introduced plants – weeds – in three fields, one that had been undisturbed for two years, another for thirty years, and another for two hundred years. The percentages of weeds, respectively, were 51 percent, 13 percent, and 6 percent. Weeds thrive on radical change, not stability.[67] That, in the abstract, is the reason for the triumph of European weeds in the Neo-Europes, concerning which we shall have more to say in Chapter 11 in a general discussion of the success of Old World species overseas.

What has all this about weeds to do with European humans in the Neo-Europes, beyond providing latter-day investigators with a model for the success of other exotic organisms – humans, for instance? The simple answer is that the weeds were crucially important to the prosperity of the advancing Europeans and Neo-Europeans. The weeds, like skin transplants placed over broad areas of abraded and burned flesh, aided in healing the raw wounds that the invaders tore in the earth. The exotic plants saved newly bared topsoil from water and wind erosion and from baking in the sun. And the weeds often became essential feed for exotic livestock, as these in turn were for their masters. The colonizing Europeans who cursed their colonizing plants were wretched ingrates.

8

Animals

WE HAVE A BELLYFULL of victuals everyday, our cows run about, and come home full of milk, our hogs get fat of themselves in the woods: oh, this is a good country.
—J. Hector St. John de Crèvecoeur, *Letters from an American Farmer* (1782)

THE *MARINHEIROS* TAUGHT their apprentices how to cross the oceans, and the latter did so, taking large numbers of people with them. Then the passengers, landsmen and women, had to make homelands of their new lands. The task was not beyond the range of their capabilities – they could have managed, given enough time – but it was beyond the range of their preferences. They were Europeans, not Americans or Australasians, and would never have adapted voluntarily to the new lands in their pristine condition. The migrant Europeans could reach and even conquer, but not make colonies of settlement of these pieces of alien earth until they became a good deal more like Europe than they were when the *marinheiros* first saw them. Fortunately for the Europeans, their domesticated and lithely adaptable animals were very effective at initiating that change.

The prospective European colonists were livestock people, as their ancestors had been for millennia. The founders of the Neo-Europes were descendants, culturally and often genetically, of the Indo-Europeans, a west central Eurasian people who spoke the ancestral language of most of the tongues of Europe (English, French, Spanish, Portuguese, German, Russian, etc.), a people who were practicing mixed farming, with heavy emphasis on herding, 4,500 years before Columbus.[1] The Europeans who founded the first transoceanic empires were also mixed farmers and pastoralists (they would have understood the Indo-Europeans' way of life more readily than our own), and the success of their animals was, generally speaking, their success.

The Europeans brought with them crop plants, which gave them a very important advantage over the Australian Aborigines, none of whom farmed, and who were slow to take it up. But the Amerindians possessed a number of productive, nourishing plants whose value the invaders quickly acknowledged by cultivating themselves. Cassava is

one of the staples of Euroamericans in the tropics, especially in Brazil, and maize is a standard food of Euroamericans nearly everywhere, as it was of Australian colonists in the late eighteenth and early nineteenth centuries.[2] The European advantage over the indigenes of their overseas colonies was not so much a matter of crop plants as of domesticated animals.

The Australian Aborigines had only one domesticated animal, the dingo, a knee-high dog of the size the English used for chasing foxes.[3] Amerindians also had dogs, plus llamas, alpacas, guinea pigs, and several kind of fowl, but that was all. For almost every purpose – for food, leather, fiber, or carrying or pulling burdens – the domesticated animals of America and Australia were inferior to those of the Old World. If the Europeans had arrived in the New World and Australasia with twentieth-century technology in hand, but no animals, they would not have made as great a change as they did by arriving with horses, cattle, pigs, goats, sheep, asses, chickens, cats, and so forth. Because these animals are self-replicators, the efficiency and speed with which they can alter environments, even continental environments, are superior to those for any machine we have thus far devised.

Let us begin with what is possibly the "weediest" of all the large domesticated animals, the pig. Pigs convert one-fifth of what they eat into food for human consumption, as compared with one twentieth or less for beef steers. (These statistics pertain to tweintieth-century livestock, which are larger than in past centuries, but we can assume that as a matter of proportion, the difference in the food-producing efficiencies of pigs and steers was in the colonial period approximately what it is today.) Pigs, unfortunately for hungry humans, eat concentrated carbohydrates and proteins, foods that are often fit for direct human consumption, which reduces the value of swine to us. Even so, there is no doubt of their importance, espe-

cially in the early years of a given colony when there was often an abundance of carbohydrate and protein and few settlers to exploit it.[4]

