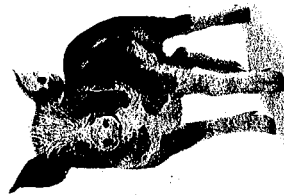


America, Found & Lost

By Charles C. Mann



Much of what we learned in grade school about the New World encountered by the colonists at Jamestown is wrong. Four hundred years later, historians are piecing together the real story.

When English settlers brought West Indian tobacco (right) and European livestock such as pigs to 17th-century Virginia, they triggered changes that would bring an end to an ecosystem—and create a new one in its place.



IT IS JUST POSSIBLE that John Rolfe was responsible for the worms—specifically the common night crawler and the red marsh worm, creatures that did not exist in the Americas before Columbus. Rolfe was a colonist in Jamestown, Virginia, the first successful English colony in North America. Most people know him today, if they know him at all, as the man who married Pocahontas. A few history buffs understand that Rolfe was one of the primary forces behind Jamestown's eventual success. The worms

hint at a third, still more important role: Rolfe inadvertently helped unleash a convulsive and permanent change in the American landscape.

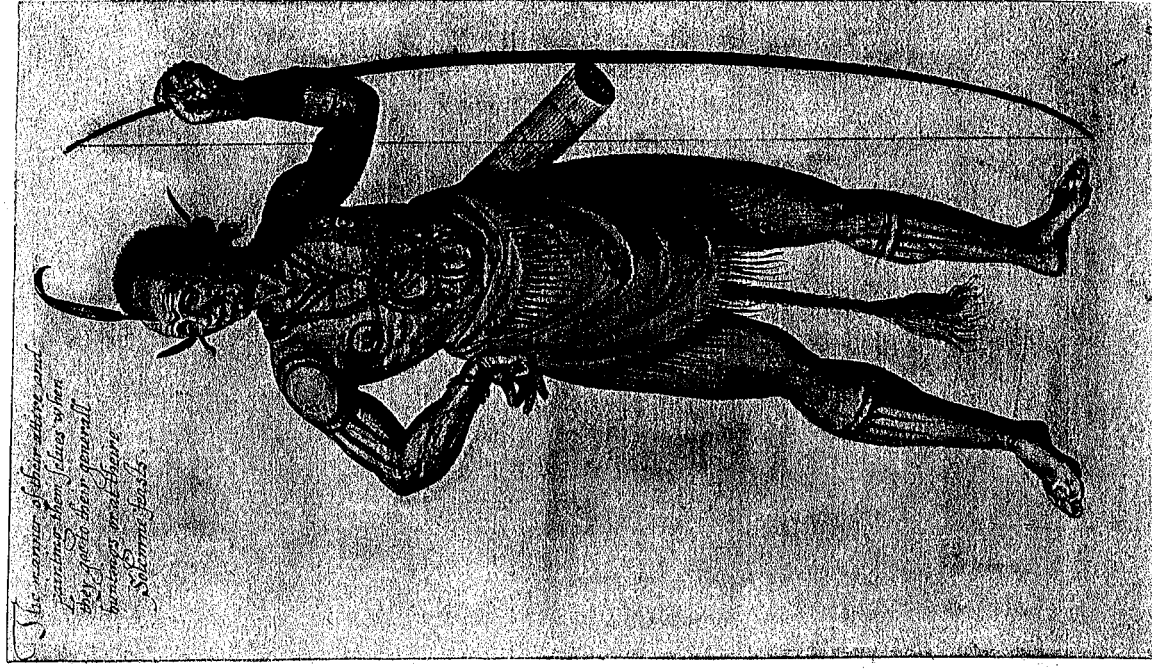
Like many young English blades, Rolfe smoked—or, as the phrase went in those days, “drank”—tobacco, a fad since the Spanish had first carried back samples of *Nicotiana tabacum* from the Caribbean. Indians in Virginia also drank tobacco, but it was a different species, *Nicotiana rustica*. Virginia leaf was awful stuff, wrote colonist William Strachey: “poor and weak and of a biting taste.” After arriving in Jamestown in 1610, Rolfe talked a shipmaster into bringing him *N. tabacum* seeds from Trinidad and Venezuela. Six years later Rolfe returned to England with his wife, Pocahontas, and the first major shipment of his tobacco. “pleasant, sweet, and strong,” as Rolfe’s friend Ralph Hamor described it, Jamestown’s tobacco was a hit. By 1620 the colony exported up to 50,000 pounds of it—and at least six times more a decade later. Ships belled up to Jamestown and loaded up with barrels of tobacco leaves. To balance the weight, sailors dumped out ballast, mostly stones and soil. That dirt

almost certainly contained English earthworms. And little worms can trigger big changes. The hardwood forests of New England and the upper Midwest, for instance, have no native earthworms—they were apparently wiped out in the last Ice Age. In such worm-free woodlands, leaf litter piles up in drifts on the forest floor. But when earthworms are introduced, they can do away with the litter in a few months. The problem is that northern trees and shrubs beneath the forest canopy depend on that litter for food. Without it, water leaches away nutrients formerly stored in the litter. The forest becomes more open and dry, losing much of its understory, including tree seedlings.

