# PLANTS AND ANIMALS IN HUMAN HISTORY*

THE Industrial Revolution has changed the life of this country very completely, but two other revolutions in the past were equally important—the domestication of animals and that of plants. Each made as great a change in human society as did the harnessing of steam power. When we look back at the past we are apt to think that when most of the people lived on the land as farmers or in close connection with the farm they were leading a natural life. That is nonsense. A farm is as unnatural as a motor-'bus or a blast furnace. If England were left to itself it would be covered with forests, moors and marshes. The farmer works on ground which has been cleared of trees or drained. He spends his time looking after most unnatural plants, such as wheat and potatoes, which would not stand a chance in competition with weeds, if men were not there to protect them ; or unnatural animals like cows, which produce far more milk than their children need.

Agriculture is a very recent invention. For hundreds of thousands of years man had been a hunter like the men of the old Stone Age who hunted the wild horse and the mammoth, or a food gatherer like those other Stone Age men who left great mounds of oyster and mussel shells on the coast of Denmark.

The first animal to be domesticated was almost certainly the dog. This happened about the end of the old Stone Age. Probably the dog was at first a scavenger, and later made himself useful as a watcher at night and a helper in hunting, and delightful as a pet. But he has been part of human society for much longer than any other of our animals, which is probably one reason why we understand him, and he us, so much better than any of them.

Though the dog was very useful to man, he did not revolutionise human life. But one day a hunter thought of keeping some wild animals alive. Perhaps at first they were just tied up for a few days and then killed, or perhaps a herd of cattle was followed about and protected from wolves. Some people think that young animals were first kept as pets. But a time came when a family or a tribe had so many domestic animals that they could give up hunting and live on the meat of their flocks.

## SHEPHERDS V. HUNTERS

This meant an enormous change. The same area of land could support far more people, so the shepherds crowded the hunters out. Of course

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there were fights, like the fights which occurred in North America and Australia between European settlers and native hunters who thought that any animal was fair game. But in the long run the pastoral peoples occupied those areas which were most suited to them. Now a hunter can own little except his weapons and a few skins. But cattle and sheep are a form of wealth which multiplies itself. The man who first owned a herd was the first rich man. He could hire a poorer man to look after his animals. If you want a picture of this sort of society, read the book of Genesis, and especially the story of how Jacob served Laban. You will find the beginnings of capitalism and the division of society into property owners and hired workers.

Not only did human society change, but the animals too. They got tamer, perhaps because the wilder ones ran away. They became more fertile and fatter, especially when men began selective breeding. At first they were only used for meat and skin, but later for milk and wool, for carrying burdens and ultimately for pulling wagons. Most of these old shepherds were nomads, driving their flocks from one pasture to another. The day on which some great genius induced an animal to carry his pack was an important day in human history. It meant that many new forms of wealth could be accumulated. Tents and pottery, and even changes of clothing, could be carried.

The second revolution came later, at least in Europe and Asia, when men began to protect certain plants as they protected animals. One of the oddest facts about man is his dependence on a quite small group of plants. There are 332 different families of flowering plants, such as the *Rosaceae*, like the rose and apple, and the *Compositae*, like the daisy and thistle. But one family, the *Gramineae*, or grass family, is of more importance to us than all the others put together. It includes the cereals, such as wheat, oats, barley, rice and maize, the grasses, and the giant tropical bamboos and sugar canes. If we eat bread we live on grasses at first hand. If we drink milk, or eat cheese, butter, beef or mutton, we live on them at second hand.

### IF THERE WERE NO GRASS?

If a plague wiped out the grasses, most of the human race would die. If all other plants perished, we should have no fruit, no flowers, no potatoes, no wood. But some kind of civilisation would be quite possible.

We do not know just how or when plants were domesticated, but we do know where, and we are fairly sure that it happened within the last eight or ten thousand years. Let me explain how people traced back the origin of agriculture. You probably know that maize and potatoes both came from America. Now in the Old World there are only a few sorts of maize and potatoes, and in America there are a great many different sorts, and also wild plants which are so nearly related to them that they can be got

to breed with them. So if we did not know where maize and potatoes came from, we could easily find out.

The Russian botanist, Vavilov, applied this principle in the Old World. He noticed that there are sixty different sub-species of bread wheat in Afghanistan and only twenty in the whole of Europe, so he concluded that bread wheat originated in, or near, Afghanistan, while on the other hand macaroni wheat originated somewhere near the Eastern Mediterranean. Most of our cultivated plants originated in mountainous areas. For example, many of our barleys and meadow grasses came from Abyssinia, potatoes from the Andes, cherries from Armenia, and so on.

Now when a plant like wheat is domesticated it changes very quickly. Suppose you have two wheat plants growing side by side, and one produces a hundred seeds, the other only fifty, perhaps because it uses up more of the sugar which it makes in its leaves to grow a good set of roots. Further, suppose the difference between these two plants is inherited. The seeds from thousands of wheat plants are gathered. Some are made into bread, some sown to give a crop next year. The plant with a hundred seeds will probably contribute twice as much to the next generation as the plant with fifty. So in a few years the more fertile sort will quite oust the less fertile. It will probably be a worse plant in other ways. If its roots are shorter it will be less able to stand drought, and so on. But you see how, without any conscious selection, wheat and other similar plants became more economically valuable, and also came to need much more care. Now just as animal husbandry enables a square mile to support more men than hunting, so agriculture gives a denser population than animal breeding, and also a more settled one. After a time agriculture came down from the mountain valleys into the basins of great rivers, the Nile, the Euphrates and the Indus, and there for the first time men began to live a life which we should call civilised.

