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The Flood

PRIOR TO THE COGNITIVE REVOLUTION, humans of all species lived exclusively on the Afro-Asian landmass. True, they had settled a few islands by swimming short stretches of water or crossing them on improvised rafts. Flores, for example, was colonised as far back as 850,000 years ago. Yet they were unable to venture into the open sea, and none reached America, Australia, or remote islands such as Madagascar, New Zealand and Hawaii.

The sea barrier prevented not just humans but also many other Afro-Asian animals and plants from reaching this 'Outer World'. As a result, the organisms of distant lands like Australia and Madagascar evolved in isolation for millions upon millions of years, taking on shapes and natures very different from those of their distant Afro-Asian relatives. Planet Earth was separated into several distinct ecosystems, each made up of a unique assembly of animals and plants. *Homo sapiens* was about to put an end to this biological exuberance.

Following the Cognitive Revolution, Sapiens acquired the technology, the organisational skills, and perhaps even the vision necessary to break out of Afro-Asia and settle the Outer World. Their first achievement was the colonisation of Australia some 45,000 years ago. Experts are hard-pressed to explain this feat. In order to reach Australia, humans had to cross a number of sea channels, some more than 60 miles wide, and upon arrival they had to adapt nearly overnight to a completely new ecosystem.

The most reasonable theory suggests that, about 45,000 years ago, the Sapiens living in the Indonesian archipelago (a group of islands separated from Asia and from each other by only narrow straits)

developed the first seafaring societies. They learned how to build and manoeuvre ocean-going vessels and became long-distance fishermen, traders and explorers. This would have brought about an unprecedented transformation in human capabilities and lifestyles. Every other mammal that went to sea – seals, sea cows, dolphins – had to evolve for aeons to develop specialised organs and a hydrodynamic body. The Sapiens in Indonesia, descendants of apes who lived on the African savannah, became Pacific seafarers without growing flippers and without having to wait for their noses to migrate to the top of their heads as whales did. Instead, they built boats and learned how to steer them. And these skills enabled them to reach and settle Australia.

True, archaeologists have yet to unearth rafts, oars or fishing villages that date back as far as 45,000 years ago (they would be difficult to discover, because rising sea levels have buried the ancient Indonesian shoreline under 300 feet of ocean). Nevertheless, there is strong circumstantial evidence to support this theory, especially the fact that in the thousands of years following the settlement of Australia, Sapiens colonised a large number of small and isolated islands to its north. Some, such as Buka and Manus, were separated from the closest land by 120 miles of open water. It's hard to believe that anyone could have reached and colonised Manus without sophisticated vessels and sailing skills. As mentioned earlier, there is also firm evidence for regular sea trade between some of these islands, such as New Ireland and New Britain.¹

The journey of the first humans to Australia is one of the most important events in history, at least as important as Columbus' journey to America or the *Apollo 11* expedition to the moon. It was the first time any human had managed to leave the Afro-Asian ecological system – indeed, the first time any large terrestrial mammal had managed to cross from Afro-Asia to Australia. Of even greater importance was what the human pioneers did in this new world. The moment the first hunter-gatherer set foot on an Australian beach was the moment that *Homo sapiens* climbed to the top rung in the food chain, and became the deadliest species ever in the four-billion-year history of life on Earth.

Up until then humans had displayed some innovative adaptations

and behaviours, but their effect on their environment had been negligible. They had demonstrated remarkable success in moving into and adjusting to various habitats, but they did so without drastically changing those habitats. The settlers of Australia, or more accurately, its conquerors, didn't just adapt. They transformed the Australian ecosystem beyond recognition.

The first human footprint on a sandy Australian beach was immediately washed away by the waves. Yet when the invaders advanced inland, they left behind a different footprint, one that would never be expunged. As they pushed on, they encountered a strange universe of unknown creatures that included a 450-pound, six-foot kangaroo, and a marsupial lion, as massive as a modern tiger, that was the continent's largest predator. Koalas far too big to be cuddly and cute rustled in the trees and flightless birds twice the size of ostriches sprinted on the plains. Dragon-like lizards and snakes seven feet long slithered through the undergrowth. The giant diprotodon, a two-and-a-half-ton wombat, roamed the forests. Except for the birds and reptiles, all these animals were marsupials – like kangaroos, they gave birth to tiny, helpless, fetus-like young which they then nurtured with milk in abdominal pouches. Marsupial mammals were almost unknown in Africa and Asia, but in Australia they reigned supreme.

