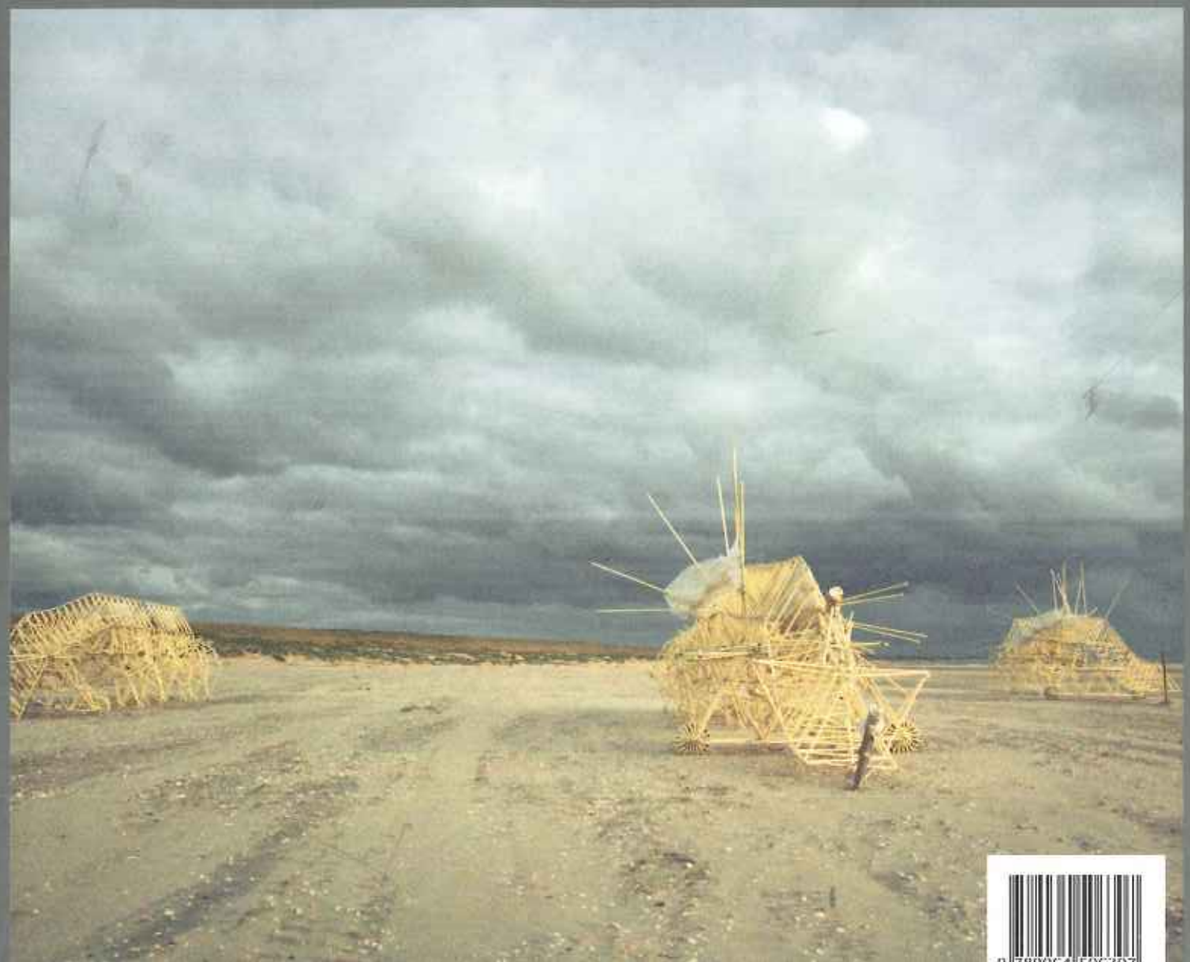
No creature on earth is better at pretending than we humans. The title of this book is a way of saying that our daily life is nothing other than a show played out in our minds. We have a talent for creating a fantasy world. Luckily for us. He who is unable to daydream becomes hopelessly depressed. Our talent for simulating is so strong that we are even able to pretend that we exist. We simulate a first-person form, an 'I'.

In *The Great Pretender*, kinetic artist Theo Jansen shows that the 'I' we envision is a tool in our evolution. We need this tool to be selfish. There can be no selfishness without the I-fantasy.

Since 1990 Theo Jansen has been engaged in creating new forms of life: beach animals. These are not made of protein like the existing life-forms but from another basic stuff, yellow plastic tubing. Skeletons made from these tubes are able to walk. They get their energy from the wind, so they don't have to eat like regular animals. They evolved over many generations, becoming increasingly adept at surviving storms and water from the sea. Theo Jansen's ultimate wish is to release herds of these animals on the shore. In redoing the Creation, so to speak, he hopes to become wiser in his dealings with the existing nature by encountering problems the Real Creator had to face.

The Great Pretender is a testimonial to his experiences as God. It's not easy being God; there are plenty of disappointments along the way. But on the few occasions that things work out, being God is the most wonderful thing in the world.

Includes a companion DVD of beach animal videos.



DVD
with
beach animal
videos
at the back of
the book

Left half

Right half

coil wheel

PREGLUTON

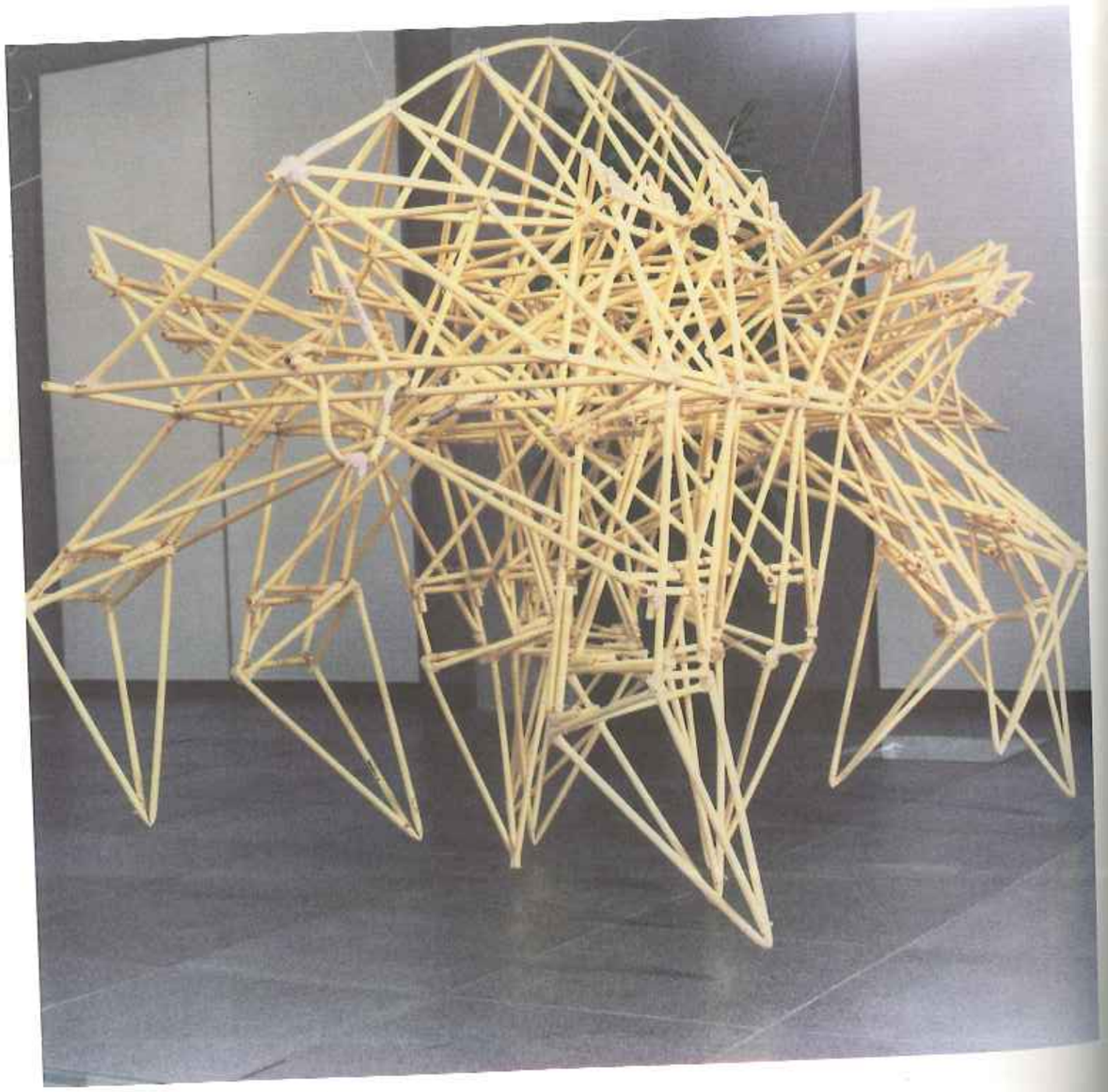
the period before the Gluton (before 1990)

