SPRING 2011

SANCTUARY

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Familiar Fare

The wild origins of common foods

Food Culture

Choices of what to eat, how food is prepared, and by whom all reflect strong cultural norms and expectations. As we celebrate food in this issue of *Sanctuary*, I am intrigued by the origin of some of the foods we enjoy today. I have always loved artichokes, the odd-looking, fun-to-eat member of the thistle family. But who ever thought of eating a giant thistle? Considered native to the southern Mediterranean region, artichokes were eaten by ancient cultures including the Greeks and Romans. They likely came to Europe in the 1400s and were even cultivated in Henry VIII's garden.

Eventually, they made the leap to America, and finally to my plate as a young teen in the 1960s. It was a real treat to have artichokes at home (perhaps it was the melted butter accompanying it!). I still smile at an old friend who confessed years later that facing an artichoke for the first time at my house was an intimidating experience.

In many cultures, women are responsible for food preparation, although until quite recently professional chefs were all men. Here in the US, Julia Child helped to change the accepted view that, while women belonged in the kitchen, it was only the kitchen of their own homes. Child's training at Le Cordon Bleu in Paris and private lessons with master chef Max Bugnard gave her the expertise and credentials of a superlative chef.

The Canadian dish known as poutine, a relatively new culinary creation, consists of French fries topped with fresh cheese curds and covered with brown gravy. If you have never experienced poutine and have just read that description, you are probably wondering who would imagine such an extreme combination of ingredients. But food choices have a lot to do with what is in your head and what biases you bring to the table.

The Australian concoction known as Vegemite is a case in point. For those who have not tried it, Vegemite is truly an acquired taste, a brown sticky paste made from yeast extract and used on toast, crackers, etc. More than a billion jars of Vegemite have been sold, which certainly suggests that most Australians are eating it and probably consider it as much a comfort food as chicken noodle soup for children growing up in the fifties and sixties in the US, under the advertising spell of Campbell's Soup—with a little help from Andy Warhol. The mother of Vegemite is no doubt the British version of the equally repulsive—or delicious, depending on your food bias—spread known as Marmite, which first appeared on the market in 1902.

These days, whatever our food preferences, we are beginning to understand the importance of fresh ingredients and the impact of food grown locally rather than shipped. As summer brings an abundance of local fresh ingredients, consider developing a garden of your own, joining a community garden, shopping your local farm stand, or joining a CSA (community-supported agriculture). Mass Audubon has abundant information available on our website or at many of our sanctuaries, notably Drumlin Farm. (See page 24.)

Bon appétit!

Laura Johnson, President

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Mayan Corn God, Yum Kaax

STAFF

Cover: Grant Wood, Young Corn, 1931. Oil on Masonite panel, 24 x 29 7/8 in.

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FEATURES

Livestock at Drumlin Farm

DEPARTMENTS

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How It All Began

I had dinner a while back at the Rialto Restaurant in Cambridge with the Harvard anthropologist Richard Wrangham, author of *Catching Fire: How Cooking Made Us Human*. Wrangham, who is, in a sense, the world authority on primordial cooking, has been considering the evolution of food consumption over the course of his work with chimpanzees and preliterate cultures. The thesis of his book is that the act of cooking, a practice that may be almost 700,000 years old, is what shaped us into human beings.

Given Wrangham's theme, dinner at the Rialto, in keeping with contemporary haute cuisine fashions, turned out to be something of an ironic affair since much of the food that evening was served raw.

© COURTESY OF THE RIALTO RESTAURANT

Seared tuna

The chef at the Rialto, Jody Adams (who incidentally was an anthropology major at Brown University before she became a chef), prepared a multicultural three-course dinner for that evening's event. The first course included Duxbury oysters and Taylor Bay scallops, presented with rolled cucumber with avocado and hibiscus. Our second course was a seared tuna with sprouted quinoa, garlic yogurt, raw beets, and dukkah, a mixture of nuts seasoned with Middle Eastern spices. The only fully cooked dish was the dessert, a cinnamon apple terrine with brandied cream. All this was served with another uncooked, but perennially popular, item—three pairings of European wines, including a 2005 Côtes du Ventoux.

Nowadays the discovery and evolution of the foods of our distant ancestors, such as potatoes, grains, and fruits, are rarely considered. Furthermore, food items originally local to one continent or another generally stayed where they were until the late 15th century and the European voyages of discovery. Since then, various edible species that appear regularly on dinner tables have traveled the globe, have been thoroughly assimilated into local cuisines, and have been shaped into delicacies such as those that appear on the eclectic menus of Jody Adams. But it is worth noting that all of these foods, no matter how sophisticated their preparations, began as the wild uncooked fare of protohumans and other animals.

Bands of nomadic early hominid species consumed a wide variety of edible plants, probably scavenged the kills of other mammals, and eventually took up hunting. But all these foods, a million years ago, would have been consumed raw.

Then came one of the major developments in human evolution—the ability to tame fire. Recent discoveries have suggested that early humans, or habilines, may have used controlled fires about 790,000 years ago, and there is good evidence for the use of cooking fires from hearths that were discovered in Hayonim Cave, Israel. The hearths were about 250,000 years old. According to Wrangham's theory, this protohuman ability to cook food had a major effect on the physiology of the general group of free-ranging, tool-using bands of habilines who roamed the African savannah over a million years ago. With the control of fire and the development of cooking, everything changed. Foods that were formerly eaten raw in the spot where they were found, or killed, were collected and carried back to primitive camps. Meats were cooked by simply laying the animal, or animal parts, on a fire; some fare was buried in hot ashes to heat it, and even bones were made edible by heating them and cracking them open with stones to get at the marrow.

Since the bands of habilines tended to gather together around a central cooking fire, the group became more cohesive. Food was shared, and the division between the genders widened. Far-ranging male hunters separated from the female plant gatherers, who stayed closer to the camps and tended the fires. Even our looks changed. Teeth became smaller since cooked food is more easily chewed than raw food. In the end, after thousands of years of evolution, what emerged from these early cooking fires was a new species of habiline known as the Cro-Magnon—which is to say, *us*.

As Wrangham pointed out, as he sampled Jody Adams's undercooked tuna (which probably matched some of the seared meats of our ancestral chefs), "We are what we cook." JHM

John Hanson Mitchell is editor of Sanctuary.

Amber Waves of Grain

Grass seeds, turkeys, the rise of ancient civilizations, and other historic and natural events

by Joe Choiniere

Along a historic county road, which is now an obligatory branch of my daily commute, grains grow. I know this is thanks to Mr. T, who habitually gathers them, in season, along the gravelly road edges. These grains are not of the commercial or culinary type: not of the oats, wheat, rice, or barley that fueled civilizations in their ascendance to dominance over the earth. They are closely related *wild* grains, what most might consider weeds, including *Setaria glauca*, the so-called yellow foxtail. And Mr. T is a turkey, similarly, not the domesticated variety but our reestablished pilgrim icon, the wild turkey (*Meleagris gallopavo*). Here, in acres of habitat barely a yard wide with Princeton's purple hills as backdrop, grow amber waves of grain.

I first supposed that Mr. T was collecting gravel, grit for his muscular gizzard, which can render acorns into digestible gruel; but it became clear to my wife, Donna (who named Mr. T), that the stately bird wasn't pecking for digestion's sake—he was tweezing at the vegetation. A brief stop on a midsummer commute verified this observation—the bird was eating crabgrass (*Digitaria* sp) seeds.

Botanically, all grass species' seeds are grains, a term normally applied to only our culinary grass species, the cereal grains. To a botanist a grain is more exactly termed a caryopsis—a fruit with a thin hard coat protecting an embryonic plant and starchy endosperm attached to the inner seed wall; and strictly a creation of the grass family, Poaceae. The seemingly innocent revelation that the small seeds of the despised crabgrass appear important to a wild turkey and that they are grains awakened me to the way that grains have fueled and figured in the lives of both humans and other biota.

Perhaps our ancient hunter-gatherer ancestors plucked seeds from grasses deftly and gently enough to prevent loss of precious food to the ground below. And it must not have taken early humans long to realize that there might be a better way to catch the seeds. Grass seed dispersal is often referred to as shattering. Some seeds quickly fall when touched; some, known as nonshattering, remain on the seed head. One of the two great developments for most of our domesticated grains was to minimize or prevent shattering in their wild progenitors. Increasing grain size was the other. Common wheat, *Triticum aestivum*, is a great example. As with almost all our cultivated grains, modern-day wheat is a far cry from its ancient wild grass ancestor. Wheat was under domestication 10,000 years ago in southeastern Turkey and spread quickly throughout the Fertile Crescent, providing a likely forerunner to agriculture, and thus was crucial to the development of our earliest civilizations.

Thomas Hart Benton, American, 1889-1975; Cradling Wheat, 1938, tempera and oil on board; 31 1/4 x 39 1/4 in.

Shattering and nonshattering types of grain are present at all times in a population, but the balance may have been tipped by agriculture. Humans, via artificial selection (perhaps unknowingly), contributed to nonshattering grains' domination in several cultivated grains. This may have happened quite simply—cutting wheat plants would dislodge the shattering type seeds, so only the nonshattering heads made it back to the threshing area, where both food and seed for next year's planting were extracted. Our modern grains have been selected to solve the "problems" that wild grains create in their adaptation to a nonhuman-dominated world. Wild grains don't ripen all at once. By shattering—ripening over time—our wild grass grains maximize their ability to proliferate in changing weather conditions day to day. Although some grains may shatter as Mr. T feeds, he has more than one chance to harvest his grain because many other grains in the same heads hold tight and ripen over the next week or longer, i.e., better for bird

Thomas Hart Benton, 1889-1975, Threshing Wheat,1939, tempera and oil; 26 1/8 x 42 1/8 in.

and grass.

Wheat seed heads look very different from their separated fruits. Unless you grind your own flour from wheat "berries" (the culinary name for the whole grains, which are definitely *not* botanically a berry), you probably have absolutely no idea even what wheat grains look like. Oats usually arrive flattened, that is, "rolled"; groats are whole plump oat grains. Rye grain is most often seen by gardeners who purchase it for cover crops in veggie gardens; millet looks like birdseed. Then again, how many know what any of our common grains look like reassembled in their full seed heads back at harvest time? Corn is borne in familiar ears; wheat, barley, oats, rye, and millet fruiting spikes are likewise termed "ears" but differ from corn in their flower morphology.

The flower heads of grasses are modified spikes, more often open panicles but compressed in most cereal grains. Flowers are called florets; although they possess no petals, stamens and stigmas are prominent and adapted for wind pollination. Two small paired bracts called palea and lemma enclose each floret and are key structures in grass recognition. One or many florets together make up a spikelet, which has its own bracts called glumes at the base. Glumes, palea, and lemma can all have long awns, or bristles, with backward-pointing barbs that may assist in animal dispersal or even seed germination. With our yellow foxtail, the bristles are attached at the base of each spikelet, forming a bottlebrush-shaped framework. Most cereal grains' compact heads bear awns, many long, affecting an arthropod-like appearance of heavy armor and looking highly inedible.

Freeing the seed from its spikelet structures is paramount to harvesting our domestic grains by hand. There are many steps to this. Oats, *Avena sativa*, offer a good example. For a while my son worked at Old Sturbridge Village and harvested grain, as he says, "from field to yield," using hand tools. Oats were domesticated later than wheat and rye, perhaps only a thousand years ago, and they evolved as weeds in fields among other cultivated grain hiding in plain view for who knows how long!

To cut oats one starts with a scythe, that long knife blade on an undulating long handle dubbed a snath. Scythes are also used to harvest hay; for grain harvest, a cradle of long wooden fingers is attached behind the blade. As one cuts in a sweeping and slicing motion, the blade rides under the cut stems, causing them to lay down gently onto the cradle. The skilled reaper carefully lays down the cradled grain stalks on the return stroke in a position to be gathered and tied together. No string is needed—the sheaf knot is made with stalks of the bundle itself.