Whether the night crawler and the red marsh

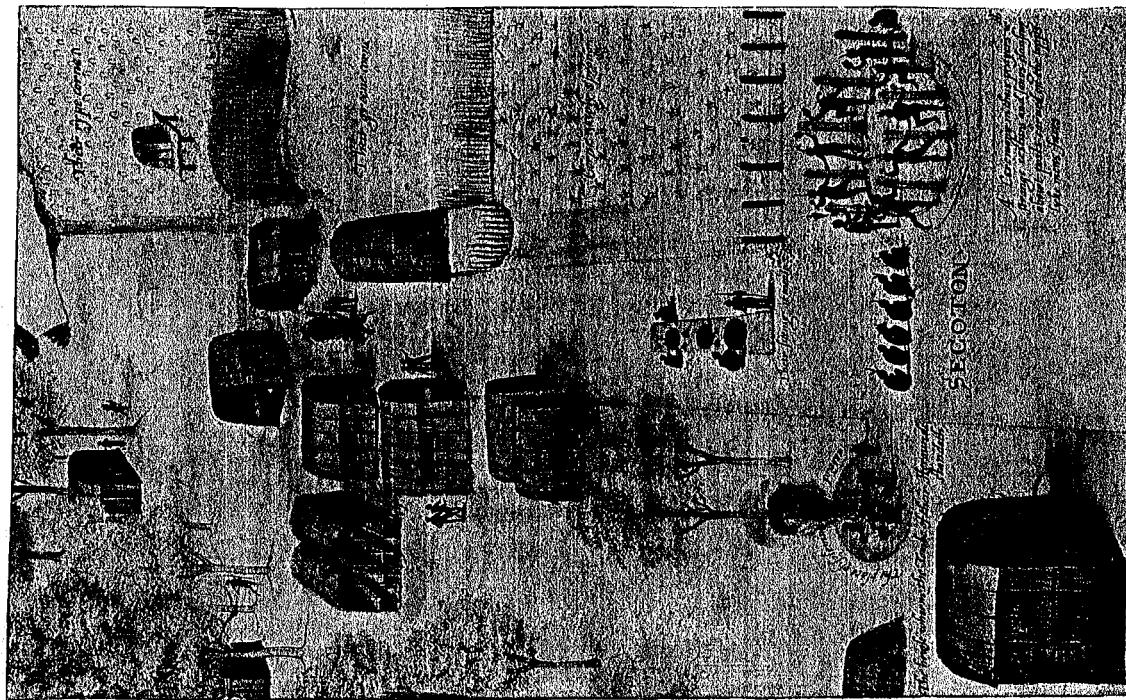
A coastal Indian depicted in 1585 by voyager and artist John White resembles the Powhatan hunters the English encountered at Jamestown in 1607. Though the region appeared sparsely inhabited to the settlers, more than 15,000 Indians were using nearly every square foot to farm, hunt, fish, and gather.

Charles C. Mann is the best-selling author of 1491: New Revelations of the Americas Before Columbus.



This manner of behaviour and painting their skins when they goe down you will haue seen in them.
Solomon Islands

TRUSTEES OF THE BRITISH MUSEUM



TRUSTEES OF THE BRITISH MUSEUM

worm actually first arrived on Rolfe's tobacco ships is not known. What is clear is that much of the northern forests in America were worm free until the Europeans arrived there, inadvertently importing earthworms on the root-balls of their plants or in the ballast of ships. The effects of this earthworm invasion have been slow to show themselves because the creatures don't spread rapidly on their own. "If they're born in your backyard, they'll stay inside the fence their whole lives," says John Reynolds, editor of *Megadriology*, the premier earthworm journal. But over time, the effect on the ecosystem can be dramatic.

Jamestown is known for inaugurating the great American struggles over democracy (the colony established English America's first representative government) and slavery (it was the first English colony to use captured Africans). Rolfe's worms, as one might call them, point to another part of its history. The colonists did not come to the Americas alone. Instead they were accompanied by a great parade of insects, plants, mammals, and microorganisms. Some of the effects were almost invisible; others were enormous. Together with the newcomers' different ways of managing the land, these creatures literally changed the ground beneath the Indians' feet. Setting up camp on marshy Jamestown peninsula, the colonists were taking the first steps toward creating the American landscape we know today.