Memory in reverse

In the Pregluton, there were no animals of plastic tubing as yet. This initial period was marked by an absence of matter. Life then consisted exclusively of dreaming about life. I made virtual animals in the computer, life-forms subject to an artificial evolution. I also went walking a lot on the beach and in the streets of Scheveningen for inspiration for my columns. Since 1986 I have been writing pieces for *de Volkskrant* national daily on matters that interest me. Often these are technical things, fantasies or musings. That one of these columns would ultimately define the rest of my life was something I had no idea of at the time. The beach animals began as a newspaper item.

Strandlopers

column in *de Volkskrant*
24-02-1990
(translation on p. 240)



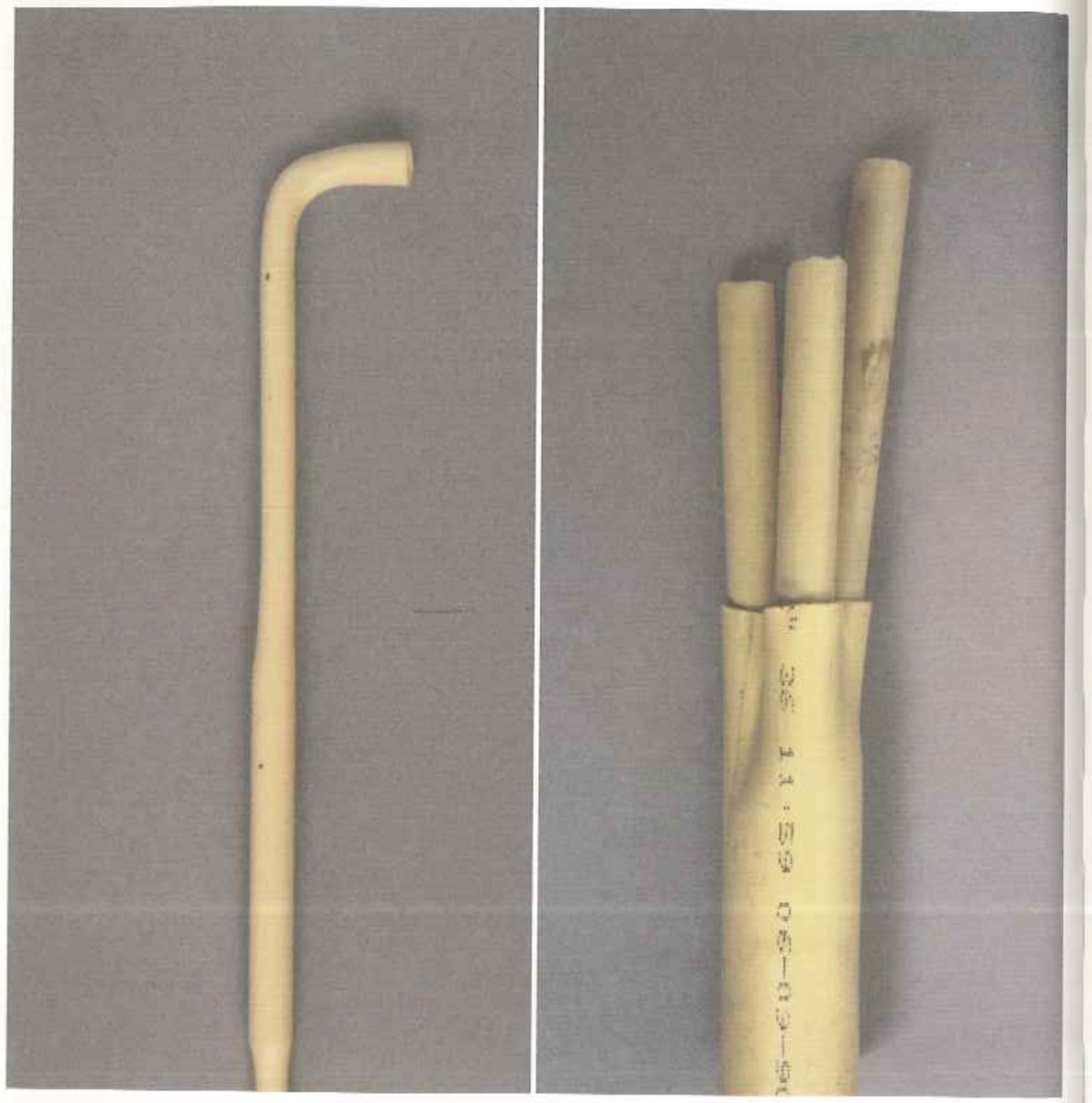
Animaris Currens. The first beach animal to walk

Nothing happened for a full six months following publication. Then, one warm September day, I went to the Gamma DIY store to buy a few of those tubes. I played around with them for a bit. It seemed you could do all sorts of things with them. That same day I decided to devote a year of my life to the tubes. That was seventeen years ago.

Scheveningen is a small seaside resort that comes under The Hague. It's where I spent my youth. It seems as though reliving my earliest years gave me an open mind. I looked at the world as if I were a child again; as though I were observing the wonders of creation for the first time. 'Resetting' was my word for it. Just as you reset a computer to start from scratch, so I 'reset' my brains by indulging in long walks taking in places from my childhood.

During my early years I must have conducted myself like an extraterrestrial visitor disguised as an earthling, as inconspicuous as a tree in a forest. I've discovered this since re-encountering people I used to know. Schoolfellows, local boys – they simply fail to recognize me. I can describe myself until I'm blue in the face, but still I draw a blank with them. This happens to me a little too often. Such encounters take place in the tram, in Scheveningen, in Amsterdam, everywhere. Whereupon I slink off in shame. I'm ashamed at my incapacity for forgetting. I am fated with an excellent memory. Details of earlier times are imprinted in my head, the stair rods at our house, the wrinkles on the forehead of our physics teacher, Mr Koesmans, the nicotine-stained teeth of my Dutch language teacher, Mr Bulsing, the faces of classmates and more than anything else the taste of school milk, which is different to that of ordinary milk. A small bottle with a silver top. I just can't forget things. Worse than that, my memories keep waylaying me. They flit across my mind at odd moments.

