

CHAPTER ONE

THE FERAL WORLD

ADAPTATION of living organisms to their environment and problems of survival remain the basic facts of existence. The vaunted 'balance of Nature' of the past and the ecological dilemmas of the future perennially preoccupy Mankind. Since first consciousness, man has presumed to control his environment by reason and not by instinct only.

'The Wonders of Nature' were perpetually fascinating both in themselves and for their utilitarian purposes. In time, the rich travelled to see them or sent emissaries abroad to make pictures and to collect samples. Study of the 'Natural Sciences' flourished. Some of their proponents became the pet creatures of plutocrats a few of whom endowed investigative centres on their own properties and paid scholars to conduct them.

When navigators found routes to new areas, the quest accelerated and travellers, hunters, traders and mere adventurers joined the dedicated botanists, zoologists and biologists in investigating the feral world. They reported many things (notably the failure of man and beast to control natural forces) and many strange and inexplicable occurrences like the mass suicide of whales and lemmings, the huge areas of land uninhabited by humans or animals because of flies, sudden pestilences and rampaging plagues, mass migrations of men and animals destroying all before them, and other 'wonders' that had no reason.

Man had his place in the feral world. He might be a pastoral itinerant, moving his flocks or herds or troops of horses or yaks to better grazing when he had denuded an area or droughts or floods had done it for him. Or he might be a forest agriculturist, burning a patch of open loam-rich soil among the bush and trees and planting his maize and pumpkins and cassava, living only so long in the area as it reached exhaustion and the barren soil was eroded by wind and rain – for the benefit of the delta-dwellers where some great rivers took it. Or he might be a hunter depending on the habits of wild animals or of fish in the rivers and sea. Feral man exploited his environment. There was so much of it. When calamity came, he died – if he could not move off quickly enough.

In gradually-evolving societies, there was often nowhere to move and it became imperative to control natural forces – to engage in communal action and concerted works. Uncontrolled exploitation at all times leads to disaster. The 'balance of Nature' fails to assert itself since Man himself seems no part of it. Deserts and desolation ensue on his negligence. Accordingly, from earliest recorded times, he resorted to devices and joint action, principally in agriculture – tillage and irrigation, fertilising and rotation of crops, selective breeding and culling and later, the first agricultural societies for common cause and encouragement. But banging drums and lighting fires seldom diverted a locust swarm nor incantations a murrain upon cattle. Nothing stopped the ghastly pandemics of Cholera, Smallpox and 'the Black Death' (Bubonic Plague) or the 'Cattle Plague' (Rinderpest) which periodically swept from East to West.

Old wives' tales and specifics sometimes helped. When Paul Kruger shot away his thumb and developed gangrene after applying first turpentine and then sugar, friends tied the steaming stomach of a freshly killed goat around the stump. Impregnated with herbs, it had healing properties. Much such lore of the East was unknown elsewhere till travellers brought it home. For untold centuries, successful prophylaxis against Smallpox was practised beyond the Mediterranean while Europe suffered periodic epidemics. Immunology was virtually unknown and thousands died until the wife of a British diplomat stationed in Turkey-in-Europe, Lady Mary Wortley Montagu, herself submitted to vaccination and loudly made it known.

1

In March/April 1717, she wrote from Adrianople (the present Edirne near the Greek border) to a friend: 'The smallpox, so fatal and so general among us, is here entirely harmless by the invention of *ingrafting* which is the term they give it. There is a set of old women who make it their business to perform the operation every autumn when the great heat is abated. People send to one another to know if any of their family has a mind to have the smallpox. They make parties for this purpose and when they are met (commonly fifteen or sixteen together), the old woman comes with a nutshell full of the matter of the best sort of smallpox and asks what veins you please to have opened. She immediately rips open that you offer to her with a large needle (which gives you no more pain than a common scratch) and puts into the vein as much venom as can lie upon the head of her needle and after, binds up the little wound with a hollow bit of shell; and in this manner opens up four or five veins.