These sheaves are further gathered into larger piles and left to dry standing up. Once dry, the stems are threshed by flailing them on a cloth mat. Threshing shakes the little spikelets with their grains free of the stems, leaving useful oat straw behind. The pile of chaff includes grains, glumes, lemma, palea, and other broken bits of plant debris. One can first sift the larger pieces out in a small screen. The remaining chaff is similar in size to the grains but much lighter in weight. To separate them, one takes advantage of the wind to winnow the chaff by deftly tossing the mixture into the air and catching it in a pan or basket. The grain falls back as the chaff blows away.

The machine invented to cut and process grain from standing grass to clean grains, not surprisingly, was called the combine—it combines all the tasks under the operation of one person, effectively eliminating human contact with the grain. Unfortunately, with the combine's speeding up grain harvest came also a need to plant more, to set up enormous fields. Grains were bred for resistance to herbicides; varieties were patented; farmers were sued when patented grains strayed onto their lands. In the face of such intense mechanization, I find it heartening that somewhere hand harvest of grains is still practiced—it's a traditional procedure that should not be lost.

There is another place where by-hand grain harvest is still practiced in North America, in this case by original peoples. In September, during the wild rice moon, one takes a canoe and uses it as a reaper of sorts, moving through tall grasses growing in shallow water, bending over the fruiting heads of the grass *Zizania aquatica* with

one arm and tapping off the ripe grains with the other, gathering and partially filling the canoe with North America's other premier indigenous edible grain, wild rice.

Wild rice is a noncomformist. It has remained relatively untamed, and some native people such as the Menominee tribe in Minnesota want to keep it wild, thus protecting the grain from genetic introductions and "improvements." Other stands of wild rice have been at least partially tamed. The wild rice we usually see in stores is semicultivated in rice paddies where it is harvested by machine, a step toward cultivation of sorts. There is a difference between wild hand-harvested rice and semiwild rice that is reaped through a particularly mechanized process. Size of grain and price differences were obvious in the samples I purchased, but flavor was also different. Both are delicious and nutritious. I noticed an almost tea-leaf-like flavor in the one-inch-long grains of the hand-cultivated rice, contrasting with burnt-spinach overtone in the flavors of the more commercial wild rice.

Wild rice isn't the progenitor of culinary rice (*Oryza sativa*); that rice originated in China, again 10,000 years ago, and has become the world's most important grain for human consumption. As with other grains, it was the foundation of a civilization in its native home area of the Yangtze River valley. I think that early explorers named our American *Zizania* grain "rice" because both culinary rice and wild rice grow in standing water.

I doubt that Mr. T's preferred road edges will ever sprout rice. But road edges do, on occasion, produce other cereal grains. Rye is used in conservation mixes to stabilize disturbed soils. Oats and wheat and, rarely, barley sprout from horse wastes along country roads. These grains can even self-sow and persist, reseeding as annuals for a few years. I have noted oats' tall floating panicles with dangling bell-like spikelets along my commute this past autumn, mixed with the even taller switchgrass, *Panicum virgatum*. Nowadays, the cereal oat, which was once a weed itself, and also switchgrass, a dominant Midwest tall grass prairie denizen, tower as amber waves above our reintroduced turkey friend as he feeds along the local roadsides.

Joe Choiniere is property manager at Wachusett Meadow and Broad Meadow Brook wildlife sanctuaries.

Wheat and the Boy

Somewhere in my childhood I heard that bread was the staff of life, and it was certainly a staple in our family: white crusty bread bought from the bakery at the end of Quarry High Street Oxford, where we lived. In England we had a bread called Hovis, which my grandmother sometimes served. It was a brown bread with added wheat germ. I didn't know this at the time; I only knew the advertising jingle: "Don't just say brown, say Hovis!"

The fact that wheat was the constituent of pasta was unknown to most English people, as evidenced by the late 1950s April Fool's documentary in which the respected journalists of the program *Panorama* showed Italian women laden with baskets harvesting long strands of spaghetti from bountiful trees. It seemed at least half of the country was tricked. I always thought spaghetti was simply one of the 57 things that came out of a can.

My first job as a teenager was working with my mother at the bakery counter in a department store in Bournemouth. In 1967 she took a course and learned about the different parts of wheat: the germ, the bran, the starch, the gluten. She brought home the diagrams and drawings, which I found fascinating, but I did not really understand the relevance of this to me.

Then in 1975 I came to this country and started working in the natural food industry and finally developed a consciousness of food. Words like organic were new to me, but I soon learned the value of whole unprocessed foods and pesticide-free products. I also saw for the first time grains of wheat; and I learned that there are hard wheats (better for bread) and soft wheats (better for pastry). There was winter wheat and spring wheat, according to when the seed is sown. There was red wheat and white wheat and durum wheat for making pasta. I learned about the allergenic nature of gluten to so many people, and of course I finally learned why the bran and the germ and the gluten are all important parts of a whole food.

When I started eating organically, I believed that I was maintaining my own health. It was several years later, after a conversation with the local farmer John Bemis of Hutchins Farm in Concord, that I realized there is a better reason for eating well—the health of the environment. Soil, air, and water were more at risk than my single body.

Every day now at the store where I work I see the variety of whole grains that are available: quinoa, which is high in protein even as it is gluten free; buckwheat and amaranth, which are not even members of the grass family; purple prairie barley; Himalayan red rice, Chinese "forbidden" black rice and jade green rice infused with bamboo; and spelt and kamut, which are essentially heirloom wheats.

Today farmers are engaged in the battle to keep genetically modified grains from sweeping the marketplace and tying growers to patented seed stock that drives small farmers all over the world into bankruptcy. The importance of choosing local food and supporting family farms is even more significant than simply buying organic—both in terms of the monocultural practice as well as transportation and sustainability. There is even a movement now to grow wheat in New England as a viable commercial crop: the place it was first grown in this country.

Perhaps one day I will not be simply walking down to the local bakery for crusty white bread made from imported processed flour, but will be able to eat whole wheat bread baked and sold locally and made with New England wheat.

Jim Leahy is a writer and natural food store manager in Concord, Massachusetts.

The Corn God

The origin and evolution of corn

by Michael J. Caduto

"Mother Corn has fed you, as she has fed all Hopi people since the long, long ago when she was no larger than my thumb."

— Sevenka Qoyawayma, Hopi

Extraplanetary visitors to Earth would wonder about our relationship with corn. On any given day, millions of people gather in dark chambers to worship larger-than-life icons that move across a flickering screen, engaging in an apparent communal rite while consuming pails of a light fluffy grain. Popcorn would appear to the extraterrestrial observer as the food that feeds our souls while we worship our cultural gods.

Eating corn was indeed a sacred ritual soon after its discovery as an edible grain in southern Mexico some 9,000 years ago. It inspired luxurious religions populated by gods whose images do appear otherworldly, including the Maya Corn God, *Yum Kaax*. Corn was the energy that powered the Maya, Aztec, and other expansive cultures of Mesoamerica.

On average, each US resident eats 14 gallons of popped corn annually. Fresh kernels explode with a bang that speaks to our love of the loud, brash, and contemporary. Yet paradoxically, popcorn derives from the most ancient form of maize. The earliest kernels on a cob were an indigenous form of popcorn—the forerunner of the prolific grain that has fed humanity for millennia.

How did the minute inflorescence of a grass that produced about a dozen stone-coated seeds evolve into modern-day varieties of corn bearing 400 to 800 soft fleshy kernels per ear?

The story begins with the small grass that the Aztecs named *teosinte*, or "grain of the gods," which grows in the watershed of the Balsas River of southern Mexico. Here, in the fertile crescent of the Americas, through a combination of serendipitous cross-pollination in the wild of a teosinte subspecies (*Zea mays parviglumis*) with a gamagrass (*Tripsacum* sp)—and selective interbreeding by the Maya, Aztec, and other indigenous peoples—the grain of the gods transformed over thousands of years from primitive popcorns into ancestral varieties of the luscious corn plant of today.

Maize cross-pollinates and hybridizes so readily that it has produced thousands of cultivars—the greatest number among all the world's crops. Each one of the hundreds of silks on a female cornflower can be pollinated separately by a pollen grain borne on the wind from any male tassel. In time, corn cultivation became a central focus of activities among the ancients of Mexico. It nourished their bodies as well as their souls.

A Mesoamerican kinship with maize winds like a root through time. The *Popol Vuh*, a sacred book of the Maya, says that the Creator and Maker, Tepeu and Gucumatz, first fashioned people from mud, but those people were weak and couldn't stand. Then the gods used wood from the rainforest trees. But those people had no souls or minds so they cut many trees and hunted with no regard for Creation, never giving thanks. So a great flood was sent to destroy them. Finally, the animals showed the Creator and Maker where corn grew, then Tepeu and Gucumatz ground the corn and fashioned people from cornmeal. These people praised the Creator and Maker. They were told that their world would remain in balance as long as they took care of the rainforest and remembered to give thanks.

Canyon de Chelly by Edward S. Curtis

The traditional milpa agriculture of Mesoamerica did, in fact, create a way of life that balanced gardening with the health of the rainforest. Clearings were cut and burned to create openings and enrich the soil. Gardens were grown using methods such as weeding, layering, mulching, fertilizing, crop rotation, and companion planting. In this way, maize, root crops, trees, and more than 80 other crops were planted over time. Raised drained fields were created in wetlands, as well as terraced hillside gardens. After 3 to 7 years of planting, the plots were left fallow, and the soil was allowed to replenish itself for up to 20 years.

Grinding Wokas by Edward S. Curtis

Through these methods, each acre could grow up to 2.7 tons of shelled corn per year. Dried corn was kept underground in grain stores called *chultuns*. In time, maize provided up to 80 percent of the diet of the ancient Maya. The forerunner of today's flatbread, or tortilla, was a common meal among these early cultures.

As corn evolved, so did the necessity of its relationship with ancient growers. Ears with ever-larger numbers to kernels, and those that were covered with a protective husk, could no longer grow without human intervention. Kernels of corn enclosed in a sheath that fell to the earth would begin to sprout, but they were so tightly spaced and competed so fiercely for water, light, and nutrients that none could grow to maturity.

Compared with the yields and versatility of other crops, however, corn had no peer. The plant became the iconic food of the Americas. Corn then began to spread its roots from Mesoamerica south to the peoples of the Amazon rainforest and the Andes Highlands, east to the Arawaks and Caribs of the Antilles, and north to the woodland peoples in the river valleys of the Mississippi and Ohio. Eventually, corn reached North Dakota and southern Canada, and moved east to the Saint Lawrence River valley and deep into South America in Chile and northern Argentina—nearly all of North and South America, in other words.

As corn traveled, native groups bred new varieties that thrived in their particular climates and ripened within the duration of local growing seasons. Varieties arose that flourished in the riparian lowlands of the East, in the arid Southwest, and in the mountains and coastal plains of the West. Ears with thicker husks were bred to protect kernels from pests, diseases, and inclement weather. Cultivars ranged from thigh high to more than twenty feet tall. Yellow corn grew in some fields while others bore ears that matured into lavish hues of blue, red, and purple.

The Tohono O'odham of the Southwest stored seeds in a clay pot called an *olla*, which was closed with a stopper and sealed with glue called *lac*. These vessels were kept in cool dry caves and rock crevices near the fields. Each olla contained seeds for growing in certain conditions, such as varieties that sprouted and matured quickly in case bad weather shortened the growing season.

Along with nutritional sustenance, corn inspired advances in plant culture and agricultural engineering wherever it traveled. More than 1,600 years ago, the Anasazi were planting corn in the Four Corners area, where the states of Arizona, Utah, Colorado, and New Mexico now come together. In order to grow corn and other crops in the desert, they constructed elaborate irrigation systems at Chaco Canyon, Canyon de Chelly, Aztec, and Mesa Verde. These channels and storage basins—which covered a region as big as Massachusetts, Vermont, and New Hampshire combined—stored and distributed the water that fell during floods and seasonal rains.