But there was an inevitable conflict between the men who lived mainly on vegetables and those who kept flocks. In the fourth chapter of the book of Genesis you can read that Abel was a keeper of sheep and Cain a tiller of the ground. There is little doubt that the story of their quarrel symbolises the struggle which was always going on between the keepers of sheep and the tillers of the soil on the borders of Mesopotamia, and does to this day. The sheep will trample down the corn. The agriculturists will plough up land which the shepherds had used for grazing their flocks. No wonder a little further on in the book of Genesis we read that 'every shepherd is an abomination to the Egyptians'. It took thousands of years before the shepherds and the tillers of the soil, the imitators of Abel and Cain, could live in peace together. And it was only in the eighteenth century, when men learned to feed sheep on root crops during the winter, that they really began to co-operate fruitfully.

## A SOCIETY WITH NO DOMESTIC ANIMALS

What I have just told you is true for the Old World, but things were very different in America. There then were very few domesticable animals, and men went straight from hunting to agriculture. The bison was too big, and perhaps too fierce, to tame, and the Ilama was a very poor substitute for the sheep and horse. If you read about the civilisations of Mexico, such as the Aztec empire, you will be struck by their extraordinary cruelty. Thousands of men and women were sacrificed in the most horrible way to their gods. Some people have thought that they must have been a naturally cruel race. I don't believe it. Try to imagine a society, not only without machinery, but without horse, oxen, or any other animals to carry or pull heavy loads; with man as the one source of power. In such a society men will be treated as animals. At one time or another most peoples have thought that their gods needed human sacrifices. But where domestic animals were available instead, they started sacrificing them, as you may read in the story of Abraham and Isaac. In Mexico they had this idea of the necessity of a bloody sacrifice, but no animals to take the place of men and women as victims.

There is one domestic plant which I have not yet mentioned—a plant too small to see without a microscope, namely yeast. There are many different kinds of yeast. Some kinds make bubbles when added to dough, so that it bakes into bread instead of a sort of biscuit. Some cause sugar to ferment into alcohol, and thus make beer and wine. The different sorts are carefully grown for their jobs. A bread yeast will no more make good beer than a carthorse will win the Derby. There is no doubt that the bread-making yeasts are friends of man, but many people think that the kinds which make alcohol are among our enemies.

## ENEMIES OF MAN

Now I am going to say a few words about the plants and animals which are certainly our enemies. I shall not trouble with lions, tigers and wolves, or even with poisonous snakes. They are quite unimportant compared with the microscopic plants and animals which cause infectious diseases, and the insects which carry them from one person to another.

It is hard to say just how much history these little enemies of man have made, because their deeds are not carefully recorded. But they make the historians' accounts of war look pretty silly. I think it is fair to say that in the large majority of wars until quite recently, most of the soldiers were killed, not by other men, but by microbes. For example the various armies fighting against the Russians in the Crimean War lost 70,000 men in battle and 182,000 from disease.

Sometimes a disease defends a country. For example, although the British have conquered a good deal of West Africa, they have never colonised it. And one of its chief defenders is the mosquito transmitting yellow fever, which is deadly to white men, but not to negroes. Quite as often the disease

helps the invaders. A good many of the Red Indians in Canada and the United States were killed by white men, but far more by small-pox. The gentle Polynesians in the Pacific Islands were largely killed by measles. One quarter of the inhabitants of Fiji died of that disease in three months in 1875. Their ancestors had never had measles, so they had developed no protection against it. If either the Red Indians or the Polynesians had possessed an ally like yellow-fever, the history of North America and the Pacific might have been very different.

Yellow fever is carried by a mosquito which sucks in the parasite when it bites a patient, and then infects people whom it bites later on. A number of less deadly diseases, such as malaria, are transmitted in the same way. So we can prevent yellow fever by abolishing mosquitoes. This can be done by draining stagnant water, where they breed, and also by using a rather curious ally, a little fish which eats the mosquito larvae. One or two of these fish are put in every water tank in many towns in Central and South America, and they have been free of yellow fever ever since.

You may ask what that has to do with history? A great deal. In 1880 a company managed by the great French engineer, de Lesseps, who had designed the Suez Canal, started to make a canal across the Isthmus of Panama. They were beaten, very largely by yellow fever. The present canal was made by the American Government, but not until American doctors had discovered the mosquito that carries yellow fever, and wiped it out. Instead of being international or French, the canal belongs to the United States Government, and this fact has a very important bearing on international trade, and may have a decisive influence on a future naval war.

I haven't said anything about the silk-worm, one of our queerest domestic animals, or about the great caravan routes across Asia by which Chinese silks were brought to Europe, until two Persian monks smuggled some silk-worm eggs out of China to Constantinople in a hollow cane. For when trade is difficult, rare animal and plant products play a very important part in it. The Portuguese who discovered the passage to India round the Cape of Good Hope were largely after pepper. Canada was explored in the search for furs. Trading posts were opened on the coasts of West and Central Africa because of the value of ivory, which, of course, is made from elephants' tusks. But all that is part of the romantic side of history. I want you to think more of the practical everyday side, to realise that the kind of civilisation possible in any country, besides depending on the sort of men, who live in it, depends also on the sorts of plants and animals, not only visible, but microscopic. If we can realise how a great invention like agriculture changed history, it will help us to understand the changes which are taking place today through the adoption of machinery. A factory worker minding a machine is as different from a handicraftsman—a better man in some ways and a worse in others—as a shepherd from a hunter. When the form of production changes, the whole structure of society changes with it. Our society is changing. That is why politics are so interesting. If we remember the tragedy of Cain and Abel, and learn from it, we may be able to make the necessary changes without shedding our brothers' blood.