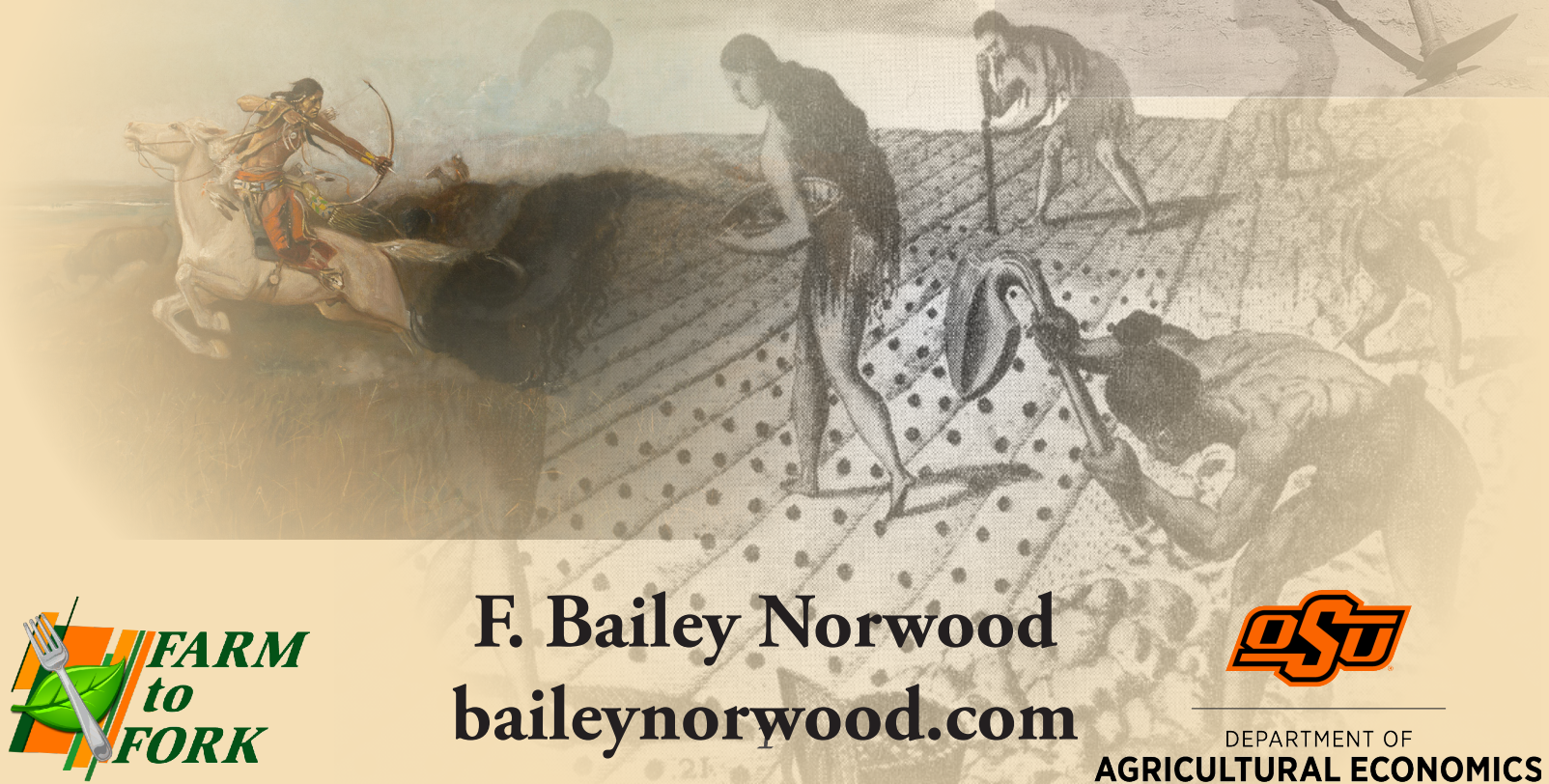


Food in Indigenous America



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The New World Meets the Old

Around 250,000 BCE Homo Sapiens first appeared on the African continent, then ventured north into Europe around 100,000 BCE, during last Ice Age, referred to as the Last Glacial Period began. From the beginning they used tools, but about this time their tools became particularly sophisticated, the bow and arrow being a prime example, and their jewelry strikingly artistic. Thus, while some refer to the period 100,000 to 10,000 BCE as the Last Glacial Period, others refer to it as the Great Leap Forward in terms of human culture.

One of these tools was the boat, and as the glaciers accumulated ice the shores began to retreat, causing the sea level to drop, sometimes as much as 360 feet, making it easier for our distant ancestors to cross continents. They reached Australia around 30,000 BCE, a feat which required them to cross channels fifty miles wide. Then around 15,000 BCE humans living in Siberia crossed a land bridge into Alaska, perhaps following the mammoths, musk oxen, and woolly rhinoceroses they hunted. This was a small group of just a few hundred people: the stock from which most Native Americans today are derived.

The America they entered shares today's land formations, but not all of its wildlife. In addition to mammoths, mastodons, and bison there were horses and camels, two animals that actually originated in North America. The natives may have hunted but they never domesticated the horse, and would have to wait until the Spanish arrived before they became horsemen. Between hunting and environmental changes, two-thirds of the large animals were driven to extinction. Had the horse not crossed the same land bridge between Alaska and Siberia, it would not be with us today.

These Native Americans were strikingly similar to those who remained behind in the Old World in terms of culture and food. Subsistence came from hunting and gathering, though they did alter their environment to their advantage. Setting fires could clear a wooded landscape, providing more forage for the herbivores they hunted. The sunflower is native to North America, and it is likely that they weeded sunflower patches to encourage growth.

Then around 11,000 BCE the technologies between the Old and New World began to drift. The New World was given an advantage, in that it began with a climate and indigenous plants that made agriculture easier to invent.

By 5000 BCE the Old World was farming wheat, pea, olives, rice, millet, sorghum, sugarcane, banana, eggplants, and figs, just to name a few. Native Americans would not start farming until around 3,500 BCE, and domesticated fewer crops, namely maize, beans, squash, sunflower and potato.

The Old World also had a stock of animals that were relatively easy to domesticate, giving rise to the sheep, goat, pig, cow, horse, donkey, water buffalo, and camel. The New

World domesticated only the dog, llama, and turkey.

Of particular importance was the Old World's learning to use livestock for work, like pulling a plow. Farming crops always involves weeding, as domesticated crops generally cannot out-compete wild weeds for water and soil nutrients. Both Old and New World farmers would have used hand-held tools like hoes and shovels to battle weeds, but the human body has limited power. Hook an ox (castrated

male cattle trained to pull implements) to a plow, though, and you can turn the topsoil upside down on a whole acre in one day. In fact, an acre (43,560 square feet) is defined as the amount of land two oxen can plow in a single day.

Oxen seem to have been used for work shortly after their domestication. It pulled wagons and plows, turned axles for grain threshers, logging, and the like. The horse was not domesticated until about 4,000 BCE and then was used mostly for riding. Oxen are generally stronger than horses, but more importantly they don't choke like the horse does when you attach them to a yoke. Horses are strong and walk faster than oxen, but the standard yoke placed pressure on their windpipe. The horse collar solves this problem, allowing farmers to hook horses to plows and wagons and move at a faster pace, but it was not invented until the fifth century in China and was not in common use in Europe until the twelfth century.

The ox and the horse allowed Old World farmers to quickly plow fields while their New World counterparts were still hoeing weeds by hand. This led to vast differences in agricultural practices. The Old World animal-drawn implements were powerful but they were unwieldy, with few degrees of freedom. To turn a horse and plow requires much room, and you generally just point them straight and have them march. Meanwhile, the Native Americans were farming by hand, and the human body has many more degrees of freedom. The human body can easily pivot and turn while remaining at the same place, and the human

If human history was a 1,000 page book, and each page covered 250 years, humans would reach North America on page 940, and the first signs of agriculture would not be seen until page 960!

hand with its opposable thumb is an adroit tool. For this reason, Old World agriculture tended to rely more on brute strength and straight rows of the same plant, while New World agriculture had to rely more on wise decisions, did not need straight rows, and multiple crops could be raised on the same plot of land.

With less domesticated livestock Native Americans relied more on hunting and beans for their protein. Also, they did not have to raise hay to keep their livestock alive during winter. The absence of livestock had another profound implication. Many of the diseases the Europeans brought to the New World, like measles and smallpox, originated in their livestock. It then mutated to affect humans, but humans eventually became immune. Native Americans were never exposed to these animals before 1492 and so they did not develop immunity. Hence, when the viruses traveled across the Atlantic they quickly decimated Native American populations, making it easier for Europeans to assert dominance.

Let us now study Native American agricultural practices in modern-day America, with a keen interest on practices before the arrival of Europeans, and the variety of other ways they obtained food, while not neglecting the interplay between their unique food sources and their culture.

Columbus becomes Christopher

Europeans knew the world was round. What stopped them from sailing west was that most of them knew roughly how large the world was, and thus understood that the distance between Europe and Asia was too large to traverse. One person, though, was not so adept at math and greatly underestimated the size of Earth, and so Columbus set his sails west to find a new trade route with Asia and India. Columbus was more lucky than smart.