Swine are omnivorous, and there were more kinds of nourishment available to them in the early colonies across the seas than to any of the species of imported animals that were to be of prime importance economically.[5] They ate practically anything of organic origin: nuts of all kinds, windfall fruit, roots, grass, any animal too small to defend itself. They especially fancied peaches in Carolina and Virginia, where "large Orchards are planted of them to feed Hogs with, which when they are satiated of the fleshy Part, crack the Shells and eat the Kernels only."[6] In New England they learned to root for and thrive on clams: "they will not faile at low water to be with them."[7] In Sydney, wrote an early visitor, the pigs "are allowed to run in the bush during the day, just giving each a cob of maize to bring it home in the evening . . . They feed on grasses, herbs, wild roots and native yams, on the margins of rivers and marshy grounds, and also on frogs, lizards, etc. which come their way."[8]

Pigs did not prosper in the very cold regions of the colonies, for obvious reasons, nor in bare, hot country, because they cannot tolerate strong, direct sunlight and unmitigated heat; they must have easy access to water and cover in the tropics. But in most of the early colonies in the Americas and Australasia there was enough moisture and shade to satisfy pigs, plus an abundance of roots and mast – and soon after the arrival of the whites a great plenty of pigs. The great exceptions to the rule that pigs did magnificently in the early colonies were the grasslands – too bare, too sunny – yet even in the pampa they swarmed along the watercourses.[9]

Healthy sows have large litters, up to ten or more piglets apiece, and with an abundance of food, pigs can increase at the velocity of funds deposited at high compound interest.

Within a few years of Española's discovery, the number running wild was "*infinitos,*" and "all the mountains swarmed with them."[10] They spread to the other Greater Antilles and to the mainland in the 1490s, where they continued to multiply rapidly. They followed in the footsteps of Francisco Pizarro (who allegedly began life as a swineherd) and were soon doubling and redoubling their numbers in the area of the conquered Incan empire. Their rate of increase on the mainland was probably lower than in the West Indies because of the former's carnivores, but pigs soon increased to many, many thousands on the continents – *infinitos* again. Every last one of these swarms of pigs, said the saintly Las Casas, were descendants of the eight pigs that Columbus had bought for seventy *maravedis* each in the Canaries and brought to Española in 1493.[11]

The swinish multitudes rooting through the swamps, jungles, and savannas of Brazil by the end of the sixteenth century presumably had other origins, as did the pigs of Port Royal, Nova Scotia, France's first successful American colony, where they multiplied and often slept out-of-doors in the winter of 1606–07.[12] Some of those in early Virginia could have been descendants of the Columbian eight, picked up in the West Indies on those voyages that took the English colonists across the Atlantic in the trade-wind belt. Whatever their origin, they thrived in Virginia, and circa 1700 did "swarm like Vermaine upon the Earth, and are often accounted such, insomuch that when an Inventory of any considerable Man's Estate is taken by the Executors, the Hogs are left out, and not listed in the Appraisement. The Hogs run where they list and find their own Support in the Woods without any Care of the Owners."[13]

Pigs were the favorite choice of explorers, pirates, whalers, and sealers for "seeding" remote islands to assure a supply of meat on the hoof for the next set of transient Europeans or Neo-Europeans to come along. As a result, pigs were already running wild on islands in the Río de la

Plata, on Barbados and Bermuda, on Sable Island off Nova Scotia, on the Channel Islands off California, and on islands in the Bass Strait between Tasmania and the mainland when mention of those patches of land first appears in the written record.[14]

In Australia, pigs swept inland from Sydney, keeping pace with or trotting along in advance of the frontier. They were almost as much a part of the usual station (ranch) as the sheep, scavenging the environs for kilometers around. On the more sloppily run establishments they might be seen no more often than once a month. Many, of course, were not domesticated even to that extent.[15] In the twentieth century, the wild pigs of Australia, though thousands have been shot, poisoned, and electrocuted, have a range that includes most of the eastern third of the continent.[16]

After a few generations, feral pigs revert to a type very different from what we are accustomed to seeing in the barnyard. Long-legged and long-snouted, slab-sided, narrow-backed, fast and vicious, and equipped with long, sharp tusks, they earned the same name in both North America and Australia: razorback.[17] The razorback is a bad-tempered beast, especially the boars, an Argentinian example of which nearly robbed us of *Green Mansions* and several good books on the pampa by almost unhorsing the young William H. Hudson, after which the animal almost certainly would have sabered and eaten the prospective author.[18]

Today, wild pigs, except in a few remaining frontier areas, are at best game animals and at worst a nuisance and danger, but from the Antilles in the 1490s to Queensland in the late nineteenth century they were a very important source of food. They provided for themselves – completely, if given the opportunity – and their meat was flavorful, nourishing and free. The first generations of European settlers in most of the colonies in America and Australasia ate pork more often than any other flesh.