One's childhood years should provide a stock of memories, memories on which you can draw to create new memories. That stock is complete at the end of your life. And then you die. It would all seem to be for nothing. But of course this isn't so. There is such a thing as a memory in reverse. Something that enters the world from the mind instead of the other way round. Memories in reverse are born in the brain as an idea. Well-formed memories in reverse have the capacity to be remembered, even if the body has died. The ultimate example of a memory in reverse is Einstein's Theory of Relativity, which came into being in Einstein's grey matter in 1905 to then be disseminated all over the world. You might also call it a departing memory. It has settled in books and in all the heads on all



Animaris Excelsus, thumb joint of drive muscle, tri-split joint

those bodies. Despite the fact that Einstein is dead, his departed memory will live on.

Besides the stock of memories, there is also the stock of relics. Objects you lug along with you every time you move house: important letters, keepsakes, embroidery. This stock too is complete at the end of your life. As a rule it ends up on the rubbish heap. But sometimes these objects have the capacity to reproduce. Aeroplanes, for example. Whenever I drive past Amsterdam Airport and see the big planes roaring into the sky, my thoughts inevitably turn to the Wright brothers. I pretend they are on the back seat of my car and that I, representative of the present day, am showing them what their work has led to, in the hope they would be impressed. Granted, their tinkering on the beach at Kitty Hawk produced a rinky-dink affair but that plane has certainly has its fair share of offspring.

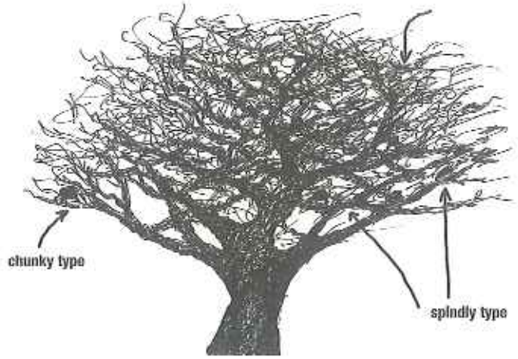
Memories in reverse have the ability to be remembered far and wide after death. Nor is it just famous and successful scientists and inventors who try to attain immortality; we all make our own attempts to achieve just that. Most people reproduce. Many of these will be unaware of why they do it. So to them I say: you're doing it to be remembered after death. They're laying on a stock of children. Children not only inherit genes, they are pre-programmed by their parents. Parents don't just leave behind a genetic trail but also a way of thinking and a way of acting.

The beach animals will be my brainchildren, my memories in reverse. Just like real children, they will be patronized, mollycoddled, cared for and trained to withstand the perils of the beach. There comes a time when they get shown the door. Off to the beach with you! Then they must fend for themselves. Once that happens, I can breathe my last with a light heart, knowing for certain they will get by.

In the Pregluton I fell under the spell of a book. This was *The Blind Watchmaker*, written by Richard Dawkins, a British zoologist and a compelling author to boot. Dawkins cites a number of striking examples from evolution. One of these was the stick insect.

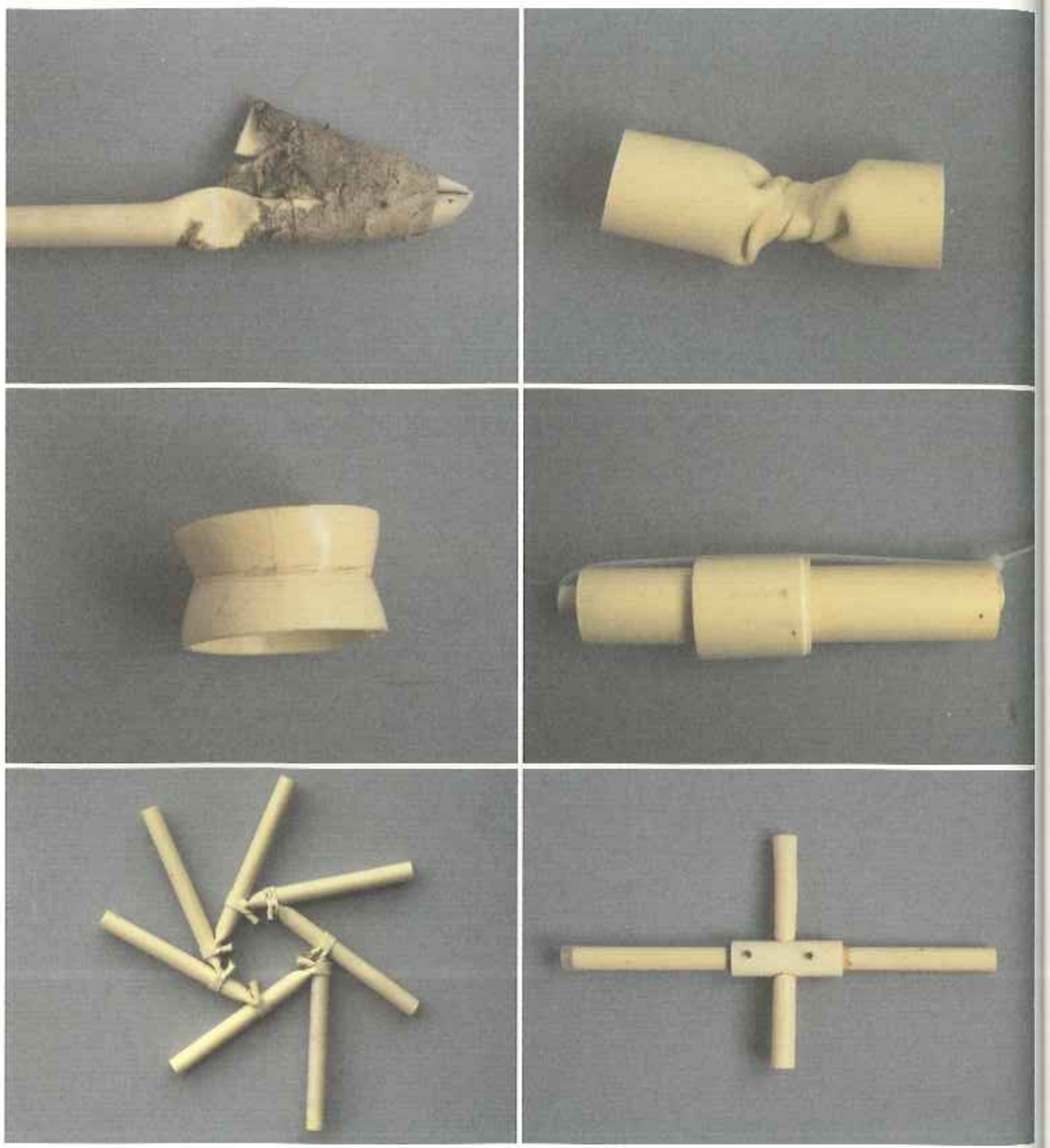
Millions of years ago, the stick insect was just an insect that lived in trees. It didn't look at all like a stick. And like all other insects, this pre-stick was eaten by birds. Yet at that stage of evolution, birds still had fairly poor eyesight. They had difficulty observing the creepy-crawlies among the branches. These days,

plastic spring



insects of a single species are never entirely identical. The same holds for us people. You have fat people and thin people and every nose is different. To us, insects of the same species all look the same yet they are individuals. The whim of nature guarantees variation. Spindly and chunky types of stick insect must have populated the trees too.