'The Grecians have commonly the superstition of opening one in the middle of the forehead, in each arm and on the breast to mark the sign of the Cross; but this has a very ill effect, all these wounds leaving little scars, and is not done by those that are not superstitious who choose to have them in the legs or that part of the arms that is concealed.

'The children or young patients play together all the rest of the day and are in perfect health to the eighth. Then the fever begins to seize them and they keep their beds two days, very seldom three. They have very rarely above twenty or thirty (poxes) in their faces which never mark and in eight days' time, they are as well as before their illness. Where they are wounded (inoculated), there remain running sores during the distemper which I don't doubt is a great relief to it. Every year, thousands undergo this operation and the French ambassador says pleasantly that they take the smallpox here by way of diversion as they take the waters in other countries. There is no example of anyone that has died in it and you may believe that I am very well satisfied of the safety of this experiment since I intend to try it on my dear little son.'

Lady Mary, a hard-headed realist, intended 'to take pains to bring this useful invention into fashion in England' but was baulked by the conviction that the medical men of the time would reject it as 'destroying a considerable part of their revenue'. She reported to her husband that 'the boy was engrafted last Tuesday and is at this time singing and playing and very impatient for his supper'; but her campaign had no immediate success. Almost a century passed before the British doctor Edward Jenner inoculated an 8-year old boy with fluid from a pustule on a cow suffering from the relatively mild cowpox, contracted also by humans, and successfully immunised him against the more severe Smallpox. 'Vaccination' (vacca: cow) developed into an immunising technique.

By then the telescope and the microscope had revealed the hem of the unseen world and control of environment came closer. Medical science moved onward and the dual problem of the health of man and beast began to be attacked on a better equipped and organised basis. In the western world, it was to the credit of the French that they first instituted centres for veterinary education and research – in 1762 at Lyons and in 1765 at the Maison Alfort at Charenton, then outside Paris.

2

That great apostle of enlightened agriculture, Arthur Young whose 'Travels in France during the years 1787, 1788 and 1789' became a classic continuously reprinted into modern times (General Smuts was pointedly given a copy for special attention to soil erosion) described his visit to the Maison Alfort on the 19th October 1787:

'To Charenton near Paris to see l'Ecole Veterinaire and the farm of the Royal Society of Agriculture. Monsieur Philibert Chabert, the directeur-general, received us with the utmost attentive politeness. Mons. Flandrein, his assistant and son-in-law, I had had the pleasure of knowing in Suffolk. They shewed the whole veterinary establishment and it does honour to the government of France. It was formed in 1766; in 1783 a farm was annexed to it and four other

professorships established – two for rural economy, one for anatomy and another for chemistry. I was informed that Mons. d'Aubenton who is at the head of this farm with a salary of 6,000 livres a year reads lectures on rural oecology, particularly on sheep, and that a flock was for that purpose kept on exhibition. There is a spacious and convenient apartment for dissecting horses and other animals; a large cabinet where the most interesting parts of all domestic animals are preserved in spirits; and also of such parts of their bodies that mark the visible effects of distempers. This is very rich. This with a similar one near Lyons, is kept up (exclusive of the addition of 1783) at the moderate expense, as appears by the writing of M. Necker (the Swiss Minister of Finance in the Government of Louis XVI) of about 60,000 livres (£2,600). Whence, as in many other instances, it appears that the most useful things cost the least. There are at present about on hundred élèves from different parts of the kingdom as well as from every country in Europe *except England* – a strange exception considering how grossly ignorant our farriers are . . .'

England, where the horse was a sacred animal and cows, sheep, pigs and dogs scarcely less so, soon took the hint and in 1792, an institution was started in London which became the Royal College of Veterinary Surgeons. In 1823 a similar school opened in Edinburgh, subsequently the Royal (Dick) Veterinary College. Both were preceded in 1790 by what became the high-sounding Königlicher Thierartzlichen Hochschule in Berlin, a famous seat of veterinary learning.