Cattle have, from the human point of view, at least two advantages over pigs: They are equipped with more efficient thermoregulating systems and are more tolerant of heat and direct sunlight; they specialize in turning cellulose – grass, leaves, sprouts – that humans cannot digest into meat, milk, fiber, and leather, in addition to serving as draft animals. These characteristics, added to the natural self-reliance of cattle, make them a species as good at taking care of themselves in open grassland as pigs are in forest and jungle. The cattle that Columbus carried from the Canaries to Española in 1493 certainly had that capability, as did their descendants who were living as breeding herds in the West Indies by about 1512, in Mexico in the 1520s, in the Incan region in the 1530s, and in Florida in 1565. By the end of the century they were in New Mexico, and in 1769 they arrived in Alta California.[19] Their story is not one of uniform success everywhere. In steamy Brazil and the Colombian and Venezuelan llanos, Iberian cattle took generations to adapt; but in the higher country they exploded in numbers, dropping calves at what the colonists thought amazing rates. At the end of the sixteenth century, the cattle herds in northern Mexico may have been doubling every fifteen years or so, and one French visitor wrote his king of the "great, level plains, stretching endlessly and everywhere covered with an infinite number of cattle."[20] They were completely naturalized, as permanent a part of the fauna as the deer and coyotes, and still advancing north. A century and three quarters later, Friar Juan Agustín de Morfí, traveling through that part of Mexico called Texas, saw "amazing" numbers of wild cattle.[21]

What happened to cattle on the pampa was even more amazing. The first European settlement at Buenos Aires failed, but the Spanish tried again, successfully, in 1580. By that date, European quadrupeds, descendants of the first settlement's strays or of feral animals that drifted in from other European outposts, were already present in large

numbers. The origins of the feral herds east of the Río de la Plata in what is now Uruguay and Rio Grande do Sul are also obscure. The Spanish or the Portuguese or the Jesuits may have introduced livestock first, and all three groups brought in cattle and horses eventually. The first solid date we have is 1638, when Jesuits abandoned a mission in the area, leaving 5,000 head of cattle behind.[22] We can be sure the freed animals propagated at high rates, as did all the herds of the pampa. In 1619, the governor of Buenos Aires reported that 80,000 cattle per year could be harvested for their hides without decreasing the wild herds.[23] The trustworthy Félix de Azara, who told us about weeds in the pampa in the last chapter, estimated the number of cattle in that grassland between 26°S and 41°S circa 1700 at 48 million, feral cattle in numbers comparable to those of buffalo on the Great Plains in their heyday.[24]

The cattle on the pampa were never properly counted until late in their history, and so a caveat should accompany Azara's estimate: 48 million, plus or minus how many? A quarter, even a half? The bovine multitudes inspired not statistics, but awe. William Hudson, in his autobiography, remembered plantations and orchards in mid-nineteenth-century Argentina with walls

> built entirely of cows' skulls, seven, eight, or nine deep, placed evenly like stones, with the horns projecting. Hundreds of thousands of skulls had been used thus, and some of the old, very long walls, crowned with green grass and with creepers and wild flowers growing from the cavities of the bones, had a strangely picturesque but somewhat uncanny appearance.[25]

The majority of the cattle of the Americas from the sixteenth to the nineteenth century were probably feral. As with the pigs, their environment rendered them fast, lean, and mean – the kind of cattle that meat packers describe as "eight pounds of hamburger on eight hundred pounds of bone and horn" – animals that when fully grown could take

on nearly any challenge. In the viceroyalty of Río de la Plata, according to Father Martin Dobrizhoffer, the cows could not be milked unless their feet were tied and their calves were present, and the cows and bulls alike moved "with a sort of ferocious arrogance," holding their heads high like stags, which they almost equaled in speed. When Anglo settlers began moving into Texas in the 1820s, they found these cattle more difficult to catch and more dangerous to handle than mustangs.[26]

The cattle that came to French and British North America were not so agile, so fearsomely equipped with long horns, nor so vicious when accosted as the Iberian cattle, but they, too, were a hardy lot. A cattle frontier preceded the European farmers as they moved west from the Atlantic, even though forests were thick and broad expanses of meadow uncommon.[27] Not until the Neo-Europeans moved onto the vast grasslands of middle North America in the nineteenth century were the numbers of their cattle comparable to the herds of colonial Ibero-America, but there were enough of them in the eighteenth century to impress Europeans who had never visited the southern steppes. Shortly after 1700, John Lawson remarked that the stocks of cattle in Carolina were "incredible, being from one to two thousand Head in one Man's possession."[28]

Some of the English cattle were feral, some tame, and all of them hardy. Within thirty years of the founding of Maryland, the settlers were complaining that their stocks of cattle were being "molested by reason of severall heards of wilde Cattle resorting amonge their tame."[29] Two human generations later, cattle on the South Carolina and Georgia frontier were migrating west "under the auspices of cowpen keepers, which move (like unto the antient patriarch or the modern Bedowin in Arabia) from forest to forest as the grass wears out or the planters approach."[30] We, of course, can make an educated guess as to what replaced the worn-out native grasses.