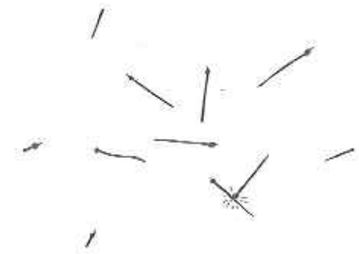
Imagine being a bird with poor eyesight, and it's immediately clear which examples of the insect world of yore would be the prime candidates for a meal: the chunky ones. The more spindly variety probably shared the same fate, only it took longer to find them. They had more time to reproduce. The upshot was that more spindly types were born. There was even a likelihood that in time an entire tree was commandeered by the spindly dynasty. Yet even in that situation variety reared its head. There were *chunky spindly* types and others you could describe as *spindly spindly*. The outcome is clear enough; the spindly spindly types produced more offspring. Over millions of years the insect bodies become more and more elongated to became the stick insect we know today. That's the way evolution works. Today's stick insect even has patterns resembling the leaf wounds found on real twigs. It may well be that scars such as hereditary pimples and knobbles gradually took on the appearance of real leaf scars as a result of selective feeding behaviour among birds. On the other hand, as time went by, the birds' eyesight improved. Each species had created the other, in a manner of speaking. The birds moulded the insects into a wondrous stick on legs and the insects are responsible for the birds' perfect vision. An absolute miracle and, at the same time, perfectly logical.



barbed hook leg of Animaris Sabulosa, rope end
rotating vertebra, precursor of foot of Animaris Rigide
example of a tube-gathering joint, on/off stick

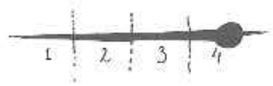
Animaris Lineamentum

I so wanted to observe the phenomenon of evolution with my own eyes. Which is why I constructed a computer creature. It was just a line (Lineamentum) that shifted across the computer screen. Whenever it left the screen at the top it appeared again at the bottom edge. The same went for left and right. If it moved off screen at the left it immediately re-entered stage right. So the creature was imprisoned in the universe of the computer screen. Selection took place here too, just as with the stick insect. Only this time not birds but the creatures themselves did the selecting. At the tip of the travelling line was a sharp (virtual) point. If this came into contact with the flank of another such line-creature it gave it a fatal sting. As a result the population on screen gradually dwindled. Once the lines had shifted 60 times, spring arrived in line country and it was time to reproduce.



stung in the flank

I must say something about the anatomy of this creature. It consisted of just four parts, four segments. In the drawing below all the segments are straight.



anatomy of Animaris Lineamentum

But they can also be bent: either one way or the other.

straight and bent

mutant of Animaris Geneticus: Animaris Propagare

Using the bent and straight body parts you can create quite a variety of forms.

different combinations

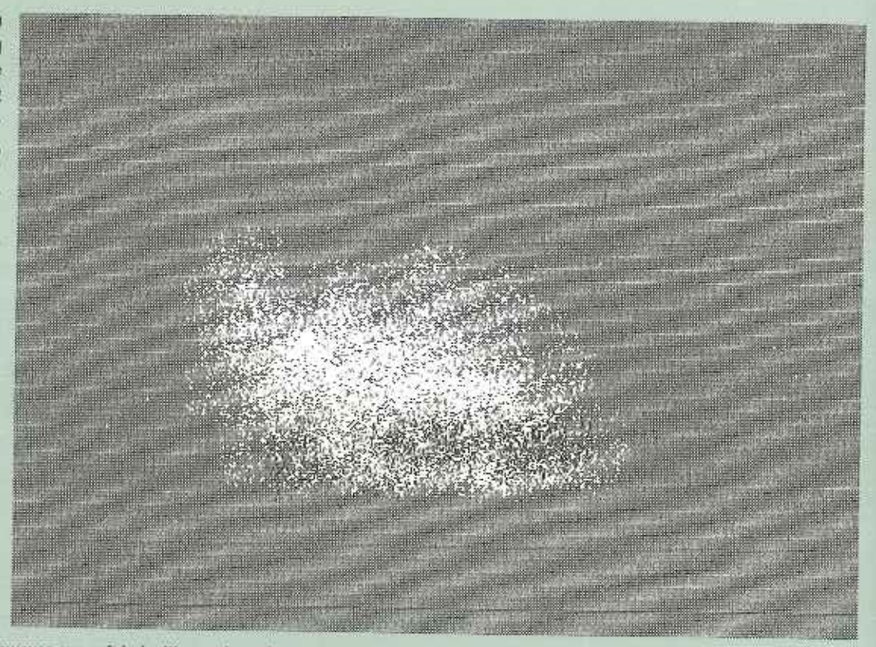
Reproduction was achieved by copying the body parts (segments) of the remaining creatures and reassembling them until the screen was chock-full of lines on the move. Then the business of selecting began all over again.
Now there were times when body parts were copied incorrectly. There was a likelihood of a deviant type, a mutant, turning up in a particular generation. I had made provision for this by including an element of chance in the computer program. A deviation such as this could be favourable or unfavourable.

Suppose that a population begins as straight lines, then a favourable deviation would be, say, a curl at the tail end. This curl would slightly shorten the creature and make it marginally less likely to get stung. Its descendants would increase in the fullness of time. The screen might even end up jam-packed with this mutant.

a curl in the tail

Were this to be the case, a mutant with a double curl might well occur at some point. A double curl is slightly more favourable again. What it all boils down to is that our line is undergoing an evolution. It begins as a straight line and rolls itself up as protection against the sharp points round about. This evolutionary process lasts roughly one night. You turn your computer on in the evening and in the morning there they all are rolled up on the screen. If you study a print-out of the different generations, you can see sudden swings. All at once the image changes, as if the evolution suddenly surged – something that really did happen in biological evolution.

Cloud no. 57



For dancing lessons we had a dancing teacher. Our dancing teacher taught us the foxtrot. He had an adam's apple so large that the word foxtrot took on an entirely different meaning for me. '1,...1, 2, 3, ...1, ...1, 2, 3, ...1, ...1, 2, 3,...' he used to shout. Merely to master this rhythm is asking a lot of a Dutchman. The ladies had their toes trampled mercilessly at times. The dancing teacher found a solution to this. He sang 'See the moooooooon shine through the treeeeees ...', in Dutch, through a microphone. This most familiar of Santa Claus songs proved to fit the rhythm of the foxtrot exactly. From that time on, I could dance the foxtrot and didn't hesitate to ask the ladies to dance whenever the occasion presented itself. Once you can dance the foxtrot, you can dance 'em all.

For drawing lessons we had a drawing teacher. We never drew, however; we painted with powder paints.

I liked painting clouds best. I used to look outside and try to paint a particular cloud exactly the way it was. It never worked, try as I might; they looked too stiff, too *painted*. The drawing teacher insisted that it was only possible to paint nature if the painter could feel its essence. This struck me as a trifle exaggerated; a camera can paint clouds and there's no camera on earth that can feel the essence of nature. So what's the difference between a camera and a painter?

I finally found out when I exchanged powder paints for a brain-machine. 'Draw a cloud', I asked the brain-machine. 'OK', it replied, but left it at that. It didn't know what a cloud was. But before I could pass that information on to it, I had to find out myself.

Clouds are formed when rising water vapour reaches a certain height where it cools off and condenses. As there is no bathroom mirror up there, the condensed droplets drift around aimlessly. If you replace the word aimlessly with the word random and the word droplets with the word pixels (dots on a computer monitor), the brain-machine *will* know what to do. It draws the cloud the way it comes into being: warm pixels rise up and become visible above the stratum of condensed droplets.