TWO HUNDRED AND FIFTY MILLION years ago the world contained a single landmass known to scientists as Pangaea. Geologic forces broke this vast expanse into pieces, sundering Eurasia and the Americas. Over time the two halves

Eye witness to a way of life that soon would vanish, John White painted gardens of corn, their staple crop, among houses in a sprawling Indian village. All along the East Coast, Indians cleared plots with stone tools and planted with digging sticks. The English would bring metal axes and—later—plows.

of the world developed wildly different suites of plants and animals. Columbus's signal accomplishment was, in the phrase of historian Alfred Crosby, to reknit the torn seams of Pangaea. After 1492, the world's ecosystems collided and mixed as European vessels carried thousands of species to new homes across the oceans. The Columbian exchange, as Crosby called it, is why there are tomatoes in Italy, oranges in Florida, chocolates in Switzerland, and hot peppers in Thailand. It is arguably the most important event in the history of life since the death of the dinosaurs.

For English America, Jamestown was the opening salvo in the Columbian exchange. In biological terms, it marked the point when *before* turns into *after*. And it began 400 years ago this month, on May 14, 1607, when 104 colonists disembarked on Jamestown peninsula, on the southern fringe of Chesapeake Bay.

Much of what we learned in grade school about the New World encountered by the colonists at Jamestown turns out to be wrong. In movies and textbooks the colonists are often depicted as arriving in a pristine forest of ancient trees, small bands of Indians gliding, silent as ghosts, beneath the canopy. But the idea that the English were "settlers" of land that was unsettled before they arrived is complete nonsense. In fact, three English ships landed in the middle of a small but rapidly expanding Indian empire called Tsenacomoco.

Three decades before, Tsenacomoco had been a collection of six separate chiefdoms. By the time the foreigners came from overseas, its paramount chief, Powhatan, had tripled its size to about 8,000 square miles and more than 14,000 people. Wary, politically shrewd, ruthless when needed, Powhatan was probably in his 60s when the English landed—a "goodly old man, not yet shrinking" with age, according to colonist Strachey, "well beaten with many cold and stormy winters," but still "of a tall stature and clean limbs." His sphere of influence stretched from the Potomac to Cape Henry (see map, page 49).

Most of Powhatan's people (known by the

Europeans imported

earthworms on the root-balls of plants or in the ballast of ships.

Little worms can trigger big changes.



NIGHT CRAWLERS, *Lumbricus terrestris*

colonists as the Powhatan Indians) lived in villages of a few hundred inhabitants surrounded by large tracts of cleared land: cornfields and former cornfields. Except for defensive palisades, the landscape was unfenced. By a quirk of evolutionary history, North America had, except for dogs, no large domesticable mammals; its native species, such as bison and deer, could not be tamed. With no horses, cattle, sheep, goats, or chickens to tend, villagers had no need to enclose their fields.

Between the villages was the forest, splendid with chestnut and elm but hardly untouched. "It was touched, and sometimes heavily," says Donald Young, an ecologist at Virginia Commonwealth University in Richmond. In the fall, Indians burned the underbrush, keeping the forest so open and parklike, colonist John Smith wrote, that "a man may gallop a horse amongst these woods." With Indian villages dotting the region's many riverbanks, the Chesapeake Bay was a jumble of farm fields, marshes, deep forest, and secondary forest (young trees growing on abandoned plots). Jamestown peninsula was an example of the last; it had been cleared,

perhaps for farm fields, a generation or two before the English arrived.

The new colony was a private enterprise funded by a group of venture capitalists called the Virginia Company. Much like investors in today's dot-com start-ups, the backers wanted a quick return. They believed, incorrectly, that the Chesapeake Bay region was laden, like Mexico and Peru, with vast stores of gold and silver. The goal was to acquire these precious metals as expeditiously as possible. Spain, too, believed that gold and silver could be found there. It had long ago claimed what is now the U.S. East Coast for itself and in 1570 had planted a mission a few miles north of Jamestown.

The local Indians wiped out that mission. English colonists who settled on Roanoke Island 110 miles south of Jamestown in the 1580s may also have met their end at the hands of a native group—very possibly the Powhatan. Nonetheless the Virginia Company directors worried more about protecting their investment from distant Spain than from the Indians. They instructed the colonists—their employees, in today's terms—to settle far from the ocean, "a hundred miles from the river's mouth," which would minimize the chance of sudden assault by Spanish ships. And they told them to make sure the settlement was close to a deepwater anchorage, so they could lay up "provisions with ease." In all they did, the directors warned, the colonists should act with "great care not to offend the naturals [Indians]."