At about this same time, the Hopi, Zuni, Tewa, and other Pueblos began to plant corn. To the four Zuni elements of life—air, earth, water, and fire—was added a fifth: corn. Myths of the Hopi speak of Kokopilau, the bow-backed flute player who led the people into this new world. As Kokopilau played, he brought the warm weather and rain while seeds of the good plants spread forth from the arc in his back, including the germ of maize.

Fourteen hundred years ago, the largest city in ancient North America north of Mexico arose after the invention of the hoe, and new varieties of maize greatly increased food production. In what is now Illinois, near the place where the Missouri River empties into the Mississippi, a metropolis of 20,000 people arose—a civilization that preceded the advent of the Roman Empire. Fueled by the fecundity of maize, the inhabitants created a colossal solar calendar more than 400 feet across. This civilization's most prominent legacy is a complex of 120 earthen pyramids known today as the Cahokia Mounds. The largest structure, Monk's Mound, is greater in size than Egypt's largest stone pyramid of Khufu.

In time, the myths and rituals of the native people of North America reflected their reliance on maize for sustenance. Corn became a fertility symbol to many native North American cultures and was often a vital part of the meals served during marriage ceremonies.

About one thousand years ago, the Maya Corn God finally bestowed his riches on northeastern North America. Seeds of corn may have spread into the Northeast in the form of short-season varieties that arrived via the vast trade routes that emanated from the Midwest. Cultivars of that eight-row flint corn are still grown in some native communities.

Into the gardens of the Iroquois and the Abenaki in the north and of the Wampanoag to the south and east, corn was quickly integrated. Similar to the gardens of Mesoamerica, cleared openings in the forest were established in the Northeast by girdling trees and burning them on the stump. A complement to squash and beans, corn was adopted as the third of The Three Sisters. Corn provided support for the twining bean vines, while the roots of beans, a legume, enriched the soil with the nitrogen so essential for productive yields of corn. Squash and pumpkins trailed over the soil in between the mounds of corn and beans, inhibiting weeds, preserving soil moisture, and preventing erosion. Harvested corn was dried and stripped from the ear, and the kernels were stored in pits dug into the floors of special lodges.

Kokopilau

In October of 1492, about five hundred years after corn had reached the indigenous Northeast, Christopher Columbus arrived in the Bahamas to explore the Americas. The gifts of corn were so evident that, in 1493, on his second voyage to the New World, Columbus sailed back to Spain bearing seeds of maize. Maize quickly spread throughout Europe, the Middle East, Africa, and the Far East. In 1516 Portuguese sailors brought *milho* (maize) to China. By 1575 it had reached the Philippines and the East Indies. The scion of teosinte soon became so intertwined in these new agricultural and cultural milieus that, by the 1800s, people in Turkey, Italy, India, China and Africa—whose families had bred their own unique varieties and grown them for generations—believed steadfastly that maize was native to their homelands.

At the time of European contact, most of the indigenous peoples of eastern North America were living an annual cycle similar to that of groups native to ancient Mexico who first bred corn as we know it. They dwelled in small communities that changed location seasonally to make the best use of available resources within their home territory.

Much of what we know from this time period was handed down by oral tradition and recorded in the journals kept by early explorers. When Samuel de Champlain traveled up the Saco River valley in the summer of 1605, he saw corn that had reached two to three feet in height by early July. He noted that the native people planted 3 to 4 kernels of corn in mounds that were about three feet apart, then added an equal number of beans to each mound. The kind of corn being planted would grow five to six feet tall. Champlain also observed the natives growing squash, pumpkin, and tobacco.

"Indian corn," as the colonists called it, went on to win the palates of humankind worldwide. By any name, corn now provides more than a fifth of the world's nutrition. Teosinte's distant progeny have been transformed into a multitude of useful varieties, including sweet corn, pod corn, flint, waxy corn, popcorn, and dent—the most commonly grown variety in the United States. As much as 13 billion bushels of corn are grown each year on some 80 million acres of US land, comprising 90 percent of the total value of all grains grown here. Most of our corn is fed to livestock. The rest is prepared, cooked, and processed into everything from chips, baby food, tamales, puddings, and sweeteners to dyes, soaps, plastics, paste, packing materials, paint, insulation, drugs, and insecticides.

Maize—a plant that can tower above us—has truly fulfilled its promise as the Corn God. The silks and tassels of its golden hair have fertilized the germ of our history, have sown their seeds in the fields of time, and have grown a story as rich and satisfying as a tub of hot buttered popcorn.

Michael J. Caduto is coauthor of Native American Gardening: Stories, Projects, and Recipes for Families. *His website is: www.p-e-a-c-e.net.*

Potato Peregrinations

Potatoes have been wandering the world ever since the 15th century.

by Gayle Goddard-Taylor

Chris Voight, executive director of the Washington State Potato Commission, thinks potatoes deserve more respect. Last fall, Voight decided to put his stomach where his mouth is and embarked on a 60-day diet composed strictly of potatoes. On day 29, Voight said he felt just fine, thanks for asking, and had plenty of energy and "no weird side effects," aside from a strong craving for salsa.

In part, his motivation for this self-imposed regimen was an outgrowth of the bad press the potato got when weight-loss programs were focusing on reduced carbohydrate intake. But Voight's mission was given even greater impetus by a USDA rule excluding potatoes from the list of approved foods that participants of the federal Women, Infants, and Children (WIC) program could purchase with their food dollars. Voight was puzzled.

"I wanted to do a reality check and tell people about a time in our history, and in current times in developing countries, when the potato sustained and is still sustaining life," he says, "because it is so healthy and nutritionally complete."

But how did a tuber that either required a side of clay (keep reading!) or an arduous process of detoxification end up on the tables of Europeans? This question is one that was bandied about for years, with various countries asserting they were the "first."

It is a question that hung over potato researchers the world over: Where did the potato (*Solanum tuberosum*) originally evolve? The wild potatoes from which today's domestic potato evolved claim a broad landscape, from the southwestern US to Chile. But where exactly did humankind first figure out a way to domesticate this toxic plant and turn it into a dietary mainstay?

Prior to the use of DNA sequencing, there were two major contenders for the title Birthplace of the Potato. Proponents of the so-called Andean type of potato argued it evolved in the Andes Mountains somewhere between western Venezuela and northern Argentina. A second group argued for a smaller area in south-central Chile.

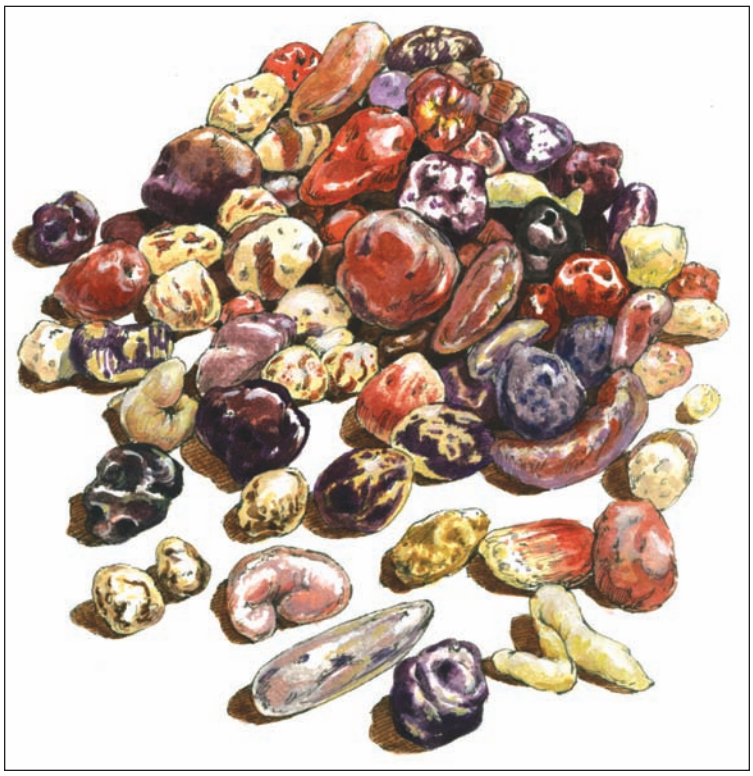
In the 1990s, a collaborative effort that included a team of University of Wisconsin researchers headed by David Spooner, a USDA researcher, and the Scottish Crop Research Institute, finally put the question to rest—although not intentionally. Spooner's team and their Scottish collaborators had only been intending to identify groups of wild species.

Their sleuthing tools were simple—they used a genetic marker called amplified fragment length polymorphism (AFLP) to analyze 362 wild relatives of today's potato against samples of cultivated potatoes from the potato gene banks in the United States and Scotland.

Contemporary potato harvest

"The AFLP is a molecular marker that looks for the relationships of closely related organisms, and we used this in the cultivated potato and in putative wild species progenitors," says Spooner.

The researchers were able to construct a computer-generated "tree" based on the AFLP data and came up



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Varieties of contemporary Andean potatoes

with three major groups—the cultivated species group and two others, dubbed the northern and southern *Solanum brevicaule* groups.

Spooner and other scientists had assumed that the potato had evolved from a number of wild species within a band of geography extending from Peru to Argentina. What they found took them by surprise—all of the domestic cultivars were clustered in one group. The results pointed to the Andes of southern Peru as the place of origin for the potato's domestication—an event that happened about 10,000 years ago.

"This was completely unexpected," recalls Spooner. "So we delayed the paper for a year to look at many more domestic species to make sure we'd gotten it right, and they still all came out in one group."

So in one knockout punch, the research team resolved not one but two things—where the domestic potato originated and whether it evolved from a single or multiple progenitors. This was big news at a time when researchers were investigating other crops to determine if they had single or multiple origins. In fact, so significant were the findings that the paper was published in the *Proceedings of the National Academy of Sciences*, one of the premier science journals in the country.

Today's potatoes, however, are vastly different from their ancient ancestors. Bred for uniformity rather than diversity, they are constantly being tinkered with to produce better taste, size, texture, and resistance to pests. It's hard to see them springing from the wild potatoes still grown by subsistence farmers on the Altiplano of the Andes Mountains, where each farmer may tend thirty varieties in a single field.

The potatoes these farmers are cultivating—what scientists call landraces—are themselves the product of a selection process that began several thousand years ago. Their wild ancestors weren't all that tasty or even healthy. High in glykoalkaloids, the tubers were bitter to the taste and caused stomach upset and even death. The potatoes, tiny little nubs growing from the roots of the potato plant, would hardly seem worth the effort of digging up. How they first came to be made palatable and farmed can only be speculated upon by researchers.

John Reader, author of *The Untold History of the Potato*, theorizes that it may have begun with hunter-gatherers who were scouring the higher elevations for llamas and other game and happened upon the wild potatoes. "It was only a matter of time before some hunters discovered the bounty of food that was stored, ripe for harvesting, in the ground at their feet," he writes.

At that point, it became a matter of singling out the least bitter-tasting tubers and leaving the rest. A safer strategy, perhaps, but not one that would allow the more palatable potatoes to thrive. As the hunters returned each year, they must have realized that, if they were to find a reliable edible crop when they returned, they would have to leave some of the preferred potatoes in the ground. And after a while, they might have thought it prudent to give the plants a leg up by turning the soil. Voilà: a farmer is born. So too was a selection process in which the tastiest and least toxic tubers were nurtured.

Still, these early farmers had to figure out a way to deal with the potato's bitterness. In the Lake Titicaca region, the Aymara people found a way to avoid getting stomach upset by mixing it with clay, something they may have seen animals that ate the potatoes do. Researchers have determined that elements in the clay would bind with the glykoalkaloids in the tubers, allowing them to pass through undigested, according to Reader.

Another more labor-intensive way of defusing the potato's toxicity was developed as well. People living at altitudes of 13,000 feet and above would take advantage of the frigid nighttime temperatures of their environment to freeze, then soak, refreeze, and then dry their potatoes. The arduous process produced something called *chuno*, which was not only emptied of its toxins but also could be stored for long periods of time. According to Reader, archeologists have unearthed *chuno* at sites that date back 2,200 years.

