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**The World According to Plants**

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But where great danger lurks,

Salvation also grows.

Hölderlin, *Patmos*

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[Forword]

Hard times, dear reader. All Western systems of thought are bankrupt and the only thing that keeps them alive is the criticism of them. The beauty of science burnt its face through its complicity in the fossil-fuel economy and the poisoning of the earth. A mixture of fear, rage, resignation and mourning gnaws at every idea that we have, every plan, everything that requires a future. The superpowers of tomorrow will inherit a few burnt-out continents and billions of refugees. People will look back at our times as the Age of Blindness, when everyone knew what they were doing to the living earth, but effective reaction proved too difficult, demanded too much effort. How does one retain one's common sense?

Learn to think like a plant. For half a billion years mosses, ferns, trees and flowers have kept the most beautiful ecosystems working on our planet. On the occasions when the latter were razed to the ground by the violence of super-volcanoes, comets or ice ages, the plants soon shot up again out of the ashes, to embark enthusiastically on a new round of vegetative inventiveness. Plants provide oxygen and food, retain water, offer shelter to animals and human beings, extract carbon dioxide from the atmosphere and in so doing moderate fluctuations in climate. All they ask for in return is an intact living space.

Plants can save the earth and its inhabitants. If we want to learn to think in a new way, cyclically instead of fixated on the end point, The School of the Plant will open its doors for readers anxious to learn. Switch to the side of the plants. That is the task I have set myself in this booklet.



We live on the most important planet in the universe. Most important, because only here do conditions exist in which we can live. The only suitable conditions in fact, since life appeared on earth and from day one was eminently well tailored to the state of things here. And now comes the nice part: because life was fully geared to conditions on earth, it was able to completely reorganise the mother planet and from a simple inauspicious beginning to derive a splendid and richly varied spectrum of life forms and landscapes. Variation: all that matters to us living beings.

We are the result of 4.3 billion years of evolution. Not a single molecule in us has not passed through many, countless other bodies. In the course of three billion years most of our living substance has been knocked together by brilliant bacteria and never changed since, while kept in continuous operation. Plants construct stalks, roots and leaves and flowers with them, animals bones, nerves, muscles and senses. Moulds weld their threads into underground networks from which they put forth their colourful toadstools in autumn. But the living matter in the cells of all those moulds, animals and plants is the same. We have carried this with us from our ancestors the bacteria into our own realms. However far apart humans and plants may seem to be, we share our living substance. We have the same needs and desires, although we satisfy them in almost diametrically opposite ways.

Life never ceased to exist for a few million years and then started up again. The lines of evolution run unbroken from the primaevial bacterium with which it all began to the green plants in the sea, the spore-producing plants on land and finally the seed-bearing plants as a provisional destination. Humans and plants are both part of phase 6 in the evolutionary history of plants. The bacteria constitute phase 1, the algae 2, the mosses 3, the ferns 4, the conifers 5 and the flowering plants phase 6. The structure of the flowering plant is the result of 150 million years of trying out on conifers and taking their chance whenever there was an opportunity. When 65 million years ago the dinosaurs and most angiosperms are wiped out by a meteor strike, flowering plants derive from a few thoroughly tested prototypes 250 thousand different kinds of flowers, 250 thousand different experiences of how life feels and how one can make contact with something other than oneself.

It is striking that humans hardly eat fern leaves and pine cones, like the dinosaurs, the dominant plant-eaters of the previous geological season. Dinosaurs had no teeth, but tore the leaves and branches wholesale from the trees. In their stomachs they kept swallowed stones with which they ground up the greenery, like birds today, the last dinosaurs. Man's body is adapted to flowering plants, to the digestion of fruit, vegetables and grains, and of the milk and meat that cattle make from grass and herbs. The human body is constructed

for walking through grassland and woodland. In a fern wood of 350 million years ago humans would not have lasted long.

### **The Greenness of Plants**

Plants differ from other living things on account of their magical powers: an extraordinary ability to transform something as intangible as light into matter. Plants are the only living things on the planet that can produce food in their own bodies. All other beings eat and digest what they find out in the world, and as a result, they are utterly dependent on what plants do, both for oxygen and for sustenance. If all the plants on Earth were to disappear today, all the animals would die tomorrow, and the day after that, the remaining people would be forced to eat each other. The only things that could go on living their lives undisturbed would be bacteria, the organisms with which life on Earth began and will one day end. And perhaps start again somewhere else – who knows?

Plants make their food by means of an alchemistic formula: with the help of sunlight they split a molecule of water into two atoms of hydrogen and one atom of oxygen. They then release the oxygen into the atmosphere, and by binding the hydrogen to carbon dioxide, they conjure up a molecule of dextrose. This fundamental organic bond is the basis for all other substances found in living things. The magic word that makes all this happen is, of course, photosynthesis. Photosynthesis is what keeps plants – and by extension, all life on Earth – alive. Photosynthesis transforms dead matter into living tissue by infusing it with solar energy. The chloroplasts of plants contain the answer to the question of what life is: this is where new life is created every day, through the process of photosynthesis.

The chloroplasts contain long rows of streetlamps with upturned shades. Instead of a lightbulb, the lamps have a magnesium atom, which absorbs light rather than emitting it. A sunbeam knocks an electron out of that atom. This electron collides into a sort of handle, which then pushes a flywheel a gear further in the organic machinery that supplies the plant with matter and energy, and all other living things with oxygen and food. This process of electron release and handle-pushing happens around a billion times a second. Don't ever say that science takes the mystery out of life: the better we understand it, the more incomprehensible it becomes. It's thanks to that single atom of magnesium that green plants are green.

It's their colour that make plants invisible. People do not perceive the three physical primary colours of red, yellow and blue, but rather the three much more primary biological colours of red, green and blue. The pigments in the leaves and stems of plants filter out the high-energy red and blue from white sunlight and reflect the green portion of the spectrum onto the human retina. Our eyes are fully adapted to nature's dominant colour scheme: in a place where green is the most prevalent colour, the eye perceives green most readily. As the only colour that is reflected rather than absorbed, green is a superfluous tint for plants, in terms of energy. In terms of culture, however, the colour is of paramount importance. Plants remove the stinging red and absorbent blue from sunlight and give humans back the

calming green. Green is plants' gift to our species. Plants are green so that humans can live: this is the message of that colour scheme to the human eye.

The first distinction that a newborn learns to make is between living and non-living things. An infant can tell that something is alive based on slight muscle movements in the face and body of the person looking at it and holding it, and in its mother's gaze, as it drinks from her warm breast, eyebrows raised. Things that move are alive; things that don't are not. If the mother's expression freezes, the baby will start to cry. If she smiles again, her little bundle of joy is reassured. This gives rise to a certain degree of trust in the solidity of reality, a certainty that what is alive will stay that way and will not suddenly stop. Plants move and grow too slowly to be perceived as alive; so from day one, a baby sees them as part of the non-living environment and thus undeserving of any special attention. The realisation that plants are also alive must be learned later, or unexpectedly discovered.

Another reason for our species' plant blindness goes back to even before our birth. The plant is a symbol of a phase of human life that most of us would prefer not to be reminded of: the time spent in utero. The fertilised egg forms itself into a little ball of eight to sixteen cells that travels down one of the fallopian tubes, eventually nestling in the wall of the uterus. But this metaphoric allusion to birds and other nest-builders is not quite apt. The dividing globule acts more like a germinating plant: it takes root and nourishes itself with the earth, or in this case, the blood and nutrient-rich fluid it draws from the mother. In this way the embryo gradually builds its own body, piece by piece, just as plants do.

The human embryo successively forms new organs, arms with hands and fingers, legs with feet and toes, and a trunk full of digestive, respiratory and reproductive organs. And atop it all, like a sunflower on its stalk: an enormous head, with hair, ears and the contours of a face, with eyes, nose, mouth, chin and cheeks. Behind that lies the cranial cavity, filled with a heavy brain. This is the same way plants generate their own new organs: roots, stems and stalks, leaves and finally, like the head on the body, the flower with its petals and sepals around wreaths of pistils, stamens, ovaries and nectaries.

Once an animal is born, it will acquire no new organs over the course of its life. At most, an organ may change its function. Plants, by contrast, continue to produce new organs for as long as they are alive. Year after year they form new leaves, roots and flowers. Plants can renew their bodies their whole life long, from the inside out. A human can only do that with the help of outside intervention, such as an organ transplant or prosthetic. Except in the first nine months. Then the human body is just as capable of development as a plant. Then it experiences what plants go through every single day.