Jamestown was the result. Not wanting to antagonize Powhatan, the newcomers—*tassantassas* (strangers), as the Indians called them—looked for uninhabited ground. Because native villages occupied all the good land upriver, the colonists ended up picking a site about 35 miles from the mouth of the James. It was a peninsula near a bend in the river, at a place where the current cut a deep channel so close to the shore that oceangoing ships could be moored to the trees.

Alas, there was a reason no Indians lived at Jamestown: It was not a good place to live. The English were like the last people moving into a

subdivision—they ended up with the least desirable property. Their chosen site was marshy, mosquito-ridden, and without fresh water. Buckets could be dipped into the James, of course, but the water was potable only part of the year. During the summer, the river falls as much as 15 feet. No longer pushed back by a big flow of fresh water, the salty water of the estuary spreads upstream, stopping right around Jamestown. Worse, sediments and organic wastes from the head of the river get trapped at the saltwater boundary. The colonists were drinking some of the dirtiest water in the James—"full of slime and filth," complained Jamestown president George Percy.

By the end of September, nearly half of the original 104 colonists had died. Percy attributed most of the deaths to "mere famine," but he was wrong, in the view of the late historical geographer Carville Earle. The river teemed with fish in the summer—especially big, meaty Atlantic sturgeon—and the English caught and ate them. (Archaeologists at Jamestown have uncovered remains from a sturgeon as long as 14 feet.) Instead, Earle argued, the colonists were killed by "typhoid, dysentery, and perhaps salt poisoning." All are associated with contaminated water. During winter the water would have cleared, but not in time to help the *tassantassas*. Many had been too sick that summer to tend the company gardens. Initially the strangers hoped to trade with the Indians for food while they spent their days hunting for gold, but the region was deep into a multiyear drought, and the Indians did not want to part with what little food they had. By January, only 38 colonists were alive—barely.

Within months, John Smith took charge of Jamestown. His wily, sometimes brutal diplomacy allowed the foreigners to extract enough food from *Tenacomoco* villages to survive the next winter. This was quite a feat—with the arrival of two more convoys, the number of mouths at Jamestown had risen, even with all the deaths, to about 200. Despite his successes, Smith, a yeoman's son, managed constantly to irritate his social betters in the Virginia Company's

leadership. Worse for the colony, he left for medical treatment in England in the fall of 1609. He had suffered terrible burns when a bag of gunpowder he had fastened around his waist accidentally ignited. In his absence, things deteriorated. That winter, the death toll again was high.

Although Jamestown was nearly defenseless, Powhatan didn't attack. For the first year or two of the colony's existence, he seems to have decided that the foreigners' trade goods—guns, axes, glass beads, and copper sheets, which the Indians prized much the way Europeans prized gold ingots—were worth giving up some not-very-valuable real estate. In addition, Powhatan was probably convinced that the *tassantassas* would die off without his assistance, suggests Helen Rountree, an emerita anthropologist at Old Dominion University, in Norfolk, and the most prominent historian of *Tenacomoco*. He could sit back and wait; the invasion from abroad would end itself.

Things would get ugly before Powhatan was proved wrong. By the beginning of 1610, the settlers at Jamestown were dining on "dogs, cats, rats, and mice," Percy wrote, as well as the starch for their Elizabethan ruffs, which could be cooked into a kind of porridge. With famine "ghastly and pale in every face," some colonists stirred themselves to "dig up dead corpse[s] out of graves and to eat them." One man murdered his pregnant wife and "salted her for his food." When John Rolfe arrived that spring, only about 60 people at Jamestown had survived what was called "the starving time."

Rolfe himself barely made it to Virginia. Almost a year before—June 1609—nine ships had left England, carrying 500 new colonists, Rolfe among them. Not far from landfall, a hurricane slammed into the expedition. Rolfe's vessel twisted so much in the waves that the caulking popped from its seams. For three straight days every man aboard, many "stripped naked as men in galleys," worked pumps and bucket chains. The voyagers were near collapse when the ship ran aground on an unpeopled island in the Bermudas. For nine months, Rolfe and the

Without the European
honeybee, Georgia
wouldn't have become
the Peach State;

Johnny Appleseed's trees
might not have borne fruit.



HONEYBEE, *Apis mellifera*

other survivors recovered on the island, catching fish, wild hogs, and sea turtles and assembling two small boats from the wreckage of their ship. They staggered into Jamestown on May 24, 1610, a year after leaving London.