With a tremendous diversity and the ability to adapt to different environments, wild potatoes were able to claim a geography that straddled the Americas, according to J.G. Hawkes, author of "The Potato, Evolution, biodiversity and genetic resources." Hawkes notes that they have been able to thrive in all habitats, with the exception of lowland rainforests.

Andean potato field with native farmers

Indeed, the potato has been sustaining life in the face of droughts, floods, pestilence, and less-than-ideal habitat for thousands of years. Today its domestic cultivars are found worldwide. Baked, mashed, boiled, roasted, French fried, and chipped, the potato is ranked at the top of the list of vegetables consumed in the United States. It ranks fourth among food staples purchased worldwide, behind wheat, rice, and maize. Despite its fourth-place ranking, studies have shown the potato supplies more food energy and more protein per hectare than those top three staples.

Included in the debate over the potato's origin was whether the European potato began in the Andes or in the lowlands of Chile, the former view becoming the more popularly accepted. But how could that explain the fact that all modern potato cultivars predominantly contain Chilean germplasm? Defenders of the Andean theory argued that the Late Blight, the disease that struck Ireland in the 1840s causing widespread starvation, destroyed the Andean potato and that Chilean potato germplasm was brought in afterward to replenish the lost potato stocks.

But Spooner wondered why the Chilean potato, not known to be immune to Late Blight, would have been imported to fill the hole left by the Andean potato. Among the contenders for the earliest introduction of the wild potato were the Canary Islands and India. Spooner's team found that the Indian contender was of the Chilean type, but that the type found in the Canaries contained the DNA of both the Andean and Chilean potatoes.

Examining DNA markers in historical herbarium species from the Canary Islands and India, Spooner's team found that the Canary Islands type—the Andean potato—predominated in Europe in the 1700s. Evidence gathered by the team supported those who argued that the Andean potato was the first to be introduced to Europe. But it put to rest the argument that the Chilean potato was only introduced after the Late Blight epidemic. In fact, the Chilean type had become predominant in Europe by 1811, long before the blight occurred.

"The whole idea of the Chilean potato being introduced subsequent to the Late Blight just didn't hold up," says Spooner.

The road that the potato took from its introduction in the Canary Islands in 1567 to its presence worldwide was long and bumpy. By 1568, it made the hop to mainland Spain, but from there it took about a hundred years for it to become generally established as a food crop, in many cases because people were suspicious of its safety.

In eastern France, people were growing the crop as early as 1600, but elsewhere doubts persisted over its acceptability as a source of nutrition. Even in times of famine, fear of the tuber led to its rejection; residents of Naples, Italy, who were in the midst of a famine in 1770, turned away a boat loaded with potatoes.

It was a different story in the British Isles. By 1662, the potato had found a home as a food crop with the backing of The Royal Society, which emphasized its importance in the event of a famine. Thanks to English immigrants, the potato was fully accepted as a field crop in Ireland by 1640, where it was frequently the main ingredient of every meal.

And speaking of dietary mainstays, with only eight days left before the end of his potatoes-only diet, Chris Voight was able to vouch for the fact that potatoes are fully capable of not only keeping a person alive but also contributing to his or her health. His "midterm" physical results, which are posted on the commission's website, proved a little surprising. At day thirty, his cholesterol had dropped 52 points, he'd lost weight, and even his blood sugar had dropped 10 percent.

"Everyone thought I'd gain weight and become diabetic and my blood work shows the exact opposite," says Voight. "It's funny because my original goal was just to be alive by the end."

Gayle Goddard-Taylor is a field editor for Sanctuary *magazine*.

Strange Fruit

Where apples came from and where they are going

by Teri Dunn

Apple Blossoms and Hummingbird, 1871, by Martin Johnson Heade, oil on board, museum purchase

I was strolling through the Saturday farmer's market, an ever-heavier bag looped over my arm, when the apples caught my attention. It was a radiant autumn morning, and, in the cool sunlight, the sweet thrilling apple scent attracted me more than anything else. I spied a long table, lined with bushel baskets filled to overflowing with Empires, Northern Spys, Macouns, Honeycrisps, Baldwins, and more.

As I inhaled, I saw that these apples were not all red, not all the same size, and certainly not all perfectly shaped. The iconic Red Delicious was missing. Good. I never liked that one. Shiny and bright red though it may be, its flesh is too often mushy and its flavor disappointing. I don't believe I've ever even noticed its scent.

I bought some aromatic if imperfect-looking Macouns, and, wiping one on my jeans, took a big juicy bite.

"What is the parentage of this apple? Do you know if it is one of those old-fashioned, heirloom apples?" I asked the farmer.

"Oh no," he said. "It's a more-modern hybrid. One of its parents is the McIntosh."

Considering it's such a widely available and popular

fruit, I realized I actually knew very little about this apple, which led to a whole series of questions. Though widespread, is it American in origin? What about Adam and Eve, was that really an apple? Could apples have originated and been cultivated in the Middle East? Why is the apple so susceptible to pests? Are the older varieties somehow better? Is shiny red skin a modern "improvement?" And why did Johnny Appleseed distribute seeds and not grafted plants—which are clones of desirable varieties?

The apple, it turns out, is not an American plant. It hails from Kazakhstan in Central Asia, where forests of them still grow on rugged hillsides. Their fruits are nothing like Red Delicious, or even Macoun, but instead—as is the way with wild plants—occur in various colors, odd shapes, and assorted sizes. Historians believe that the apple traveled from Kazakhstan via commerce in other parts of Asia and eventually reached Europe because it grew along the Silk Road.

Maybe I've read too many fairy tales—but the Silk Road evokes romantic images of hearty stomping horses and weary but adventurous travelers passing through magic forests adding strange fruits to their colorful woven saddlebags. The fact is, however, *Malus sieversii*, the acknowledged ancestor of today's *Malus domestica*, grew and still survives on the untamed hillsides of Kazakhstan. Indeed, Philip Forsline, for years the curator of the world's largest collection of apple varieties—in Geneva, New York—has traveled there repeatedly to collect seeds and cuttings (scions) where the wild plant originated.

As for the Bible's apple of temptation, contrary to the prevalent impression and translation, not to mention depiction in art, it was very likely not a true apple. The Middle East is and was a drier, hotter place, and nobody really believes apples grew in such a climate in any real or imagined gardens. A scholarly book by Harold and Alma Moldenke called *Plants of the Bible* reprints the iconic Adam and Eve painting by Lucas Cranach the Elder, complete with rosy apples and strategically placed fig leaves. (Interestingly, the original is housed not in one of the great art museums of Europe but in our very own Fogg Museum at Harvard University.) The authors then remark, "While tradition usually holds that it was the 'apple' (that is, apricot) which was 'the tree of knowledge' in the Garden of Eden, other legends say that this mythical tree was the fig."

The other most famous of apple legends originates right here in this country, where the apple eventually traveled and was especially widely and enthusiastically distributed by John Chapman, better known as Johnny Appleseed. As signs at the town line proudly announce, Johnny, who was born in 1774, was a native of Leominster, Massachusetts. Biographers speculate that he gained his interest and expertise with growing orchard trees in his early years, and brought those skills with him when he lit out for the territory in his early thirties. He migrated with the waves of settlers pushing out into western Pennsylvania, the Ohio Valley, and beyond, and lived till the ripe old age (in those days, at least) of 70, planting and selling hundreds of thousands of apple trees along the expanding American frontier.

It's not puzzling that Chapman had apple seeds. Many worthy plants came over to the new land with the colonists, and apples had proven to be cold hardy and productive in the Northeast by the time Chapman began promoting them to settlers farther west. Nor is it puzzling that an adventurous young man could become accomplished in wilderness survival and travel, and that he moved about the landscape transporting seeds, which of course are easily portable, being so small and lightweight.

What is puzzling is that this farm boy dealt in seeds when he must've known that no two saplings would be alike.

A closer look at the diet of those times handily solves the mystery. Back then, apples weren't for eating. So uniformity or consistency weren't required, nor was beauty, redness, any particular size, or even a bold sweetness. The overwhelming use for apples was to make cider. It was easy, it was nutritious, it was common. Everyone drank cider. This drink was not the sweet spicy elixir we enjoy every fall; it was a fermented apple juice known to many as hard cider.

I recently spotted a book on cider making at my local food coop, and paused over it. *Cider: Making, Using & Enjoying Sweet & Hard Cider*, by renowned writer Annie Proulx and Vermont orchardist Lew Nichols, has all the information and recipes anyone could need to brew what early American settlers depended upon and savored, plus plentiful information and advice about cultivating a home orchard. In the introduction, I learned that when Whig candidate William Henry Harrison campaigned for president in 1840, couching himself as a man of the people, his signage showed a cider barrel and he magnanimously promised not a chicken in every pot but cider in every cabin. This validates the importance of cider in our young country's history. Johnny Appleseed laid the groundwork for Harrison.

Enter the Temperance movement, refrigeration, the advent of other sources of sweet flavor and—as so often happens with popular plants—selection for preferred qualities, and cider began to drain away in popularity. "An apple a day keeps the doctor away" may be so, but this slogan was originally created to encourage people to keep consuming apples as times changed. After a while, apples morphed from the source of a mildly alcoholic staple beverage into a wholesome, innocent, in-hand treat—generally the way we view them to this day.

When public attention shifted to good eating apples, the plant's natural variability and ability to adapt to various climes and locales yielded a bounty of choices. There is an entertaining account of this in Michael Pollan's *The Botany of Desire*. As with heirloom

Grandma's Apple Tree

vegetables, apples were as diverse as their names.

Some names had the reek of the American 19th century, its suspender-popping local boosterism, its shameless Barnum-and-Bailey hype, its quirky un-focus-grouped individuality. There were names that set out to describe, often with the help of a well-picked metaphor: the green-as-a-bottle Bottle Greening, the Sheepnose, the Oxheart, the Yellow Bellflower, the Black Gilliflower, the Twenty-Ounce Pippin. There were names that puffed with hometown pride, like the Westfield Seek-No-Further, the Hubbardston Nonesuch, the Rhode Island Greening, the Albemarle Pippin....

Alas, also like many heirloom varieties of vegetables, most of these apples have slowly but surely fallen out of commerce as our country and the way we grow, ship, and market our food has changed. Tough skin that withstands jostling and resists bruising became a higher priority, as did uniform bright red color on the outside and white flesh on the inside. Most supermarkets offer mainly Red Delicious, McIntosh, and maybe Gala. Even my farmer's market guy doesn't offer an especially wide range of choices...not compared with what is possible.

Some heirlooms are wonderful—fragrant, funky looking, and ambrosial. Some heirlooms are neither palatable nor pretty apples by modern standards, but perhaps their genes offer other valuable qualities such as pest resistance.

It's a very real possibility that apples are now in the same pickle as modern corn: the gene pool has become dangerously narrow. A pest or disease could appear and wipe out one or several of the few varieties favored these days. Already, the ever-narrowing gene pool has, some over many long decades, allowed the rise of those nasty feisty pests Lew Nichols and other modern growers combat.

By this reasoning, the diversity that Johnny Appleseed dispersed so widely was a gift we Americans didn't truly appreciate at the time and maybe still don't. By this reasoning, the repository orchards in Geneva, New York, the plants that survive in the Kazahkstan forests, the preservation projects of foundations and museums dedicated to Johnny Appleseed, and the efforts of Philip Forsline and his colleagues and successors are valuable indeed.

One uniform red apple is not the way to go. It is the way to squander a beloved, diverse, historically fascinating, and delicious fruit.

Teri Dunn is an author who divides her time between Cape Ann and Upstate New York. Her favorite eating apple is the Macoun, and her favorite cooking apple the Baldwin.

To learn more about heirloom varieties, go to www.applesource.com.