Within a few thousand years, virtually all of these giants vanished. Of the twenty-four Australian animal species weighing 100 pounds or more, twenty-three became extinct.² A large number of smaller species also disappeared. Food chains throughout the entire Australian ecosystem were broken and rearranged. It was the most important transformation of the Australian ecosystem for millions of years. Was it all the fault of *Homo sapiens*?

Guilty as Charged

Some scholars try to exonerate our species, placing the blame on the vagaries of the climate (the usual scapegoat in such cases). Yet it is hard to believe that *Homo sapiens* was completely innocent. There are three pieces of evidence that weaken the climate alibi, and

implicate our ancestors in the extinction of the Australian megafauna.

Firstly, even though Australia's climate changed some 45,000 years ago, it wasn't a very remarkable upheaval. It's hard to see how the new weather patterns alone could have caused such a massive extinction. It's common today to explain anything and everything as the result of climate change, but the truth is that earth's climate never rests. It is in constant flux. Every event in history occurred against the background of some climate change.

In particular, our planet has experienced numerous cycles of cooling and warming. During the last million years, there has been an ice age on average every 100,000 years. The last one ran from about 75,000 to 15,000 years ago. Not unusually severe for an ice age, it had twin peaks, the first about 70,000 years ago and the second at about 20,000 years ago. The giant diprotodon appeared in Australia more than 1.5 million years ago and successfully weathered at least ten previous ice ages. It also survived the first peak of the last ice age, around 70,000 years ago. Why, then, did it disappear 45,000 years ago? Of course, if diprotodons had been the only large animal to disappear at this time, it might have been just a fluke. But more than 90 per cent of Australia's megafauna disappeared along with the diprotodon. The evidence is circumstantial, but it's hard to imagine that Sapiens, just by coincidence, arrived in Australia at the precise point that all these animals were dropping dead of the chills.³

Secondly, when climate change causes mass extinctions, sea creatures are usually hit as hard as land dwellers. Yet there is no evidence of any significant disappearance of oceanic fauna 45,000 years ago. Human involvement can easily explain why the wave of extinction obliterated the terrestrial megafauna of Australia while sparing that of the nearby oceans. Despite its burgeoning navigational abilities, *Homo sapiens* was still overwhelmingly a terrestrial menace.

Thirdly, mass extinctions akin to the archetypal Australian decimation occurred again and again in the ensuing millennia – whenever people settled another part of the Outer World. In these cases Sapiens guilt is irrefutable. For example, the megafauna of New Zealand – which had weathered the alleged 'climate change' of c.45,000 years ago without a scratch – suffered devastating blows immediately after the first humans set foot on the islands. The Maoris,

New Zealand's first Sapiens colonisers, reached the islands about 800 years ago. Within a couple of centuries, the majority of the local megafauna was extinct, along with 60 per cent of all bird species.

A similar fate befell the mammoth population of Wrangel Island in the Arctic Ocean (125 miles north of the Siberian coast). Mammoths had flourished for millions of years over most of the northern hemisphere, but as *Homo sapiens* spread – first over Eurasia and then over North America – the mammoths retreated. By 10,000 years ago there was not a single mammoth to be found in the world, except on a few remote Arctic islands, most conspicuously Wrangel. The mammoths of Wrangel continued to prosper for a few more millennia, then suddenly disappeared about 4,000 years ago, just when the first humans reached the island.

Were the Australian extinction an isolated event, we could grant humans the benefit of the doubt. But the historical record makes *Homo sapiens* look like an ecological serial killer.

All the settlers of Australia had at their disposal was Stone Age technology. How could they cause an ecological disaster? There are three explanations that mesh quite nicely.

Large animals – the primary victims of the Australian extinction – breed slowly. Pregnancy is long, offspring per pregnancy are few, and there are long breaks between pregnancies. Consequently, if humans cut down even one diprotodon every few months, it would be enough to cause diprotodon deaths to outnumber births. Within a few thousand years the last, lonesome diprotodon would pass away, and with her the entire species.⁴

In fact, for all their size, diprotodons and Australia's other giants probably wouldn't have been that hard to hunt because they would have been taken totally by surprise by their two-legged assailants. Various human species had been prowling and evolving in Afro-Asia for 2 million years. They slowly honed their hunting skills, and began going after large animals around 400,000 years ago. The big beasts of Africa and Asia learned to avoid humans, so when the new mega-predator – *Homo sapiens* – appeared on the Afro-Asian scene, the large animals already knew to keep their distance from creatures that looked like it. In contrast, the Australian giants had no time to

learn to run away. Humans don't come across as particularly dangerous. They don't have long, sharp teeth or muscular, lithe bodies. So when a diprotodon, the largest marsupial ever to walk the earth, set eyes for the first time on this frail-looking ape, he probably gave it one glance and then went back to chewing leaves. These animals had to evolve a fear of humankind, but before they could do so they were gone.