The need to control environment and render it beneficent to mankind had now been immensely stimulated by commerce and, still slowly but steadily, by nascent industry. When Arthur Young visited Lyons in the middle of the French Revolution (December 1789), he made no attempt to visit the pioneering agricultural veterinary institute but occupied himself with noting the plantations of mulberry trees and having violent arguments with local worthies about their production of silk and their manufacture of goods from Chinese silk. Young felt that vis-à-vis cotton and silk manufactured articles, England should have come out better in a recent trade agreement with France.

A practicable route to the East had been opened more than a century before by the Dutch East India Company's founding a half-way provisioning station at the Cape of Good Hope. Its ships took three months or more to reach the fabled Cape of Storms but, once at anchor in Table Bay, the scurvy-stricken crews could be carried ashore and revived with fresh fruit and vegetables. Their rations of putrid salted meat and foul water were thrown overboard and fresh stocks shipped for the last long haul to India and further east.

This two-way traffic caused the Cape to prosper agriculturally but not without disastrous consequences. Ships returning from the east brought Smallpox which, in 1713, 1755 and 1767, greatly diminished the numbers of indigenous Hottentots, a coloured people who, apart from imported slaves, provided the only feasible source of future labour. 4

The Cape had its own Arthur Young in the person of C. L. Neethling who, similarly using his observations in France and Switzerland, carefully wrote a treatise in 1798 on methods of improving agriculture among his fellow colonists. He dealt with all aspects, including animal husbandry and spoke scathingly about the treatment of draught oxen and horses, then the only means of locomotion. It unfortunately remained unpublished but his personal propagandising certainly had effect. There were overseas-educated farmers at the Cape who soon founded agricultural societies.

In the East itself, health conditions for Europeans were much worse and the ships which passed the Cape on their way back to Europe frequently disembarked French, English and Dutch Company servants incapable of proceeding further. Later many took their furloughs there. Some bought houses and huge estates in the interior, constituting in the rudimentary Cape society a

coterie of 'Nabobs'. They brought a welcome wisdom to a developing country, particularly in the breeding of horses.

By this time, Southern Africa, India, the Far East, Canada and to a lesser extent Australia swarmed with naturalists of every kind, plain hunter-adventurers and traders, and sometimes military men and officials bent on other business than recording observations and collecting specimens. Few however resisted the impulse to communicate their impressions of a fascinating feral world where man by no means dominated his environment. Avid interest in Europe stimulated them to record it. This was the dawn of the great colonial era and what they wrote was of equal value to commercial men and scientists. 'The Wonders of Nature' became a universal vogue and the 'Curio' industry was born (the horns, hides, teeth and skeletons of animals; the weapons, musical instruments, ornamentation, skulls and skeletons of indigenous peoples; the pressed flower, seeds, twigs, bulbs and other evidences of strange plants could all be sold at high prices in Europe). The learned societies in every capital welcomed speakers freshly returned from the outer world and wondering members examined their specimens with gravity and awe.

5 The members of such societies and academic institutions were themselves travelling in the unknown world. Francois le Vaillant, a French student of natural history, spent three years at the Cape of Good Hope (1781-84), travelling extensively and leisurely in the interior and subsequently publishing his observations in five illustrated volumes which, such was the passion for Africa at the time, were soon translated and published in English, German, Dutch, Danish, Italian, Russian and Swedish. A zoologist by training, le Vaillant was keenly observant (if sometimes flippantly) of ecological factors and noted the animal diseases which hampered development of the settlement. Like almost all the observers, lay and professional who followed him, le Vaillant noted that cattle, indispensable for food, transport and traction, were subject to many afflictions such as Tong-Sikte (Blue Tongue in sheep), Klauw-Sikte (Foot-and-Mouth disease in cattle), Spong-Sikte (Black Quarter) and periodically to a crippling and finally fatal disease Lam-Sikte. He associated this 'lame sickness' with grazing on coarse grass and a seasonal depraved craving for chewing old bones and even the horns of their living fellows.