Moveable Meat

Domestic ruminants travel with their human consumers.

by Chris Leahy

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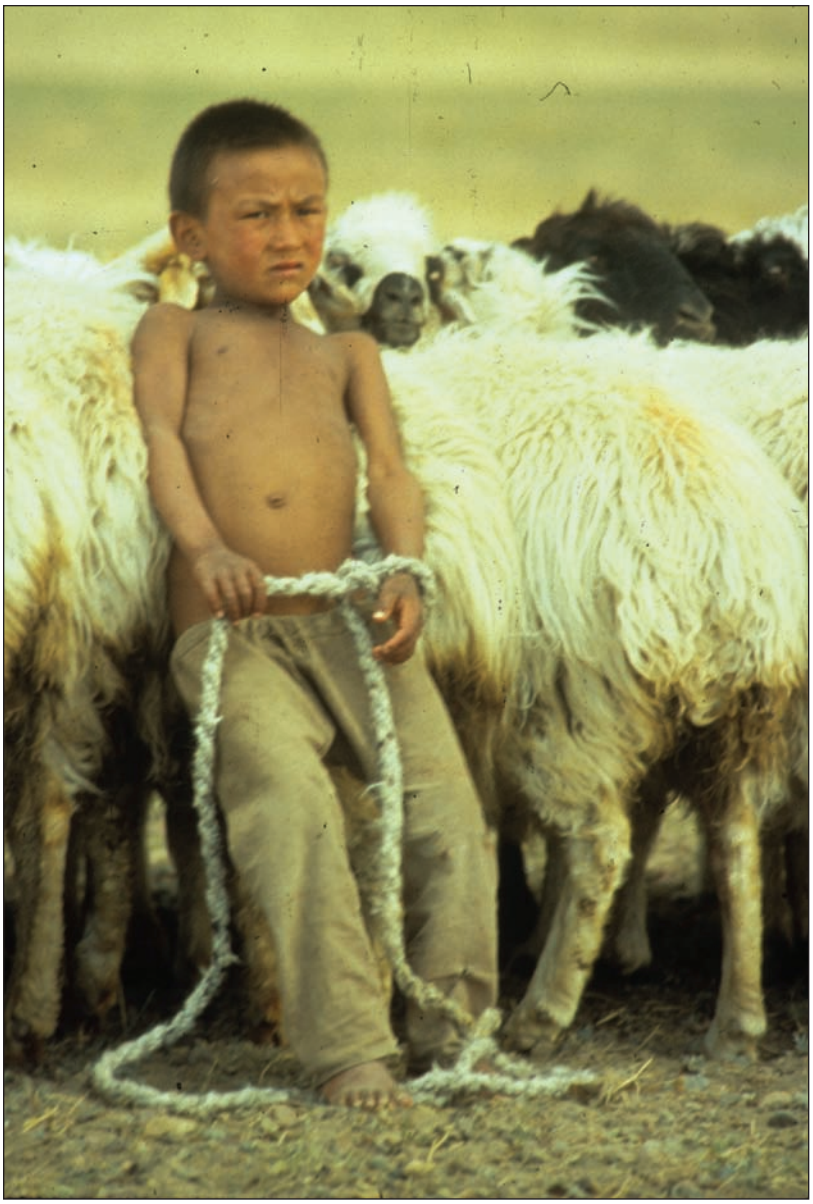
A khainag in Mongolia

June 12, 1982. The Ulaanbaatar Hotel, Mongolian People's Republic. A colleague and I arrive for our first Mongolian meal in the cavernous hotel restaurant. The waiter puts before me a bowl of something that makes me think of a Dickensian gruel—grayish brown, vaguely mushy, but with an intriguing shimmer. "What's this?" I ask the interpreter. She repeats the question in Russian to the waiter and then translates his reply: "Fat soup."

The "soup" part was in fact superfluous; the dish was simply a generous serving of warm mutton fat. It was my first encounter with traditional Mongolian cuisine.

The cuisine of Mongolia consists almost exclusively of the meat and dairy products derived from the horses, sheep, goats, yaks, and camels that have sustained this nomadic herding culture for millennia. Whereas western food culture has become obsessed with variety, the diet of the Mongolian pastoralist continues to be centered on a relatively small selection of foods derived from a simple, accessible, and sustainable base of domestic ruminants. (I once asked a nomad I met near a lake that I knew to be brimming with char, trout, and perch if he ever ate fish. He twisted his face into a mask of disgust, and then, realizing that I was just an ignorant foreigner, he explained: "Look, animals eat grass. Mongolians eat animals. Fish eat bugs!")

Ruminants are to the protein side of the human diet what grasses are to the carbohydrate component. Their wild ancestors were among the first species to be domesticated by people—a step up the ladder of social development from the time-consuming and life-threatening practices of hunting and gathering. And their meat and milk continue to make up a major (sometimes dominant) share of the diets of most human societies.



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Mongolian sheep boy

The ruminants (from a Latin verb meaning to chew over again) are cud chewers. The category includes the deer, giraffes, cattle, antelopes, sheep, and goats in the taxonomic Suborder Ruminantia, plus the camels (including the New World llamas, alpacas, guanacos, and vicuñas). Cud chewing is the visible part of a digestive system that allows these herbivores to efficiently process the cellulose that makes up virtually all of their diet. After the initial grazing and munching, the grass passes into the first of four stomachs, called the rumen, where liquid digesta is separated from the solid and the latter cud is regurgitated to be chewed and swallowed again. Having eventually been broken down by bacteria and fermentation in the first three stomachs, the nutrients pass to a forth "true" stomach and the intestines, more or less on the human model, where acids and enzymes complete the process and nutrients are absorbed. All this is more than you would want to know about rumination perhaps—but a reminder not only that "all flesh is grass" but also that turning indigestible cellulose into meat required the evolution of an astonishingly complex digestive apparatus.

All of our domestic breed of cud chewers derive, of course, from wild species, and while there are some ambiguities in their genetic fingerprints it is widely agreed that modern cattle descend from the aurochs (*Bos primigenius*), now extinct, though once widespread across Europe and Asia. The main sheep progenitor is the mouflon (*Ovis orientalis*), wild native populations of which still exist in the mountains of Asia Minor. The bezoar ibex (*Capra aegagrus*), which still colonize the rocky crags of the Zagros Mountains of Iran and Iraq, gave rise to our present goat breeds. Based on archeological evidence, all these ruminants appear to have emerged as domestic animals from 8,000 to 11,000 years before present, initially in the region of the Fertile Crescent, the so-called cradle of civilization in Mesopotamia and the Levant. The dromedary and Bactrian camel were domesticated independently in different desert cultures several thousand years later.

It is not difficult to guess why these ruminants in particular became so important in the development of human societies. They would have been familiar as game animals in the regions where agrarian practices first emerged. They were (the huge and fearsome aurochs excepted) relatively unaggressive and of moderate size. They also naturally formed flocks, reached sexual maturity at an early age, and had high reproductive rates. Though they were initially valued mainly for food, it gradually became clear to ruminants' tamers that they were walking general stores—their fibers, skins, bones, and dung providing readily available sources of clothing, tools, house wares, and fuel. Eventually, they gained the official status of "clean" animals in the Abrahamic religions. The Law of Moses mandates that only animals with cloven hooves and that chew the cud are fit to eat, a rule that survives in kosher strictures.

In settled cultures, it didn't take long for food to be transformed from a simple hard-won necessity to a source of pleasure and even luxury as preservatives, spices, and cooking styles proliferated and made their way around the world via emerging trade routes. Nomadic peoples, however, faced serious constraints on the development of a sophisticated cuisine. In many cases they arose in habitats—tundra, desert, coniferous forest—that do not lend themselves to cultivating crops. And though nomads became experts at animal hus-

bandry, they were forced to move with their flocks and herds with the seasons to find adequate forage, sometimes mimicking the transhumance patterns of wild grazers. Once a group is committed to a life on the move, growing grains and vegetables becomes impossible and the would-be chef must make do with limited kitchen facilities, whatever herbs or seasonal fruits might be available in the current pasture, and (mainly) what the animals themselves provide.

From a biological conservation perspective, it is notable that the few remaining nomadic cultures live in relative harmony with the natural world and are far less destructive of their environment than people following other forms of social organization. Because they live mainly on meat and milk products from their herds, they do little hunting and do not damage soils by tilling. And since they build no permanent structures and heat and cook using dung as fuel, they pose little threat to the forests. It is the urbanized "developed" cultures that are the hardest on habitats and wildlife populations—not out of necessity, of course, but in response to the relentless appetites of commerce and the desire for wealth.

With fat soup as my starting point, it took me a while to understand that the pleasure Mongolians get from eating their traditional foods does not rely on bedazzling the palate with a banquet of exotic tastes (though of course urban Mongolians can now indulge in such western gourmandizing). It is much more like constantly savoring a limited menu of irresistible comfort foods. (If you access your inner hungry 9 year old, I bet you can think of six to eight dishes that you'd be pretty happy to dine on, well, forever.) Some of these specialties I found instantly and irresistibly delicious. There is a mutton-filled dumpling called *buuz* (bootz), for example, which properly made contains the perfectly combined essence of tasty meat and fresh pasta. It would be awkward however to explain to a health-conscious American cook that the test of good buuz is the quantity of liquid mutton fat that spills forth with the first bite. I probably don't have to explain the appeal of öröm, congealed cream that is vanilla-ice-cream sweet without benefit of sugar. And the best yoghurt I have ever tasted is made from the milk of Gobi camels.

Other Mongolian tastes take some acquiring. A favorite summer food of the nomads is *airag*, or fermented mare's milk, of which one thirteenth-century traveler noted that he "broke out in a sweat in horror and surprise" after tasting it, but also (perhaps after a little more) that "it makes the inner man most joyful." At the other end of the sensation spectrum is *aaruul*, sun-dried curds, with roughly the flavor and consistency of chalk, which is a common snack, valued for its durability during the long winters!

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Mongolian goat girl

Perhaps the greatest pleasure one gets from eating Mongolian food comes not from the food itself, but from sharing the very evident joy that Mongolians feel and express preparing food in ways that Genghis Khan's soldiers would have recognized and then savoring it in the company of friends.

In closing, I should not neglect to mention that after meat and dairy, the third major food group of the Mongolian diet is (the world's best) vodka.

Chris Leahy holds the Gerard A. Bertrand Chair of Natural History and Field Ornithology at Mass Audubon.

Eat Your Invasives

A few of our naturalized alien plants were first brought over to this country for their culinary value. They were then overlooked and some escaped into the wild; European barberry and garlic mustard are two examples.

by Russ Cohen

Barberries were well known and appreciated by Massachusetts households of the Colonial and subsequent periods. According to an article that appeared in the periodical *New England Farmer* in the early 1800s, "Barberry jelly, ruby clear, is the finest table jelly to serve with venison and other high-flavored roasts, and epicures will have no other when they have once tried it." New England housewives often put barberries into the jars of other preserved fruits to add a tart flavor, and Henry Thoreau observed the townspeople going out to pick them as early as mid-September before they were fully ripe to gather the fruit first.

Barberry plants can still be found growing alongside 18th- and 19th-century farmhouses and rural roads. A good time to locate the bushes is in May, when they are covered with clusters of yellow blossoms with a heavy and somewhat-unpleasant scent. The blossoms are followed by deep red berries that ripen in the fall and typically persist on the bushes into the winter, and occasionally into the following spring. (One year I made barberry jelly in May from the previous season's berries that were still clinging to plants that had already begun to flower.)

Before extolling the culinary virtues of the common, or European, barberry (*Berberis vulgaris*), it is important first to distinguish it from the nefarious Japanese barberry (*Berberis thunbergii*), a plant at or near the top of the invasive species blacklists. Japanese barberry has become a serious pest in southern New England, especially in old fields, pastures, and early successional woodlands. In the Berkshires, it invades and degrades rich woodland habitats relied upon by spring ephemeral wildflowers and rare plant species, and it's also a serious problem in the forests of Quabbin. Japanese barberry is easy to distinguish from European barberry once you know what to look for. Japanese barberry rarely gets over 3 to 4 feet tall and has small, untoothed leaves and a single spine beneath each cluster of leaves. Its orange-red berries are borne singly on the underside of the twigs.