The second explanation is that by the time Sapiens reached Australia, they had already mastered fire agriculture. Faced with an alien and threatening environment, it seems that they deliberately burned vast areas of impassable thickets and dense forests to create open grasslands, which attracted more easily hunted game, and were better suited to their needs. They thereby completely changed the ecology of large parts of Australia within a few short millennia.

One body of evidence supporting this view is the fossil plant record. Eucalyptus trees were rare in Australia 45,000 years ago. But the arrival of *Homo sapiens* inaugurated a golden age for the species. Since eucalyptuses regenerate after fire particularly well, they spread far and wide while other trees and shrubs disappeared.

These changes in vegetation influenced the animals that ate the plants and the carnivores that ate the vegetarians. Koalas, which subsist exclusively on eucalyptus leaves, happily munched their way into new territories. Most other animals suffered greatly. Many Australian food chains collapsed, driving the weakest links into extinction.⁵

A third explanation agrees that hunting and fire agriculture played a significant role in the extinction, but emphasises that we can't completely ignore the role of climate. The climate changes that beset Australia about 45,000 years ago destabilised the ecosystem and made it particularly vulnerable. Under normal circumstances the system would probably have recuperated, as had happened many times previously. However, humans appeared on the stage at just this critical juncture and pushed the brittle ecosystem into the abyss. The combination of climate change and human hunting is particularly devastating for large animals, since it attacks them from different angles. It is hard to find a good survival strategy that will work simultaneously against multiple threats.

Without further evidence, there's no way of deciding between the

three scenarios. But there are certainly good reasons to believe that if *Homo sapiens* had never gone Down Under, it would still be home to marsupial lions, diprotodons and giant kangaroos.

The End of Sloth

The extinction of the Australian megafauna was probably the first significant mark *Homo sapiens* left on our planet. It was followed by an even larger ecological disaster, this time in America. *Homo sapiens* was the first and only human species to reach the western hemisphere landmass, arriving about 16,000 years ago, that is in or around 14,000 BC. The first Americans arrived on foot, which they could do because, at the time, sea levels were low enough that a land bridge connected north-eastern Siberia with north-western Alaska. Not that it was easy – the journey was an arduous one, perhaps harder than the sea passage to Australia. To make the crossing, Sapiens first had to learn how to withstand the extreme Arctic conditions of northern Siberia, an area on which the sun never shines in winter, and where temperatures can drop to minus sixty degrees Fahrenheit.

No previous human species had managed to penetrate places like northern Siberia. Even the cold-adapted Neanderthals restricted themselves to relatively warmer regions further south. But *Homo sapiens*, whose body was adapted to living in the African savannah rather than in the lands of snow and ice, devised ingenious solutions. When roaming bands of Sapiens foragers migrated into colder climates, they learned to make snowshoes and effective thermal clothing composed of layers of furs and skins, sewn together tightly with the help of needles. They developed new weapons and sophisticated hunting techniques that enabled them to track and kill mammoths and the other big game of the far north. As their thermal clothing and hunting techniques improved, Sapiens dared to venture deeper and deeper into the frozen regions. And as they moved north, their clothes, hunting strategies and other survival skills continued to improve.

But why did they bother? Why banish oneself to Siberia by choice? Perhaps some bands were driven north by wars, demographic

pressures or natural disasters. Others might have been lured northwards by more positive reasons, such as animal protein. The Arctic lands were full of large, juicy animals such as reindeer and mammoths. Every mammoth was a source of a vast quantity of meat (which, given the frosty temperatures, could even be frozen for later use), tasty fat, warm fur and valuable ivory. As the findings from Sungir testify, mammoth-hunters did not just survive in the frozen north – they thrived. As time passed, the bands spread far and wide, pursuing mammoths, mastodons, rhinoceroses and reindeer. Around 14,000 BC, the chase took some of them from north-eastern Siberia to Alaska. Of course, they didn't know they were discovering a new world. For mammoth and man alike, Alaska was a mere extension of Siberia.