When he found land it was a system of islands, and so he assumed he was in the East Indies. So when he encountered the Taino people of the Caribbean he called them “Indians”, as we do today. To celebrate this discovery he began naming all the islands after the Spanish royalty (who funded his endeavor) or Christian holy days. Columbus even gave himself a new name, “Christoferens” (or Christopher) which means “Christ bearer”.

The Taino people grew what Americans call corn, but they referred to it as *mahiz*, which is Anglicized to “maize”, and so the Spanish to this day refer to it as maize. The English did not arrive in the New World until much later, and they already had a word “corn” they used to refer to whatever the main crop in a region was. “Corn” referred to oats in Scotland and wheat in England. The word comes from the German *kurnam*, which means “small seed”, which is

also where the word “kernel” comes from. In some parts of England they would cure beef using small “kernels” of rock salt, giving rise to what we know today as “corned beef”.

The English soon relied heavily on maize in the new world, making it their dominant crop. They naturally referred to it as their “corn”, and the name stuck, so we shall use it here.

Hernando Cortes: 1519

Columbus only conquered Caribbean islands. It was Hernando Cortes who conquered the Aztecs in modern-day Mexico, bringing with him Spanish cattle, pigs, horses, goats, chickens, and sheep; and also sugarcane and grapes. Cortes had heard of the wealthy Aztec empire in Central Mexico, and wanted it for himself and the Spanish crown. For about a century the Aztecs had brutally subjected the regional tribes, forcing them to pay tribute and to be sacrifices to the Aztec gods, so these subjected tribes eagerly joined Cortes, and with European weaponry and contagious disease, the Aztecs were easily conquered.

We can imagine the wonder Cortes felt when he entered Tenochtitlan, the Aztec capital. Its population was 200,000 people, whereas the largest city in Spain had only 70,000 denizens. Stone aqueducts brought in fresh water, and religious temples soared into the sky, and everything was stunningly clean and orderly, a contrast to the filth of European municipalities.

A city that large would be hard to feed without agriculture, and agriculture they certainly had. Uniquitous was the maize, squash, and beans that fed natives from Tenochtitlan all the way up to Great Lakes. The three crops grew together, with beans growing on maize stalks for support, the maize borrowing nitrogen injected into the soil by the beans, and squash covering the surrounding area with its broad leaves to suppress weed growth. This polyculture (growing more than one crop in the same area at the same time) was a system shared by many other tribes, including the Cherokee, who referred to the system as the Three Sisters.

While those three sisters were the most important crops, the diversity of Aztec agriculture is notable. They grew avocados, chili peppers, tomatoes, limes, amaranth, onions, sweet potatoes, jimacas, and cactus. In addition to these delicious food sources Cortes had never seen was a sophisticated agricultural techniques: the chinampa system.

The chinampa system was dominant in the wetlands, where artificial islands in freshwater lakes were created for food production. A chinampa is built by first finding a somewhat shallow part of a wetland with a mostly constant water level. A rectangular area is staked out using posts

created from the ahuejote tree. These posts support a fence built from reeds, and then plant matter and mud is placed into the fenced-in area until it rises above the water level, becoming a manmade island. If the island is only about a foot about the water level the island soil will remain moist but also dry enough to allow air and prevent the roots from drowning. Finally, Willow trees were planted along the edges of the island, and as the Willows grew their roots would hold the island in place long after the reed fences deteriorated. An alternative chinampa is constructed by building up land in an area and then using canals to surround it with water.

Building chinampas is obviously a labor-intensive process, but it has the advantage that it is incredibly productive. The water in wetlands is saturated with nutrients, and since the plant roots are easily able to access this water, the plants always have all the food and water they need to grow. If there is too much rain, the wetland / canals divert the excess, so that a nearly constant water level is maintained. So while it was expensive to build, chinampas were the most productive agricultural system on a per-square-foot basis. As long as the plants were able to defend itself from the insects and fungal diseases so ubiquitous to wetland areas, a people can be assured of a constant food source. Chinampas are still used today, in the exact areas they were used by the Aztecs!

In addition to the agriculture, chinampas provided a natural habitat from which to harvest fish, frogs, turtles, and fowl. It also provided an algae food source today referred to as spirulina. They referred to it as *tecuitlatl*, which means “rock poop” lol. The famous Aztec runners consumed it regularly, and today it is considered a superfood by some due to its ability to boost the human immune system.

Up in the surrounding mountains chinampas are infeasible, and that is where a terracing agricultural system was employed. This is where you create strips of flat land supported by walls into formerly sloped land. Terracing comes naturally to humans, as almost every civilization that farms on hilly land invents it. Cortes would have

been familiar with terracing, but would likely have been impressed with how widespread it was used.

De Soto: 1539

The Spanish were raiding northwestern Mexico in 1536, mainly enslaving natives, when they came across three Spaniards donning native attire. One of these went by the name Cabeza De Vaca, who previously spent foot in Tampa Bay, FL as part of a Spanish invasion. They sought gold but only found enemies in the form of Apalachee Indians (whose legacy would be the name of America’s eastern mountain range). Attempting to flee from the Apalachians, they found themselves enslaved by the Karankawa Indians,

who caught a terrible illness from the three Spaniards.

Since it was the Spaniards who brought the disease, only they could cure it, the Karankawa thought, and so de Vaca and his companions recited Catholic prayers for the ill. The infected recovered, and consequently the Spaniards were considered to be powerful shamans, and so they were set free. As they traveled west, seeking Mexico, word of their healing powers preceded them, and other Indian bands welcomed their presence. They passed through Texas, New Mexico, and finally northern Mexico, where they finally encountered their own people.

De Vaca was something of a New World Marco Polo, and he had two important items of interest to aspiring conquistadors. One was the enormous fields of maize he saw growing throughout the

southeastern U.S., enough to easily feed a passing army. Another was a tale he heard about wealthier bands of natives to the north of where he traveled. When Hernando De Soto heard this, he dreamed of riches like Cortes found in Mexico, and in 1539 invaded Florida, then marched throughout the Mississippian cultures of the southeast.

De Vaca had not exaggerated about the agriculture of the Mississippian people. De Soto had no trouble feeding his army as he marched mile after mile beside permanent settlements of maize growers, and in fact he would not have been able to travel as far as he did without those fields to plunder. Some fields were said to extend for twelve miles.



Modern-Day Chinampas



Terracing

The Timucua people of northern Florida would clear their fields by burning, and then till and plant with wooden and shell hoes and dibble sticks. They were sufficiently south that they could obtain two crops each year, and usually planted maize, bean, and squash in the same field. One acre of this mix could usually feed one person for one year. They used no fertilizer (the tale about using fish as fertilizer is now considered dubious) and would instead rotate fields, growing crops on some lands while leaving other fields fallow for microorganisms to recharge with nutrients.

As Soto continued west, eventually dying at the Mississippi river, he and his men spread the European diseases brought with them along the way, causing a population collapse in the native population. When the French explored the area in 1670 they found the area only sparsely populated. The Mississippian people lost confidence in their shamans and their leaders, and retreated to the hills and mountains. What was once a large, densely populated, and common culture fractured into small diverse bands. The natives encountered by Europeans after 1700 were mostly new tribes formed in Soto's devastating wake, tribes colonists gave names like the Chocktaw, Chickasaw, and Cherokee.

Coronado: 1540

A year after Soto's adventures began the Spanish sent an expedition into New Mexico. When they returned, for reasons unknown, they reported lies about cities of splendor and riches. In truth they had only visited people who constructed sturdy buildings of adobe brick but had no gold, silver, or anything the Spanish were seeking.

Francisco Vasquez de Coronado believed the lies, and he headed into Arizona and New Mexico in 1540. The exact route he took is debated, but we do know some tribes he encountered and some he might have encountered, and enough records exist from this and expeditions that we can make some statements about agriculture before European contact.

He route might first have taken him up eastern Arizona, where could have encountered the Pima, who called themselves the "river people" as they lived and farmed adjacent to rivers, where they built canals to flood their fields for irrigation. Maintaining the canals and keeping the fields level (to ensure uniform flooding) was the duty of males.

The general agricultural practices at the time are well documented. After the last frost passed they would plant maize, beans, gourds, and cotton. They never used straight rows, nor did they plant in the same location every year. Three times a year they would cultivate (remove weeds with hoes) their crops both to prevent weed growth but also to till up the ground so that it would not crack and

lose moisture during dry periods. Corn, beans, and pumpkins were planted in mounds, and they left the cut weeds on the ground as a mulch.

Birds eating the crop was a perpetual problem, and it was children's duty to scare them away. Using children as living scarecrows is a common feature across most farming tribes, with many tribes (though not the Pima) building watchtowers to the field could be better controlled.

Planting and cultivating was considered mostly men's work. Harvesting was the female domain. Maize was ready when the stalks and husk were dry. The husks would be roasted and then placed on the house roof to dry for about ten days. Then the maize would be shelled by placing the ears on a mat and beating it with a club, storing the maize kernels in baskets in separate buildings.

Pumpkins would be harvested in October and stored in pits where they would keep until February (sometimes even late April).

Beans were harvested by pulling down the vines, threshed to separate pods from the vine, threshed again to separate beans from the pods, and when winnowed using a basket, where small plant materials would fall through the spaces in the bottom of the basket but the beans would

Cotton

The "Indians" of the New World and the people of the Indian subcontinent share more than just a moniker.

Both independently domesticated the cotton plant at roughly the same time (around 3,000 BCE), soon producing large amounts of it for clothing.