Like an embryo in its mother's womb, a plant is utterly helpless. It is completely at the mercy of its surroundings. These could include drought, rainstorms, scorching sunlight, wintry cold, mudslides, wind erosion. Or root rot, exhausted humus, slime moulds or the combine harvesters of the modern farmer. A plant must take whatever life throws at it, not only as a victim, but also – and mainly – as raw material. Plants form the foundation of the food pyramid.

A plant makes itself, a herbivore eats the plant, a carnivore eats the herbivore, the omnivore eats everything and everyone. And the moulds and bacteria, in turn, consume the waste left over after this feast, thus ensuring that essential vitamins and minerals are returned to the foundation of the pyramid. In this way plants can reconstitute themselves over and over, a herbivore can feed a carnivore and an omnivore can satisfy its own wide-ranging appetites. Power is an animalistic concept. Plants have no notion of what it could mean. It is this total powerlessness and lack of freedom that frightens people so much and makes it almost impossible for them to think back on their time in the womb.

### **The Pleasures of the Rambler**

Plants remain invisible – or all too visible, depending on how you look at it. They are so ubiquitous that they do not impinge on human consciousness unless you are deliberately open to their presence. When town folk venture into the woods, they spend less time looking at the objects within their field of vision, than at the in-between spaces, where there is only light and air. Human observation is always searching for spaces where something could happen, and for a chance to make something happen. Cyclists, for example, do not have to recognise the individual houses in a street, or the streetlights or the models of parked cars. They only need to pay attention to what routes are passable for them and their bike. In this same way rambles rarely take note of the trees around them, but focus instead on how the path continues beyond a curve, weaving its way through the open space of the forest. A path or thoroughfare is a kind of vehicle itself, and there is only one thing a vehicle wants to do: move forward.

Why is it then that people decide to go strolling among the trees and bushes when there is just as much open space and just as many pathways to be found in a city neighbourhood, with its streets, alleys, town squares and the occasional fountain? What do trees have to offer that cannot be found in built-up areas? Variety. Every tree is unique in the way it occupies space and helps to shape the rambler's path. It extends its branches in every available direction. Its leaves refine the sunlight cascading from above into a colourful festival of *son et lumière* on the ground. It is not important what specific types of trees provide this variety. The continuous interplay of open and closed, high and deep, far and near, wide and narrow, occluded and exposed calms the inner turbulence of the most restless among us. As *décor*, plants provide variety, however still they may stand. They do not change position; the walker glides past them as if he or she were on a conveyer belt.

Ramblers on a forest path carry a time capsule with them. They move through a glass tunnel, beyond which something vaguely resembling nature is visible. Inside the tunnel their own lives play out, their consciousness darting back and forth between memories, conversations, family troubles, work issues, life's little annoyances, forgotten duties, future plans, do's and don'ts. Sometimes a fragment of the outside world manages to find its way into this tunnel, but this is aesthetically tinted and familiar. Beautiful light slanting across thin tree trunks: morning mood. Even if the pensive rambler is internally recounting the story of his own life, he remains ensconced within the realm of micro time: minutes, hours,

years. Forest time, by contrast, passes slowly. There, the smallest unit of time is the day: a full 24 hours, divided between daylight and moonlight. The passage of the seasons is the next level up. The mild spring, when the seeds sprout and the leaf buds break open – each species, each individual at its own moment. Then along comes summer, with its gentle mornings and evenings, and between them, the ordeal of the midday sun. During an autumnal storm the leaves swirl through the air, tired but content. Once winter hits, the trees can only knuckle down and endure it. The main thing is to stay upright, because if you fall, no one is going to help you up again.

In principle a forest can live for millions of years. This is the scale on which plans for the future are made. If we humans could burst our bubble of micro time and step, unprotected, into the long duration of the forest, our conception of time would expand a thousandfold. Suddenly, the content of our highly personal time-bubble seems much less impressive. The forest gives people a yardstick with which to measure their own importance. For many rambler, the safe option is to focus exclusively on the highlights of the landscape. Most prefer to take the consciousness-expanding substances provided by nature experiences in homeopathic doses.

Yet there is much to discover in an urban wood that cannot be found in the rest of the city, if you are inclined to look for it. Nature lovers examine each individual plant in the hope of finding a rare species. Guidebooks in hand, they can unerringly identify each of them by name. The paths around the plants interest them less. They prefer to forage through the landscape, with little concern for where they might end up. Open spaces in the woods are ideal spots for a bit of bird-watching. When gazing upward, a pair of binoculars can be a handy accessory; in the dense low growth, by contrast, you have to rely on your ears.

With their eye for natural beauty, aesthetic rambler study the trees of the forest one by one, as if they were sculptures in an open-air museum. They mainly pay attention to artistic qualities, age and local culture, so as to form a value judgment and reach a final insight. What religious sentiment is expressed by this skinny birch or that common oak, with its branches fanning out in all directions? Why is it that the droplet-shaped silhouette of a hornbeam is so compellingly beautiful?

Trees symbolise the pursuit of higher things. A tree is at once materialised thought and heightened desire, expressed in living wood – a solid object and yet quite airy. Trees are self-designed architectonic constructions of such daring and determination that no man-made object can rival them. And whether the branches of a beech or poplar stretch grandly skyward or disrupt the tree's otherwise perfect profile by drooping down over a canal for some extra light, in terms of their structure and overall image, they are always perfect just as they are, and there is no human artist that can emulate them. And for whom is this great achievement intended? For their own pleasure and no one else's, it would seem.

In summary then, the pleasures of the city-dweller in the forest are space, variety and a path to follow. Yet there is something missing from this list, and that is movement. Wait a minute – what's that noise? A dove loudly takes off from a cluster of leafy branches,

and with one flap of its wings it launches itself skyward and then glides with sovereign grace through the open air above a pond or meadow, tracing out a perfect parabola. Until that dove's unscheduled flight, there was only a gap between the treetops, but now a space has suddenly opened up like a majestic palace hall under an alabaster ceiling. The forest visitor gratefully takes that memory home with him and does not see it again until those last moments before dying, when the essential memories pass before your eyes one last time, borne aloft by that final question: *why did this happen to you?*

Other birds, which spend their lives closer to the ground, like finches on the forest floor and wrens under bushes, revitalise the spaces where they gather the bits and pieces of their lives. Sometimes a buzzard circles its way into the firmament, high above the treetops, as if to accentuate the insignificance of those of us below. Sometimes a haughty bird of prey rests on a high branch, casting a hooded eye upon the vanities below. On another occasion a red-brown fox or a red deer the size of a horse will suddenly step onto the footpath. A peak experience! The rest – all those thousands of trees and tens of thousands of plants we pass by along the way – is just context, scenery on a stage that offers a platform for the scurrying of woodland creatures and the bewilderment of humans.

### **Ecstasy of the House Plant**

Animals are so much more empathetic than plants. The pet dog comes trotting along wagging its tail when keys jingle in the street door, the tabby cat stretches out on the warm lap to watch TV, a jubilant nightingale announces to campers that it's the May bank holiday, foxes deftly catch moles from the lawn, the fallow deer looks sentimentally and with a slight squint at the unexpected passer-by, fat spiders mark the beginning of autumn and honking, V-shaped formations of geese tell us that winter won't pass us by this year. And the slobbering piglet grunts amusingly if it is not bitten in the tail by another animal in the same sty, the hamsters squeak cheerfully in their cage and the white mice run with great gusto in their treadmill. Our owner is good to us, is the message that all domestic animals radiate. Don't ever bite the hand that feeds you, is their moral principle. Your owner works himself into the ground so that you can fill your days doing nothing. All you need to do is give the impression that you've had terrific luck finding that one good-hearted soul to whose life you, dear creature, give meaning.

There are political parties especially for animals, but there is as yet no party for plants. 4 October is World Animal Day. It is never World Plant Day, although in many countries annual tree planting days are organised, but the existing plants are not mollycoddled: people plant young trees and set them straight to work. People rightly get worked up about the suffering inflicted on calves reared in crates and pigs confined in small pens in industrial farming, but no one finds it unethical to eat tomatoes and peppers that have been exhausted in a 24-hour light regime, and that if they do not grow into a shape suitable for efficient packing, are mercilessly dumped. There are vegetarians, but there are no carnivores who cannot square it with their conscience to eat living plants.