At first, glaciers blocked the way from Alaska to the rest of America, though some pioneers might have bypassed these obstacles by sailing along the coast. Around 12,000 BC global warming melted the ice and opened an easier passage. Making use of the new corridor, people moved south en masse, spreading over the entire continent. Though originally adapted to hunting large game in the Arctic, they soon adjusted to an amazing variety of climates and ecosystems. Descendants of the Siberians settled the thick forests of the eastern United States, the swamps of the Mississippi Delta, the deserts of Mexico and steaming jungles of Central America. Some made their homes in the river world of the Amazon basin, others struck roots in Andean mountain valleys or the open pampas of Argentina. And all this happened in a mere millennium or two! By 10,000 BC, humans already inhabited the most southern point in America, the island of Tierra del Fuego at the continent's southern tip. The human blitzkrieg across America testifies to the incomparable ingenuity and the unsurpassed adaptability of *Homo sapiens*. No other animal had ever moved into such a huge variety of radically different habitats so quickly, everywhere using virtually the same genes.⁶

The settling of America was hardly bloodless. It left behind a long trail of victims. American fauna 14,000 years ago was far richer than it is today. When the first Americans marched south from Alaska into the plains of Canada and the western United States,

they encountered mammoths and mastodons, rodents the size of bears, herds of horses and camels, oversized lions and dozens of large species the likes of which are completely unknown today, among them fearsome sabre-tooth cats and giant ground sloths that weighed up to eight tons and reached a height of twenty feet. South America hosted an even more exotic menagerie of large mammals, reptiles and birds. The Americas were a great laboratory of evolutionary experimentation, a place where animals and plants unknown in Africa and Asia had evolved and thrived.

But no longer. Within 2,000 years of the Sapiens arrival, most of these unique species were gone. According to current estimates, within that short interval, North America lost thirty-four out of its forty-seven genera of large mammals. South America lost fifty out of sixty. The sabre-tooth cats, after flourishing for more than 30 million years, disappeared, and so did the giant ground sloths, the oversized lions, native American horses, native American camels, the giant rodents and the mammoths. Thousands of species of smaller mammals, reptiles, birds, and even insects and parasites also became extinct (when the mammoths died out, all species of mammoth ticks followed them to oblivion).

For decades, palaeontologists and zooarchaeologists – people who search for and study animal remains – have been combing the plains and mountains of the Americas in search of the fossilised bones of ancient camels and the petrified faeces of giant ground sloths. When they find what they seek, the treasures are carefully packed up and sent to laboratories, where every bone and every coprolite (the technical name for fossilised turds) is meticulously studied and dated. Time and again, these analyses yield the same results: the freshest dung balls and the most recent camel bones date to the period when humans flooded America, that is, between approximately 12,000 and 9000 BC. Only in one area have scientists discovered younger dung balls: on several Caribbean islands, in particular Cuba and Hispaniola, they found petrified ground-sloth scat dating to about 5000 BC. This is exactly the time when the first humans managed to cross the Caribbean Sea and settle these two large islands.

Again, some scholars try to exonerate *Homo sapiens* and blame climate change (which requires them to posit that, for some mysterious

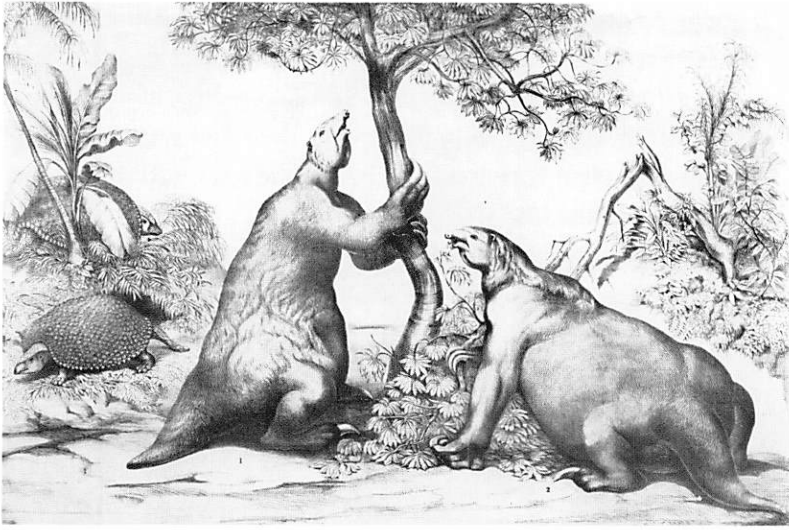
reason, the climate in the Caribbean islands remained static for 7,000 years while the rest of the western hemisphere warmed). But in America, the dung ball cannot be dodged. We are the culprits. There is no way around that truth. Even if climate change abetted us, the human contribution was decisive.⁷