Much the same observations were made a decade later by the highly professional Martin Hinrich Karl Lichtenstein who, recently qualified as a doctor of medicine in Germany, came to the Cape in the entourage of the interim Dutch Governor before the British finally took possession of it. He subsequently became a professor of zoology in Berlin, no doubt stimulated in that direction by his Cape experiences which he recorded in a work describing his travels from 1803 to 1806 (translated as usual into English, Dutch and French).

7 Lichtenstein in the ecological context of immunising against disease, had however a special significance. With the menace of Smallpox always before it, the Batavian Government at the Cape resolved most enterprisingly to employ Jenner's method of prophylaxis in a campaign of wholesale vaccination. There were difficulties. Although the method was not alien to cattle owners wont to practice it on their beasts for Lung Sickness and like diseases, it was unusual for humans. Jenner himself had not made spectacular progress. Further, the cowpox necessary for the inoculation was not available at the Cape and the previous English administration's attempts to import it had failed. There were of course no methods of preservation by way of refrigeration on the long voyage.

By chance in November 1803, a Portuguese slave-ship with cowpox cases was brought to the Cape and the live infection became available. In the general campaign then promoted by the Batavian Government, Lichtenstein as a modern young doctor aged 23, played a leading part. In August 1805, he was instructed to conduct a vaccination tour deep in the platteland or hinterland of the settlement. In his short 'Diary of a Journey through the Karroo', he described the

anxiety of the remote and isolated inhabitants to take the treatment and also to have their Hottentot servants inoculated. He himself dealt with 300 cases, leaving precise instructions for vaccination by missionaries and for future action, should Smallpox break out. A vaccination centre was started in Cape Town but immunology soon tumbled off the eminence on which it had been enthroned. Only the hem of the unseen world had so far been revealed.

The venal world, on the other hand, had revealed itself all too clearly to the commercial companies of many nations. Some, like the Dutch East India Company, went bankrupt after a century of exploitation; but others, battenning on the riches of the Orient and undeterred by hideous diseases in man and beast coupled with lethal extremes of climate, created channels of commerce so closely affecting the well-being and development of European peoples that something had to be done to consolidate and perpetuate them.

Britain – never wanting the Cape because it had no riches beyond a few tough and militarily-serviceable horses and a small agricultural area useful for provisioning ships – grasped at India and adjacent territories. France and Holland entrenched themselves further east and Portugal at isolated trading posts. All sought a foothold in China. Tenuous commercial control was followed by colonial administration and with it came the Army and the missionaries to join the botanists and zoologists who joyfully continued their explorations and observations.

Army doctors and farrier-surgeons (or ‘horse doctors’) were expected to maintain colonial control in the face of a host of menaces to human and animal welfare. The Army was essential to protecting the constant supply of raw materials and locally-manufactured colonial goods to the parent countries. Without protection from disease as well as the outraged indigenous inhabitants, the system would have failed. Many of these men, confronted by conditions and epidemics totally omitted from their training, made valuable observations on human and animal diseases. If they could not fully control them, they at least gave prominence to the fact that if trade followed the flag, its continuance depended less on arms than on what was then called ‘hygiene’ or general health.

The missionaries, many of whom were medically trained and all of whom were acutely observant, travelled widely, reaching their apogee in David Livingstone in Africa. They too knew that the new lands could have no future without engaging disease, particularly among domestic animals. Without the horse and the ox, commerce, let alone civilised life, was impossible.

The diseases of the horse endemic in Europe and the Middle East had been known for centuries, perhaps for thousands of years; but there existed in Africa a mysterious seasonal ‘Horse Sickness’ with devastating mortality which no traveller failed to note from earliest times. (Burchell gave an account of it at the Cape in 1811.) A worse scourge since it affected both food and transport was the equally noted ‘lame-sickness’ among cattle and several other lethal diseases such as ‘Rooi-water’ or Red Water, known in India as ‘Surra’, and Lung Sickness.