Young parents like taking their babies and toddlers to the zoo, but they seldom go to the botanical garden. People are very keen on nature films on TV, and they are also always

about wild animals. Fish, baboons, the camel, the giant anteater, the sloth, gorillas and seals: animals offer a menagerie of metaphors for possible emotional lives that parents present to their children. Will you become heavy and tough like a bison, irresistibly cute and pointy like a porcupine, sharp-featured and vulnerable like a desert fox? Find your totem. Every child has a favourite animal, and takes it to bed to cuddle. But a favourite plant?

The caressability quotient of plants is virtually nil. Plants don't like to be touched, turn away from the point of contact. That is why regularly used side paths between bushes remain open, although the plants in the verge are strong enough to overgrow them in a few days. Pets are given a name, children immediately guess the name when Daddy comes home with the promised animal. House plants remain nameless or are referred to vaguely by their shop name or horticultural family. There are moving animal cemeteries, plants end ignominiously on the compost heap.

The empathy between people and plants acts in a much more aloof way than between people and animals. If a house plant feels comfortable and likes where it is placed, it turns its back on its carer. It turns leaves and flowers towards the window, towards the outside, towards the sunlight. For it the room and its occupants are a shadow or hazy blue gloom. It receives the regular splash of water as a chance event, local weather or a gift of the gods. The house plant couldn't care less who looks after it and whom it serves, provided it can do its work, what it most likes doing: worshipping the sun, making life. Garden plants allow themselves to be positioned strategically in a raised border and are occasionally inclined to bow to their gardener, but nothing indicates that this gesture stems from sympathy or gratitude. It is the wind that makes the pom pom dahlias bend so gallantly towards the lady in wellingtons to whom they owe their thriving existence.

The influence of vegetative life on the growing child flows through different channels than that of animal recognition. Just as people and animals express their feelings via spontaneous movements of facial muscles and posture, plants do the same in the position of their leaves and flowers, but so slowly that it is not discernible for a quick observer like a human being. Still, their attitude does come across, as a feeling of relief on entering a room full of plants, or like a melancholic soul the whole leafless winter. The plant consciousness trickles in via flower and leaf smells which become the bearers of memories that are sought out in one's subconscious or on the contrary anxiously avoided far into old age. What a melancholy longing the strong, deeply sweet smell of a ripe fig-tree mobilises in us, or the heavy perfume of honeysuckle, or on a sunny day the tingling freshness of wild thyme above the dune path. And what do the plants themselves feel, for them to release such a smell?

For as long as people have lived in towns and can only reach nature with technical means of transport, they have started growing plants as a form of art instead of as food. In back gardens, frames, on windowsills and in greenhouses, people accept plants into their living environment as part of the household effects, even in the chilliest modernistic interior design. To show off their rare acquisitions, the wealthy have their living rooms and terraces adorned with tropical potted palms and miniature orange trees in tubs from the orangery.

In the hell of the industrial revolution delight in flowers seized workers too, who in an age before television, internet and commuter trains, had time to grow immaculate white carnations in the middle of the soot-covered slums. Through crossing and sophisticated fertilisation they created countless cultivars of primulas and auriculas with petals full of subtle lines, patches, fringes and the most drastic colour combinations, which led to flower shows, challenge cups and a thriving society scene.

People like plants that came from far away most. The discovery was once made that many tropical and subtropical plants can survive out of their local environment if you protect them behind glass and yourself assume the role of the climate by ensuring the correct quantity of heat and water. This led to a boom in colourful house and frame plants collected by hardy herb-hunters, plant chasers working for garden centres and gentlemen amateurs who set off at random into the wilderness in search of scientific curiosities. They dug them up and transported them in pots and frames on the decks of ships and on aeroplanes. They transferred the plants from wild country and virgin forest to immaculate, neat window niches.

And there they still stand dreaming in solitude of the wild mountains and forests from which they have been stolen because of the shape of their leaves, the shades of their weird flowers or the general impression of their capacity for growth. They have forgotten the way of life of their ancestors, whose genes they still carry inside them. They even smell differently, but they still gallantly raise their flowers up, hoping against hope for an insect which may do something, the details of which they no longer remember.

Take a colossal tree like the weeping fig, often scores of metres wide, with its gigantic air roots, which drill straight downwards into the ground from the heavy side branches and carry the whole construction of the tree, with the original trunk disappearing forever in the trellis work. The exotic plant breeders take it for granted that this giant strangler fig after cultivation in a frame and positioning in an office or living room will no longer produce anything but a floppy little ficus bush, with pale thin shoots and unattractive leaves, of which only the dark hue and smooth surface still testify to a tropical origin.

The task of the house plant is to link indoors and outdoors, the domestic with the wild, the living room with fresh air, the narrow town street with open agricultural land, that vegetative realm of which town life is the denial and the mirror. What distinguishes the house plant is that it may be just as subject to the whims of humankind as wheat and apples, but at the same time radiates the illusion of having a will of its own. Purity, purity! Without plants it will start stinking in the house, if not of bad breath and sweat, then of cleaning products.

Like grain and soya the house plant is given pleasant conditions, or has them created for it and enlists human help. Payment in kind, as with the farmer. Food, oxygen and beauty, although for the latter the house plant prefers to refer to cut flowers in the vase, life that dies and interprets its ultimate insights in colour and shape and is rewarded for that artistic high point with a funeral in the rubbish bin.

No plant is absolutely straight. As it grows it winds and twists, branches and puts out buds in the three dimensions of length, breadth and height. People build up their living space with the aid of straight lines which are never anything more but the shortest distance between two points. The vegetable line is organic and has natural volume. The plant erects a living space for itself alone, a personal sphere in which no animal can put a nose or a hand without violating it. Every organism, including human beings, has a virtual volume around it, a culturally determined distance in which somebody else cannot simply enter without causing rejection or attraction reactions. However lonely a houseplant may be, it creates a private domain recognisable for human beings, an area within which its life takes place, a metaphor for the sense of life that human beings and plants share, their non-geometrical organic thinking and formal logic.

A house plant is an ecstatic nun. Grown in the nursery from cuttings or cloned, it is the product of an immaculate conception. Fertilisation is absent for lack of bees, butterflies or beetles. She forms her virgin flowers solely for the spiritual marriage with her heavenly lover. For her alone, behind the window glass, the sun lets its light shine down on earth. The house plant is in a state of perpetual light rapture. The source of life forces its way uninhibitedly into its body, warms it up and raises it to the highest happiness on earth. Making new life, new music, is what every plant most likes doing. From light, air, water and earth it makes living matter and pours it into the carefully prepared shapes of roots, stalks, leaves and radiant flowers. Living material that can cause others joy, animals, bacteria, moulds, people.

Never forget this one point. A plant observes everything that happens in its vicinity and is also aware of the presence of human beings. It has more than enough senses to recognise them. A plant knows to whom it is devoting its life's work, and that is not her distant descendants, but those who can live at this moment through its physical efforts. For life never happens earlier or later, but always only in the present. We live now. Now is our turn to live.

### **What a Plant Wants**

A world once existed that was organised precisely as plants wanted it. For 200 million years the world was a fern frame where conifers eventually appeared among which funny dinosaurs scuttled about. After on the continents there flourished for 65 million years a paradisaical flower garden full of deciduous trees and herbs among which furry animals crept around. And then humans appear, the two-legged hunter armed with a throwing spear and a hand axe. The large grazers are their prey. They were colossuses, the megafauna of prehistory. Mammoths, mastodons, woolly-haired rhinoceroses, giant deer, gigantic kangaroos, avocado-eating sloths as big as trees, metres-high flightless birds, cave-bears and sabre-tooth tigers, take your pick.

First the slow herbivores succumb, later the tougher predators. Fast-growing grasses and bushes which otherwise would have been eaten away by the super-grazers, have the chance of growing unhindered and make life impossible for fellow-plants which prefer to

live on regularly cropped fields. The soil becomes poor because of the absence of nitrogen-rich fertilisation by huge turds and quantities of urine. The sixth mass extinction begins, ten thousand years ago, when the human population, numbering seven million, has become large enough to cause noticeable consequences in what up to then had been a patchwork of calmly shifting ecosystems.

