. The plantain is a fruit much longer than it is broad, and the little ones (bananas) are much better than the lage

Corn.

Planted March 10. On June 8 no sign of tassels, but other corns had all bloomed. Tassels not developed on June 30; many others dead. On July 18 tassels emerging; still coming July 31. All still alive, but now suffering badly from drought. This is No. M13. M9 produced tassels a littler earlier. Other types of corn mostly dead. All living forms, notably inferior in drought-resistance.

Texas, 1906, p. 2.

19463. Zea mays. Corn.

10-ozs.of red corn.

Specimen seeds of each of the above sent Herbarium.

In the same shipment were received in addition to the above,3 lots of Ricinus sp., 5 worm-eaten seeds and specimen of rubber labeled "Yebe del Ucayaly, Loreto, Peru"; a few worm-eaten seeds of "Sapium verum"; 6-ozs.of dead Cacao seeds; and 5-ozs.of dead coffee berries. The seeds were sent to the Seed Herbarium and the specimen of rubber placed in the specimen file.

19457 to 19465.

From Moyobamba, Peru. Received thru Mr. Serafin Filomeno, November 12, 1906, by mail.

19457. (Undetermined) Rubber.
"Mazaranduba, cultivated rubber" 25 seeds.

19458. (Undetermined). Rubber.
"Monisoba, cultivated rubber". 43 seeds.

19459. (Undetermined). Rubber.
"Yebe de Ceballo Cocha, from Loreto". 6 seeds.
See specimen file for specimen of rubber made from this plant.

19460. (Undetermined). Rubber.

"Yabe de Balsapuerto". 6 seeds.
Specimen of rubber on file in specimen file.

19461. (Undetermined). Rubber.
"Leche Caspi. Wild rubber discovered by S.Filomeno". 60 small seeds.

19462. (Undetermined). Rubber.
"Cuta Moyobambi, not very abundant in resin; discovered by S.Filomeno". 60 small seeds.

19463. Gossypium sp. Cotton.
Brown fibered cotton. 6-ozs.seed. Specimen of fiber sent Dr.Webber.

19464. Gossypium sp., Cotton.
White fibered cotton. 6-ozs.seed. Specimen of fiber sent Dr.Webber.

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF PLANT INDUSTRY.

Cr-W

OFFICE OF SEED AND PLANT INTRODUCTION AND DISTRIBUTION.

FOREIGN EXPLORATIONS.

Washington, D. C.,

December 19, 1906.

Mr. O. F. Cook,

Bionomic Investigations,

Department of Agriculture.

Dear Mr. Cook:

I am sending you herewith a copy of our inventory cards for Nos. 19457 to 19465, rubber, cotton and corn seeds from Peru.

If you desire any of these seeds for your experiments, we will be glad to place them in your hands. I can send you samples if you desire to see them. I would also be glad to show you the specimen of rubber which we have on file here.

Very truly yours,

David Fairchild.

Agricultural Explorer in Charge of Foreign Explorations.

E c.

Ethnology.

Cucurbitaceae. Look up use of seeds of melon and other cucurbits among Indians and Chinese. Were these plants not first domesticated as cereals? Cf. Chinese seed melons with African kiffie seed. Are there American cucurbits grown only for seed? Candy made of squash(?) seed in Guatemala. 1-175.

One of the factors is the weariness of life that appears in all highly developed civilizations. Life becomes so complicated - makes so many demands, and yet leaves so few opportunities of conscious enjoyment of life or exercise of normal instincts that people tend to break away and follow one or another of the lines that seem to lead back to a simpler and more satisfying existence. Hence the rural tendency is found in its most acute form in the largest centers of population--the very citadel of civilization is anxious to escape back to the rural state of its fathers or grandfathers.

Higher Education in the Tropics.

An unsolved problem. Need of education in the field. Sent to Europe or U. S. the result is a merely exotic growth and out of sympathy with home conditions and limitations, ~~while with but danger of the opposite~~ but under ~~ordinary circumstances~~ the usually poor equipment of facilities and instructors institutions of tropical countries produce little of promise either to the individual or to the community.

Political aspects of education in Porto Rico or other countries which it is desired to assimilate to higher standards of culture and government.

Maize. Trans-Pacific?

That Turkish corn has come to us Europeans from America is without doubt; at the same time the Asiatic offshoot of this plant has been noticed quite recently (by Bonafous), and Siebold mentions the picture of Maize kernels on certain primeval Japanese emblems or coats-of-arms, while Aug. de St. Hilaire thinks that the variety which ripens in 40 days, which was cultivated in the Missions of Paraguay, the fatherland of the Guaranis, was there endemic.

Martius, Erhnographie und Sprachenkunde Amerikas, Vol. 1, p. 19 (?)

Maize

CORN.

A very slender variety with dark purple foliage was planted by the Indians in times of scarcity because it will grew quicker than other sorts in rainy seasons when other varieties will produce little or nothing. It can hardly be inferred, however, that the dark color of this variety has anything to do with its adaptation to the rainy season, for Professor Pittier finds that in Mexico the corn varieties of the dry uplands also have purple foliage.