Cotton originated in the New World in Peru but found its way all across both continents. It was one of the first crops seen by Columbus in the Caribbean.

The Hopi Pueblo people also bestowed it with religious importance, using it to symbolize rain when performing rain ceremonies.

The vast majority of cotton is upland cotton, derived from cotton plants native to Central America and Mexico. Pima cotton derives from South American varieties, but is named after the Pima people of North America.

not. The harvested beans would be dried in the sun for days and then separated by color and stored.

Tobacco was raised on irrigated acres, where one crop could last several years. The soil would be loosened with a digging stick. Tobacco seeds (extremely small) would then be placed in one's palm, and then blown by one's breath to scatter the seeds. Both the growing and the smoking of tobacco was reserved for elder males. The reader will probably be surprised to know the Pima and Pueblo people did not raise chili peppers or even know about them, until they Spanish introduced it in their conquests.

North of the Pima an explorer would encounter a variety of tribes living in large adobe structures in densely inhabited villages. Their language often varied as he went from one village to another, but wanting to group them all under one name he declared them to be the Pueblo people (Pueblo being "town" in Spanish).

One Pueblo people were the Hopi. Whereas the Pima relied on irrigation the Hopi were masters at dry land farming. They could not control the rain but they could control which seeds to plant, and this was the sphere where women took charge. They maintained a number of landraces of maize varieties, each suited to a different microclimate. The varieties could be distinguished by their size, shape, and color, and women carefully inspected each kernel and planting only those that seemed to be the variety they wanted.

A maize with small red kernels might be better suited on the western, drier side of a mountain while large white kernels better suited in the valleys that received more rain and the air was still. Maize plants cross pollinate easily, and if the one variety crossed with another it might have a pink color, and the women would not choose it for next season's planting. Through this meticulous selection of maize seed type the Hopi preserved pure lines of maize that thrived well in specific locations.

The sharing of maize and bean varieties occurred through marital rituals. When a Hopi man married he left his home to live with his wife's family, bringing some maize seeds from his mother's house with him.

Rather than maize fields they had numerous maize plots scattered around, sometimes miles from their Pueblo. The most popular areas were flat lands underneath mesas, where the sands tended to preserve moisture (rather than cracking like clay does) and where floods from the mesas tended to pore off the cliffs.

The first planting of corn occurred in April for a July harvest, and the second was in May for a late fall harvest. One set of maize varieties would be planted in April with a different set of varieties in May, as some varieties had a

longer growing period and some handled the heat better.

The Hopi planting system will seem bizarre to modern gardeners. Small hills were formed about three feet apart, and then up to a dozen seeds were planted in each hill, a foot deep or more. As the plants grew they would be thinned until only about six maize stalks per hill. The deep planting ensured the roots had access to moisture, and the numerous seeds in each hole might have been an insurance policy against low germination rates and pests.

They did not rotate fields, meaning the same fields were planted in corn every year, but they did alter the location of the hills on which the seeds were planted, so they practiced something akin to intra-field rotation. With maize growing in a differently located hill each year this mimicked crop rotation and fertilization was not necessary.

Some of the maize would be harvested while green (meaning not fully mature, like the sweet corn we eat), and some would be allowed to mature on the stalk. When harvesting mature ears, the husks would be removed and used as tamale wrappers while the ears were allowed to dry in the sun. When dried, they would be separated by color.

The Pueblo were unique people in their almost total reliance on agriculture, and so maize played a leading role in their spiritual rituals. They did not need to ask gods or spirits for benefits in prayer, but believed they only had to carry out certain ceremonies at the proper time to ensure fortune.

Ceremonies begin with the winter solstice, which the Hopi referred to as Soyal. Each village had a Soyal chief who watched the behavior of shadows cast by a certain mesa at sunrise, and from this he could calculate the day of the Soyal. When the Soyal was sixteen days away the priests entered a kiva: a circular underground room used for religious rituals. In the kiva was an alter, consisting of a drawing on the earthen floor made from cornmeal and surrounded by sacred corn ears (ears of particular beauty). Also present were prayer sticks: stocks of wood with feathers and decorations.

When the Soyal is close (perhaps 3 days away?) messengers come to each house with cornhusks containing feathers and pollen, and every member of the household breathes on it. Later messengers collect maize seed from the women of each house. This seed is placed on the alter, and later returned to the households. The kiva is entered and exited through a ladder, and as the seed corn is taken into and out of the kiva the man pauses four times and makes gestures as if he is having sexual intercourse.

On the night of Soyal all villagers gather in kivas, where a male with white stars painted on his body (to represent stars) and a large star (made from cornhusks) on his head

performs a ceremonial dance that is thought to cause the sun to cease its retreat and return. When stars appear through kiva opening the Soyal ceremony ends. This then sets into a play a number of other ceremonies that must be performed throughout the year to ensure a boon of maize.

Jacques Cartier: 1534

Watching the Spanish ship gold to the Old World to spend on futile wars, the French wanted to follow suit. The French explorer Jacques Cartier reached the northern parts of North America and claimed it for his king, naming it New France. Another French explorer by the name of Samuel de Champlain followed later in 1608, founding Quebec, and though he did not find the gold he was searching for he did find an abundance of beaver, whose pelts were treasures themselves. When Champlain arrived at Lake Huron in 1615 he encountered the Ojibway people, and likely became the first European to consume wild rice.

We think of rice as being as Asian import, but did you know that there is a type of rice native to North America? Well, it isn't technically a rice, as it is the species *Zizania aquatica*, whereas rice officially belongs to the *Oryza sativa* species. However, it looks like rice, tastes like rice, and most people called it "wild" rice, and so we will retain the rice designation with no apology.

It is the only cereal regularly consumed that is native to North America (cereals being edible seeds from a grass). It began in the Great Lakes region of the U.S. and Canada, thriving in slow circulating alkaline waters that are rich in minerals and relatively constant in depth. The seeds are heavy, sinking into the water and lodging in the mud and other plant matter. The seed germinates in April, relying on the energy stored in its seed for the first month's growth, until it reaches the surface and can begin collecting light from the sun. A patch of water can be so covered in the plant that it seems to be a meadow. By the end of the season it may be as tall as eight feet about the water surface. Relying mostly on wind pollination, the seeds do not mature all at once, dropping seeds when they are fully mature into the water to reproduce. Only by seed does the plant ensure its progeny.

Muskrats, carp, birds, and various other wildlife feed on

the seed, and when Native Americans arrived in the area they soon saw its potential, settling on the lake banks to become gatherers, and to some extent, farmers of what we call wild rice.

The Ojibway people call it *manoomin*, which means "good berry". Many things make it "good". In a good year it can provide large amounts of food. It has a nice flavor. (Many times stores selling wild rice are actually selling a mixture of wild rice and regular rice). And it is particularly nutritious, being high in protein relative to other cereals.

Wild rice was as common of a food to the Ojibway as bread was to their European counterparts. It requires a mostly steady depth of water to grow, so during years of particularly large rains where water levels grew and remained high, their major source of food could be threatened. For this reason they, like most Native American tribes, also grew

maize, beans, and squash, and when rice yields were high would store it in bark containers or skin bags underground, where it would keep for years.

Over time the Ojibway learned to farm the wild rice, planting the seed in two-foot deep water and weeding the area. At some times and places this provided two-thirds of their rice harvest. Harvest was performed by boat.



An Ojibwe woman ties together stalks of wild rice with basswood fiber to prepare them for harvest. Photograph by Frances Densmore, ca. 1930s.

Before the seed was ripe and in its milk stage, the Ojibway would enter the rice patches and pole the grass, meaning they would plant a pole in the mud and tie the rice stalks around it, preventing the wind from whipping it on the water surface and causing the seeds to drop into the water before they could be harvested. Polling (or binding, if grass was tied together without a pole supporting it) also made it harder for birds to eat the seed and created paths through the rice patch for boats to float without disturbing the plants much.

Each family was allowed a share of the rice, and polling/binding was their way of marking which of the rice was theirs. (They performed a similar activity for harvesting maple syrup by marking the trees the family considered theirs with an axe.) Just as cattle brands have unique shapes identifying each ranch, each family would have had a unique way of tying the bundles to indicate which family claimed the rice bundle. Sometimes they would even dye the twine a certain color to signify the family. The twine would be

made from tree bark that was torn into long strips, soaked in water, then woven together.

Harvesting was performed by untying the stalks from the poles, bending it over into the canoe, and beating the seeds loose. Not all the seed ripen at the same time on the plant, so the rice patch might be visited multiple times for harvesting.

On dry land the processing would take place. This first involves drying the seed in the sun. Then it is parched, perhaps by drying it in baskets held over fire, where the smoke would dry it further. Threshing follows by beating it with a stick, and then the chaff is separated from the kernels in winnowing baskets.

Cooking involved boiling it in water or broth, after the seed had been washed several times. For a food resembling a gruel more water would be used, otherwise for fluffy rice two parts water/broth was used for one part grain. One of their favorite dishes was *Tassimanonny*, made by boiling wild rice, corn, and fish. When seasoning was used it would be mostly limited to maple sugar, berries, and animal fat. To a lesser extent chokecherries, blueberries, or Juneberries might be used. If the rice wasn't boiled it would likely be roasted on hot stones, causing it to explode akin to popcorn.

The wild rice would also feed The city name "Topeka" from Topeka, Kansas is thought to mean "a good place to dig prairie turnips".