This slow but steady slaughter by human beings has nothing to do with the *struggle for life*, which is supposed to be the driver of daily life in evolution and ecosystem. Nor can human beings derive any rights from it to legitimise their behaviour. The theory behind the struggle for life is not difficult. The strongest win, given the circumstances. Whoever does not die survives. If you reproduce, you will have descendants, to whom you pass on both your good and your bad qualities. And this explains everything that living beings have achieved in the last one billion years at least, so why should humans not join in?

Yet when visiting a wood, dewy grassland, a buzzing heath or soggy marsh the walker seldom finds signs that point to the eye-for-an-eye-and-tooth-for-a-tooth that supposedly characterises the coexistence of natural species according to the militant theory of the survival of the fittest. You don't see any tree branches trying to strangle each other or pushing each other out of the way. Their crowns form reasonably neat globes next to each other. The branches too keep a careful distance from each other, they hardly ever scrape each other, even in a storm. They manifest the *crown shyness* typical of trees. Trees allow each other and themselves sufficient space to spread their branches as elegantly as possible and to turn as great an area of leaf towards the sunlight. They are happy to take a step back for someone else. Discipline is mastery.

Occasionally of course you see behaviour in an animal or plant that points to open aggression among members of the same species or individuals of different origin. Invasive touch-me-not drives out lilies-of-the-valley, crows pick out each other's feathers and magpies have to drive them apart. Blackbird swallows earthworm. Is eating conflict? Have human beings defeated lettuce in the fight for survival? More a win-win situation.

In a carelessly laid-out area of recreational woodland it is sometimes a tight fit. Plant a beech and a lime three metres apart and after a couple of years their branches will start to tangle. But the war zone is only a metre wide at most and behind the frontline both trees unfold their fans of branches in a carefree way according to their own, sovereign logic. When does a neighbour's dispute escalate into struggle for life? Plants, animals and moulds fight as little as possible. They do their very best to prevent and avoid every competitive battle. There are no black sheep or laughing-stocks in the extended family of nature, species that all others are against.

The insight into the respect of living beings for each other's life led to a correction in the all too one-sided idea of the evolutionary process as struggle and survival. Evolutionary biologists no longer talk of a struggle for survival, but of fitness maximalisation. The best one will win if it does its very best. Survival is a sporting achievement, not murdering weaker brothers. And unexpectedly a glimmer of light shines through the otherwise so gloomy

cloud of evolutionary thought. Plants and animals live not because they have to, but because they like it.

But even if evolutionary theory is expressed euphemistically, it reveals its violent foundation. It is not the amazing capacity of living bodies for variation and diversity that offers an explanation for evolution, but only the selection which is carried out by nature according to variation. That leads to the survival of the fittest, but also to the death of everyone who diverges from the norm. A huge blind spot: you can only select if there is a choice. And it is life that offers choices, not death.

It is only a metaphor, this evolutionary model of plants fighting for water and begrudging each other the sunlight on their leaves, no more than a matter of perspective. In a clearing in a conifer wood a good three thousand germinating plants per square metre spring up. After five years there are thirty individuals left: a death rate of 99 per cent. After fifty years there is just one large conifer left rustling per square metre. Is this fir tree a mass murderer which has eliminated all its brothers and sisters with mean tricks and cunning tactics, a despot and megalomaniac who finds nothing as satisfying as seeing the dead bodies of his opponents laid out in huge heaps around him?

No. It is a very sad solitary figure who over the years saw all its playmates fade and disappear. However much it did its best to keep them alive by slipping them some extra food via its roots and mould helpers, it was no use. Not that the tree is lonely, it is a part of a densely occupied plot of mutually feverishly communicating old and wise, awkwardly wise trees. Each one of them is a survivor, the last remaining sons and daughters of large families, and in their heart all equally sad and disgruntled. In the purple darkness of the fir wood there prevails a culture of mourning and loss, a picture of the human future.

The theory of struggle and survival explains less than a tenth of what is to be seen in undisturbed nature. Plants hardly if ever fight but constantly collaborate, with other plants, plants of the same species and chance neighbours, with moulds and bacteria. They absorb the latter into their root corms, where the microbes consolidate nitrogen gas from the air in compounds that the plant needs but cannot make for itself. In exchange they give the bacteria sugars and other molecules that the bacteria cannot make for themselves. Moulds also grow into the roots and carry water with minerals and organic materials that they derive from the soil and dead plants and animals. In so doing they increase the absorption capacity of the roots by a factor of ten or more and in exchange receive from the plants sugars which can only be constituted above ground through photosynthesis in the leaves.

The hyphal threads of a single fungus or mushroom link with the roots of plants over a wide area, often in a circle with a radius of kilometres. The plants in their turn make contact via the mould with the other plants in their vicinity. Through these mould connections the whole lush wood, including the vegetation in the clearings, forms a single organism, one living whole that knows what is happening in its body, on the edges and in the centre. The hyphal threads are living cables which are used by the plants to send messages to each other in the form of molecules and electric charges. Dig a spade into woodland soil and you will break five million hyphal threads.

An old, wise mother tree is in direct communication via its roots and mould helpers with the small trees in its shadow. The mother tree transmits the eternal stories of build-up and destruction, strength and patience, grandeur and humility to succeeding generations, in the language of molecules, organic chemistry. No image is involved, no abstraction, the message remains within the bodies, but passes from mother tree to adoptive children via a hyphal thread, a medium with a completely different way of being than the vegetative one. The mother tree intervenes directly with its molecular narrative in the bodies of the young trees within its reach. It determines their growth strategy, it strengthens them and induces growth zones in places where they will be necessary later. It prepares its little ones for the moment when they shoot upwards, into the light, when mother falls over or dies of old age. It takes an average of a hundred years to transfer all the wisdom of the mother tree to the bodies of her adopted children. The short sturdy trunks and deep, wide-ranging roots of the child trees are their interpretation of what mother meant.

How does nature succeed time and time again in creating a new wealth of forms when the climate changes, a mountain massif rises up kilometres high, a continent shifts from the South Pole to the tropics, the sea rises or falls by about eighty metres and inundates enormous areas with sea water, or on the contrary drains them and creates freshwater expanses. Is that the result of struggle? No, creativity. Even after the gruelling extinction rounds, in which some ninety per cent of all species are lost due to volcanic eruptions or the impact of a meteorite, life nevertheless starts again after a couple of million years with species and ecosystems which work according to quite different construction and communication plans than before the crash, before the planetary reality check on the evolutionary sustainability of existent species which every mass extinction is.

Animals become extinct much more easily than plants. If an animal population shrinks to a hundred individuals, that will almost certainly lead to its disappearance. But a group of five plants can last for a surprisingly long time in one spot. A plant species can survive down the ages in such an intimate residual club or *deme*. Many plants in the temperate deciduous forest are demes left from the larger populations of the same species from the primeval forest before human beings cut it down and replaced it with open recreational woods. Some demes are only at the beginning of their ecological career and are still awaiting their glory days. If the circumstances change in the right direction, they will be ready.

Demes undermine the idea that large populations are necessary for natural selection. A handful of plants or a stock of seeds is enough for evolutionary development. And when after five or six dark years the ash cloud from the comet impact subsides and all the dinosaurs have died out, spores and seeds move out into the fertile soil. The dead land is filled with the green leaves of ferns and leafy plants. And in a few million years the angiosperms reach full development, the deciduous trees in the temperate deciduous forest, the evergreens in the tropical rainforest and the herb flower plants in both zones. Ultimately 250 thousand species in total.

## The Decency of One's Location

What the evolutionary theory of the struggle for existence does apply to, is a certain kind of human action. Everything is allowed provided you don't get caught, is the morality here. A natural example is provided by the invasive species. In the course of tens of thousands of years an ecosystem has filled every nook and cranny with countless variants and species and along comes a guy who wants something different and plants an Oriental knotweed as food for his cattle. And before you know it whole natural areas on sandy and peaty soils are overgrown and sawing down and chopping up doesn't help as the bush reproduces vegetatively via pieces of stalk and roots and not sexually via seed (the insects that pollinate them are absent from the new location). The bushes are so strong that they break right through concrete foundations and asphalt roads and out-compete everything that grows and blossoms, so that there is literally no remedy.