Once my brain-machine had grasped the principle of the cloud, there was no stopping it. One cloud after another saw the light of day. One night I just let the brain-machine get on with it. I lay down on my bed with the blissful feeling that something was at work for me in the living room. That night I dreamed about the gurgling adam's apple of my dancing teacher. Not a Santa Claus song this time, but the screech of a matrix printer rose from his throat.

In the morning I found a hundred clouds on the living room floor. All of them different. My favourite is cloud no. 57 and it's reproduced here. Once you can draw one cloud, you can draw 'em all, it seems. Who drew the cloud? Who should sign the drawing, the brain-machine, the printer or I?

I didn't draw the cloud. I might have dreamt it though.

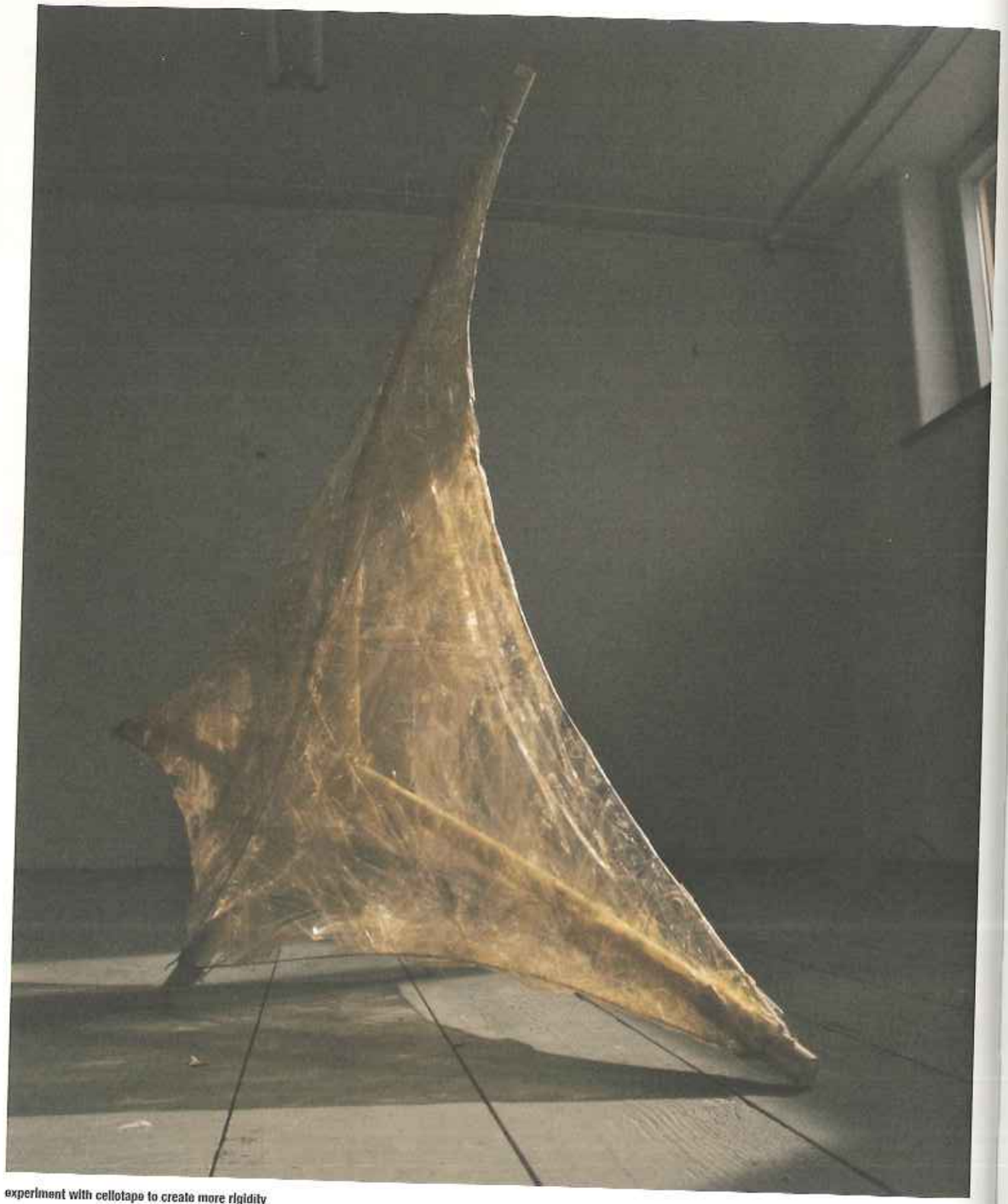
thirty generations on

forty generations on

The strength of the line creature lay in its simplicity. It had only four body parts (genes) and proved capable during the course of one night to adopt a smart form and more or less avoid the spines around it. It isn't difficult to see rolling up as an intelligent act. Just imagine it was you living in an environment bristling with spines; like the line creature you'd make yourself as small as possible and curl up (out of fear).

I also came up with the idea for a walking creature in the computer. This square beast (Quadrupes) could stretch and bend its legs and move them back and forth. Each leg was able to thrash in a repeating combination of four movements. Two hundred such creatures whose legs made this thrashing movement were created in the computer. A subroutine had been built into the program, one that could assess the effect of this thrashing on the creatures' bodies. The routine calculated the speed at which the creatures moved.

And now for the selection: the more rapid creatures earned the privilege to reproduce. The inherited thrashing movements were copied and, mixed with mutations, distributed at random to a subsequent generation once more of 200 creatures. As time went by, the random thrashing developed into walking and, five generations on, Quadrupes even broke into a gallop on occasion.



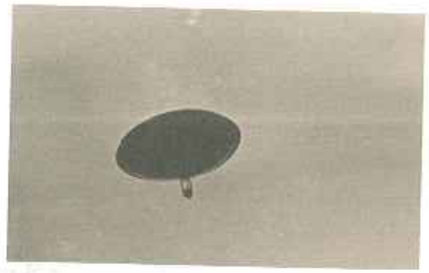
experiment with cellotape to create more rigidity

GLUTON
the tape period (1990-1991)

Plastic tubing

The adhesive tape period or Gluton was brief, just a year. In that year I bought a large consignment of plastic tubing. This yellowish tube is typically Dutch. In Germany they have grey plastic tubes, in America they make them of metal. Every country has its own kind of tube. Since 1947 Dutch law has decreed that this yellow tube be used to conduct electricity cables in houses. In the late 1940s the plastic insulation used for electrical cables was nowhere near as satisfactory as it is today. So it was decided that the wiring in a house should be replaceable. And plastic tubing was a way of doing it.

Something like six million kilometres of tubing has been produced over the years – and this is a conservative estimate. It defines the look of streets in the Netherlands. It can be found among the rubble in skips. And tied to the roof racks of the delivery vans of service engineers. In the 1980s manufacturers changed the colour of the tube to the yellowish hue it still has today. I used this tubing as early as 1979 to make a flying saucer which flew over Delft and caused a near-riot.