Appalled by what they found and with limited supplies, Rolfe's group quickly decided to abandon Jamestown. They loaded the skeleton-like survivors into boats, intending to set off for Newfoundland, where they would beg a ride home from fishing vessels that plied the Grand Banks. As they waited for the tide to turn for their departure, they saw three ships approaching. It was yet another convoy, this one amply supplied and containing a replacement governor and 150 more colonists. The old colonists, despondent, returned to the task of figuring out how to survive.

It wasn't easy. At least 6,000 people came to Virginia from England between 1607 and 1624. More than three out of four died.

The central mystery of Jamestown is why the badly led, often starving colonists were eventually able to prevail over the bigger, better-organized forces of the Powhatan empire. In other parts of the Americas, colonizers had their

way smoothed for them, so to speak, because they landed in places that already had been devastated by Eurasian illnesses like smallpox, measles, and typhoid—diseases that had not existed in the Americas. When the Pilgrims came to Massachusetts in 1620, for instance, they established Plymouth village literally on top of an Indian village that had been emptied two years before by an epidemic (apparently spread by survivors of a French vessel that shipwrecked on Cape Cod). In Virginia, despite previous contact with Europeans, the Powhatan had somehow avoided any epidemics and were going strong when the Jamestown colonists arrived. Yet by the late 17th century, the Powhatan too had lost control of their land. What happened?

One answer emerging points to what historian Alfred Crosby calls "ecological imperialism." The tassantassas replaced or degraded so much of the native ecosystem that they made it harder and harder for the Indians to survive in their native lands. As the colonists bitterly came to realize that Virginia had no gold and that the Indians weren't going to selflessly provide them with all the food they needed, they began to mold the land to their needs. Unable to adapt to this foreign landscape, they transformed it into a place they could understand. In doing so, they unleashed what would become a multilevel ecological assault on North America. Their unlikely weapons in this initial phase of the campaign: tobacco, honeybees, and domestic animals.

MOST HISTORIANS think it unlikely that Pocahontas saved John Smith's life. Smith was sent off to explore the headwaters of the Chickahominy River in December 1607, in a canoe with two English companions and two Indian guides. One hope was that the river might be the entrance to the long-rumored passage between the Atlantic and Pacific Oceans. The expedition was intercepted by a force led by Opechancanough, Powhatan's powerful brother.

Opechancanough brought his captive to Powhatan, who lived on the north bank of the York River. In Smith's telling, the leader decided

to execute him after a public feast. Executioners "being ready with their clubs to beat out his brains, Pocahontas, the king's dearest daughter," then perhaps 11 years old, suddenly rushed out and cradled Smith's head in her arms "to save him from death." Fondly indulging his daughter's crush, Powhatan commuted Smith's sentence and returned him to Jamestown with food.

Historians don't buy this account, published in 1624, not least because Smith also described his capture a few months after it happened, in a report not intended for publication, and said nothing about being saved by an Indian maiden. Overall, the two versions of Smith's Virginia adventures are similar, except the one intended for the bookstores presents the events with a melodramatic flourish. Being saved from death by a lady's intervention was a favorite motif in Smith's tales. True or not, the story of Smith's rescue has overshadowed a more important bit of history: Pocahontas actually did help save the colony—by marrying John Rolfe six years later.

Evidence suggests Pocahontas was a bright, curious, mischievous girl, one who, like all girls in Ikenamococo, went without clothing until puberty. Her real name was Matoaka; Pocahontas was a teasing nickname that meant something like "little hellion." When Pocahontas visited Jamestown after Smith's return, Strachey remembered, she got the boys to turn cartwheels with her, "falling on their hands turning their heads upwards, whom she would follow, and wheel so her self naked as she was all the fort over."

The English appear to have liked the girl—but not enough to prevent them from abducting her in 1613. They demanded that Powhatan return the English guns he had acquired, but the leader refused to negotiate with people he must have regarded as criminals. Perhaps Pocahontas was angered by her father's refusal to ransom her. Perhaps she liked being treated royally by the English, who viewed her as a princess. Perhaps Pocahontas, by then a teenager, simply fell in love with one of her captors—decorous, pious, politically adept John Rolfe, who for his part seems to have

truly fallen for her. In any case, she agreed to stay in Jamestown as Rolfe's bride.

Both Powhatan and Jamestown's leaders seem to have viewed Pocahontas's marriage as a de facto nonaggression treaty. As relations eased, the foreigners were given free rein to grow tobacco. In Ikenamococo, the custom was for families to farm their plots and then let them go fallow when yields declined. Any land not currently being planted became common hunting or foraging grounds until needed again for farms. Rolfe and the other tassantassas found a loophole in the system. To them, the Indians' unfenced land looked unused—no matter that it was purposely kept open by burning, and constantly traversed by hunting and gathering parties. The English cleared this "vacant" land to plant tobacco, but instead of abandoning fields as they were depleted, gave them over to cattle and horses. Rather than cycling the land between farm and forest, they divided it into parcels and kept them in continuous agricultural use—permanently keeping prime farm and forage land away from the James River societies, pushing the Indians farther and farther away from the shore.