In contrast, European barberry typically grows 6 to 8 feet tall, has toothed leaves, and two- or three-branched spines beneath each cluster of leaves. Its egg-shaped, centimeter-long, deep red berries hang in drooping clusters of a dozen or so and are much juicier and tastier than Japanese barberries, which tend to be dry and bitter. One way to remember which is which is that Japan is just one country, thus singly borne berries, whereas Europe is many countries, thus berries borne in a cluster. (To complicate matters, however, these two species occasionally hybridize and the resulting plant bears some resemblance to both.)

The berries are ripe and at their juiciest in midautumn. If you are able to extract enough juice from the berries for a batch of jelly without adding water by heating them in a crock and squeezing the juice out of the softened berries, you will find that they contain enough pectin to make jelly. If, however, you wait to gather them until the shriveled but still highly flavored fruit looks like little red raisins, you will need to simmer them in a little water first for a half-hour or so. Remove the seeds, which resemble the small pegs once used in shoemaking, by pouring the resulting product through a sieve, and combine it with crab apple juice or use commercial

European barberry

pectin to get it to jell. With an equal bulk of sugar to juice, barberry makes a very tart, distinctly flavored jelly. Barberry juice adds a red color and tart flavor to apple juice, apple sauce, and stewed Japanese knotweed stalks.

Another plant species believed to be deliberately brought to our shores from Europe for its culinary and medicinal values is garlic mustard (*Alliaria petiolata*), so-called because the leaves when crushed give off a distinctive garlicky smell. This aroma divulges no indication of the plant's lineage since the species is not even distantly related to garlic or onions (in the genus *Allium*) but is in fact a member of the mustard family (Brassicaceae).

© "WILDMAN" STEVE BRILL

Garlic mustard

If you've heard of garlic mustard, it's probably not for its comestible or medicinal qualities but for its notorious (and, unfortunately, well-deserved) reputation as a highly invasive, rapidly spreading, and ecologically disruptive species throughout much of the US. Nonetheless, its habit of remaining green throughout the winter made it especially useful to people in days of yore before refrigeration and the modern produce distribution system made green vegetables widely available throughout the year.

While it is possible that garlic mustard found its way here on its own (hitching a ride on a ship in a bale of hay), given the plant's extensive usage in England and elsewhere in Europe, it is very likely that it was deliberately brought here for planting in kitchen and herb gardens. After all, the same edible and useful traits (especially the availability of the green leaves in late winter and early spring when few other green vegetables were available) would be as valuable to the settlers here as they were to them in the Old Country. At least two native species, marsh marigold (*Caltha palustris*) leaves and ostrich fern (*Matteucia struthiopteris*) fiddleheads, as well as the European import wintercress (*Barbarea vulgaris*), were also extensively appreciated as early-season sources of green vegetables.

Many environmental agencies and organizations have declared war on garlic mustard and are seeking to raise public concern and alarm about the plant's spread. While some control methods utilize cutting, burning, or herbicide spraying, a commonly employed control method is hand-pulling. This is typically done in the spring, after the plants have begun to flower but before the plants have produced viable seed.

A staff member at the Kalamazoo Nature Center in Michigan (whose grounds are afflicted with a garlic mustard infestation), who sought to raise public awareness of the issue and recruit volunteers for its garlic mustard pulls, approached chefs at various restaurants in the city to see what dishes they could concoct with the invasive species. The tasty results were compiled in *From Pest to Pesto: A Culinary Guide*, published by the nature center.

Most parts of garlic mustard have a pungent flavor that is too strong for most people to enjoy when eating the plant in its raw state. Nevertheless, you can collect tender garlic mustard basal leaves or the clusters of flower buds in the spring and boil them for several minutes (at least) to tone down the plant's bitterness to a tolerable level, pour off the water, and then eat it as is. While still somewhat bitter, it will not be intolerably so and you can incorporate it into other dishes. Garlic mustard roots taste horseradish-like and can be used as a substitute for that pleasantly bitter root.

The most palatable parts of the garlic mustard plant, which do not require parboiling, are the tender portions of developing stems of second-year plants when they're less than a foot tall and before the flower buds form. The plants are typically at this stage in Massachusetts around the last week of April into early May. The stem is relatively mild and tender enough to be eaten raw, and also lends itself well to a quick stir-fry or a chopped-up ingredient in soups.

You can achieve two objectives (culinary and ecological) at once by hand-pulling the entire plant out of the ground, snapping off the tender portion of the stem, eating it (or saving it for later), and then placing the remainder of the plant (roots, leaves, and all) into a plastic garbage bag for disposal. It is strongly advised not to put garlic mustard directly into compost since the plants may not be effectively neutralized. You can put the plant material into black plastic bags and leave them for a good amount of time (several weeks or so) in a warm location so that the insides of the bags get thoroughly cooked and decomposed—then the bags' insides can be safely added to the compost bin.

Russ Cohen is Rivers Advocate for the Massachusetts Department of Fish and Game and a wild foods enthusiast. He is the author of Wild Plants I Have Known…and Eaten.

Plymouth Plenty

Plymouth Colony's three-day harvest feast in the fall of 1621 was likely even better than our present-day Thanksgiving meal.

by Ann Prince

In the early 1980s I worked at Plimoth Plantation playing the part of Mary Soule. At the time, I often wished that I could go back to the year we were reenacting, 1627, and spend one day in the village as it was 350 years before. My boss (aka Francis Cooke in the village) thought I'd be horrified by the real 17th-century Plymouth, but I figured that one day wouldn't hurt, especially if it was during a mild season of the year. The curiosity was overwhelming at times, but, of course, going back in time is impossible. Instead, we have to rely on the inexact field of history to surmise how people lived long ago.

Ann Prince as Mary Soule at Plimoth Plantation, 1983

Piecing together what happened and in particular what was served during the "first Thanksgiving" (which was actually autumn festivities celebrating a successful harvest and a surfeit of food after a bleak first winter) requires detective work. What wild and cultivated food would have been available? What fare were the English and the Wampanoag familiar with? What were their methods of cooking and their favorite recipes?

The most definitive information is a firsthand narrative by Edward Winslow who gave an account of the event in a letter dated December 12, 1621. He wrote that both the wheat and the Indian corn harvest were good, though the barley didn't do as well and the peas weren't worth gathering. Once the crops were harvested, he wrote that four men went fowling and brought back enough birds to feed the 50 villagers for a week. These were most likely migratory waterfowl, including ducks and geese. John Pory, who visited Plymouth in 1623, mentioned the "swarms and multitudes" of waterfowl that covered their bay from September till March. Then the sachem Massasoit brought along to the event 90 men who joined the 50 colonists for three days of entertainment and feasting. No one knows whether any Wampanoag women and children attended. To add to the bounty, some Native men went out and returned with five deer. Since they had been commoners across the sea, the English folk were probably eating venison for the first time in their lives in Plymouth. Only the wealthy landowners back in England were allowed to hunt for deer in their forested "parks."

The venison and fowl were roasted on spits over hot coals, as were probably wild turkeys, which were plentiful in Plymouth then. Birds such as ruffed grouse, bobwhites, and heath hens may have been cooked over the fire as well. And, since it was there for the taking, seafood may have been caught and prepared. "Our bay is full of lobsters all the summer and affordeth variety of fish," wrote William Bradford in *Of Plimoth Plantation*. "In September we can take a hogshead of eels in a night, with small labor, and can dig them out of their beds all

the winter. We have mussels…at our doors."

Every morning at "The Plantation" I would get a basket with food and instructions on what I was supposed to cook that day. There was usually some sort of meat or some eggs, and we kept flour, onions, salt, oil, and a few other staples in our houses. It was an easy transition for me since, at 24, I'd had more experience cooking over a campfire than with 20th-century appliances. Also, tending the kitchen garden just outside in the yard was second nature since one of my interests was botany, and getting my hands into what my mother called "good clean dirt" was something I'd always enjoyed.

As "goodwives," we used big kettles that hung in the fireplace over the flames, frequently making a stew we called "potage," which we thickened with corn meal or wheat flour. To supplement our provisions, we raised various potherbs and root vegetables including carrots, onions, beets, parsnips, spinach, cabbage, chard, leeks, collards, sage, parsley, mint, thyme, savory, and marjoram. Toward midsummer, our potages became much more flavorful as our gardens flourished.

No doubt the harvest festival of 1621 included potage. Not only were there plenty of bones with leftover meat available to boil a day or so into the feast, but stew was a part of the Native peoples' diet too—a dish they called *sobaheg*. Their version had ingredients such as beans and grits; venison or some other meat such as turkey or smaller game birds; beaver or bear; squash or pumpkin; walnuts, chestnuts, and groundnuts; and Jerusalem artichokes. After a winter of near starvation, likely the colonists were flexible about adding new foods to their familiar cuisine, so any combination of imported and native foods could have rounded out the stews.

Corn was a staple for the Native people and soon was adopted by the newcomers. The Wampanoag ate "Indian corn," a colorful and hard flint corn, at every meal. Dried corn was soaked and crushed to make grits or boiled with beans to make succotash, and it was ground with a mortar and pestle to make corn meal, which was used in recipes for cornbread and corn pudding. The English adapted their own corn recipes for porridge, pancakes, and bread. "Our Indian corn, even the coarsest," wrote Edward Winslow, "maketh as pleasant a meat as rice." Needless to say, in various forms, Indian corn was on the menu throughout the three days of festivities.

While pumpkin pie was not a dish either the English or Wampanoag were familiar with or would have conjured up, fresh native pumpkin, cooked on hot coals, could have been on the bill of fare, as well as fresh and dried fruit, and tarts made of the host of wild berries and plums. "Here are grapes, white and red, and very sweet and strong also," wrote Edward Winslow. "Strawberries, gooseberries, raspas, etc., [and] plums of three sorts, with black and red."

Considering all the options—the abundant wild fare, native crops, the harvest reaped from seeds of vegetables and herbs brought from Europe, and New World and Old World recipes—an educated guess on what was served at the renowned 1621 Plymouth harvest feast would make a gratifying gourmet meal: Roasted Fowl, Venison Stew, Fresh Seafood, Turkey with Potherbs, Seared Pumpkin, Nuts and Berries, Seasonal Herbs, Root Vegetables, Fresh Fruit, Plum Tart.

Edward Winslow concluded his letter sent to England with this generous sentiment: "And although it be not always so plentiful as it was at this time with us, yet by the goodness of God, we are so far from want that we often wish you partakers of our plenty."

Ann Prince is associate editor of Sanctuary.

The Political Landscape

A Forested Future for Massachusetts

by Heidi Ricci and Christina McDermott

As members of the Mass Audubon community, many of us enjoy the forests that cover much of Massachusetts. But how often do we contemplate how special this landscape is and where its future lies? We may blissfully roam through the trees, enjoying the company of boles and branches and the animals that dart among them, but few among us are familiar with another side of things: forest politics. It sounds like an oxymoron, linking our wooded havens to a stiff bureaucratic world. In reality, though, it is the behind-the-scenes policy that is crucial for our forests to thrive.

© BOB SPEARE

Forests cover 3 million acres in Massachusetts, providing clean air and water, diverse wildlife habitats, and stunning scenery that lure tourists and locals alike. Stoic defenders against the harmful effects of climate change, our trees absorb and store nearly 9 million tons per year of carbon dioxide that would otherwise remain in the atmosphere. Approximately 1 million acres of forest are currently protected from development in Massachusetts. While that's a start, it is critical that we increase the rate and amount of forest protected in public and private ownership and improve management to sustain all the values these forests provide.

Mass Audubon is involved in several efforts to achieve these goals, and our members and the public can help.