UFO

Originally the tubes had been white. The celebrated hula hoops were made from them back in the 1960s. They were also popular among kids as blowpipes for firing paper darts. That was my first encounter with these tubes. I was an expert in

Dream-gazing

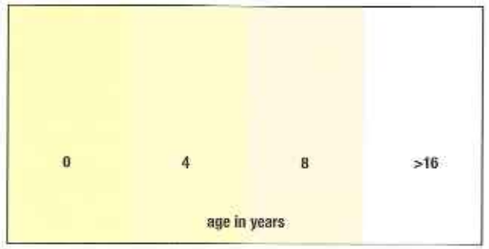
Real, authentic Dutch honey comes from the island of Tiengemeten in Zuid-Holland province. It's not yellow but white. I've noticed it tastes of cows. The bees there prefer *turd blossoms*; there's no other possible explanation. You can taste the countryside. OK, it's nice stuff, but .... Real, authentic salami should be bought at the market in Padua. This sausage is slightly brown inside instead of red. It's delicious, but at the same time I have to confess it tastes of the sties where the pigs are fattened. A trifle dungy .... The goats and kids in the children's farm at Blijdorp Zoo in Rotterdam smell of goat cheese. Maybe they aren't milked as often as they should be, so that the smell can't escape. An extract smelling strongly of urine is exuded from the animals' pores. I love goat cheese, but whenever I slide a piece into my mouth, I must confess I can taste the goat's wee-wee. So there's nothing dirty about cowpats and urine. In fact they're downright tasty in the right concentration. Evidently, the *setting* in which you taste or smell a thing is important. The honey, salami and cheese are there in the shops. You can be confident that the Commodities Act doesn't allow inedible food on the shelves. For this reason you assume it's edible and all at once urine tastes like a delicacy, particularly if it's expensive goat cheese. Our senses are the slaves of knowledge. They don't taste what they *should* taste. As soon as you *think* you're tasting something, you taste it. As soon as you think you see a thing, you see it. In 1980 a large piece of agricultural plastic film floated across the town of Delft. I saw it take off. It was circular with something resembling a hoop along its circumference. A gust of wind carried it high into the sky. Shortly after, I heard the wail of police sirens through the streets. The town was in uproar. I came across people who swore blind they had seen a flying saucer. I tried to convince them it had been a plastic bag, but it didn't work. They didn't want to believe me. On further consideration they managed to convince *me*. Now I believe them. I know for certain they saw a flying saucer. Their brains projected the thing onto their retinas. Though in reality it was a plastic bag that flew overhead, they saw a flying saucer. The thing even radiated heat, and there was a smell of ozone once it had passed. It shot into the clouds at great speed and was as big as Delft University's nuclear reactor. Just as we dream, so we observe. Everything around us is merely an invitation to observe. Observations begin with light pulses, odour pulses, sound pulses. These pulses switch on the internal film projector, open the doors of the internal aroma cupboard, tune the internal radio to the internal frequency. We dream our lives. We see what we think.

firing darts into open windows. You could write messages on them. Not that I ever did, but you could. You could write 'I love you' and then fire the dart into a girl's bedroom. The mere possibility of this form of airmail delivery fascinated me.

Exposure to sun and rain causes the tubes to fade to the same white they had been in the '60s. They also become more bone-like with time. In the beach animal bone-yard at my lab in Ypenburg near The Hague can be seen the fossils of

bone-yard

extinct species bleaching in the sun. Their age can be estimated from their colour. And fairly accurately too, using the chart given below.



chart

tube-cutting mould

Plastic tubing costs ten eurocents a metre, which means that a large beach animal (10 metres long, 4 metres wide and 4 metres high) costs about 100 euros in tubing (roughly 130 US dollars). The first obstacle on the path to artificial life was the problem of connecting the tubes: how were they to be fastened together? I started by sawing pieces of tube and winding adhesive tape round their extremities. Out of this first means of fastening came the first beach animal: Animaris Vulgaris.

Animaris Vulgaris

Looking back

I look back at Animaris Vulgaris with a twinge of sadness. What a sorry sight it is too. Whatever made me think I could get it to walk? Some kind of irrational optimism, no doubt. Irrational optimism is something only we humans possess. Ten thousand years ago we weren't capable of too much. There were few tools in those days, maybe some early axes and spearheads. You need tools to be able to make other tools. But there were no tools to speak of. It all began with our own nails and teeth. This is where today's endless sea of equipment and skills originally came from. And there's us thinking we can do it all. We think we owe it to our own capacities, but believe me, it's the beginning stages that cost the most effort. It's a bit like removing wallpaper. This is no easy task at first. At times it's fixed so securely that you have to resort to a stripping knife. Once there's a hole, though, you can easily tear off the rest.

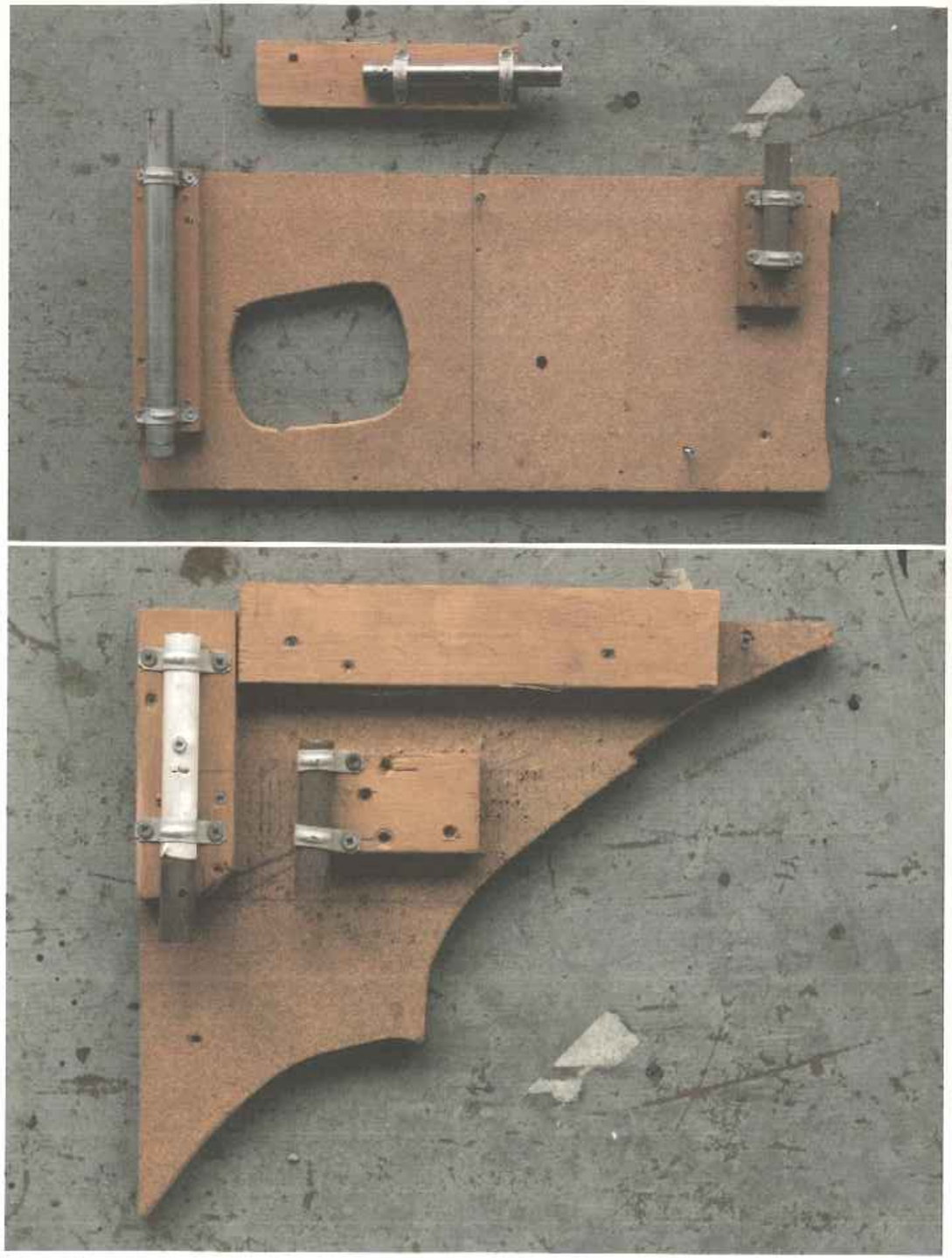
What you need is the *capacity of being able*. This is the art of escaping, of breaking out of the cramped conditions of being unable. Suppose I can't find my glasses