Or look into that pond full of water hyacinth and water pennywort. They establish themselves in quiet lakes and ditches full of delicate wreath-shaped weeds and subtle varieties of duckweed and choke all the other greenery and fish. In their land of origin the invasive plants were esteemed members of the living community, but in the new regions, where they have no business and no one puts them in their place, they behave like proles and cause what economists call a disruptive innovation. In a market full of small and medium-sized businesses they establish a monopoly or monoculture in which there is no room for plants with more local claims. They destroy all the work carried out for whole generations by all the local species to build up a sustainable, balanced, richly varied garden of plants in landscape style. Struggle for life in the twenty-first century: a handful of extreme invasives seize power and establish an oligarchy where until then a relaxed democracy had flourished.

Competition is for losers, says the young CEO, the best strategy for survival is to become the only player in your market sector. This raises the question why in an untouched ecosystem like wet meadow or mixed deciduous woodland so many species actually occur. Why doesn't one naturally seize power and leave all the others floundering, as it does on a flat farm field where the green asphalt consists solely of rye-grass and no other species even try to establish themselves? The invasive species prove that in every organism there is a world conqueror who a long way from home can mercilessly fill whole areas with more and more of its own body. Every flower contains a weed, which farmers define as a plant that is difficult to eradicate and cannot be cultivated as something with commercial worth.

Apparently species only emerge where they know how to behave and fit into the existing community of plants, which makes special allowances for them. That is the key to the wealth of species on hilly grassland behind tall chalk cliffs or a mountain meadow rich in herbs. On the one hand the ground is so uneven that it forms a patchwork of slightly different micro conditions in respect of water content, available traces of food and temperature patterns throughout the years. On the other hand the plants provide protection for each other, which makes settling possible and prevents them from being blown away or drying out.

Not that plants are all softies. There are strongly competitive plant species, but they form heavy and nutrition-rich seeds that fall not far from the tree. Non-competitive species produce on the contrary enormous quantities of light seed which spreads across huge distances on the wind. Competitively weaker species prefer to pioneer on bare patches of ground, behind fallen trees or on washed-up river sand. The stronger species come much later and can no longer be dislodged, but by that time the weaker ones have long since established themselves on another rough piece of ground. There will never be more than a few specimens of some species: even under the most ideal circumstances they remain as rare as the one handsome lad in a provincial school full of clodhoppers.

In a few hectares of tropical rainforest biologists counted 600 different kinds of trees, 116 types of bushes and 171 creepers. By comparison: in the Low Countries only about 50 native trees and bushes are found. Whereas here you find large areas covered with stocks of beech and ash, in the rainforest trees of the same species are seldom right next to each other. A distance of a hundred metres is more usual, with thirty other species in between. Moreover, tropical tree species are strikingly similar and it requires a thorough study to be able to distinguish them by sight. They also all behave more or less the same as regards dissemination and establishment technique, rate of growth and crown development. So why did evolution see fit to introduce so much variety and how do the trees manage not to oust each other mercilessly, since they are not all equally strong?

The explanation is that every tropical species of tree has to deal with life-threatening parasites. However, the latter move much less easily through the jungle than the seeds of the trees, which packed in juicy fruits are eaten by animals and elsewhere are deposited on the ground together with fertile faeces and all. If two specimens of one species were to stand side by side, mould infection would mean the end of both of them. The mutual distance ensures that where one tree dies the others survive. That the solitary specimens are still capable of pollinating each other is due to their collaboration with insects and the powerful, extremely specific smells with which they lure them to their mature flowers.

Once people decimated the complete classical world in a few hundred years, scarcely the lifetime of an olive tree, the groves of cedars and oaks and laurels in which lightly clothed goddesses had hunted and disported themselves, and naiads of springs and streams were able to turn the heads of lonely shepherds and absent-minded youths. All that holy wood was carried off to the town, to the ships, to war. In the course of a thousand years the classical love of chopping travelled from east to west along the basin of the enclosed sea, until the ocean was reached on both sides and there was not one trunk left of what had been the source of all civilisation up to then. Lesson one: natural resources are finite. Once the trees were gone, the mountainsides were bare and the rivers dried up, the proud culture of the cities of the plain and on the rocky coasts declined. No more poetry was heard, philosophy was forgotten, the ruins sank beneath the sand. Lesson two: those who destroy their ecosystem will come to grief.

The natural counterpart of the infamous concept of genocide is *silvacide*. Not murdering peoples but forests. The forest to the north of the Mediterranean evergreen forest had defended itself against intruders through its impenetrability and repetitive

construction. The advancing travellers/conquerors constantly thought that they had previously passed this particular plot of birches or lime-trees metres thick, a disorientation that was experienced as dark and extremely hostile. The temperate deciduous forest is a continuous repetition of the same thing only different. Every twenty metres a new collection of trees appears, which first opens up into the cathedral sized space of a stand of beeches and then narrows to a dense ticket of maple, constantly slightly different. The amount of variation is low compared with the tropical jungle. One does though when passing through come across unmanageable obstacles every few hours such as fallen giant oaks, abysses and towering rocks which have to be steered around. Stumbling along determines one's course in virgin forest.

The first thing that colonialists do everywhere, is saw down trees, build straight roads right through the horizontal wilderness. In this way in a further thousand years in three or four waves after the classical period the whole continent was stripped of its temperate deciduous forest until there was scarcely a trace left, apart from a few last remnants. The taiga-like deciduous forest in the boggy lowlands and the wood, thousands of years old, on the hillsides, covered a continent in a cloak of grandeur and mystery, but was mown down to make room for grass, grain and stones, and a completely different species structure from what nature had found for itself. Destruction of habitats has for thousands of years been high on the list of factors that are driving the sixth mass-extinction, and the motives for it are always equally noble. People want to provide more living space, more food for humans with their desire for civilisation.

### **Pastures and Ploughed Fields**

A ploughed field or an orchard is a piece of land on which plants have to do what they alone can achieve: produce tasty biomass in nutritious roots, stalks, leaves, flowers, fruit or precious seed. The deal is clear. The plant produces a harvest and the farmer guarantees his plants the required growth conditions and development period. Whereas town-dwellers can organise their own time, the farmer keeps pace with his plants and animals. Town-dweller and agrarian live in separate worlds, but what links them are the plants that one grows and the other eats. They are part of the same cycle. From smallholder to agro-industrialist the earning model of farming existence has remained the same for ten thousand years, and only the scale has become greater.

Traditionally a farmer lives together with his plants and animals, he adopts them into his family. But when they are ready the farmer ruthlessly cuts the throats of his adopted sons and daughters and eats them, smacking his lips. By that time the sowing seeds lie waiting in a cool storage barn until it can enter a new round of sowing, germinating, growth, flowering, fruiting and harvesting. In the orchard the fruit trees have already grown buds in late summer from which in spring the new leaves and fertilisable flowers will grow. And in the stalls the pregnant cows huddle against the beams between which they will bear a new generation of red meat, at the end of winter. Pigs continue littering all through the year.

Everyone performs his task professionally, plant, animal and farmer each receive their share. Give and take is the principle of life. In the stall a religious mood soon emerges.

Cows are shrewd creatures. Once settled on grassland with the occasional spinney – primitive cattle could climb trees – they attracted the attention of man as a source of barbecue meat and milk products. And humans met their demands. From the moment that 80 specimens of the aurochs crossed over to human control and allowed themselves to be domesticated and bred on, according to the wishes of their benefactors, from the highlands to the lowlands woods were opened up and marshes drained to make room for what cattle most like eating: grass, which has in the meantime been grown so nutritiously with artificial fertiliser and eugenics that today's cows have lifelong diarrhoea.

Yet the cow, wherever it stands under the protection of a barbed-wire fence or a bull, always makes a contented, self-satisfied impression. They lick the hand of the farmer and passer-by and their smell is sweet and friendly. For road-users they are visual stimuli, black-and-white and brown, in what is otherwise a deadly dull agro-landscape, living furniture on bright-green fitted carpet. And what do cattle do in return for the complete readjustment of nature and personal care by man? With their shit they make the ground water acid so that all the plants die except for the grass, and with their farting they pump more greenhouse gases into the atmosphere than all the cars on earth put together. Dairy cows are monsters, disguised as huge babies.

Plants that took the side of humankind and allowed themselves to be grown as an agricultural plant sometimes turn out to be enormous scoundrels. Take the case of soya. The tropical rainforest has a crazy diversity of thousands of species of tree with hundreds of endemic beetles and frogs and fifteen thousand different orchids high in the branches. On the marshy subsoil among moulds, water, ferns gathering fallen leaves, strangler creepers, razor sharp leaf edges and clouds of stinging mosquitos, jaguars, tapirs and venomously biting rodents prowl and leeches are ready to attach themselves to every piece of flesh that ventures near them. Every plant, every living creature in the rainforest does precisely what it is good at and cannot do otherwise. In the course of millions of years it has adapted precisely to whatever forms of life circulate in its direct vicinity.