8 In 1838, a Quaker evangelist James Backhouse toured the expanding Cape Colony and, nearing Bethelsdorp, the London Mission Station outside Port Elizabeth, noted ‘the poor moory tract of country which nevertheless supports considerable herds of oxen and some sheep and goats; and for these it is said to be favourable. The grass is chiefly sour and the cattle have a strong inclination for correctives. Sometimes they are said to eat the brush of each other’s tails. We passed two bullocks that were contending with two dogs for the bones of a dead horse. One of the former had the blade-bone in his mouth. Cattle often stand chewing bones in the kraals or folds of this country.’ He was watching the characteristic syndrome of impending ‘Lamziekte’.

Two days later, ‘one of our horses exhibited symptoms of a fatal disease called in this Colony, The Sickness. His eyelids were swollen and the blood-vessels of his mouth and tongue were in a state of congestion. He appeared to be in perfect health last night when tied to the wagon-

wheel to secure him from Hyenas which are numerous here. This disease usually comes on suddenly and runs its course quickly. On being loosed, he began to browse but had difficulty in swallowing. He was bled without delay and dosed with Calomel and Tartarized Antimony. After this he neighed cheerfully to his companion, went to him on an adjacent hill where he lay down. He soon rose again and began to eat but quickly lay down and then struggled and died. His death took place about an hour after the symptoms of "The Sickness" were first noticed. Before night, his carcass was nearly consumed by vultures and by the dogs of the Hottentots. Thus quickly is a horse finished in Africa!

9 At precisely the same time, a German observer, Professor Ferdinand Krauss of Stuttgart, travelling not much more than a hundred miles further south in the Cape Colony, was noting the number of serious cattle diseases including 'lahmsikte', and the high mortality from Horse Sickness – so high in fact that 'here, owing to the lack of horses, the post is carried on an ox. The postman sits on an ordinary saddle with reins and guides the ox in the Kaffir manner with a rein running through holes in both nostrils of the animal. The oxen are trained to trot and even gallop but it is neither as comfortable nor as quick as with a horse.' Soon after, Krauss lost his own pet riding horse. The symptoms were always the same – the animal showed slight signs of discomfort, ate normally, lay down, frothed voluminously at the nostrils and mouth, and was dead – within 24 hours.

When disease diminished both horses and oxen, the country drifted toward standstill. As time went on, it continuously occurred. The very future of humanity, indigenous and exotic, in the colonial world could well be menaced. There were great areas of Africa, empty of man and beast, to prove the possibility.

'Science' as opposed to 'Nature' now intervened at the instigation of Commerce and its handmaidens, the Colonial Empires.

A struggler from the depth of poverty in France, Louis Pasteur, by diligence and punctiliousness arrived at the post of professor of chemistry at the University of Strasbourg in 1848. Of equal ability in geology and physics, he went to Lille in 1852 to organise a new School of Science. In 1855, his alma mater l'Ecole Normale in Paris summoned him as director of studies and there he remained until 1867.

Pasteur combined prodigious versatility with acutely perceptive observation. In a wide range of observations, enabled by improved microscopes and methods of staining specimens to make them particularly visible under magnification, he enunciated a theory of the cause of change in various substances. Such changes, he said, were due to micro-bodies or 'germs'. They did not occur by themselves.

He was not the first to observe these creatures but no one previously had identified their causative function. Pasteur first studied chemically the process of fermentation at Lille and disproved Liebig's hallowed doctrine that such changes as it caused in substances were due to spontaneous generation. They were, he said, the work of 'germs' which operated variously in all forms of matter. He studied them in milk and vinegar, particularly under the influence of heat, and was able to control their effect. He drew the attention of the beer- and wine-makers of France to his results and revolutionised both industries. By the application of his studies of fermentation, it was estimated that he had saved France from an annual loss in wine of a quarter of total production amounting to £5,000,000 – a massive sum at that time.

That specific living organisms, visible only under high magnification, caused significant changes in all forms of matter was a new and heady doctrine capable of application in many fields. Its commercial importance had at once been apparent. Almost symbolically, Pasteur's attention was directed to a disease of silk-worms which had reduced the French silk industry from an annual income of 130,000,000 francs to 3,000,000. In 1865, he undertook a painstaking investi-

gation to find the 'germ' that caused it and at what stage in the life-cycle of the worm it appeared.