Two Ojibway food sources barely known today include Grouse Whortleberry (a species of huckleberry) and Duck Potatoes. The Duck Potato plant grows in shallow water with the wild rice, producing edible tubers at their base. They can be eaten wild but are best cooked, after which they can be eaten like potatoes or dried into a powder for soup.

The Blackfoot tribe was north of the Great Lakes, but Europeans would not encounter them until much later. It is believed they were one of the first tribes to head west as the Europeans advanced. The first recorded contact was when the Hudson Bay Company (an English fur trading company) met a Blackfoot group in 1754. Twelve years later Lewis and Clark from the famous Lewis and Clark expedition would encounter a different group.

The Blackfoot were a warrior tribe, and upon gaining horses, conquered and vanquished other tribes until they

had an empire covering much of south-central Canada and Montana. They relied heavily on bison, and as this food source dwindled they became sufficiently weakened and finally subdued by the U.S. in 1888.

Many readers have heard of the Blackfoot through the famous novel *Fools Crow*, by celebrated Native American and a Blackfoot himself, James Welch. In this novel the Blackfoot are often digging up turnips, but these aren't the turnips you see in the store. These were the prairie turnip, an important food source that was gathered wild, not farmed.

From Texas to Canada, almost anywhere the bison grazed the prairie turnip grew. Its scientific name is *Psoralea esculenta* or *Pedimelum esculentum*, and is a legume and member of the pea family. In addition to prairie turnip, it also goes by the common names tipsin, prairie potato, breadroot, and in the Blackfoot language,

Thínpsinla. A perennial living up to

six years, it grows up to a foot high and produces purple flowers. It is when the plant is flowering it is harvested because only then is it easy to locate.

Uniquely adapted to the prairie, this plant can remain dormant for up to two years when rainfall is scarce, and then when the rain arrives it quickly grows, produces seed, and then allows the wind to separate the top part from its roots. It can then be seen rolling along the plains like a small tumbleweed, dispersing its seeds as it rolls.

The root was obtained through digging and its skin peeled before it was consumed raw or boiled. It could also be dried by slicing it and drying it in the sun, after which it could be pounded into flour. It has a high nutrient content, providing a unique source of Vitamin C for Indians living on the plains and consuming large amounts of bison meat. A pudding dish might be made by cooking the prairie turnip flour with serviceberries or chokeberries, and today it is sometimes added to Indian frybread recipes.

So important was the prairie turnip that it was considered not just food but "medicine", possessing a sacred character. Their spiritual stories feature this revered legume, as revealed accurately in Welch's *Fools Crow*.



Excerpt from *Fools Crow* involving a myth about the prairie turnip

Ambush Chief told of the time So-at-sa-ki, while digging turnips, had dug up the sacred turnip, creating a hole in the sky. She looked down and saw her people, her mother and father, her sister, on the plains and she grew homesick. Night Red Light, upon hearing of her daughter-in-law's act, became angry, for she had warned Feather Woman not to dig up the sacred turnip. Sun Chief, when he returned from his journey, became angry with Morning Star, for he had not kept his wife from doing this, and so he sent Feather Woman back to earth to live with her people. She took Star Boy with her because Sun did not want him in his house. She also took the elkskin dress, the bonnet, the digging stick. She and her son rode down the wolf trail back to her people, and she was happy to be with them. She hugged them and rejoiced, for she was truly glad to be home. But as the sleeps, the moons, went by, she began to miss her husband. Each morning she would watch him rise up. She shunned the company of her mother and father, her sister, even her son, Star Boy. She became obsessed with Morning Star, and soon she began to weep and beg him to take her back. But each morning he would go his own way, and it was not long before Feather Woman died of a broken heart.

As Star Boy began to grow up, a scar appeared on his face. The older he grew, the larger and deeper the scar grew. Soon his friends taunted him and called him Poia, Scar Face, and the girls shunned him. In desperation he went to a many-faces man who gave him directions to Sun Chief's home and whose wife made Scar Face moccasins for his journey. After much traveling, he reached the home of Sun Chief far to the west. Sun had just returned from his long trip across the sky and he was angry with Scar Face for entering his home. Sun Chief decided to kill him, but Night Red Light interceded on behalf of the unlucky young man. Morning Star, not knowing the youth was his son, taught him many things about Sun and Moon, about the many groups of Star People. Once, while on a hunt, seven large birds attacked Morning Star, intending to kill him, but Scar Face got to them first, killing them. When Morning Star told his father of this brave deed, Sun Chief removed the scar and told the youth to return to his people and instruct them to honor him every summer and he would restore their sick to health and cause the growing things and those that fed upon them to grow abundantly. He then gave Poia two raven feathers to wear so that the people would know he came from the Sun. He also gave him the elkskin robe to be worn by a virtuous medicine woman at the time of the ceremony. Star Boy then rode down the wolf trail to earth and instructed the Pikunis in the correct way, and then he returned to Sun's home with a bride. Sun made him a star in the sky. He now rides near to Morning Star and many people mistake him for his father. That is why he is called Mistake Morning Star. And that is how the Sun ceremony came to be.

Welch, James. *Fools Crow* (Contemporary American Fiction) (p. 112). Penguin Publishing Group. Kindle Edition.

Prairie Turnip

Jamestown: 1607

The English were late to the New World party, for while Spain and France were busy exploring America (by 1507 it was given the name 'America,' in honor of Amerigo Vespucci, who recognized it was not east Asia but a different continent) the English were busy conquering Ireland. Once the Irish were shown to be not so lucky, though, the English set about exploring the mid-Atlantic portion of North America.

They called that region Virginia in honor of Queen Elizabeth I (who was supposed to be a virgin). When their hopes to get rich through the discovery of gold remained elusive, they found they become at least moderately wealthy through the raising of tobacco.

First there was a settlement on Roanoke Island on the North Carolina coast in 1585. The soil was poor though and food was difficult to grow. At first they didn't care because they planned on conquering the Native Algonquin Indians and be fed by them, but the cruelty of the English chased the Indians away and, unable to feed themselves, they abandoned the settlement. A second group was sent to Roanoke to try it again, but mysteriously vanished. (Presumably they left to find food and were killed).

The third time's the charm, and in 1607 a new English settlement was formed at Chesapeake Bay, and here at least twenty percent were able to stay alive. They named the settlement Jamestown to honor King James I of England. It is here where Pocahontas entered the pages of history and became the best known native in American lore.

This colony is perhaps the worst representation of European civilization one could find. They consisted of a mix of gentlemen and vagrants. The gentlemen thought themselves too noble to work and preferred instead to enslave others. The vagrants consisted of street urchins from London, whose family were kicked off their land during the enclosures and, with employment being scarce, had to fight and steal just to survive. These vagrants had barely worked in their lives and had little interest in starting now.

Rather than plant crops to feed themselves they either searched for gold or played games, and so when they ran low on food they expected the natives to feed them. Understandably the natives would subsidize them only so much. In one case a group of colonists attempted to force the natives to feed them, and instead the colonists were slayed, and their dead mouths stuffed with maize as a warning to the others.

The leaders of the colony then tried violence to make their own people work. One person was caught stealing oatmeal, and to deter others from the same, a long needle was placed

in his tongue to prevent him from eating, and then he was left to starve while chained to a tree.

Until 1616 the company attempted to operate treating its colonists as something akin to slaves, in that they held little property of their own, were forced to work, and were told how to work. This is communism centuries before Karl Marx. They were forced to work, given food in return, and there was little connection between the amount of work they performed and the food they ate. Not surprisingly there was not much enthusiasm to work hard, so no one worked hard and thus no one ate much food. They solved this by making two changes to their economic system.

First, they abandoned communism and embraced private property. A head-right system was established whereby free land was given away and families were allowed to manage that land however they wished, but they could expect no charity. If they wanted to eat, they needed to work that land. The lesson that property and incentives matter for economic growth is a lesson communist China would have to learn in the twentieth century (see next page).

(The truth is more complex than the previous paragraph suggests. In addition from switching from communism to capitalism they altered the types of people settling. Instead of recruiting gentlemen trying to strike it rich quick and street urchins that just wanted out of London, Jamestown gave free land to people with money to pay their own way across the Atlantic, and to indentured servants who were willing to work for the land. These were people used to working, wanted to work, and had the skills to manage their own business.)

The second adjustment was the adoption of tobacco as a cash crop. The English first developed a love for tobacco, and then an addiction. The summers were not long enough to grow it in England but they certainly were in Jamestown, so instead of growing their own food they raised tobacco and traded for it.

The Algonquin in the surrounding area had been growing tobacco for probably thousands of years. It grew wild throughout much of the Americas, and was probably first domesticated and farmed in the Andes mountains around 5000 BC.

This tall plant with wide leaves produces nicotine as a natural pesticide, making its leaves distasteful to eat, but humans and bees like the effect of consuming it, so humans learned to smoke it and bees consume it from pollen regardless.

John Rolfe was one of the Jamestown settlers who had spent time in the West Indies. There he collected seeds from a tobacco plant variety that he brought and introduced to Jamestown. This is the variety they grew for trade, and

From Planet Money (NPR Podcast) Episode: The Secret Document that Transformed China

In 1978, the farmers in a small Chinese village called Xiaogang gathered in a mud hut to sign a secret contract. They thought it might get them executed. Instead, it wound up transforming China's economy in ways that are still reverberating today.