Excellence in stewardship of the protected state lands is one of our priorities. Mass Audubon is a strong supporter of the Department of Conservation and Recreation's (DCR) Forest Futures Vision, which provides a road map for management of over 300,000 acres of state forests and parks. The vision divides these lands into three categories: Reserves, Parklands, and Woodlands. Up to 60 percent of the land will be placed in Reserves and Parklands where commercial timber cutting will be prohibited and forests will be allowed to develop old-growth features, which are rare in Massachusetts today. Parklands also provide opportunities for recreation, scenic views, and protection of culture, history, and habitat. Woodlands will be managed by applying high standards for forestry, which will provide a continuous harvest of locally grown timber and other forest products. We encourage the public to help determine the designations for each property (more information is available on the DCR website, www.mass.gov/dcr/; click on Forest Futures Visioning Process).

The Wildlands and Woodlands partnership, founded by Harvard Forest in 2005 and now working throughout New England, collaborates with many groups including Mass Audubon, land trusts, landowners, and municipalities to protect forestland. This visionary program promotes protection of large forest Reserves surrounded by well-managed and mostly privately owned working Woodlands. Together, this landscape-level approach can both protect wildlife habitat and promote renewable sources of local wood products. It will also secure an interconnected forest matrix that will be more resilient to the unavoidable impacts of climate change already underway.

Mass Audubon's *Shaping the Future of Your Community* program is helping communities reduce suburban sprawl and chart a more sustainable future. We assist communities in using innovative land use tools such as Open Space Residential Design, an approach that promotes land preservation within developments based on environmental and social priorities. This and other strategies can result in compact and efficient developments and protect local woodlands at no cost to the community. We also urge communities to adopt the Community Preservation Act, legislation that provides funding for open space, affordable housing, and historic preservation.

A particularly controversial forest-related issue is the use of woody biomass energy. Biomass is defined as any organic material, derived from plants or animals, that can be burned or chemically converted to produce heat and/or electric power. Examples of biomass include wood, crops and agricultural residues, and solid and liquid wastes. The use of woody biomass specifically has been proposed at a large scale in New England. Electric production by burning woody biomass using the methods proposed by most of these facilities is inefficient and requires huge quantities of wood. Meeting that increased demand would require more forest harvesting while also releasing heat-trapping pollutants into the air.

We support the efficient use of sustainably harvested wood as biomass but only at a scale using local renewable sources. We have worked with the Office of Energy and Environmental Affairs to revise standards ensuring that the use of wood for energy does not degrade forests or contribute to climate change, and one of our 2011 priorities is to work with the state on strengthening Forest Cutting Standards to better protect forest habitat and carbon storage.

Massachusetts is fortunate to have so much forest following a history of cutting and regrowth. Protecting forests while supporting local economies is a top priority for the state, especially in the face of climate change. Only with the right management strategies in place can we secure a future for our precious forests and the life they support.

Heidi Ricci is senior policy analyst in Mass Audubon's Advocacy Department, with 25 years of experience advancing the protection of forests and water resources across Massachusetts.

Christina McDermott is assistant to the Director of Public Policy and Government Relations.

Birding Programs

BERKSHIRE SANCTUARIES
Lenox, 413-637-0320
Bird Walks at Canoe Meadows
April 1, 8, 15, 22, 29—8-10 a.m.
May 6, 13, 20, 27—7-9 a.m.

BLUE HILLS
Milton, 617-333-0690
Bird Walk at Fowl Meadow
May 7—7 a.m.

BOSTON NATURE CENTER
Mattapan, 617-983-8500
Evening Bird Walk
May—6:30-7:30 p.m.

BROAD MEADOW BROOK
Worcester, 508-753-6087
Migration Madness in Massachusetts
April 27-May 25—7-8:30 p.m.
20 in 20: Lunchtime Power Birdwatch
May 4, 11, 18, 25—12:15-1 p.m.

BROADMOOR
South Natick, 508-655-2296
Wacky Woodcocks
April 8, 16, 29—7-8 p.m.
Preregistration is required.

CONNECTICUT RIVER VALLEY
Easthampton, 413-584-3009
Birdsong and Sound at Arcadia
April 6—7-9 p.m.
Bird-A-thon with the Arcadia Team
May13-14—6 a.m.-6 p.m.

IPSWICH RIVER
Topsfield, 978-887-9264
Early-Spring Migrants of Cumberland Farms
April 15—7 a.m.-3 p.m.

JOPPA FLATS
Newburyport, 978-462-9998
Wednesday-Morning Birding
Every Wednesday—9:30 a.m.-12:30 p.m.
Bird-a-thon Madness
May 1—8 a.m.-6 p.m.

SOUTH SHORE
Marshfield, 781-837-9400
Searching for Bobwhites
April 30—8 a.m.-noon

WACHUSETT MEADOW
Princeton, 978-464-2712
Bird-a-thon-Birds and Breakfast
May 14—7:30-10:30 a.m.

WELLFLEET BAY
South Wellfleet, 508-349-2615
Feeder Central
Through late May—10-10:30 a.m.
Birding Cape Cod
January 7 through late May—9 a.m.-noon
Birding Wompatuck State Park
May 7, 14
Bird-a-thon
May 14—7 a.m.-3 p.m.

Call the individual sanctuaries for more information, fees, and to register.

For a full listing of Mass Audubon programs and events, visit our online catalog at www.massaudubon.org/programs.

At Our Sanctuaries

Agricultural Wisdom

by Matt Celona

Heirloom tomatoes grown at Drumlin Farm for the Farmers Market

Here at Drumlin Farm we grow eleven varieties of heirloom tomato because of the range of flavors and appearances the varieties provide us and our customers. There is no fixed standard for what defines an heirloom tomato. Generally, "heirloom" indicates an open-pollinated variety that has been passed from grower to grower for some time, usually since before WWII and the subsequent explosive growth of industrial agriculture with its emphasis on vegetable transportability and extended shelf life. Heirloom seeds contain a wealth of genetic diversity and of human and natural intelligence directed toward the ends of good eating and beauty. At Mass Audubon, we like to participate in this chain of agricultural wisdom.

In early April and again in early May, we start seeds in the greenhouse that we eventually transplant to the field in two successive plantings. Over time, we've settled on a core group of our favorite varieties, and these are the ones we feature at our spring seedling sale in our mixed six-pack of heirloom tomatoes: Moskvich, Japanese Black Trifele, Yellow Brandywine, Pink Brandywine, Aunt Ruby's German Green, and Striped German.

The Moskvich ripens first and is the only truly red tomato of the bunch. It's like an Early Girl, but the skin is tender and the flavor is better. The Striped German, with its large size and red and yellow marbled flesh, is the variety we're harvesting long after all the others have quit producing for the season. In between these delicious bookends, we delight in the balanced flavor and sea green, jewel-like interior of Aunt Ruby's, the fattened pear shape and deep sweetness of Japanese Black Trifele, and the smooth texture and superb flavor of the Yellow and Pink Brandywine.

In 2011, we'd like to have some of the intense heat and prolonged dry periods we experienced during the 2010 growing season. These ideal growing conditions allowed each tomato variety to express the full intensity of its flavor, and helped us forget the cool wet summer of 2009 and its ruinous late blight infestation.

Matt Celona is crops manager at Drumlin Farm Wildlife Sanctuary.

Poetry

Edited by Susan Richmond

Keats at the Farmers' Market

by Susanna Lang

. . .fill all fruit with ripeness to the core . . .

Brussels sprouts, still on their stalks, cauliflower
florets wrapped in their leaves, gourds, acorn squash—
nothing my son would eat—pie pumpkins, purple
onions, their skins glistening, the last blueberries,
chard in several colors, lacy arugula
the insects had gotten to, once considered
an aphrodisiac. Every Wednesday and Saturday,
the man repeats, We'll be here every Wednesday
and Saturday through October, though the bins
may not be as full as in July, except at the orchard stalls,
thirty varieties of apples just this week.
In the prairie garden by the parking lot, goldenrod
    has faded
to silver and a man waits for the bus, wearing a dark suit
though it's Saturday, white shirt, tie, broad-brimmed hat,
sparrows gathered at his feet; he must have brought
bread or seeds in his pocket, a feast. Last evening
there was a woman waiting, wind in her head scarf,
willing the bus's lights to emerge from the half dark.
First day of Ramadan, the sun would have gone
all the way down by the time she reached home,
time to eat. Her bag pulled her arm down,
she did not look away from the bus to watch the boys
in black T-shirts spin off their boards, only dodging
at the last moment. Home now ourselves, our bags
weighted with melons, pears, two varieties of apples,
we pile our fruit on the counter and half listen
to the cricket, only one, who has found a place
in some corner of our kitchen, his chirping slower
than it was a month ago. He must already
have found a mate; or if not, he will not find one now.

Susanna Lang's collection, Even Now*, was published in 2008 by The Backwaters Press. Her poems have appeared in such journals as* Rhino, Green Mountains Review, *and* Jubilat.

Into Place

by Charles W. Pratt

It's not so much a departure as an arrival,
Or rather, a having arrived—as when, out driving,
You pass an orchard on a southward hill.
Old apple trees aslant in heaps of prunings.
For Sale. What do you know of apples? Still,
One morning you wake up under a different ceiling
And feeling that you've not chosen but been chosen,
Are something less than owner, more than guest.
You fertilize and mow, attend the slow
Growth of apples readying for harvest,
And settle into place like leaves or snow,
Unfold like a letter delivered as addressed.

In March, Charles W. Pratt will reluctantly leave the orchard he has lived in and loved for 27 years. Into Place *is reprinted from* Still Here *(Finishing Line Press) and also appears in* From the Box Marked "Some Are Missing," New & Selected Poems, *Hobblebush Books.*

At Mass Audubon Summer Camps, Nature is Up Close and Personal

Whether you're looking for a day camp (we have 16 statewide) or an overnight experience at Wildwood,

wildwood

we have just the right camp for your child. Information on summer 2011 is available now at www.massaudubon.org/camp.

Spring 2011 Optics Sale

Members' special discount of 15%

April 2 to April 10

A great selection of binoculars, spotting scopes, and accessories

Audubon Shop
At Drumlin Farm Wildlife Sanctuary
Route 117, Lincoln, MA 01773
781-259-2214
Tuesday-Sunday, 10 a.m.-5 p.m.

SCHOOL VACATION WEEK PROGRAMS

BLUE HILLS
Milton, 617-333-0690
Spring Explorers Nature Days
April 19-22—9 a.m.-3 p.m.
For children ages 6-11

BOSTON NATURE CENTER
Mattapan, 617-983-8500
Marvelous Mud
April 19-22

BROAD MEADOW BROOK
Worcester, 508-753-6087
April Vacation Week
April 18-22—9 a.m.-3 p.m.
For children ages 6-11

BROADMOOR
South Natick, 508-655-2296
April School Vacation Week
April 19-22—9 a.m.-3 p.m.
Preregistration is required.

CONNECTICUT RIVER VALLEY
Easthampton, 413-584-3009
April Vacation Days at Arcadia
April 19, 20, 21, 22—9 a.m.-3 p.m.

HABITAT
Belmont, 617-489-5050
April School Vacation Week
Forest Frolic:
April 19—9 a.m.-3:30 p.m.
Powerful Patterns:
April 20—9 a.m.-3:30 p.m.
Eco-Action:
April 21—9 a.m.-3:30 p.m.
For the Birds:
April 22—9 a.m.-3:30 p.m.
For children in grades K-3
Adventurers:
April 19-22—9 a.m.-3:30 p.m.
For children in grades 4-6

IPSWICH RIVER
Topsfield, 978-887-9264
School Vacation Week
April 19-22—9 a.m.-3 p.m.

JOPPA FLATS
Newburyport, 978-462-9998
April Vacation Week Flyby
Ponds and Pools:
April 19—10 a.m.-2 p.m.
Back to the Beach:
April 20—10 a.m.-2 p.m.
Say Hello to the Salt Marsh:
April 21—10 a.m.-2 p.m.