Tobacco fueled an addiction for more and more land. The Indians had long grown the crop, but only in small amounts, and in fields that mixed different plants. Driven by the English demand, the colonists covered big stretches of land with *N. tabacum*. Neither natives nor newcomers understood the environmental impact of growing it on a massive scale. "Tobacco has an almost unique ability to suck the life out of soil," says Leanne DuBois, the agricultural extension agent in James City County. "In this area, where the soils can be pretty fragile, it can ruin the land in a couple of years." Constantly wearing out their fields, the colonists cleared ever more forest, leaving behind sparse pastureland.

Even in their own villages and farm fields, the Indians couldn't escape the invasive species brought by the English—pigs, goats, cattle, and horses. Indians woke up to find free-range cows and horses romping through their fields, trampling the harvest. If they killed the beasts,

gun-waving colonists demanded payment. To the English, the whole concept of a "civilized" landscape was one in which ownership of the land was signaled by fencing fields and raising livestock. After all, England had more domestic animals per capita than most other European nations. "They looked down on the Indians because they had no domestic animals," says Virginia DeJohn Anderson, a historian at the University of Colorado at Boulder. At first the imported animals didn't do well, not least because they were eaten by starving colonists. But during the peace after Pocahontas's marriage, they multiplied. Colonists quickly lost control of them.

The worst may have been the pigs. Smart, strong, constantly hungry, vicious when crossed, they ate nuts, fruits, shellfish, and corn, turning up the soil with their shovel-like noses in search of edible roots. Among these was tuckahoe, a starchy tuber the Indians relied on when times were hard and their corn crops failed. The pigs liked it, too. The natives found themselves competing for food with packs of feral pigs.

But the largest ecological impact may have been wreaked by a much smaller, seemingly benign domestic animal: the European honeybee. In early 1622, a ship arrived in Jamestown that was a living exhibit of the Columbian exchange. It was loaded with exotic entities for the colonists to experiment with: grapevine cuttings, silkworm eggs, and beehives. Most bees pollinate only a few species; they tend to be fussy about where they live. European honeybees, promiscuous beasts, reside almost anywhere and pollinate almost anything in sight. Quickly, they swarmed from their hives and set up shop throughout the Americas.

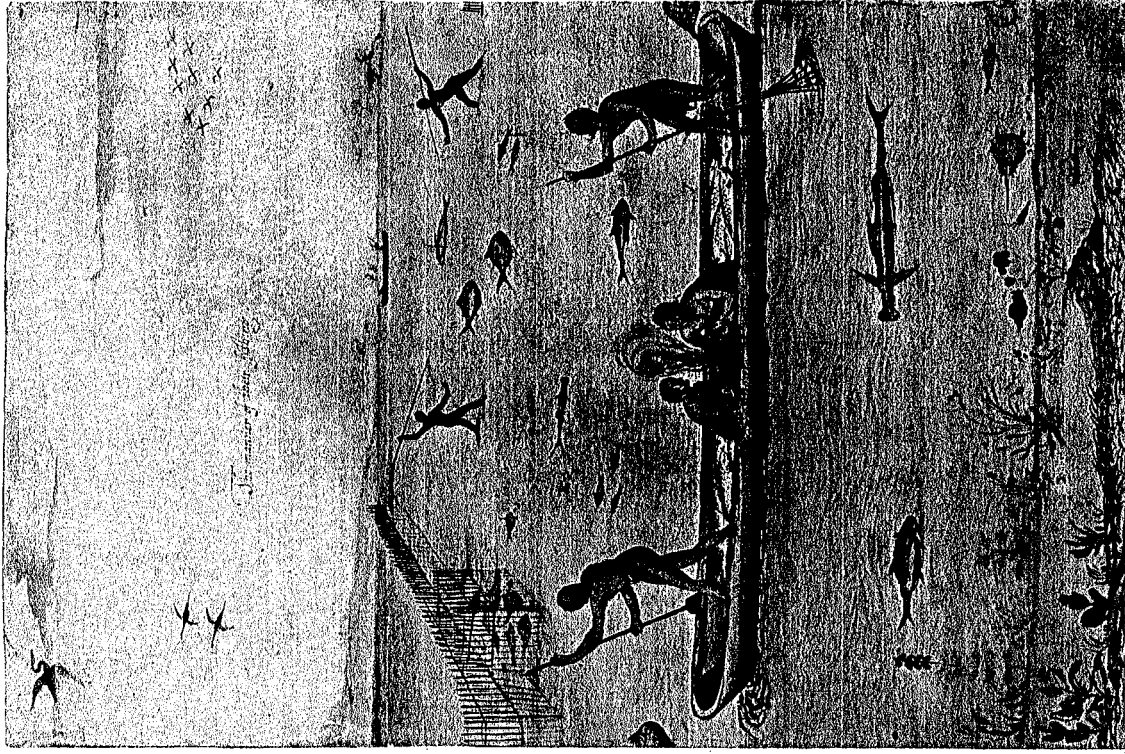
The English imported the bees for honey, not to pollinate crops—pollination wasn't widely understood until the late 19th century—but feral honeybees pollinated farms and orchards up and down the East Coast anyway. Without them, many of the plants the Europeans brought with them wouldn't have proliferated. Georgia probably wouldn't have become the Peach State; Johnny Appleseed's trees might never have borne