To maintain a measure of control over these frontier cattle and the other semidomesticated animals that roamed the woods from Nova Scotia to the lower Mississippi, one easily obtained item was needed: salt. A stockman would locate his herd by listening for the bell hung round the neck of the herd leader and then approach with a cake of salt in his outstretched hand. While the animals licked the salt, he could harness or yoke or select for slaughtering those he wanted.[31]

These herds of only semidomesticated animals wandering in the forests and canebrakes had no easy time of it. The full trough, the warm barn, the attentive herdsman were unknown to them. Their weakest went to feed the cougars and wolves, died foundering up to their withers in bogs, froze in blizzards, "pined and starved." But the survivors made up the losses and more in the months of warmth and lush forage, and continued to mosey farther into the North American wilderness.[32]

In the nineteenth century, Australia established itself as one of the chief wool and mutton producers in the world, but nature did not foreordain that sheep should dominate in the antipodes. The mechanization of Europe's textile industry did that, and without that influence, feral cattle might have taken over as thoroughly as they did, for instance, in Texas.

The colonizing First Fleet arrived in Australian waters in 1788 with a discomforting number of livestock on board, obtained at Cape Town, South Africa. The master's mate on the *Sirius* declared that the ship looked like a livery stable. Among the animals were two bulls and six cows. Within the first few months at Sydney, these eight animals strayed off or, some said, were driven off by a surly convict named Edward Corbett.[33] The settlers assumed that the Aborigines had killed them. When spotted next, seven years later, the cattle numbered sixty-one head and they were grazing in an area soon called Cowpastures. The

governor, John Hunter, went out to see them, and he and his party were "attacked most furiously by a large and very fierce Bull, which rendered it necessary for our own Safety, to fire at him. Such was his Violence and Strength, that six Balls were fired through, before any Person dared approach him."[34]

The governor, who may have been familiar with the story of feral livestock on the pampa, decided to leave the cattle alone so that "they may become hereafter a very great Advantage and Resource to this Colony." By 1804, the feral herds ("mobs," to be properly Australian) numbered 3,000 to 5,000 head. The Australians in time would become fine livestock handlers, but they were not yet, and the best they could do with these fierce African animals was to shoot some and salt them down, and capture a few of the calves. The rest confounded those who pursued them by "running up and down the mountains like goats." The herds had become a nuisance and worse, providing a source of food for escaped convicts living in the wild – the famous and infamous "bushrangers." Furthermore, the wild cattle were occupying, and were unshakably resolved to continue occupying, some of the very best land between the sea and the Blue Mountains.[35] The government, convinced that humans, not cattle, had been ordained to be the dominant species in New South Wales, reversed its policy toward the wild cattle and in 1824 ordered the last wild descendants of the strays of 1788 destroyed.[36]

In the second decade of the new century, the Australians found a way through the Blue Mountains into the grasslands beyond and passed through with their livestock; there, according to all appearances, cattle increased faster in proportion to their original number than either sheep or horses.[37] Most of these cattle were now of European rather than South African ancestry, but that did not mean docile animals. The calves were as wild as deer and nearly as fast, and many – "Kangaroos, as we term them" – could leap a

two-meter fence.[38] By 1820, the number of cattle in the tame herds of New South Wales was 54,103; ten years later it was 371,699. In another human generation, Australia would have millions.[39] No one knew the number of the feral cattle, some of which preceded the frontiersmen and women, some even the explorers. In 1836, Thomas L. Mitchell, trekking through the wilderness near the Murrumbidgee River, came upon cattle trails around the water holes so wide and hard-packed that they resembled roads, "and at length the welcome sight of the cattle themselves delighted our longing eyes, not to mention our stomachs." The animals were so unused to people that "we were soon surrounded by a staring herd of at least 800 head of wild animals."[40]

Even the so-called tame cattle on the frontier saw so few humans – most cattle stations consisted of no more than two or three stockmen and a "hut-keeper" – that one wonders to what extent the animals realized that men were their masters. The bulls were especially imperious. They stayed with the herds most of the time, but drifted off to spend the winters in solitude, returning in the spring to battle for females. One of the memorable sounds of the Australian frontier was the returning bull's challenging bellow, "now sullen and deep, then rising into a shrill scream, clear as a bugle . . . awakening the echoes for miles around, through the deep glens, and pathless solitudes."[41]

Horses died out in the Americas some 8,000 to 10,000 years ago, and returned again only when Columbus carried several to Española in 1493. The Iberians, initially a minority wherever they went in the New World, found horses effective, indeed an absolute necessity, in fighting the Amerindians, and so they brought the animals with them everywhere.[42] The horses propagated rapidly in most of the colonies – not with the wild abandon of pigs, perhaps, but rapidly.[43] Even in coastal Brazil, where the climate is too hot to be ideal for horses, there were plenty of

them by the end of the sixteenth century, and the settlers were shipping them to Angola.[44] Given the same latitudes and climates, horses died in Africa and bred in America.