This tropical lowland forest is now being pulled down hectares at a time by bulldozers and chains. People are carting the hardwood off to the building trade, clearing the ground with fire, sterilising the soil with artificial fertiliser and herbicides, and sowing a plant which in a few months with any luck will produce a high yield of pods. Past the dead-straight edge of the remaining forest to be cleared there is only one single plant to be seen. Tight rows of a billion identical, cloned specimens of the protein-rich soya bean. The soya bean has been genetically modified, surviving agricultural poison that kills all other plants – and with it also all the worms, beetles and rodents, living on the weeds, and the birds that hunt them, and the birds of prey that are the strict keepers of the whole: cleaners of plants that up to now could manage without the help of poison.

Where in the jungle the hallucinatory thundering and screeching keeps giving the visitors the shivers, in the soya fields it is deathly still. Only the wind is audible above the

fields of doom. The poison has done its work. The soya plants are scarcely living beings any longer, rather vegetative robots, clumsy organic machines. The dominant plant entered into an alliance with criminal industries to stifle everything that is different and claim all the space for itself, all the money. In the struggle for existence the soya bean has proved the fittest, the best adapted to the prevailing circumstances. Except that its adaptation consists in having its staff chop down and spraying to death the landscape so that nothing and no one is left to be taken into account during its growth. Down with competition and may the best man win, down with plant and mould working together against all too intrusive insects and worms. Commercial monopoly is the starting point and monoculture the final result.

Every few months technical apparatus in the form of fertiliser and poison-spreaders arrive in the soya deserts. In season a battalion of kilometre-devouring combines advances in a wedge-shaped front across the dusty fields, tugs the soya plants out of the ground and collects the nourishing beans. The rest of the plant is rubbish. The soil is given no time to recover, as the following cycle begins immediately after the harvest. Artificial fertiliser, seeds, poison, harvest. And who for, this massacre of living nature, this ecocide, and why? To feed piglets and calves on another continent so that they quickly become fat and eatable, saleable merchandise. For those indifferent mass animals that don't even taste very good, they tear down a living pristine forest, while it will take at least 700 years to return something comparable to what in 20XX are the abandoned, stone-dead agricultural ruins of project gene food.

### **Cultures of the Forest**

Worldwide there are scarcely any natural areas left which are completely made up of plants which evolved in situ or established themselves there through independent pioneering. In the Low Countries six per cent of the plant species present are native, the rest come from elsewhere. The multicultural human society was preceded by a multicultural nature. And how lovely those bulbs are every spring, the snowdrops, crocuses, trumpet daffodils, wood anemones, scyllas and all the other colourful pearls and jewels which were once brought over from the Middle East and since then have run wild on what would otherwise have remained bare woodland soil in March. There was no question of the suppression of native bulbs, there were simply none.

Not every exotic species becomes an invasive monopolist. The stranger can also be an enrichment for what is naturally quite a poor environment – especially if it is recovering from an ice age which ended shortly before. Plants, like the people who lug them around, have become citizens of the world. The great migration of edible plants, decorative plants and production trees from the sixteenth century on mixed up all the plant communities and vegetation types worldwide, with their accompanying insects, moulds, bacteria, viruses and soil organisms. Old nature will never come back. Plants don't feel sad about that, the nostalgia of nationalism is alien to them.

Only through thorough fieldwork can one sometimes deduce how plants once adapted to their original environment before civilisation created very different conditions.

Horrible word, civilisation, you can hear the stripping and taming of the earth in it. And once that emptiness is a fact, nothing will stop man from introducing a new kind of vegetation, not only to cultivate as an agricultural crop, but also pleasing the eye with what the population after a single generation will see as the original vegetation of their native area. Townspeople experience even a shorn pasture as nature, or more precisely as *greenery*. In private and public gardens, supplemented by forgotten street corners, canal quays, vacant lots and roofs that are overgrown, there are now many more types of plants to be found than in the countryside which has been emptied by motorised saws, agricultural machinery, poison and artificial fertiliser.

Culture is everything not made by nature but intended as a paean to man and his abilities. Culture is nature that looks at itself from a distance and hence can change itself effectively. Culture is controlled nature, not something different. Culture is raw material processed by technical means in which work is expended to create value. Culture is one play-element among many. Culture is manipulating a natural object so that it becomes art, the subject of attention and reflection. Culture is the carrier of spiritual values to which nature cannot arrive under its own steam: insight, wisdom, meaning, historical awareness, a common humanity, the religious dimension, trust and gratitude. *Give us this day our daily life* is the only prayer that the plant knows. Nature equals blind production, a conveyor belt that constantly turns out new generations of bodies whose sole function is to put successive generations into the world. Everything about a plant or animal is in the service of the production of new generations. Reproduction is nature, but sex is culture. Play instead of duty.

Says man. Plants see things differently. Nature is matter that wants to understand itself by expressing itself, and it expresses itself in culture. Culture is the way in which nature organises itself in a certain spot. Culture is: that's how we do things here. We build elms with this kind of trunk, we allow this kind of fern on the floor of our wood, these kinds of herbs at the edge of ploughed fields. Culture is everything that has been learnt at one time or other, whoever you are, plant, animal or mould. Young trees too have to go through the school of life before they can climb the heights. Culture translates itself in the many moods that maples are able to create in a recreational woodland, sometimes as thick grabbing branches on a gnarled head, sometimes as impenetrable woods, sometimes as leafless branches which sprout from the ground like a fountain in a circle and create a breathing emptiness between the plantless soil and the whispering crowns of the trees above. Culture takes place in time, not only in space.

A wood is a patchwork of cultures, of gothic beeches and buzzing limes, crooked spruce firs, ashes grabbing for light, applauding poplars and skinny birches which stand mischievously in a group along the heathland. On a meadow by a stream rises a majestic horse chestnut, which with its full crown and shadow founds a kingdom, but every autumn dies back gloomily with dirty, diminished crinkled leaves. Culture is not the opposite of nature. What people regard as their cultures, forms one cluster in a much wider class of natural cultures. Human cultures too are no more than ways of establishing nature in a particular spot. There is only one nature, one multicultural society of trees and bushes and

plants and quadrupeds and birds and insects and on and on, all bubbling with desire to realise their own individuality, receive recognition, receive and give love, spread happiness and enjoy life, without having to be constantly on one's guard. Culture is: this is how we want to live. With grace.

The distinction between the social world of man and the natural world of the rest of living organisms is an artificial one. Social life is one of the elements that characterise the ecosystem in a particular spot. Let an industrial site fall into neglect and the tenderest clovers will germinate between the sliding concrete sheets and the dog rose will appear on the sand heaps whose base was contaminated with used oil until moulds gave them a good spring clean. Every social system, every society ought to maintain itself in an environment that tends spontaneously to another, previous state, a type of vegetation instead of a town or a ploughed field. Economy is part of ecology, not the other way round. There is only one nature, we cannot repeat it often enough.

But in that one nature a merciless war rages, a struggle that has gone on for 4.5 billion years between two camps with diametrically opposed interests. One camp wants life to last as long and as richly as possible and experience it itself as intensely as possible and have others experience it. The green plants belong in the life camp, they provide oxygen and water, they create soil where otherwise there would be bare rock. They remove masses of greenhouse gas from the atmosphere and confine it in biomass, food and nourishment, or render it harmless in coal, oil and natural gas.

In order to exist plants have to resort to huge numbers of bacteria and moulds which are constantly doing repair work to the fairly rickety ecosystem without which a plant will not bloom. These so-called lower organisms, of which there are unimaginably more on earth than all the plants and animals put together, are also on the side of life. And the animals belong too, apart from a few demented herd animals. And humans? Oh, humans with their freedom ...

Whatever happens, never give up, that is the motto of the life camp. Again and again plants and their allies find a new solution to the design problems with which they are confronted when, for example, the average temperature on earth shoots up by eight degrees in scarcely a century. Plants are responsible for more inventions than those entered in any patents office in the world. Life is full, it fills everything that tries to stay empty. In every litre of seawater there live a billion individual bacteria – what are they doing there?