leg of Animaris Vulgaris

because without my glasses I can't find anything. Or you want to get into your house but the key's indoors. This puts you, so to speak, in the cramped conditions of being unable. The art of being able consists of escaping from this restricted state. Irrational optimism is a way out. Obviously it's possible to find your glasses without glasses. And get into your home without the key. Being able is something you have to master, and then all doors will open for you. I must admit to having had my share of desperate moments. There are even two aluminium tubes in Animaris Vulgaris. It was despair that drove me to this blemish, this youthful sin against the theory of limiting one's materials.

I want to make everything out of plastic tubing. Just as nature as we know it consists largely of protein, I want to make my own life-forms from a single material. You can use protein to make skin, eyes, lungs. Protein is multi-purpose stuff. So is tubing. It's flexible, but exceedingly rigid when used in a triangular construction. You can run pistons through it, store air in it, all sorts. I only discovered the wide range of its uses after many peregrinations through being-able country. Given the restrictions of this material I was forced to seek out escape routes that were neither logical nor obvious. The strategy I followed to assemble the animals is in fact the complete opposite of that taken by an engineer.
Suppose that engineers at a university of technology were to be commissioned to make something that could move of its own volition along the beach. What would you expect them to do? You can bet your life they would be ready in three months and also that they would have assembled stainless steel robot-like devices armed with sensors, cameras and light cells. Devices that are first thought out and then assembled. That's how engineers work. They have ideas and then they make these ideas happen. First they pore over books, then they open all the drawers in their workplace and take out what they need. It's a working method that gives rapid and reliable results, no two ways about it.

Countermanding that is the fact that any such devices engineers at these universities would develop would all be much alike. This is because our brains are much alike. We think we have exceptional brains (and of course we do) but they are embarrassingly alike in many ways. Everything we think up can in principle be thought up by someone else. Now real ideas, as evolution shows us, occur by sheer chance. The idea for the beach animals was one such accident. It



tension mould,
crankshaft mould

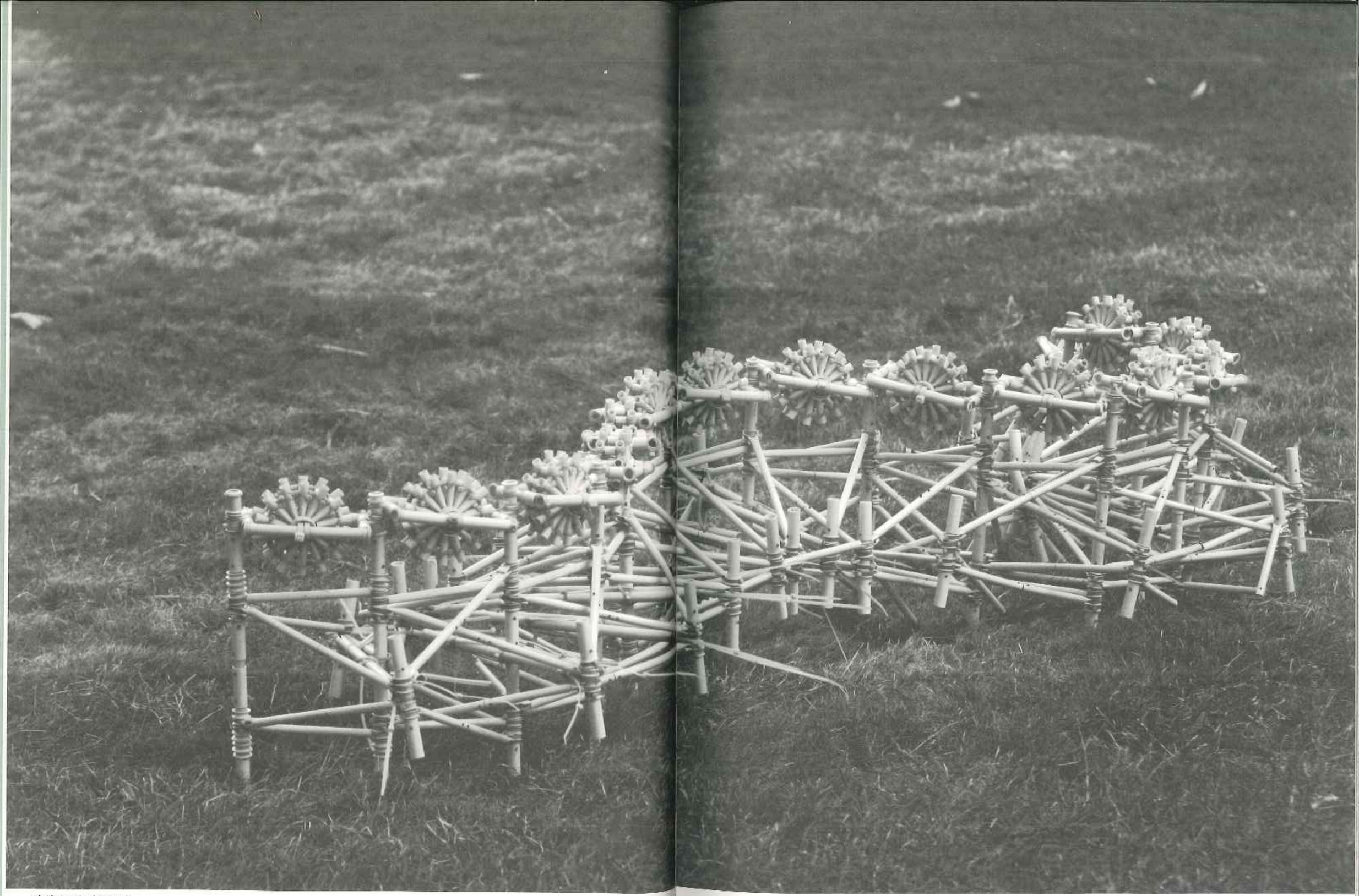
came about after I had been fooling around with plastic tubes for quite a time. It was the beach animals themselves that let me make them. And the plastic tubing showed me how.

Remarkably, chance is more likely to play a role when there are restrictions. Financial restrictions, for example, may mean that drawers in the workplace stay closed. This necessitates looking for other possibilities elsewhere. During this search new ideas automatically emerge, ideas that are often better than the ones you first had. Again, the restrictions of the plastic tubing oblige you to look for technical solutions that are less than obvious. All that searching and fooling around takes longer than the engineer's way of going about things. You might compare the engineer's method with a motorway. It takes you where you want to go, fast. However, everyone is travelling in the same direction. In the other approach, which I shall call the artist's method, your destination has yet to be decided. You park your car along the hard shoulder and scramble down the bank, machete in hand, hacking a path through the undergrowth. You'll probably never arrive at a destination in the accepted sense of the word, but you are very likely to call in at places where no-one has ever been before.