In northern Mexico, horses thrived and went wild in multitudes. In 1777, Friar Morfí found feral *mesteños* (the Mexican word for horses of the northern plains, which North Americans corrupted into "mustangs") beyond counting near El Paso, Texas. The horses, wild, of course, were so plentiful that the plain was crisscrossed with their paths, so many paths that this empty land seemed "the most populous country in the world." They had eaten and worn away the grass from large expanses, which immigrant plants were moving in to occupy. Around the water hole at San Lorenzo he found a great abundance of the plant called *uva de gato* in Spain and stonecrop in England, "which gladdened the landscape with its greenness." It may have been one or more of the European species of the genus *Sedum,* highly valued today as ground cover, that have spread widely since the *marinheiros* learned to read the oceanic winds.[45]

The story of the mustang in North America, of its spread north across the Great Plains into Canada before the end of the eighteenth century, is well known, and we shall not repeat it here.[46] That migration was largely the work of Amerindian raiders and traders, but it was the Spaniards who drove the first horses into Alta California in the 1770s. There the animals took up the ways of their ancient ancestors of the mid-Asian steppes. When the gold rush began in 1849, there were so many wild horses that ate so much of the grass that livestockmen with an eye for the profit that other stock could make out of the same grass drove the horses off the cliffs at Santa Barbara by the thousands.[47]

Some of the ancestors of the horses of the Atlantic seaboard colonies were of Mexican origin, brought eastward by traders from the midcontinental grasslands,[48] but

most came directly from Britain and France, arriving in Virginia as early as 1620, in Massachusetts in 1629, and in New France in 1665. John Josselyn found plenty of horses in seventeenth-century Massachusetts, "and here and there a good one." Their owners let most of them scavenge the wilderness for their own feed in wintertime, though the practice, he said, brought the animals "very low in flesh till the spring, and so crest fallen, that their crests never rise again." He was from Europe, where horses were very expensive, and worth taking good care of. In North America they were relatively cheap and wandered free, often with little more evidence of their connection with humanity than a collar with a hook at the bottom to catch on fences as they tried to leap over them to get at the crops. Hogs, incidentally, were collared with triangular yokes so that they would not push through fences.[49] Fences were not for keeping livestock penned in, but for keeping livestock out.

Having hardy mounts for no more than the effort of catching them was a boon for the frontiersman, but there were so many of them in some places than they actually became a nuisance. (How unthinkable in Great Britain on both counts.) By the end of the seventeenth century, feral horses were pests in Virginia and Maryland. Runty stallions made so much trouble by impregnating valuable mares that statutes were passed requiring their penning or gelding. In Pennsylvania, anyone finding a stallion under thirteen hands running free had the legal right to geld him on the spot.[50]

Thousands of feral horses are still with us in the western parts of North America, where there is still a lot of open country. Despite drought and blizzard, epizootics, the gluttonous pet-food industry, and periodic cullings by men looking for free mounts, in 1959 mustangs were still roaming a dozen or so western states and two Canadian provinces.[51]

As mentioned earlier in reference to cattle, the first European settlements on the pampa did not succeed, but

large herds of feral horses were grazing there when the Spanish returned to Buenos Aires in 1580. They were increasing at what was perhaps an unprecedented rate for large herds, and at the opening of the next century there were wild horses in Tucumán "in such numbers that they cover the face of the earth and when they cross the road it is necessary for travellers to wait and let them pass, for a whole day or more, so as not to let them carry off tame stock with them." The grasslands around Buenos Aires were overrun with "escaped mares and horses in such numbers that when they go anywhere they look like woods from a distance."[52] Such reports trigger skepticism, but are probably accurate. The pampa, east and west of the Río de la Plata, was a paradise for horses; even in the nineteenth century, after many of the advantages the animals enjoyed initially had dissipated, herds set apart as sources of cavalry mounts and protected from human harvesting increased at a rate of one-third per year.[53]

The Jesuit, Thomas Falkner, found the number of horses on the pampa in the eighteenth century to be "prodigious," and the going price of a two- or three-year-old colt was half a dollar. Sometimes, he wrote, the pampa was empty, the feral horses over the horizons, and other times they were on all sides.