Life always wants more and always something different. It cries at everything that works as happy as a child: again, again, again! Life is never bored, it is always active, even in the coldest winter when the flow of sap is almost stationary, but a battery of cells is being prepared for the following spring, to go on swelling and swelling, and very quickly to bring a leaf or a flower into the light.

This constant thinking ahead, this sacred imperative of living nature, fills the camp of death with deep disgust. For death life is a scandal crying to heaven, an unbearable humiliation that cries for revenge. Everything that lives stinks, is filthy, damp. Repulsive, sticky, unnatural, a metaphysical blunder of world-historical proportions. The aim of the

death camp is to put an end to it as soon as possible, or if that is not possible to make it as tenuous and as boring as possible, or if that can't be done to become as sad as possible oneself.

The aim of the death bringers is called entropy. The promise is the release of consciousness from the strictly organised prison of the body. Life may have billions of forms, death has only one. That offers a way out. Dying is difficult, but everyone manages it. And everything must die, die, die. What a mysterious, magic word it is, the most beautiful sound on earth. You have to bare your teeth to pronounce it.

Whereas you have to work for life, you don't need to do anything to be dead. You just need to die. After a completed life or a life that feels utterly wrong, a death of one's own choosing is a worthy conclusion. Suicide leaves those who are left behind with the sense of guilt at being too cowardly to take the route to the grave that they too had sometimes contemplated. For death and the peace that it offers, one can give a thousand good arguments. For life there is only one argument. You have been given it without having asked for it. Because that is the unfair thing. You can only wonder if you want to live when you are already alive, if you have already tumbled into the trap.

Why are you so patient, death asks the living. What are you waiting for? What's stopping you? Under the consciousness of the restless human being lurks an abyss of emptiness, absence and non-being. There are many routes to sink into that hole. And also many to distract one's attention. Think of religion, consumerism, money worries and children. Cynical strategy of the death camp: the population explosion. So many people on earth that the ecosphere is bound to collapse under the strain, and no one is guilty, because the motive is love. And anyone who wants to do anything against it is inhuman, a sicko.

In the war between life and death the power relationships are very unequal. Death has the whole universe and all past time in its grip. Life happens only at this one moment in this one spot on this transient planet, our precious Earth. Death need to win only once and the struggle is settled for all eternity. Life has to be passed on, built up, unfolded and broken down again, by millions of different beings from tiny to mega-sized, from masses to extremely rare – each round is a risky undertaking. And yet life goes on and on. It has endured five mass-extinctions with flying colours. Life is shrewd and stubborn, constantly devising new tricks and tactics to get out of a jam.

### **In the Anthropocene**

What makes the sixth mass-extinction different from its five predecessors is that this time not only the numbers per species and the quantity of different species will plummet, while greenhouse gases will push up the average temperature in the course of a few decades to heights that will cause whole continents to dry out and forests to burn down. This happened previously and was withstood, 252 million years ago. Then the recovery time for the worldwide ecosystem totalled slightly under 20 million years. Another new feature of the sixth mass-extinction is that the chemical composition of the soil and the ground water has

also changed worldwide, polluted by billions of kilos of industrial emissions, artificial fertiliser and agricultural poison which once absorbed into the food chain never again seep out of it.

Even when herbicides, fungicides and insecticides concentrate in the fat of top predators and disrupt the bodies of human and eagle to the point of death, the poison will still not have been rendered harmless. In the processing of the dead body microbes reintroduce the carcinogenic substances into the cycle of construction and decay that life passes through year after year. Agricultural poisons are poisonous because they cannot be broken down biologically and never will be. They are synthetic, technical substances for which no organic cycles of recycling have been developed in evolution by bacterium, plant or animal. That is their point, their unique selling point.

Biochemistry is the favourite science of the death adepts. When you understand how a biological process works chemically, you can wreck it. You can also manufacture substances which no living organism can deal with, like plastics, and fill the oceans with them until all the creatures in them choke. You can earn billions that way, and money is good according to the death camp: it is an abstract system of signs that consists largely of numbers in computers and so does not leave behind any stink or wetness.

Meanwhile seawater is becoming more acid and the shellfish are dissolving, and the sea is also becoming saltier, to the detriment of sea mammals, and it is being fished until it is empty down to the bottom and churned up so that remaining populations collapse. The sea level rises many metres in a few decades. The saline pollution of the agricultural land behind the newly created coasts will lead to mass migrations of people. When, from the polluted, oxygen-less liminal seas sulphur gas rises up and creeps onto the land, first the birds will die with their sensitive lungs like canaries in the mine shaft and then the other citizens of the world.

Colonies of mould and bacteria travel by boat to another continent and there kill the chestnuts, the ashes or the potatoes, bananas and other cloned fruit. Invasive species like the mitten crab strip blooming algae zones down to the bare stone, and in so doing the habitat of the original coastal residents and themselves. Scent molecules from billions of litres of perfume and deodorant are being disseminated through the lowest layers of the air, which demands the utmost from the smelling organs of honey bees in search of flowers to pollinate, which for them are invisible from afar.

It takes a lot to create a mass-extinction and the camp of death leaves no stone unturned but uses all methods at once. The previous plan to eliminate life with the help of atomic weapons, which would blow up or burn out the planet – that attack has been up to now warded off by watchful citizens and recalcitrant politicians. We're now entering the Anthropocene, an honorary title that humankind slides onto its sweaty forehead like a plastic crown.

A new geological period? Rather a transitional time, lasting a few hundred years. It begins with the fatal invention of a steam machine and explosion engine running on fossil fuel which form the basis of the industrial world and ends with the reduction of the flora

and fauna to a handful of species in the only remaining strip in what remains of the temperate climate zone after the extinction. A geological flash. When the meteor that destroyed the dinosaurs struck there spread worldwide in the clouds of dust the extraplanetary element iridium, which can be recognised as a layer in rocks down to today. What will be left of the Anthropocene in 66 million years' time? A wafer-thin layer of heightened radioactivity.

The Anthropocene is the geological name for the awareness that all the knowledge that people have gathered up to now about themselves and nature is founded on quicksand, a misunderstanding, often a lie too. Ancient philosophers and domains of knowledge worked on the tacit assumption that whatever man might destroy, exploit or plunder and whatever exciting systems of ideas man dreamed up – capitalism, communism, socialism, humanism, realism, idealism, nihilism, modernism, post-humanism, plants would go on undisturbed waking in the spring and going to sleep in autumn or race through the whole year as in the tropics.

The driving idea was always that, because humankind had placed itself as a species outside nature, nature could not touch it, except for that remnant that remained in man himself in the form of *human nature* or innate malevolence or goodness, depending on the philosopher or ideologue that was talking. Change man, for the rest will remain the same anyway. That slogan is now passé. Humankind can no longer afford this illusion or this cynicism. Nature is no longer the imperturbable and indifferent background to the human drama, the grand tragedy of rise and decline, pride and fall, blind power hunger and love in vain. Nature definitely can die and the last one to turn the light off over a planet choked in slime will not be a wild animal, let alone a plant, but a human being in the depths of despair.

Since people no longer love plants, they have started to get bored. Even on the greyest pavements the parks department uses trimmers to destroy the lovely sow thistles that fight their way up between the slabs. But, however dreary the stone world becomes, women still wear flowered dresses, and against the darkest back window there is a lemon geranium spreading its scent. Human - plant = death. You immediately feel the emptiness when you enter a house without house plants. Severe grey offices too in concrete and mirrored glass cannot do without wispy yuccas or round-leaved calatheas in self-watering pots. So the conclusion is different: human + plant = life!

Replace *man* in this equation by any other animal. Magpies, ants, red admirals or snow leopards, without plants no animals, no food, no oxygen, no protection, no spot of which you can say without being able to explain it: I live here. I feel at home in this type of vegetation, even though the original wood or heathland has long since disappeared behind the walls of the town and there are only shreds left in the countryside, small landscape elements, hours of happiness.

Look, says the mediagenic professor on TV, let me explain it using a comparison. The time that has passed since the Big Bang has lasted so long that if you write down the whole story of the universe in the 25 thick volumes of the encyclopaedia here on the table, man only occurs in the last volume, in the very last sentence of the very last paragraph. Short-

sightedness of science: if you were to write the story of the earth and our solar system, humanity would occur at the end of volume eighteen, with a further seven volumes to go.

People are not the end of world history, they constitute only a passage in an epic narrative with four billion or so years still to run, until the sun cools. And if you were to write out the whole universe you would need some 12,500 volumes, because the universe will definitely continue to exist for another ten billion years. What makes man worth mentioning in this story? The fact that you are reading this provides the answer.