The contract was so risky — and such a big deal — because it was created at the height of communism in China. Everyone worked on the village's collective farm; there was no personal property.

"Back then, even one straw belonged to the group," says Yen Jingchang, who was a farmer in Xiaogang in 1978. "No one owned anything."

At one meeting with communist party officials, a farmer asked: "What about the teeth in my head? Do I own those?" Answer: No. Your teeth belong to the collective.

In theory, the government would take what the collective grew, and would also distribute food to each family. There was no incentive to work hard — to go out to the fields early, to put in extra effort, Yen Jingchang says.

"Work hard, don't work hard — everyone gets the same," he says. "So people don't want to work."

In Xiaogang there was never enough food, and the farmers often had to go to other villages to beg. Their children were going hungry. They were desperate.

So, in the winter of 1978, after another terrible harvest, they came up with an idea: Rather than farm as a collective, each family would get to farm its own plot of land. If a family grew a lot of food, that family could keep some of the harvest.

This is an old idea, of course. But in communist China of 1978, it was so dangerous that the farmers had to gather in secret to discuss it.

One evening, they snuck in one by one to a farmer's home. Like all of the houses in the village, it had dirt floors, mud walls and a straw roof. No plumbing, no electricity.

"Most people said 'Yes, we want to do it,' " says Yen Hongchang, another farmer who was there. "But there were others who said 'I don't think this will work — this is like high voltage wire.' Back then, farmers had never seen electricity, but they'd heard about it. They knew if you touched it, you would die."

Despite the risks, they decided they had to try this experiment — and to write it down as a formal contract, so everyone would be bound to it. By the light of an oil lamp, Yen Hongchang wrote out the contract.

The farmers agreed to divide up the land among the families. Each family agreed to turn over some of what they grew to the government, and to the collective. And,

crucially, the farmers agreed that families that grew enough food would get to keep some for themselves.

The contract also recognized the risks the farmers were taking. If any of the farmers were sent to prison or executed, it said, the others in the group would care for their children until age 18.

The farmers tried to keep the contract secret — Yen Hongchang hid it inside a piece of bamboo in the roof of his house — but when they returned to the fields, everything was different.

Before the contract, the farmers would drag themselves out into the field only when the village whistle blew, marking the start of the work day. After the contract, the families went out before dawn.

"We all secretly competed," says Yen Jingchang. "Everyone wanted to produce more than the next person."

It was the same land, the same tools and the same people. Yet just by changing the economic rules — by saying, you get to keep some of what you grow — everything changed.

At the end of the season, they had an enormous harvest: more, Yen Hongchang says, than in the previous five years combined.

That huge harvest gave them away. Local officials figured out that the farmers had divided up the land, and word of what had happened in Xiaogang made its way up the Communist Party chain of command.

At one point, Yen Hongchang was hauled in to the local Communist Party office. The officials swore at him, treated him like he was on death row.

But fortunately for Mr. Yen and the other farmers, at this moment in history, there were powerful people in the Communist Party who wanted to change China's economy. Deng Xiaoping, the Chinese leader who would go on to create China's modern economy, was just coming to power.

So instead of executing the Xiaogang farmers, the Chinese leaders ultimately decided to hold them up as a model.

Within a few years, farms all over China adopted the principles in that secret document. People could own what they grew. The government launched other economic reforms, and China's economy started to grow like crazy. Since 1978, something like 500 million people have risen out of poverty in China.

Today, the Chinese government is clearly proud of what happened in Xiaogang. That contract is now in a museum. And the village has become this origin story that kids in China learn about in school.

...

it must be superior to the existing variety because the Algonquin adopted it also. That is not John Rolfe's only claim to fame though; he also married Pocahontas.

The more diligent Jamestown settlers did learn from the natives how to better grow their own food. They saw how the Algonquin cleared land by girdling trees, where you remove all the bark one horizontal section of a tree, or tie vines tightly around the trunk. Most trees are dicots, where they have a vascular system just underneath the bark of the tree, where nutrients and water are exchanged. Damaging this is like severing the artery of a person. In some locations they would grow polycultures, where multiple crops are planted in the same field, like the Three Sister system. In other locations they grew the plants separately, with one plot devoted to only one crop and another plot devoted to a different one.

The Algonquin had three varieties of corn, two varieties of pumpkins, a number of different bean varieties, sunflowers and chenopods. It is likely the reader is unfamiliar with chenopods, but perhaps have heard of some common names of its species: goosefoot, amaranth, lambs quarters, and quinoa. They can take on a variety of appearances, being either herbaceous or shrubs, colorful or dull. Both their leaves and their seeds were used as food and can be quite nutritious (the quinoa is considered something of a superfood by foodies). These plants tend to be particularly easy to grow, but to most people they have an inferior taste, which explains why they are not very popular today.

A colonist by the name of John Smith documented the nearby Algonquin agricultural practices. Corn and bean seeds would be planted in the same hole on a formed hill, so that the bean vine could grow on the corn plant. Women and children would weed the crops by hoeing around the plant, using the loosened soil to make an earthen hill around the plant stalk as it grew. Corn will grow bracer roots slightly above the ground, and when covered with soil these roots will then grow larger and support the plant better. John Smith did not observe them hoeing between the corn plants, but other natives using a slightly different system would have.

They would have regular successions of plantings, between May and June, so that they could have continual harvests from August to October. Some corn would be harvested early for roasting, and the rest would be dried in the sun and then shelled by twisting the cobs in their hands.

The Fox tribe in modern-day Michigan shared the Algonquin language, and in the upper Mississippi region the natives held different spiritual beliefs than their southern counterparts. They tended to believe that one great spirit made earth, heaven, and humans. Rather than

taking the form of a powerful object like the sun, this great spirit had a human form and took great care to help humans. Often referred to as the Great Manitou, he would sometimes be described as smoking tobacco in heaven, and so keen was he that humans be happy he gave them the tobacco plant to smoke as well.

Tobacco was thus sacred. It was cultivated only by men and women were not even allowed in the fields. Every time tobacco was smoked it was considered a sacred ceremony. Just as the Pueblo people would annoint people with corn flour, the Fox would spread dried tobacco leaves on people and sacred objects during ceremonies.

The Fox were more concerned with warfare than agriculture, and when they held religious festivals it was usually in hopes of success in battle. In summer they lived in bark houses, and during one of their sacred ceremonies elders and other clansmen would sit with the bundle keeper (a collection of sacred objects). They played drums, sang, and held a feast consisting of a white dog boiled with corn, for when Great Manitou gave them tobacco he also gave them a white dog and corn. The dog would be almost worshipped before the feast, treated exceptionally well and dressed up in decorations. All day they would eat, careful not to let any food drop to the ground, as that would be disrespectful to the Great Manitou who had given them so much.

Juan de Oñate: 1598

Coronado had earlier encountered the Apaches, but it was Juan de Oñate who had to deal with them as he traveled up from Mexico into "New Mexico" to establish a colony in 1598. When he reached the Pueblo people they offered no resistance, and he returned the favor by taking over one of their pueblos and demanding tribute in the form of food, cotton blankets, buffalo robes, and the like.

The Apache, nomads who enjoyed raiding the Pueblos for food, tools, and slaves, were equally eager to raid the Spanish, and as the Spanish reciprocated it began a series tit-for-tat series of raids, each enslaving people of the other. Female slaves were especially desired, and a young female could be purchased for two horses and a few knives. Meanwhile, Spanish cruelty to the Pueblos escalated to the breaking point, forcing them to side with their historical enemies and, with the Apache, rebelled in 1680, driving away the Spanish but keeping their livestock.

It did not take long for the Pueblo and Apache to resume their feuds, and noticing the division, the Spanish were able to reconquer the area around the Rio Grande in New Mexico twelve years later. From this point forward, the Spanish were less cruel to the Pueblos, and they both

Excerpt from Nathaniel Philbrick's Mayflower involving the origin of the Thanksgiving holiday

We do not know the exact date of the celebration we now call the First Thanksgiving, but it was probably in late September or early October, soon after their crop of corn, squash, beans, barley, and peas had been harvested. It was also a time during which the Plymouth Harbor played host to a tremendous number of migrating birds, particularly ducks and geese, and Bradford ordered four men to go out "fowling." It took only a few hours for Plymouth's hunters to kill enough ducks and geese to feed the settlement for a week. Now that they had "gathered the fruits of our labors," Bradford declared it time to "rejoice together ... after a more special manner."

The term Thanksgiving, first applied in the nineteenth century, was not used by the Pilgrims themselves. For the Pilgrims a thanksgiving was a time of spiritual devotion. Since just about everything the Pilgrims did had religious overtones, there was certainly much about the gathering in the fall of 1621 that would have made it a proper Puritan thanksgiving. But as Winslow's description makes clear, there was also much about the gathering that was similar to a traditional English harvest festival—a secular celebration that dated back to the Middle Ages in which villagers ate, drank, and played games.

Countless Victorian-era engravings notwithstanding, the Pilgrims did not spend the day sitting around a long table draped with a white linen cloth, clasping each other's hands in prayer as a few curious Indians looked on. Instead of an English affair, the First Thanksgiving soon became an overwhelmingly Native celebration when Massasoit and a hundred Pokanokets (more than twice the entire English population of Plymouth) arrived at the settlement and soon provided five freshly killed deer. Even if all the Pilgrims' furniture was brought out into the sunshine, most of the celebrants stood, squatted, or sat on the ground as they clustered around outdoor fires, where the deer and birds turned on wooden spits and where pottages—stews in which varieties of meats and vegetables were thrown—simmered invitingly.