> They go from place to place, against the current of the winds; and in an inland expedition which I made in 1744, being in these plains for the space of three weeks; they were in such vast numbers, that, during a fortnight, they continually surrounded me. Sometimes they passed by me, in thick troops, on full speed, for two and three hours together; during which time, it was with great difficulty that I and the four Indians, who accompanied me on this occasion, preserved ourselves from being run over and trampled to pieces by them.[54]

Horses in such profusion, tame or feral, existed nowhere else on earth. Their abundance shaped the societies

of the pampa more firmly and more permanently than the discovery of gold would have. The metal would not have lasted long. The enormous herds of wild horses, the indispensable element of gaucho culture, lasted for two and a half centuries.

Seven horses came to Australia in 1788 with the First Fleet. The governor reported next winter that "the horses do very well," but that was not true, or not for long, at least.[55] Only two of them survived the first years, and not until good South African mares arrived in 1795 did the number of horses really begin to increase. In 1810 there were 1,134, a decade later four times as many, and the settlers were even starting to export a few.[56] Many were already roaming free. In Australia they were known not as mustangs but as brumbies. The word may be derived from the Aboriginal term "baroomby," meaning wild, or from Baramba, the name of a creek in Queensland, or from the name of James Brumby, who came to New South Wales about 1794 as a private, settled on a hundred acres where he grazed stock, and then went off on an expedition to Tasmania in 1804. Before leaving, the story goes, he mustered (rounded up) his animals, but missed a few horses, and they strayed off to found dynasties of brumbies.[57]

Brumbies once ran by the tens and scores of thousands in the interior of Australia, and in 1960 there were still 8,000 to 10,000 of them living in Western Australia, "by spur and bridle undefiled." They are not lovely animals; 150 years ago they were so narrow in the chest and shoulders that saddles intended for them had to be made narrower than those for European horses, and in 1972 an expert on brumbies declared that "they have a great bloody head like a bucket." But they are amazingly durable and need no more feed than what they can find for themselves, summer or winter. They make excellent horses for working stock, intelligent and able to "turn on a cabbage-leaf."[58]

As elsewhere, horses thrived so famously in Australia that the Neo-Europeans forgot what a miracle it was to have mounts for next to nothing, and cursed the excess of their own good fortune. The brumbies were pests, sweeping past and carrying tame horses off with them, "leaving their owner to chew the cud of mortification." Worst of all, they drank and ate water and grass needed for profitable animals: sheep, cattle, and obedient horses.[59] Between the 1860s and 1890s, brumbies were a major nuisance in New South Wales and Victoria, "a very weed among animals." Many were killed for their skins – so many that in 1869, horsehides brought only four shillings each in Sydney. Some Australians simply fenced off the water holes in dry times and got rid of the animals that way. Other settlers, not willing to wait for thirst to work, devised methods of knifing or shooting the brumbies so that they would run a long way before dying, thus preventing noisome accumulation of dead horses at a single point. In the 1930s, when bounties were offered for horse ears, two men shot 4,000 in one year on the Innamincka. A little later, one man shot 400 horses in a single night.[60]

So much for domesticated quadrupeds gone wild. There is no value in belaboring the point that they adapted marvellously well to the Neo-Europes, and vice versa. We could go on at length about goats, dogs, cats, even camels, and go on further to point out that domesticated birds – chickens, for instance – prospered in the Neo-Europes, but the point has already been made: Old World livestock prospered in the Neo-Europes. In fact, they did amazingly better in the Neo-Europes than in their homelands – a paradox. Let us examine the story of what might be described as the Neo-Europes' only domesticated insect, the honeybee. If this Old World insect did as well in the Neo-Europes as did pigs, cattle, and horses, then the forces behind the success of Old World immigrants must have been pervasive indeed.

There are many kinds of bees and other insects producing honey all round the world, but the one insect that combines high production of honey with being amenable to human manipulation is the honeybee, a native of the Mediterranean area and the Middle East. There humans collected honey (and wax, for many peoples more important than the sweet product) long before written history began, and there Samson created one of the Old Testament's most striking images when he found "bees and honey in the carcass of a lion."[61]

In the fifteenth and sixteenth centuries, the sailors of western Europe became *marinheiros,* with many and diverse results, among them enormous expansions in the ranges and numbers of honeybees. These bees may have been in the islands of the Mediterranean Atlantic before the arrival of the Europeans, but if so, then not in all the islands. If they had been in Tenerife before Our Lady of Candelaria, then why would she have been obliged to produce wax for her candles by miracles? It appears that they arrived late in Latin America, and in many cases came from North America, not from Europe. In tropical America, the indigenes were collecting honey from bees long before Cortés and continued to do so; and for long after Cortés sugar was plentiful and cheap in Latin America. Both factors tended to discourage the importation of honeybees. Today Argentina is one of the world's top producers of honey, but that is a relatively recent development. In contrast, honey was an essential sweetener in North America, and the honeybee arrived early.[62]