At that moment in history, a pandemic of Rinderpest swept from east to west across Europe destroying hundreds of thousands of cattle. Quarantining uninfected animals to prevent their contracting the disease proved a forlorn hope. No cordon sanitaire proved remotely effective and there was no alternative but to slaughter all animals likely to be infected. In England alone, 500,000 beasts were massacred. The possibility of isolating the 'germ' causing the disease crossed no one's mind. Bacteriology as initiated by Pasteur was still an infant science and from 1864 to 1870, Rinderpest had its way throughout Europe. Russia offered a prize of a million roubles to anyone who could devise a specific that guaranteed immunity.

Pasteur himself advanced from his silk-worm problem (which he solved in 1869) to highly sophisticated work in the fields of human and animal diseases. He could identify and isolate the 'germs' (or microbes or bacilli or bacteria as they were variously called) that wrought changes in organisms; but that brought him no nearer dealing with them in the sense of preventing their destroying the organisms they inhabited. In his painstaking imaginative way, he experimented in artificially cultivating bacteria, that is, without a host and grown in laboratory cultures. He subjected them to variations of temperature and other conditions including diluting and weakening them and even killing them outright. Then, applying the ancient immunological expedient of injecting a weakened form of a disease into a subject to confer immunity, he experimented in various fields. Of numerous successful attempts over several years, he was able in this way to offer immunity to Anthrax in sheep, to Glanders in horses (through a substance called Mallein deriving from the Glanders bacillus) and to Cholera and Rabies (hydrophobia) in humans.

The effect of his work on general agricultural economy and colonial expansion was incalculable. The French Academy of Sciences formally accepted his technique of prophylactic inoculation with a weakened form of the causative bacterium (or what was later termed 'attenuated virus') to confer immunity and established the Pasteur Institute in Paris to enable him to continue his work and to manufacture and market his preparations. It was by no means only an institute for pure research but very definitely a commercial proposition from which Pasteur derived financial benefit. It opened in 1888, accumulated a talented staff and soon extended its activities throughout the world. It was perhaps the most significant step yet taken in the recorded history of man's attempt to control natural forces.

By that time, the new science of 'Bacteriology' or Micro-Biology had gripped the world – and particularly the colonial powers – by the throat. Untold benefits would follow the solution of disease problems in man and beast in hitherto unexploited countries. There were in addition the advantages to be gained in those already 'civilised' and panting for further development in local industry if only increased supplies of raw products could be obtained and further markets found for their manufactured goods.

The prizes were munificent. To control natural resources, seen and unseen, to master environment for the benefit of man, to increase areas of domination became as much the ambition of power-hungry nations as of scientists of integrity. Progress in the new discipline must be encouraged. In Germany – most avid for colonial advance – the study of microbes was undertaken widespread, greatly aided by improved apparatus from the Zeiss firm at Jena and others. Among its leading investigators was the medical doctor, Robert Koch, junior to Pasteur by 21 years.

Pursuing in his spare time the same enquiries into the Anthrax and other bacilli, Koch improved immunological techniques. The German Government rewarded him with official appointment to the Federal Health Service and facilities for research. He was later awarded large sums of money for further successful bacterial work and in 1885, with the directorship of a special

Health Research Institute attached to the University of Berlin. At the same time, the German Federal Government launched a colonising campaign to stimulate its burgeoning industry. Its emissaries laid claim to large portions of Africa – the Cameroons and Togoland in the north west, South West Africa and East Africa (Tanganyika) – as well as certain areas and islands in the Pacific. Other nations clutched at the remaining pieces of unappropriated territory.

In the ‘Scramble for Africa’ and the economic development of home countries through the exploitation of their colonies, Koch became the pampered pet of the German Government and, by virtue of his striking discoveries, the envy and the target of criticism of his colleagues at home and abroad. Before long his Institute was as famous as Pasteur’s.

As long as strange and terrible diseases afflicted man and beast in Europe and abroad, the struggle for power between nations could not be resolved. It was in fact in Africa South that many of the world’s crucial economic and ecological problems were solved.