Noah's Ark

If we combine the mass extinctions in Australia and America, and add the smaller-scale extinctions that took place as *Homo sapiens* spread over Afro-Asia – such as the extinction of all other human species – and the extinctions that occurred when ancient foragers settled remote islands such as Cuba, the inevitable conclusion is that the first wave of Sapiens colonisation was one of the biggest and swiftest ecological disasters to befall the animal kingdom. Hardest hit were the large furry creatures. At the time of the Cognitive Revolution, the planet was home to about 200 genera of large terrestrial mammals weighing over 100 pounds. At the time of the Agricultural Revolution, only about a hundred remained. *Homo sapiens* drove to extinction about half of the planet's big beasts long before humans invented the wheel, writing, or iron tools.

This ecological tragedy was restaged in miniature countless times after the Agricultural Revolution. The archaeological record of island after island tells the same sad story. The tragedy opens with a scene showing a rich and varied population of large animals, without any trace of humans. In scene two, Sapiens appear, evidenced by a human bone, a spear point, or perhaps a potsherd. Scene three quickly follows, in which men and women occupy centre stage and most large animals, along with many smaller ones, are gone.

The large island of Madagascar, about 250 miles east of the African mainland, offers a famous example. Through millions of years of isolation, a unique collection of animals evolved there. These included the elephant bird, a flightless creature ten feet tall and weighing almost half a ton – the largest bird in the world – and the giant lemurs, the globe's largest primates. The elephant birds and the giant lemurs, along with most of the other large animals of



10. Reconstructions of two giant ground sloths (*Megatherium*) and behind them two giant armadillos (*Glyptodon*). Now extinct, giant armadillos measured over ten feet in length and weighed up to two tons, whereas giant ground sloths reached heights of up to twenty feet, and weighed up to eight tons.

Madagascar, suddenly vanished about 1,500 years ago – precisely when the first humans set foot on the island.

In the Pacific Ocean, the main wave of extinction began in about 1500 BC, when Polynesian farmers settled the Solomon Islands, Fiji and New Caledonia. They killed off, directly or indirectly, hundreds of species of birds, insects, snails and other local inhabitants. From there, the wave of extinction moved gradually to the east, the south and the north, into the heart of the Pacific Ocean, obliterating on its way the unique fauna of Samoa and Tonga (1200 BC); the Marquis Islands (AD 1); Easter Island, the Cook Islands and Hawaii (AD 500); and finally New Zealand (AD 1200).

Similar ecological disasters occurred on almost every one of the thousands of islands that pepper the Atlantic Ocean, Indian Ocean, Arctic Ocean and Mediterranean Sea. Archaeologists have discovered on even the tiniest islands evidence of the existence of birds, insects and snails that lived there for countless generations, only to vanish when the first human farmers arrived. None but a few

extremely remote islands escaped man's notice until the modern age, and these islands kept their fauna intact. The Galapagos Islands, to give one famous example, remained uninhabited by humans until the nineteenth century, thus preserving their unique menagerie, including their giant tortoises, which, like the ancient diprotodons, show no fear of humans.

The First Wave Extinction, which accompanied the spread of the foragers, was followed by the Second Wave Extinction, which accompanied the spread of the farmers, and gives us an important perspective on the Third Wave Extinction, which industrial activity is causing today. Don't believe tree-huggers who claim that our ancestors lived in harmony with nature. Long before the Industrial Revolution, *Homo sapiens* held the record among all organisms for driving the most plant and animal species to their extinctions. We have the dubious distinction of being the deadliest species in the annals of biology.

Perhaps if more people were aware of the First Wave and Second Wave extinctions, they'd be less nonchalant about the Third Wave they are part of. If we knew how many species we've already eradicated, we might be more motivated to protect those that still survive. This is especially relevant to the large animals of the oceans. Unlike their terrestrial counterparts, the large sea animals suffered relatively little from the Cognitive and Agricultural Revolutions. But many of them are on the brink of extinction now as a result of industrial pollution and human overuse of oceanic resources. If things continue at the present pace, it is likely that whales, sharks, tuna and dolphins will follow the diprotodons, ground sloths and mammoths to oblivion. Among all the world's large creatures, the only survivors of the human flood will be humans themselves, and the farmyard animals that serve as galley slaves in Noah's Ark.