The first honeybees brought to North America arrived in Virginia in the early 1620s, where honey became a common food in the seventeenth century. In Massachusetts, bees came ashore no later than the 1640s, and by 1663 they were thriving "exceedingly," according to John Josselyn. The immigrant insects did as well as or better than the Europeans themselves in seventeenth-century British America.[63]

To an extent, their advance was due to human intervention, humans with hives on their rafts and wagons moving into Indian territory, but in most cases the avant-garde of these Old World insects moved west independently. They were naturalized in the seaboard colonies in the seventeenth century and widespread there by 1800,[64] but the Appalachians were a real barrier for them. Some were carried across by people, and some reputedly blown across by a hurricane. They did get across and then seem to have spread even more rapidly in the Mississippi basin than they had east of the Appalachians. In the campaign that climaxed with the battle of Tippecanoe in 1811, the advancing United States forces found many beehives in hollow trees in the Indiana wilderness, and one man recorded that he and his friends found three bee trees in an hour.[65] The first honeybees west of the Mississippi are supposed to have settled in Mme. Chouteau's garden in St. Louis in 1792.[66]

One of the favorite recreations of rural North Americans was to seek out and steal the honey from the hives of wild bees. A whole system of techniques grew up: how to find foraging worker bees, how to follow their beeline back to the bee tree while cracking shins and falling into creeks, and how to smoke out the bees and chop down the tree – all without being stung any more than was absolutely necessary. Then came the reward, as witnessed by Washington Irving on the Oklahoma frontier in the 1830s. The unbroken honeycombs were placed in kettles to take back to camp or settlement, and

> those which had been shivered in the fall were devoured upon the spot. Every stark bee-hunter was to be seen with a rich morsel in his hand, dripping about his fingers, and disappearing as rapidly as a cream-tart before the holiday appetite of a schoolboy.[67]

Honey was a blessing to the North American indigenes, who had previously had only maple sugar for a strong sweetener, but the "English fly" was for them a dismal

portent of the approach of the white frontier. St. Jean de Crèvecoeur wrote that "as they discover the bees, the news of this event, passing from mouth to mouth, spreads sadness and consternation in all minds."[68]

Australia has small stingless bees, which the Aborigines valued for their very sweet product, but it was as innocent of true honeybees as America. These arrived in Sydney on 9 March 1822 on the ship *Isabella,* along with 200 convicts.[69] Once established in New South Wales, the bees propagated and swarmed with the same vigor as in America. They were introduced in Tasmania in 1832 or shortly before, and the first hive there swarmed either twelve or sixteen times the first summer ashore, according to which account one accepts.[70] It seems that several of the eucalypti, native to Australia, are among the best of all honey sources in the world.[71] When Anthony Trollope visited Australia in the early 1870s, he found the alien bee much more plentiful than the native, and honey to be "a customary delicacy with all the settlers."[72] A hundred years later, Australia is one of the world's largest producers and exporters of honey.[73]

The creatures we have discussed thus far went to the colonies because the colonists wanted them, but others crossed the seams of Pangaea without invitation. These varmints pose a very interesting set of animals for us, because whereas it can be argued that the barnyard organisms succeeded overseas because the Europeans worked for their success (not necessarily true, but let us accept that argument for the moment), no one would argue that rats, for instance, succeeded because the settlers wanted them for neighbors. On the contrary, Neo-Europeans have made gargantuan efforts to exterminate them. If they have thrived in the Neo-Europes, then the forces encouraging the success of Old World creatures in the colonies must be truly powerful.

The common rat of Europe is really two rats: the black and the brown, the former smaller and the better climber,

and the latter larger, fiercer, and a better burrower. The rat mentioned in colonial sources is probably the former (often called the ship rat) most of the time, but the chronicles speak only of "rat." Either animal or both will do for our purposes, so we shall use the single word for both. To make matters more confusing, the colonial Spanish often used the same word for mice and rats.