fruit; Huckleberry Finn might not have had any watermelons to steal. So critical to European success was the honeybee that Indians came to view it as a harbinger of invasion; the first sight of one in a new territory, noted French-American writer Jean de Crèvecoeur in 1782, "spreads sadness and consternation in all [Indian] minds."

The question arises: If the colonists were pushing Powhatan out of Tsenacomoco, why didn't he push back? Clearly the Indians were more numerous and understood the terrain better. They were also well armed—colonial matchlocks were less accurate than native bows and took longer to reload. One answer is that Powhatan was slow to realize the foreigners would not self-destruct after all. Year after year, they died by the scores, amply proving to him that the English didn't know how to survive in America. Yet new shiploads just kept coming. Although Powhatan sent representatives to London, he apparently didn't understand the implications of their reports of its dense population. England could keep replacing colonists, no matter how many died. By the time he realized this, Powhatan was an old and tired man who had lost his appetite for what would have been a bloody enterprise.

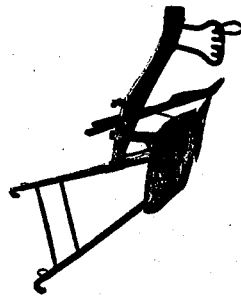
Yet this doesn't explain why his brother Opechancanough, who was distrustful of the tassantassas and took the reins after Powhatan's death in 1618, didn't simply destroy the colony. He did organize a violent surprise attack in 1622 that killed almost a third of the English, but despite ongoing skirmishes, he didn't follow up with another sustained assault for 22 years, by which time the colony was firmly established. Nor does it explain why adjacent Indian groups didn't strike the foreigners either. One possible

From early spring until the first harvest of corn, Virginia Indians relied on fish caught close to the shore with spears, traps, and nets. After dark they ventured out in canoes lit with fires to attract night feeders. Paddlers steered between oyster reefs so large they might sink a boat.



TRUSTEES OF THE BRITISH MUSEUM

By the late 1700s
the Atlantic coast was
lined with such alien crops
as wheat, rice, and
West Indian tobacco.
The Columbian exchange
was in full swing.



WOODEN PLOW, ca. 1800

reason is that, by then, the English hadn't just made the landscape inhospitable. It had turned deadly.

THE FIRST KNOWN THANKSGIVING in English America was celebrated on December 4, 1619, at Berkeley Hundred, a brand-new plantation about 30 miles west of Jamestown. Thirty-eight fresh tassantassas had arrived there earlier that day with a deed awarding them title to 8,000 acres. (This transaction likely occurred without consulting the original inhabitants.) Like Jamestown, Berkeley Hundred was a private, for-profit enterprise backed by venture capitalists in England. The main order of business: Grow as much tobacco as possible. But the financial backers also watched out for their employees' spiritual welfare. The day of arrival, they instructed, should be "yeardy and perpetually kept holy as a day of thanksgiving to Almighty God." After unloading their baggage, the tassantassas knelt in prayer on the cold shore.

History has not recorded where these kneeling men came from, but records suggest a substantial fraction—as much as a third—of the immigrants in Virginia before 1640 were from the marshes of southern and eastern England. In the 17th century, these areas were rampant with malaria. It was not unusual for 10 or 20 percent of the marsh population to die in a single year, according to Mary Dobson, a medical historian. In contrast to the rest of England, burials outstripped baptisms during much of the 17th and 18th centuries. Little wonder people from these areas wanted to emigrate to the Americas.