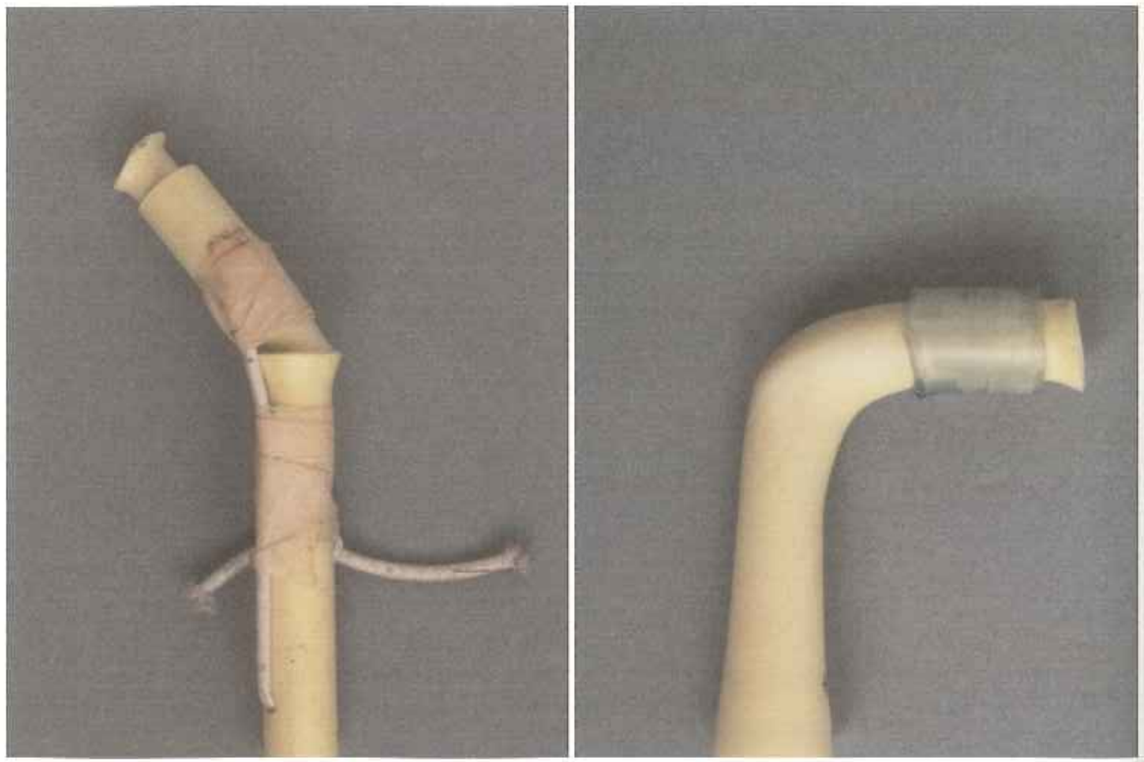
I've described the situation pretty much in black-and-white terms. I know from practice that there are plenty of engineers who scramble down the bank at times and artists who join the onslaught of vehicles. What is handy about the artist's method is that you yourself don't have to devise or invent anything. The material does that for you. So it was the plastic tubes that put the idea of a new nature into my head. Not a nature of protein like the one we know, but a nature of yellow tubing.

All this time, I tried to put the 'real' nature out of my mind. I really did try to start all over again, with a clean slate. It then transpires that animals don't always have to eat. Beach animals live on wind instead of food. They get their camouflage from sand clinging to the adhesive tape (see Animaris Sabulosa in the chapter on the Calidum period). Cannibalistic reproduction is another way of iconoclastically railing against existing nature (Animaris Geneticus in the Tepideem period).

Though I did my best to forget 'real' nature, I couldn't avoid resorting to its principles at times. One occasion was when I was developing the beach animal's leg. I could find no better, energy-efficient device for perambulating across sandy surfaces than the one already existing in old nature. I don't think there is any-



wheel-worm (upside-down)



feeler, thumb joint of drive muscle (Animaris Excelsus)

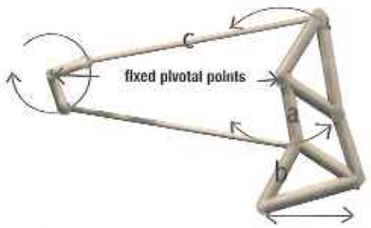
thing that can beat good old legs. Now I'm working on muscles, nerves, brains. I wasn't looking for them but they happen to come in handy if you wish to survive on the beach.

I take comfort in the thought that these parallels have occurred in biological evolution. Consider the fish and the dolphin. They are unrelated. As you know, the dolphin is a mammal; the fish is a fish. And yet they still have more or less the same shape. Evidently nature couldn't come up with an aquadynamic form other than that of the fish: fattish at the front and gradually narrowing to a point at the tail.

I have come to empathize with the Creator. Not just in the tussle with stuff but also in the sheer pleasure of creating. You can't imagine the excitement that possesses me when something works, even though it may be a mere detail.

Animaris Vulgaris

This animal, now deceased, had 28 legs, attached by small pieces of tube to a rotating spine, or crankshaft, in the middle. Each crank was set differently so that the positions of all legs were different too. If the one leg was on the ground, the other was lifted. Like a human leg, each leg of Animaris Vulgaris consisted of three distinct parts. We have an upper leg, a lower leg and a foot. These pivot at their joints. With a little imagination the toes too can be regarded as independent members but this isn't our concern here. The principle of the leg of Animaris Vulgaris basically was that the upper and lower leg moved in such a way that the toe (at the end of the foot) moved back and forth describing a horizontal straight line.



leg of Animaris Vulgaris

Upper leg and lower leg were connected by a rotating crankshaft. The crank of the upper leg was rotated 90 degrees relative to that of the lower. Providing the





In the winter of 2003 a portocabin was placed above the windy noise barrier along the motorway between The Hague and Rotterdam.
It became the new workplace for beach animals. A beach was laid out on which to experiment with the animals; a 'limbo' before the real beach.
It was an art commission by Projectbureau Ypenburg to accompany the construction of the residential district beyond the noise barrier on the former airfield.
The commission ran its course in three years but the workplace has remained.

rods are long enough, the sum of the upper and lower leg describes a more or less straight line (it's the sum of a sine and a cosine). If the foot had been fixed rigidly to the lower leg, the animal would merely have described a horizontal back-and-forth action. It would not have moved forwards as it wouldn't have lifted its foot from the ground. And that was precisely the purpose of the foot, the third and lowermost part of the leg. The ankle joint allowed the foot to tilt sideways. In taking a step, first the toe touched the ground and described a straight line, so that the hip joint described a straight line also. On its way back, the foot was tilted sideways so that there was no further contact with the ground. In a manner of speaking, the animal was raising its leg. The cranks of the 28 legs were rotated relative to one another so that at a given moment each leg was at a different stage of the process. This complex of movements caused the animal to move sideways and in such a way that the hip joint described a straight line. The animal seemed to be moving on wheels. At least that was the idea. But it didn't work that way in practice. Animaris Vulgaris has never been able to stand up. It could only move its legs when lying on its back. I had spent a year working on it. Although it was hardly a success in technical terms, I had learnt a lot along the way.

It was the adhesive tape that caused Animaris Vulgaris to fail. The joints and connections were not rigid and strong enough to carry the body. This would all change in the Chorda with the arrival of the cable tie, a nylon strap mainly used for organizing wires and cables. I also discovered the computer (an Atari) as a tool for making beach animals' feet.