Rats shipped as stowaways with the Iberians everywhere they went in America, but the accounts of the *conquistadores* omit mention of them. We do, however, know a little about their early years on the Pacific coast of South America, thanks (as with weeds) to Bernabé Cobo and Garcilaso de la Vega. There were several indigenous species of rodents in Peru and Chile, but none equal to the immigrant rats in adapting to the ways of European civilization. It was the latter, in all likelihood, that were the protagonists in the three plagues of rats (and of mice, too) that swept Peru between the arrival of Pizarro and 1572. "They bred in infinite numbers," said Garcilaso de la Vega, "overran the land, and destroyed the crops and standing plants, such as fruit trees, by gnawing the bark from the ground to the shoots." Afterward they remained in such numbers on the coast "that no cat dare look them in the face."[74] Rats and/or mice (possibly indigenous, probably imported) afflicted Buenos Aires almost from its first beginnings as a viable settlement, swarming among the grapevines and the wheat. The colonists called upon Saint Simon and Saint Jude for divine intervention and sang masses pleading for mercy. Two hundred years later, at the beginning of the nineteenth century, the rats were so numerous that at night people stumbled over them in the streets: "Every house swarms with them, and graneries are dreadfully taxed. Indeed, the increase in that species seems to have kept pace with the cattle in those regions."[75]

Immigrant rats almost extinguished Jamestown, Virginia. In 1609, when the colony was barely two years old,

the settlers found that their stores of food had been consumed by "the many thousands of rats" from the English ships. The settlers were reduced to dependence on their own meager skills as hunters, fishermen, and farmers for nourishment, and to dependence on Amerindian generosity.[76] At about the same time, the French at Port Royal, Nova Scotia, were also doing battle with multitudes of rats that they, too, must have inadvertently introduced. The Amerindians nearby were victims as well, beset with this entirely new kind of four-legged varmint that had come "to eat or suck their fish oils."[77]

The story was much the same in the early days of Sydney. In 1790, rats (conceivably native marsupials, but almost certainly rodents the settlers had brought with them) overran the food stores and the gardens as well. The governor estimated that they were the cause of the loss of "more than 12,000 weight" of flour and rice.[78] And the rats continued to arrive. Early in the nineteenth century, a Tasmanian newspaper grimly announced that "the number of rats leaving the convict ship now tied up in the Bay has to be seen to be believed."[79] Today, Old World rats infest Australia's ports and waterways and have even left the immediate vicinity of humanity to go wild in the bush, reverting to a way of life they have practiced little in thousands of years.[80]

Neo-Europeans did not purposely introduce rats, and they have spent millions and millions of pounds, dollars, pesos, and other currencies to halt their spread – usually in vain. The same is true for several other varmints in the Neo-Europes – rabbits, for instance. This seems to indicate that the humans were seldom masters of the biological changes they triggered in the Neo-Europes. They benefited from the great majority of these changes, but benefit or not, their role often was less a matter of judgment and choice than of being downstream of a bursting dam.

Were there animals from the Neo-Europes that swarmed over Europe and the Old World? Was the exchange anything like even? The answer, which the reader must be expecting by this time, is no. The American turkey did go to the Old World, but it did not go wild there and has not swarmed like locusts over the face of Africa or Eurasia. In much of Great Britain the relatively large and aggressive North American gray squirrel has replaced the Old World red squirrel, decimated early in this century by an unknown epidemic disease. And the American muskrat, first released in Bohemia in 1905, has spread widely since, helped along by other ill-advised introductions. By 1960 its range extended from Finland and Germany to the headwaters of several of the tributaries of the Ob River far to the east.[81] Still and all, nothing has happened in the Old World approaching the deluge of Old World domesticated animals gone feral in the Neo-Europes. The exchange of animals, tame or feral or wild, between the Old World and New World has been as one-sided as the exchange of weeds, and Australasia seems to have contributed nothing of importance to Europe in this category. As with weeds, the reasons why will be discussed in Chapter 11.

There is an old American folksong of the frontier in which a certain Sweet Betsy from Pike County, Missouri, crosses the mountains, presumably the Rockies or Sierras, "with her lover, Ike, with two yoke of oxen, a large yellow dog, a tall shanghai rooster, and one spotted hog."[82] Betsy was heir to a very old tradition of mixed farming, and whereas it must be pointed out that her oxen were castrated and the other animals without mates, Betsy's party was not the only one to cross the mountains; wagon trains had bulls and cows, plus hens and dogs and pigs of genders opposite to those of her animals. (Betsy herself had the foresight to

bring Ike.) Rapid propagation of the colonizing species would be the rule on the far side of the mountains. Betsy came not as an individual immigrant but as part of a grunting, lowing, neighing, crowing, chirping, snarling, buzzing, self-replicating and world-altering avalanche.

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THE COLONY OF A CIVILIZED NATION which takes possession, either of waste country, or of one so thinly inhabited, that the natives easily give place to the new settlers, advances more rapidly to wealth and greatness than any other human society.
—Adam Smith, *An Inquiry into the Nature and Causes of the Wealth of Nations* (1776)