In addition to the ducks and deer, there was, according to Bradford, a "good store of wild turkeys" in the fall of 1621. Turkeys were by no means a novelty to the Pilgrims. When the conquistadors arrived in Mexico in the sixteenth century, they discovered that the Indians of Central America possessed domesticated turkeys as well as gold. The birds were imported to Spain as early as the 1520's, and by the 1540's they had reached England. By 1575, the domesticated Central American turkey had become a fixture at English Christmases ...

The Pilgrims may have added fish to their meal of birds and deer. In fall, striped bass, bluefish, and cod were abundant. Perhaps most important to the Pilgrims was that with a recently harvested barley crop, it was now possible to brew beer. Alas, the Pilgrims were without pumpkin pie or cranberry sauce. There were also no forks, which did not appear at Plymouth until the last decades of the seventeenth century. The Pilgrims ate with their fingers and their knives.

recognized they needed each other to fend off raids by the Apache.

The Apache originally resided in northern U.S. and southern Canada, but around the time Columbus was born they migrated south to the great plains, becoming nomads and adept buffalo hunters. They used dogs to help them hunt, warn them of enemies, and to haul goods. Buffalo meat was their protein source, and they relied on wild berries and roots for the rest of their nutritional needs. Buffalo hides were used for tipis and robes, the rough side of buffalo tongue as a comb, and buffalo manure as fuel.

Being nomads, they needed a nutritious, convenient, and non-perishable food source during their long walks, and this was pemmican, made by pounding wild berries into buffalo jerky. The word means “manufactured grease” in the Cree language. The jerky provided most of the nutrients they needed on the trail and the berries with their Vitamin C prevented scurvy. Buffalo meat is lean, but fat is an essential nutrient and can be found in bone marrow and around the kidney. By mixing the meat and fat the Apache were ensured they had enough of both for their long journeys. In fact, most all the tribes of the Great Plains consumed large amounts of pemmican, so it is worth exploring the recipe.

The Apache had perhaps the most complex religious system of all the North American natives, where the sacred and the ordinary were fused together in everyday concepts and objects. The roots of cattails were a common Apache food, and they believed its pollen contained beneficial powers. It was used to bless infants and heal the sick. The four cardinal directions were infused with moral qualities, with the east being the holiest and most beneficent. To keep away ghosts they would carry ashes with them at night. Bears were thought to be reincarnated criminals, and any encounter with a bear might induce “bear sickness”, causing a prolonged sense of tiredness. If they came across a bear trail that must be crossed an Apache would say out loud, “It was a year ago,” that the bear crossed, hoping that would keep its spirit from inflicting them harm. Like Indiana Jones, they were deeply afraid of snakes, and would not kill one if it entered

a rancheria (the traditional term for their encampments). Consequently they would not eat animals that ate snakes, so roadrunners and turkeys never appeared on their menu.

Most religious revelations were channeled through special shamans referred to as di-yins, but there were some actions any Apache could take to interact with the spiritual world. For example, if rainfall was excessive and they needed it to stop, an Apache would draw a circle with charcoal on their back and then display their anus to the sky.

A sickness was thought to either be caused by angering the spirits or through natural forces. If the former, the assistance of a di-yin was needed, but if the latter, herbal remedies were sought. Colds and sore throats were treated with the root of the osha plant, also known as wild parsnip or wild celery. The root might be chewed on, smoked, or ground and mixed with water. Osha is still a popular cold remedy today, and is readily available at natural apothecaries.

Like many native tribes, the Apache relied heavily on hunting for protein, and for those who dwelled in the mountains this referred mostly to deer. Creeping up on deer was aided by wearing a stuffed head of a deer, and does were called by blowing across a horizontal leaf in a way that mimicked a fawn’s bleating.

Hunting was strictly a male activity, and their religious sensibilities

prescribed strict rules regarding how the deer was butchered. One myth says that a young man who killed a deer butchered it under a white pine tree, an act considered taboo. While carving the carcass a pretty woman approached, referring to him as her husband and asking him to “do something in the bushes”.

Suspecting she was trouble, the young man ran to his grandmother, who dug a hole under a fire and told him to hide there. Then the woman came into the camp, and not seeing him, squatted, urinated, and commanded her urine to find “her husband”. The urine flowed to the fire, revealing his location, and she pulled him out. The woman then said, “Come on, husband, do it with me right here,” and then laid down and lifted her legs, revealing her vagina, which had teeth on all sides.

Pemmican Recipe from Paul Kane’s 1859 Travel Journal

“The thin slices of dried meat are pounded between two stones until the fibers separate; about 50lbs. of this are put into a bag of buffalo skin with about 40lbs. of melted fat, and mixed together while hot, and sewed up, forming a hard and compact mass; hence its name in the Cree language, pimmi signifying meat, and kon, fat. Each cart brings home ten of these bags, and all that the half-breeds do not require for themselves is eagerly bought by the Company, for the purpose of sending to the more distant posts, where food is scarce. One pound of this is considered equal to four pounds of ordinary meat, and the pimmi-kon keeps for years perfectly good exposed to any weather.”

This revealed her to be the dreaded Vulva Woman. Knowing she would not leave him alone, the man had to find a way to be her husband but not be harmed by her. His solution was to keep placing sticks into her vagina, allowing it to tear the sticks apart like a mulcher, until finally the vagina's teeth was worn out and no longer sharp. From then on he had to be her husband, but at least he would not be killed by the vagina's teeth. And that is why you do not butcher a deer under a white pine tree!

In addition to the don't-do's there were rules on what to do. The deer head must point to the east, and the hunter must neither step over the deer nor walk on the east side of the deer.

A successful hunt was considered a spiritual gift, one that must be shared with others, so he was expected to share the meat with the elderly and widowed, along with anyone who requested a portion. The meat would be boiled, roasted, or dried into jerky. Some Apache lived where the buffalo grazed, and they particularly loved eating the meat of an unborn bison.

Most hunters are also gatherers, and so it was for the Apache, and what looks like a desert to most of us was seen to them as a buffet. The yucca plant may not look edible but the Apache regularly consumed its central stem, harvested before its blossoms appeared. This stem would be baked and then dried, where it would store for up to a year. To prepare the dried stem, it would be soaked in water and pounded into a mixture with wild fruits like the chokecherry.

We know the mescal plant as the raw material for mescal and tequila spirits, but its heart could be dried in the sun and baked. From then it would be consumed immediately or dried and pounded into thin sheets, where it could be stored safely for many years.

Other wild plants used as a food source include sunflowers, plants in the amaranth family, pinyon pine nuts, acorns, and mesquite seeds, to name a few.

Apache reliance on agriculture varied by tribe and location, but like most Indians the common crops were corn, beans, and squash. Here, in the origin story of squash, the Vulva Woman makes another appearance. A man married Vulva Woman without knowing her true identity, and when he went to consummate their union he saw the teeth on her vagina and, understandably, ran away. Encountering an ugly old woman he told her his troubles and she hid him in her squash patch, a plant the man was unfamiliar with.

Once Vulva Woman passed the area unable to find her husband, the old woman gave him some squash seeds to take with him on his journey home, instructing him plant them at a hand's depth away from where gophers live, and

to not let newly married men or pregnant or menstruating women near it.

Beverages were a specialty of the Apache, many flavored by the nectar and pollen of cactus flowers. Long before hipsters replaced real milk with "milk" made from nuts the Apaches prepared walnut milk. Certain acorns were made into a coffee-like drink.

Beer made from corn was a particular specialty, and this is how it was made. First, corn seed would be germinated. In summer the seeds could be planted shallow in the earth, and in winter it could be soaked in water and then made warm enough to sprout by sleeping under the covers with it. As soon as a shoot appeared, it would be dried and pulverized. The result is corn malt, which was added to water and boiled for hours, adding flavorings like the bark from a *lignum vitae* tree. The liquid would then be drained off and the grain particles ground a second time, after which the drained liquid was returned and brought to a second boil.

After being allowed to cool, the mixture is now a wort, containing high concentrations of sugars from the corn seed. Wild yeast would then naturally ferment the wort, converting the sugars to alcohol. After just one day of fermentation it was ready to be consumed, and must be consumed quickly because in just another day it would spoil. It is unclear how strong this beer was, but it was often described as "potent" so probably had an alcohol content greater than 5%.

The Apaches arrived in the Great Plains from the west, readily adopting horses and hunting buffalo in large numbers, but not completely abandoning agriculture. During good years they would trade their surplus with the Pueblo people of New Mexico, and during bad years they would raid those same people. Of course, the Pueblo people would sometimes raid the Apache, and raids focused mainly on the most valuable commodity in New Mexico: slaves.

Most of the Great Plain Indians we think of today didn't actually arrive there until the eighteenth century. These include the Kiowa, Lakota, Dakota, Sioux, Blackfoot, Crow, and Cheyenne tribes. It would be a mistake to assume Native Americans didn't adapt to new technologies and seek to use those technologies to dominate others and engage in conspicuous consumption. This is especially true for the Commanche, who arrived in the central plains from the northwest, reaching the southern plains by the end of the sixteenth century. Before the horse they were a dominated tribe, living in poverty on the eastern side of the Rocky Mountains, around modern-day Wyoming.