SOUTH SHORE
Marshfield, 781-837-9400
School Vacation Week
April 19-22
For children ages 5-12

VISUAL ARTS CENTER
Canton, 781-821-8853
Migration
April 18-22—9 a.m.-3 p.m.

WACHUSETT MEADOW
Princeton, 978-464-2712
April School Vacation Days
April 19-22—9 a.m.-3 p.m.
For children ages 5-11

WELLFLEET BAY
South Wellfleet, 508-349-2615
April Vacation Kid Adventures
April 18-22
Half or full day available; for children ages pre-K-grade 8
April Vacation Family Fun
April 18-22—2-3:30 p.m.

Call the individual sanctuaries for more information, fees, and to register.

For a full listing of Mass Audubon programs and events, visit our online catalog at www.massaudubon.org/programs.

Statewide Volunteer Day

5th Annual

Mark your calendar for our 5th annual Mass Audubon Volunteer Day. Have fun while lending a helping hand with a variety of indoor and outdoor projects for all ages and abilities. Bring your friends and family and a picnic lunch, and enjoy the sanctuary after the work is done.

April 30, 2011
9:00 a.m.-noon

Sign up online at www.massaudubon.org/workforwildlife

Work for Wildlife at any one of these wildlife sanctuaries:

Central & Western
- Broad Meadow Brook, Worcester
- Laughing Brook, Hampden
- Rocky Hill, Groton

Greater Boston & North Shore
- Blue Hills, Milton
- Boston Nature Center, Mattapan
- Habitat, Belmont
- Ipswich River, Topsfield
- Visual Arts Center, Canton

Southeast, Cape, & Islands
- Allens Pond, Dartmouth
- Felix Neck, Edgartown
- Long Pasture, Barnstable
- Moose Hill, Sharon
- North River, Marshfield
- Wellfleet Bay, Wellfleet

Mass Audubon Tours
supporting conservation here and abroad

Travel with Mass Audubon Naturalists

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Birding Plum Island
April 13-14
For more information, contact Wellfleet Wildlife Bay Sanctuary at 508-349-2615

Wild Birds of the Peaks and Prairies of the Rocky Mountain State
April 15-23
For more information, contact South Shore Sanctuaries at 781-837-9400

Birds and Blooms of the Texas Big Bend Country
April 26-May 4, with René Laubach and Doug Williams
For more information, contact Berkshire Sanctuaries at 413-637-0320

Mongolia's Natural Wonders
May 28-June 13, with Chris Leahy
For more information, contact the Travel Office at 800-289-9504

Birding Big Bend and West Texas
May 3-10, with Bill Gette and David Larson
For more information, contact Joppa Flats, 978-462-9998

Birding the Connecticut Lakes, New Hampshire
June 17-19, with Bill Gette, Nancy Soulette, and Deb Listernick
For more information, contact Joppa Flats at 978-462-9998

Machias Seal Island and Eastern Maine
June 25-27, with Bill Gette and Lynette Leka
For more information, contact Joppa Flats, 978-462-9998

Puffins and Peatlands
July 14-17, with Carol Decker and John Galluzzo
For more information, contact Ipswich River at 978-887-9264

Women's White Mountains Weekend
July 28-30, with Carol Decker and Berkley Cline
For more information, contact Ipswich River at 978-887-9264

Tanzania Birding Safari
Feb 2-20, 2012, with Wayne Petersen
For more information, contact the Travel Office at 800-289-9504

To see all trips and tours, go to TOURS BY DATE at www.massaudubon.org/travel.
For detailed itineraries, email: travel@massaudubon.org or call 800-289-9504.

Family Programs

BERKSHIRE SANCTUARIES
Lenox, 413-637-0320
Bird Banding Demonstration
April 9—10 a.m.-noon
Evening at the Beaver Ponds
April 21, May 12—6:30-8 p.m.
Fish Tales
May 1—1-3 p.m.
Mother's Day Wildflower Walk
May 8—10-12:30 p.m.

BLUE HILLS
Milton, 617-333-0690
Creepy Crawlies Days
April 30, May 1—10 a.m.-4 p.m.

BOSTON NATURE CENTER
Mattapan, 617-983-8500
Fantastic Flowers and Other Recycled Creations
April 23—1-2:30 p.m.

BROAD MEADOW BROOK
Worcester, 508-753-6087
Drop-In Day
Earth Day: April 23—10 a.m.-3 p.m.
Bird Celebration: May 14—10 a.m.-3 p.m.

BROADMOOR
South Natick, 508-655-2296
Wild about Reptiles
April 10—1-2:30 p.m.
Preregistration is required.
Exploring Boston Harbor Islands
June 12—8:45 a.m.-2 p.m.
Preregistration is required.

IPSWICH RIVER
Topsfield, 978-887-9264
It's Big Night
April 9—6-8 p.m.
Audubon Nature Festival
June 5—10 a.m.-4 p.m.

JOPPA FLATS
Newburyport, 978-462-9998
Family Day at the Bird Banding Station
April 30, May 8—9:30-11:30 a.m.

MOOSE HILL
Sharon, 781-784-5691
Dad and Me
June 19—11 a.m.-3 p.m.

VISUAL ARTS CENTER
Canton, 781-821-8853
Family Art Studios: Batiks
April 10—2-4 p.m.

WACHUSETT MEADOW
Princeton, 978-464-2712
Sheep Shearing Open House
April 2—1-4 p.m.
Rain date: *April 3—1-4 p.m.*

WELLFLEET BAY
South Wellfleet, 508-349-2615
Celebration Saturdays
April 9, May 14, June 11
Citizen Science Saturdays
April 30, May 28, June 25

Call the individual sanctuaries for more information, fees, and to register.

Curious Naturalist

American Heritage

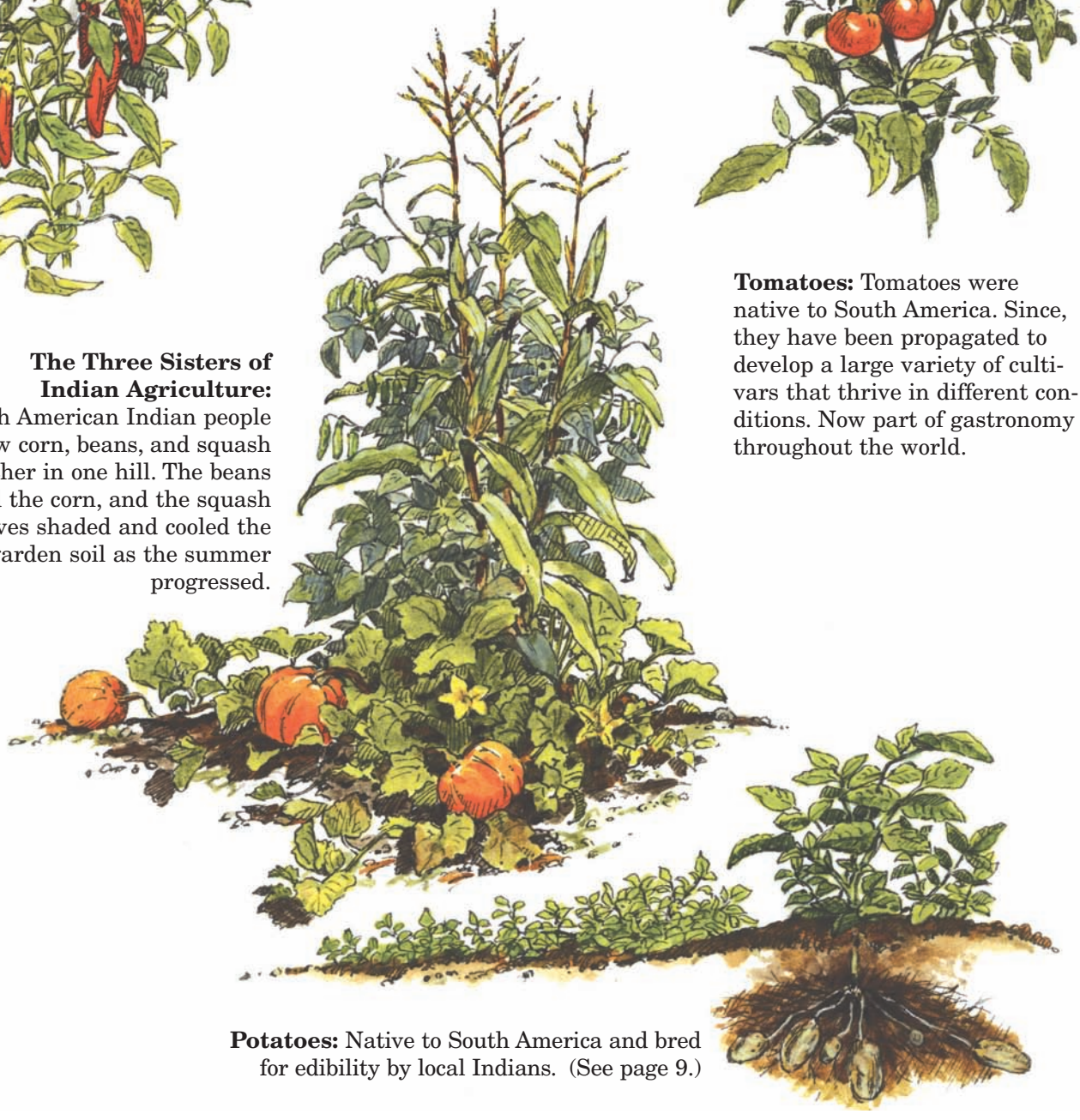
Illustrated by Gordon Morrison

Many of the most common and popular ingredients of Western cuisine are in fact based on American food plants that were introduced to Europe after 1492.

Peppers: Sweet bell peppers as well as hot chili peppers were native to Mexico and Central and South America, and were traditional ingredients of local foods.

Tomatoes: Tomatoes were native to South America. Since, they have been propagated to develop a large variety of cultivars that thrive in different conditions. Now part of gastronomy throughout the world.

The Three Sisters of Indian Agriculture: North American Indian people grew corn, beans, and squash together in one hill. The beans climbed the corn, and the squash leaves shaded and cooled the garden soil as the summer progressed.



Potatoes: Native to South America and bred for edibility by local Indians. (See page 9.)

Outdoor Almanac Spring 2011

March 2011

March 20 Vernal equinox, first day of spring. Days and nights are equal length.

March 23 Listen for the trill of song sparrows.

March 26 Phoebes and fox sparrows arrive about this time.

April 2011

April 3 New moon.

April 4 Listen for spring peepers.

April 5 Field sparrows return.

April 15 Tree swallows have returned.

April 18 Full moon. The Pink Moon.

April 21 Look for white shadbush blossoms in woodlands.

April 27 Listen for the trill of toads from nearby swamps and marshes.

April 29 Brown thrashers, towhees, house wrens, barn swallows, and chimney swifts return.

May 2011

May 3 New moon.

May 6 Watch for trout lilies, columbine, trillium, and other woodland wildflowers before the trees leaf out.

May 7 Watch for spring azure butterflies at forest edges and in gardens.

May 15 The height of spring warbler migration; listen for the dawn chorus and watch the treetops and shrubbery at dawn and dusk.

May 17 Full moon. The Flower Moon.

May 20 Painted turtles and snapping turtles move onto land to lay their eggs.

May 25 Scarlet tanagers and rose-breasted grosbeaks return.

May 28 Dogwood blooms.

June 2011

June 1 New moon.

June 6 Listen for the bullfrog chorus from freshwater marshes and ponds.

June 8 Field wildflowers begin to bloom about this date.

June 9 Sulphur butterflies emerge; fireflies appear in grassy areas.

June 15 Full moon. The Strawberry Moon.

June 21 Summer solstice, longest day of the year.

June 23 Gray treefrogs begin singing.

June 30 Check your garden for robber flies, which hover in midair then zip off.

July 2011

July 1 New Moon.

July 2 Daylilies bloom along roadsides.

July 6 Watch for monarch butterflies on milkweed blooms.