In man the universe becomes conscious of itself. To that end it had to bring forth a being that is capable of taking distance from the stream of life from which it comes and of which it continues to be a full part. Written language is the means to achieve this. If you write the words that you speak and think and can read them on a piece of paper or a screen, you are looking at your own thoughts and you realise that you do not coincide with what you think or feel and that you are something different from what you want or what drives you on.

You do not coincide with your own consciousness, because you can place it outside yourself. The I of the writer and the reader see themselves uncoupled from nature. Not that their bodies no longer obey the laws of nature, but their spirit abides elsewhere, in the world of abstraction. In the network of concepts out of which thoughts are built up, in the clouds of words with which people understand each other and their lives. *I is another*. Who? Everyone decides for himself. But where, where does that I reside?

It is to be found in the realm with which all living beings are linked, from the bacterium and the blue-green algae to the ferns and the oh so still and aged alders or the evening primrose, radiant in the evening twilight, and the tiny tardigrades and springtails in the damp moss up to the wailing swifts and the thoughtful blackbird that twitters about the spring in the roof gutter. Or from the gibbons and makis singing praises high among the leaves of the misty forest to the elephant on the savannah with its few trees, and from the yeast that make the beer foam to the unearthly forms of morels on soft green spring ground.

That realm of the spirit, in which the answer is to be found to the question not how, but why life on earth has existed for so long and is so keen to go on making inventions and developing habits and enjoying progress and the eternal recurrence of the same thing in a different form. The plants cannot formulate that answer, but man can with their languages, their unpredictable talents, perhaps.

### **Resurrection of the Plant**

Humanity must realise what it is doing when it decimates between 70 and 90 per cent of the species on earth and in so doing reduces itself to a population size of, instead of the present slightly under ten billion, 60 thousand individuals. That number has been calculated by bold deep ecologists and is below the fatal threshold above which the human species would again start increasing exponentially, with all the devastating consequences for the

ecosystem. The number is an expression of hope: it is not necessary to abolish humans to save the world, restricting to natural numbers is enough.

How can the low number be achieved? Wiping out half of humanity with a medieval plague epidemic would have scarcely any effect, because if the birth rate remains the same you'll be back at the old number in twenty-five years. Nor did the massacres of the two world wars and their aftermath lead to a reduction in human numbers, on the contrary. Much more effective and humane is one natural child per woman. That will halve the population in one generation, and again after a quarter of a century: continue with the one-child policy as is necessary.

A courtly culture will establish itself and develop, a tradition of care for the dying and mourning for deceased family and friends. An economy of permanent shrinkage. Biotechnology will clean the soils, lay synthetic forest floors, rid the oceans of microplastics, restore fresh water to the wetlands invaded by salt water, filter layers of the atmosphere, absorb carbon gas. Restoration is a much more exciting idea than progress.

They are only people. Sixty thousand. How great is the destructive power of this species, that so few specimens are tolerable for what in x hundred years' time will be left of our sorely tried ecosphere? Or is that number so small because there won't be enough agricultural land left to maintain cows and fields of grain for the provision of food for human beings, who have to maintain a high energy level in their bodies to make their written culture continue?

Or does 60 thousand mean that humankind has finally found its place in nature and adjusts in order to make room for the grander life on earth, of the plants, toadstools and other animals with their microscopic auxiliary troops? Who knows but the plants and other survivors will be prepared to keep humanity in service for a while. Sixty thousand Terra gardeners who with nanorobots and microdrones are monitoring nature on a planetary scale and where necessary repairing it. Every year they pollinate – for lack of exterminated bees and butterflies – the remaining flowers.

The plant has a different way of dealing with death than the animal or human being. For every animal dying means the final end. A little bit of him or her may live on in the descendants, but they are autonomous beings who can get on perfectly well without parents if the latter are out of the picture. A plant on the other hand dies while leaving itself behind, reduced to its minimal form, a seed with an embryo from which a new plant will grow if it finds the right environment.

A bulb plant dies in spring already after blooming for a few weeks. Afterwards it nestles in its leafless and flowerless subterranean parts for the rest of the long year. An annual herb is even more drastic. The whole body of the plant dies off except for the fine seeds which it has formed and released, about three months after itself has germinated from a similar seed. The world determines whether there will be a next year for the annual.

Again and again plants allow death to advance to the extreme edge and again and again they manage to find an escape route in time. Their metamorphosis into a seed or

spore is the door from death back into life. A deciduous tree dumps all its leaves each year and so allows half of its body weight to die and fall into a restless autumnal grave. At any rate the greater part of a tree consists of dead matter. All the core wood in the trunk has died, up to eighty per cent of the total weight. Only in the thin strip of sapwood and bark are there still signs of life.

The ground-covering weed and the heaven-storming giant of the forest are dead most of their lives, not apparently dead like animals in hibernation, but stone dead. They compost actively. They are food for single-cell organisms and worms. And then spring comes and life blooms again. The miracle of resurrection happens every year anew.

[Afterword]

This booklet contains a translated version of the first of the four chapters of my book *Vanuit de plant gezien* (As Seen by the Plant), which was published at the beginning of 2019 by Uitgeverij De Arbeiderspers in Amsterdam. The second chapter is an architectural investigation into how plants construct themselves and why. Chapter Three is a natural-philosophical essay on the way in which plants organise the world and make it habitable for themselves and animals. Finally there follows a case study of plants in the Netherlands, where plants are central in the (worldwide) struggle between industrialists and ecologists over the design of the landscape.

My writing up to now, twelve essayistic books, has been largely devoted to the influence of technical media on our experience of the world, and how that translates into art, science and technology and one's experience of one's own body. Media create a blind spot in their users: the latter get very excited about the content of the media, but they fail to see how the medium itself constructs their emotional life, or only in exceptional cases – of which humour and art are the most important. The question as to the operation of media, and especially of computer, robotic and cybernetic systems, remains of great importance, if we want to understand what eludes us.

McLuhan said that you can grasp media but not escape their grasp. I believe that escape is possible. All it needs is a widening of perspective to include the blind spot where plants live. The media form their own, closed media reality, but behind the screens nature has simply gone on existing. The old axiom that whatever dramas human beings come up with, the leaves will appear on the trees in spring and the story of the birds and the bees will begin anew – that certainty has started to wobble. Everyone has by now formed an impression of the horrors that will ensue in the sixth mass extinction, of which the rise in the climate is only one aspect.

As Seen by the Plant forms part of a series that begins with my collection of personal essays, *Wat is leven?* (What is Life?, De Arbeiderspers, 2014). In it I ask myself what disappears when my father and later my mother die, and what is added when my son is born. I analyse among other things the work of vitalist biologists: the botanist Raoul Francé, the zoologist Jakob von Uexküll, the system biologist Ludwig von Bertalanffy, and the third-generation cyberneticist Francesco Varela. They dare to ask the question about life itself instead of covering it up, as in the dominant, materialistic biology, in which I was trained. This brought my love of plants to mind and when I investigated their condition at the moment, I was seized by panic.

The second volume in the series is a study of the Swiss essayist and world-observer Adrien Turel (1890-1957). The starting point is the absolute difference that Turel perceives between animals and plants. Animals can only move their bodies, plants can only grow. This brings Turel as early as the 1930s to an analysis of the Anthropocene, which he calls the

Ultratechnicum, humanity as a system of absolute power. I engage with Turel's thinking in my *De successtaker. Adrien Turel en de wortels van de creativiteit* (The Success Shunner. Adrien Turel and the Roots of Creativity, Uitgeverij Duizend & Een, Amsterdam 2016).

I wrote *As Seen by the Plant* in a consistently vitalist style, although I obtained my facts from the usual, mechanistic sciences. I asked myself the question whether this mental exercise would be possible and my conclusion is that vitalism works at least as well as materialism, but is much less harmful. In the scientific view of the world, the plant is there and I am here. Seen through the vitalist lens you can also be in the plant and vice versa. You don't become a plant, you experience the world from the point of view of the plant. You see what the plant pays attention to when it looks around in your world. I don't believe that vitalism is the one true faith, but it does make you a better person. I am not an adherent of (philosophical) animism. I acknowledge that plants, animals and moulds are persons, but stones and molecules are not. Life and death are absolutely separate and operate in opposite directions, I learned that from my plants.

Amsterdam, February 2020