When the horse arrived the Commanche embraced it like

no other tribe. No other tribe learned to wage war while remaining horseback (those with horses rode to the battle but dismounted to fight). No other tribe developed a horse breeding program. No other tribe specialized so heavily in hunting buffalo and waging war. No other tribe, no other people (perhaps save for the Mongolians in the time of Genghis Khan) mastered breaking and riding the horse like the Comanche.

When the horse came to dominate their life and culture, the Comanche headed south, where the milder winters would provide more food for their steeds. On their way south they fought the Apache for fifty years, eventually defeating every people (Indian, Spanish, and Anglo settler alike) in what would be known as Appacheria, covering modern-day Texas, Oklahoma, New Mexico, and Kansas. Large parts of northern Mexico, Chihuahua especially, would be systematically invaded for horse theft.

The Great Plains extend from Texas and New Mexico up to Montana and North Dakota, a vertical column of grassland that receives only twelve to twenty inches of rain a year, rain that comes sporadically and in large chunks. A few tree species grew along the rivers, namely cottonwood and willow. The rainfall was just enough for grass though. The plains gain in elevation and decline in rainfall as one ventures east to west. Tallgrass prairies in the east could grow grasses like tall bluestem, but the western regions of the plains favored buffalo and grama grasses. Herbivores living here had to survive on grass, and they did so in enormous numbers. In 1600 it is estimated that more than twenty million buffalo roamed these grasslands.

The Comanche hunted buffalo on horseback with bow and arrow, reserving guns for warfare against people. Guns and ammunition were easy for them to acquire, as the French in Louisiana were eager to arm the Comanche in hopes they would use them to terrorize the Spanish.

They specialized in selling meat and hide from buffalo they killed, horses they stole, and human slaves. Horses

allowed them to kill many buffalo at one time, and the slaves they did not sell were put to work tanning hides. So much buffalo products, horses, and slaves were sold that they arguably became the wealthiest, largest, and most terrifying Native American tribe to exist. With their adoption of a new lifestyle came a new political system allowing them to behave more like an empire than a loose confederation of tribes.

This wealth and power made them an empire—a particularly brutal empire. When they were not hunting they were raiding, and each raid tended to follow a similar routine. Males were not just killed but tortured, an example being slowly roasting the man over a fire. The women would be publicly raped by one Comanche after another. Younger females would be enslaved, perhaps becoming a full tribe member. Babies were dispatched without a thought. All the horses would be taken, and the raiders would then quickly flee, perhaps covering sixty miles before the survivors could organize a rescue party.

Both the Apache and European immigrants were impoverished by Comanche raids and tribute, and it wasn't until the tribe was defeated and forced onto a reservation could Comancheria be settled. In the meantime, the Comanche ruled the south central plains, vacillating between raiding settlements and forcing those settlements to trade with them. As their wealth was gained by buffalo slaughter and human enslavement, their culture exuded a warrior ethos. To die a young man in battle was a far better fate than succumbing to smallpox like so many of the Pueblo people, they thought. Unlikely to live a long life, young warriors used the

time they had to engage in conspicuous consumption by accumulating more horses, wives, and slaves.

Buffalo were harvested in numbers too large to be sustainable, and their time was numbered, but in the meantime Texas was their kingdom. In 1760 there were only 1,200 colonists in Texas, and half of them lived in San Antonio, congregating together in fear of the Comanche



Map from S. C. Gwyne's *Empire of the Summer Moon*

When American armies set out to track down the Comanche, they could only do so with the assistance of Tonkawa Indians, who hated the Comanche and, being cannibals, wanted to literally eat them

warriors.

Being buffalo hunters they had ample protein but depended on trade for their carbohydrates. Taos, New Mexico was a particularly important trade fair for the Commanche, and such trade wasn't all voluntary. The residents of Taos new if they did not trade with the Commanche they would be invaded by the Commanche, so they grew maize, squash, and beans to exchange for buffalo meat to avoid the tribe's enmity.

Flush with more buffalo meat they could consume it naturally became a major component of their diet, but also their culture. Some meat would be roasted over a fire. Other meat would be boiled. Before access to European pots boiling was achieved by placing a buffalo hide in a hole, filling it with water and meat, and then dropping heated rocks into the water. Much meat would be dried into jerky or pemmican for traveling. Like the Apache, they would mix buffalo bone marrow with mesquite beans to make a nutritious and mushy food.

Some of the buffalo was consumed raw. Salty bile from the gallbladder was squirted onto liver and consumed raw. If a female buffalo with a nursing calf was killed, a beverage was made by mixing the mother's milk with her blood, but the drink they really loved was the curdled milk retrieved from the stomach of the nursing calf. The heart was never consumed.

Kit Carson

All lived in fear of the Commanche, including the Apache, some of whom fled to northwest New Mexico. On their way they raided the Pueblo people, stealing their livestock and taking captives. The captives brought their own culture with them, many elements of which their captors adopted. They eventually became an amalgam of Apache and Pueblo people. As these two cultures blended a new people emerged. The Spanish saw them farming in the valleys of northwest Mexico and so referred to them as Apache de Navihu, meaning "Apaches who farm in the valley". This was eventually shortened to "Navajo" as we know them today, but they refer to themselves as the Diné, which in their language simply means "the people".

When Juan de Oñate entered New Mexico in 1598, in a caravan that stretched for two miles, he brought with him 1,300 horses, 100 donkeys and mules, 1,600 cattle, 200 oxen, 3,400 sheep, 1,000 goats, and 60 pigs. We do not know how many of each livestock made it to the place that would be named Santa Fe (means "holy faith"), but this was the seedstock that began the livestock industry in the southwest. These were the horses whose descendants would be ridden by the Commanche. These were the sheep

that would be embraced by the Navajo.

It was the churro breed of sheep that thrived in New Mexico. All sheep descend from the Asiatic ural sheep domesticated around 8,000 BC (maybe earlier). Sheep are ruminants, like cattle and goats, with a complex digestive system allowing them to digest coarse cellulose found in grasses and woody shrubs. In dry areas with little vegetation sheep are favored over cattle because they are smaller, requiring less food. Their advantage over goats is that goats prefer to forage in forested areas whereas sheep prefer the open pasture, making them easier to herd.

Spain was a nation of sheep people. It was their preferred choice of meat since the Middle Ages, and their shepherds lived a life of transhumance, constantly on the move with their herds in response to the seasons. Each flock would be driven hundreds of miles each year, starting in the northern mountains in summer to the lower south for warmer winters.

The preferred breed in Spain was the merino, with its large yields of fine and soft wool. It was brought to Iberia soon after the invasion of the Moors in 711, replacing the churro, who produced relatively small-yielding and lower-quality wool. The merino sheep were valued so highly that exporting them from Spain was forbidden, yet the Spanish were happy to see the churro leave, so when ships were boarded with livestock to colonize the New World it was the churro breed that crossed the Atlantic. And when they arrived in New Mexico, it was like the churro were engineering specifically for the region.

The churro are tougher than merino, and thrived in conditions most animals would starve. Their meat tastes better, and though Europeans thought the wool inferior, its hard and straight fibers with a lower oil content was ideal for the method of spinning and weaving used by the Pueblos, a wool that didn't even need washing before spinning. The Pueblos had long dyed and spun cotton, and the natural dying pigments they used was absorbed perfectly by the churro wool. The merino would not make an impact on New Mexico livestock until after the U.S. Civil War.

From the moment the Spanish arrived in New Mexico they were raided by the Navajo, and from the moment the Navajo stole their first churro sheep they were hooked. From this point forward, they became a different people, where virtually everything in their culture revolved around churro sheep. They now lived the quasi-transhumance life, always roaming about to find fresh food for their churros. Yet they were partly sedentary as well, still relying on agriculture for their carbohydrates.