But rather than escaping malaria, the colonists brought the disease with them, thanks to the marvelously complicated life cycle of the single-celled plasmodium parasite that causes it. It spends its early stages in the gut of several species in the *Anopheles* mosquito genus. When these mosquitoes bite people, plasmodia swim into their bodies. Once in their new home, the parasites transform themselves into tiny creatures called merozoites, which eventually pop out of red blood cells in synchronized assaults—every 48 hours for *Plasmodium vivax*, the species first introduced into the Americas. Reacting in frenzy to the attack, the body's immune system sets off waves of intense fever and chills.

This type of malaria rarely kills victims directly, but leaves them weak for months, until the body gradually fights it off. But *P. vivax* can hide for as long as five years in the liver of sufferers who appear to have run it out of their systems, producing full-blown malarial relapses every six to nine months. Others can have the disease but show no symptoms, turning people in seeming good health into carriers.

In theory, it would take only one such carrier to arrive at Jamestown and get bitten by one of the mosquito species that inhabit the East Coast to establish malaria in the entire continent. In this way, one or more colonists must have "infected" the New World's mosquitoes with the parasite for malaria. "It's a bit like throwing darts," said Andrew Spielman, the late Harvard professor of tropical public health.

"Bring enough sick people in contact with enough mosquitoes, and sooner or later you'll hit the bull's-eye—you'll establish malaria."

By 1657 the colonial physician and politician John Winthrop (son of the famed, identically named governor of Massachusetts Bay Colony) was commonly encountering what we now know as malaria in the course of his work. According to Robert Charles Anderson, the genealogist who is transcribing Winthrop's medical journal, the disease was probably well established in the Massachusetts colony by 1640. Since many more early colonists went to Virginia than Massachusetts, malaria could have been stalking the Tidewater there as early as the 1620s. This is speculative, but not implausible. Once malaria has a chance to get into a place, said Spielman, "it usually gets in fast."

If malaria arrived early, it may help explain why Opechancanough never mounted a sustained fight against the colonists, even when it became a matter of survival to his people. Malaria effectively saps the vitality of entire regions. In England's malaria belt, marshlanders were routinely dismissed as stupid, apathetic, and fatalistic. Similar abuse was heaped on the settlers at Jamestown; Strachey was one of many who denounced what he saw as their propensity for "sloth, riot, and vanity." But at least England could not. If a substantial fraction of their population was malarious, it would have limited their ability to attack the colonists. From the native point of view, it would have been as if the environment around them had suddenly become toxic.

No matter how the parasite was actually introduced to Virginia, we know that malaria spread throughout the East Coast, eventually playing a major part in the pageant of U.S. history. Without malaria, slaves would have been less desirable to southern planters: Most people from tropical Africa are resistant to the plasmodium parasite, the product of millennia of evolution in its presence. The disease became especially endemic in the Carolinas, where it crippled the army of British Gen. Charles Cornwallis during the Revolutionary War. England had by that time drained

its marshes and largely been freed of malaria. Meanwhile, the colonists had become seasoned. "There was a big imbalance. Cornwallis's army was simply melting away," says J. R. McNeill, an environmental historian at Georgetown University. McNeill takes pains to credit the bravery of the Revolution's leaders. But a critical role was played by what he wryly refers to as "revolutionary mosquitoes." Cornwallis surrendered, effectively ending the war, on October 19, 1781.

By then the Columbian exchange was in full swing. The Atlantic coast was dotted with monoculture fields devoted to such alien crops as wheat, rice, and West Indian tobacco. Black rats from Europe were devouring Indian corn stores from Maine to Florida. Meanwhile, European farmers were adopting New World plants like corn, potatoes, and tomatoes; chili peppers, unknown in Asia before Columbus, were on their way to taking over Indian, Thai, and Chinese kitchens.

No longer maintained by Indian burning, the shrinking forests of the East would become choked with underbrush—the overgrown, uninhabited "wilderness" celebrated by Thoreau. In the 1800s, the great grasslands of the Midwest, once kept open by native burning, began filling with trees. With the Indians vanquished by disease, some archaeologists believe, species they had formerly hunted, such as the passenger pigeon, experienced a population explosion.

On the James River, where the process began, land-clearing sped runoff and increased the river flow, sweeping aside the mats of vegetation that lined its banks in Powhatan's day. With its plantations, tobacco fields, and rolling meadows, the landscape of the Chesapeake Bay had been utterly transformed. It looked more like England than it had when Jamestown began, but it wasn't at all the same. Four centuries ago, the English didn't discover a New World—they created one.

An Artistic Look See more of John White's watercolors depicting Indian life in 16th-century America at ngm.com/0705. For information on an exhibit of White's work at the British Museum, go to www.thebritishmuseum.ac.uk/aneeworld.