The Navajo culture doted on their sheep, speaking to

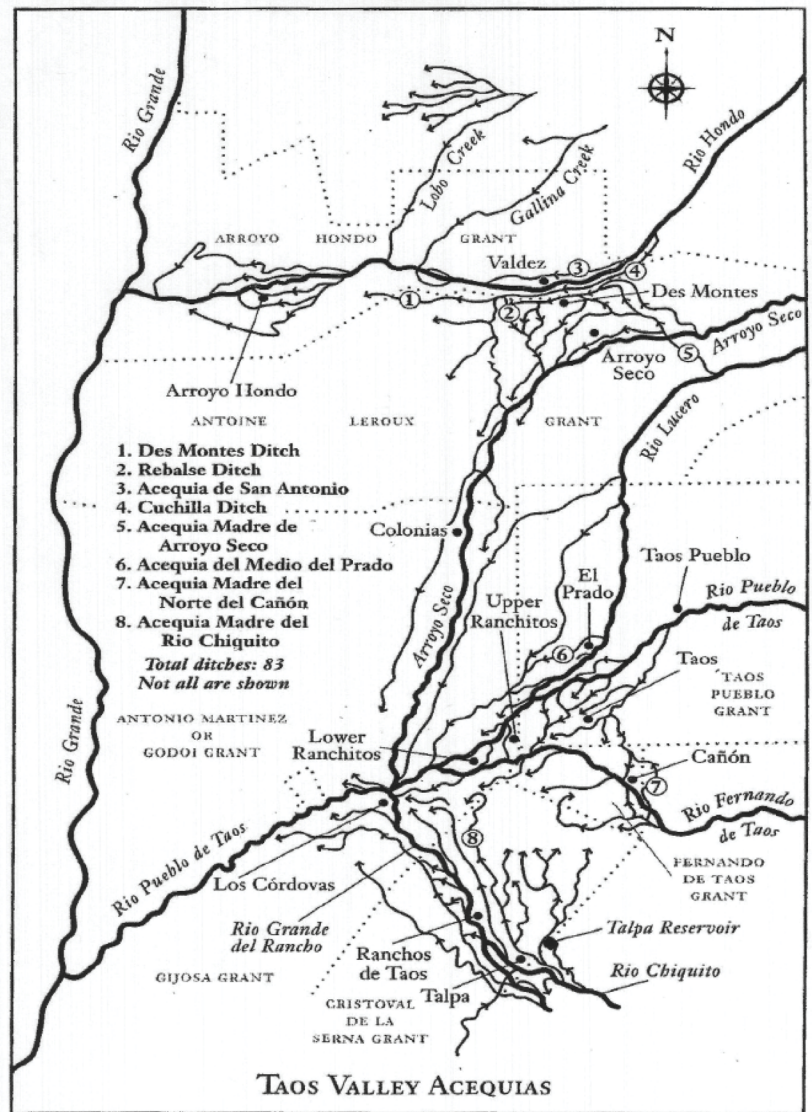
Acequia in Spanish means “irrigation ditch”, and New Mexico’s acequia system provides a major means of irrigating fields by diverting water from rivers that begin from snowmelt in the mountains onto fields that would normally receive little water.

The Pueblo people already used canals before the Spanish arrived, but on a much smaller scale, and sometimes was used more to control water from rainfall than divert water from rivers.

The first two things the Spanish did when settling a new area was to build a church and dig an acequia. The technology and management of the canals was an amalgam of the systems in southern Spain and those of the Pueblo. Historians say acequias in the southwest U.S. still have a governance structure similar to Medieval Valencia, Spain.

It a public works project but managed like a cooperative, where all the users of the water participate in the governance of the system.

Today there are more than 1,000 acequia systems in New Mexico.



Source: Henkel, David S. 2014. “Community-Based Water Systems: Preserving Livelihood, Ecology, and Community.” *Human Ecology Review*. 20(2): 75-95.

Acequia Anatomy

Presa—dam at the river

Acequia madre—mother canal

Compuertas—headgate

Canoas—log flumes to cross canyons

Sangrias—lateral ditches perpendicular from mother canal to fields

Desagüe—channel to drain excess water back to river

Parciante—holder of acequia water rights, and thus responsible for ditch management in proportion to the water they receive

Mayordomo—Ditch superintendent elected/appointed by the *parciantes*

Sacar la Acequia—annual communal activity where the acequias are cleaned. Each *parciante* must participate or pay someone to take their place.

them directly, singing to them, and hand feeding them pollen. Children were told that the sheep is their mother, the sheep is life. All their tools were made from sheep bones, and their beds consisted of sheepskins. Sheep meat obviously comprised much of their diet, but so did the lung, liver, head, and heart. Sheep blood was boiled and mixed with corn mush, and the best delicacy of all was sheep fat tied to a stick with sheep intestines and roasted over a fire.

As anglo settlers pushed westward, they bought Louisiana from the French, defeated Mexico for all of southwestern U.S. (a region the Mexicans did not lament losing too much, given that it was dominated by the Commanche anyway), and ordinary families risked everything they had on obtaining new land. The anglo's style of invading native lands differed from the Spanish, who would send an army of soldiers and Catholic priests first, establish themselves, and then call for settlers. For the anglos, the vanguard consisted of families who gambled their lives to reach free land first. Only later would the military forts reach them to provide protection.

Every new anglo settler in New Mexico dreaded the Navajos. They knew a raid would come, and probably soon. It was assumed the Navajo would steal some of their sheep. The settlers were more concerned about them stealing their children. The Spanish just put up with it for centuries, but the Americans would do no such thing, and in 1863, Kit Carson was charged with conquering the Navajo and forcing them onto a reservation.

In the contest for "greatest man in the world" Kit Carson might just win. He was the quintessential bad ass whose adventures in war and exploration made him every American kids hero in the late nineteenth century. Though uneducated and even illiterate, only the occasional Indian could scout better, and only heros in fiction can muster a greater combination of fighting ability and luck. Moreover, by all accounts he was a decent person. He didn't hate Indians. His first wife and some of his children were Indians, and throughout his life befriended as many as he fought. One must understand, in those days, everyone (save for the Quakers) fought someone.

When Carson began his campaign against the Navajos he didn't need to beg the Ute Indians for help, as they hated the Navajos. Carson did not share this hate, but he did believe their raiding had to be stopped, and if the Navajo did not want to be eradicated as a people at the end of American guns, they would have to be relocated to a reservation and "civilized". He was old at this point, and tired after experiencing adventures equivalent to ten lives, but he also knew that no one could subdue the Navajo

better, and no one would be more fair to them.

Carson and his army eventually forced the entire Navajo people to surrender, and he moved them east to a reservation in Bosque Redondo, New Mexico. This was the largest forced migration of native Americans next to the Cherokee's Trail of Tears, with a march of nine thousand Navajos, five hundred of them dying along the way.

The U.S. government actually put in considerable effort to ensure the Navajo would be successful in their new home. The Bosque Redondo was about as large as the state of Delaware and had good access to water. Moreover, the tribe was given much assistance to help them become successful farmers.

Carson, after killing so many Navajo and subduing the entire tribe, wanted them to have a better life also, and volunteered to be the reservation superintendent. He was the man for the job, with his deep understanding of and respect for Indians, and their respect for him. The tribe was seemingly conquered by one man and they were in awe of him, calling him the "Rope Thrower" for his ability to rope in an entire people.

Things went well at first. Their first job was to begin constructing an *acequia madre* (mother irrigation canal to provide irrigation for crops) seven miles long. The second job was to plant crops, focusing mainly on corn, but also wheat, sorghum, rice, and turnips. The canals were built, the crops planted and growing verdant, but there were problems.

The U.S. government made a mistake thinking they could move both the Navajo and the Mescalero Apache onto the same reservation. Yes, they spoke a similar language and were related, but they hated each other and began fighting.

The government tried to build housing similar to the Pueblo people, consisting of permanent houses side-by-side, but that is not how the Navajo lived. It was their custom to vacate their house when someone died, making "permanent" houses impractical. Before, each family lived in small wood houses called hogans, separated from other families, and so the Pueblo idea was abandoned and the Navajo built their hogans, but wood soon became scarce.

European settlers always wanted the natives to adopt Christianity, but Navajos were accustomed to a host of gods, many of them female. It just didn't make sense to them. The water plentiful but was alkaline and tasted nasty, and when the Navajo developed dysentery they presumed the water to be poisonous.

Until the crops were harvested food would have to be provided by the U.S. government, but there wasn't much of it, and so Navajo families started prostituting their daughters for more food. Syphilis then broke out on the

reservation, and doctors reported 50% of the army soldiers contracting a venereal disease. As the girls became pregnant and attempted abortion, many died.

The Navajo were forbidden to own weapons, and when the Commanche learned of this they began systematically raiding the helpless people.

Then the corn crop failed. For as long as they could remember the Navajo had successfully raised corn, but not all in one place in a monoculture. Their fields would be scattered about, their locations undergoing a vetting process. First they would taste the soil. It had to be sandy, because a clay soil cracked when dry, releasing the moisture underneath. They they would plant small amounts in areas that seemed auspicious, testing its growing potential. When a site was chosen it would be cleared by burning, but the rocks would always remain, as they help preserve moisture from condensation.

Their insect management skills were clever. To control grasshoppers on their corn, sheep would be driven in the corn rows, where their sticky wool would capture the insects like glue traps. Out of the field, the grasshoppers would be picked off the animals and killed. Squash plants were sprayed with a mixture of urine and goat milk as an insecticide.

They had mastered corn farming in the high elevations of western New Mexico, but not the lower eastern New Mexico. Also, they were encouraged to discard their traditional food production techniques in favor of American methods. The corn crop seemed well in 1864, with tall plants adumbrating large full ears. But within the corn husks was the cutworm, inflicting its damage out of sight, eventually destroying the entire crop. The Navajo had never seen a cutworm, nor had the Americans seen it this far west.

In addition to all the other misfortunes at the Bosque Redondo, now the corn crop was a disaster. After years of suffering bad water, Commanche raids, and their culture stripped from them, General Sherman (of Civil War fame) arrived in 1868, five days after Kit Carson died. Sherman's job was to return the Navajo to their ancestral lands, where they live today, albeit in a much smaller area.

Imperfect and incomplete

A curious aspect of the Navajo culture is their adherence to a philosophy of incompleteness and imperfectness. Perhaps it is an embedded acknowledgement that the world is continually changing, never achieving perfection, in the same way the Christian thinks of sin. The idea of anything being finished was resisted, whether it be a basket or a blanket, akin to the way Hollywood likes to end a movie

with a foreshadowing of a sequel.

Navajo blankets were made with such skill and care that it was said they could hold water, but the Navajo would never claim one to be perfect, and they even deliberately left a flaw they called a "spirit outlet". And so we end our journey with the Native Americans in a similar way, with no grand conclusion and no philosophical denouement; just a last sentence remarking that their story continues.

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