

Evolution and I

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PREFACE

The theory of evolution and natural selection are sometimes said to be the best idea that anyone has ever had. It was Charles Darwin who had the idea first, even if other researchers and thinkers were close. But even if the theory of evolution today stands strong at a general level, there is still much to debate in the details.

On the one hand, there are matters which are by no means settled from a scientific point of view, such as the question of group selection: Is natural selection mostly about individuals and genes, or do groups also compete to the extent of being evolutionarily significant among humans?

On the other hand, there are matters related to ideology, prejudices, misinterpretations (more or less dependent on the times), and then there are just plain misunderstandings which have had disastrous consequences. One such misunderstanding is that evolution is about progress; that all living creatures are improving all the time. In actual fact, evolution is about change – sometimes slow or even non-existent, sometimes fast. You might well be able to argue that organisms – individuals of different species – on average are improving all the time, in some respect and adapted to the particular set of prevailing conditions. But these conditions can change, the rules of the game can shift, or the entire game can be turned on its head, as in the case of major natural disasters that have also left their mark on life on Earth.

That is when traits that previously served a useful purpose in the battle for survival, or rather in reproduction, in the worst case become a handicap. Or as Bob Dylan put it in 1963 in “The times they are a-changing”: “*The loser now will later be fast.*”

As the title suggests, the focus of this book is on *Evolution and I*, where the “I” refers to the author only to a small extent. My aim is also to try to describe how one might imagine that the self – and consciousness – in us humans is influenced and how it is constructed. A central theme is that the self – and consciousness – is constructed from the bottom up, so that even if one can imagine a kind of managing director at the epicentre of the self, this MD is easily deposed and often quite powerless. Many different factors make up and influence the self. But we don’t know how, and relatively little

is known about what the self and consciousness actually are. Are they even material in any sense? And do they need to be, from a scientific perspective? I don't go into major fields of research such as neurophysiology, neural networks and the like more than marginally, and even less so psychoanalysis. This book makes no claims to be comprehensive but is intended as a thought-provoking essay.

Today there is astounding new knowledge about not only the brain itself but also microorganisms of various kinds – bacteria (in particular those that live in our guts), viruses that in some cases have dwelt inside our genes for many millions of years, parasites, etc. How they live with us, off us, and sometimes act against us. Common to all of these microorganisms is that they are primarily interested in their own survival and reproduction, and we are interesting to them only insofar as we benefit them. So we can say that they behave selfishly, even if this is just a metaphor.

I discuss whether or not thoughts, fragments of ideas, ideas, ideologies, religion and other things that fill our consciousness – *memes* according to some philosophers and scientists – might behave in a similar manner and in fact make up our personalities, even influencing which thoughts we think. It may well be that we cannot even think without them. Can the theory of evolution and natural selection even help us understand things that are not physical?

Today, the algorithms used by Google and other giant corporations (and their great power over us), robots taking over, artificial intelligence, and the whole society around us in all its complexity are hot topics of debate. But it's not often one gets to read about these phenomena from the evolutionary point of view, and it is precisely this that I want to contribute.

Many people have been involved in different discussions related to the subject of this book. I especially wish to thank my wife Anna and my children Eleonor, Joakim, Alexander and Amalia for keeping my creativity alive in addition to many other things.

Stockholm, November 2018

CHAPTER ONE

JUST ANOTHER ANIMAL?

We cannot discuss evolution and I (the self) without considering what kind of animal a human being is. While it is obvious that differences exist between us and other animal species, are these just differences in degree? Is there anything that the human being has that doesn't exist in any form in any animal? What is it that makes human beings so special? Or are human beings special?

Attempts to actually define what distinguishes human beings from other animals are usually problematic. Generally, you can find a characteristic that is like a human characteristic in some animal – even if we don't need to go as far as the Cynic Greek philosopher, Diogenes. When someone defined Man as a naked biped, Diogenes held up a plucked chicken to refute this. Diogenes lived in a barrel. When Alexander the Great (who had been taught by Aristotle) came to visit the great man, asked Diogenes if there was anything he could do for him, Diogenes replied: “Yes, could you move, you're blocking my sunlight”. Alexander was apparently so impressed by this reply that he stated that if he had not been Alexander, he would wish to be Diogenes. Even Plato was influenced by Diogenes, and so added to the definition stating that Man was a naked biped with broad, flat nails.

But being a biped is not a particularly good distinguishing characteristic, even if it has meant a great deal to us. And neither are our fabulous hands. Some other animals have equivalents, and I'm not just thinking about the great apes, which also have hands that can be used to manipulate tools. Furthermore, many species are naked, without fur or feathers, and one could also add that we do indeed have fur, it's just that it isn't very visible.

Crying man

A characteristic that could differentiate us from animals is our ability to cry as an expression of our emotions. This is a great example of Mother Nature making good use of a physiological characteristic for something other than

its original purpose. Because the eyes of many animals do weep when something physically irritates them. But as far as is known, animals don't cry for the same reasons as human beings, even if it wouldn't surprise me if one could find evidence of human-like crying in some animal – maybe orangutans! The fact is that Jacobus Bontius, the European who first described the orangutan in the early 1600s, claimed that these animals did cry for the same reasons as us. There are also stories of orangutan young crying real tears, but as far as I know this has not been scientifically documented.

Thus far perhaps, a definition of Man might be “the crying animal”, but in the spirit of Plato with an addendum (flat nails), that this is crying to do with emotions and social signals.

Nonetheless, crying is interesting from the evolutionary point of view. Human beings cry to different degrees, women cry more than men, and small children cry most of all – but not babies, who scream rather than cry. Interesting recent studies provide insights into how we cry and why. We can cry because we are sad, but we can also make ourselves less sad by crying.^{1,2}

The ancient Stoic and rather pessimistic (or if you prefer, realistic) Roman philosopher Lucius Seneca argued that there was no reason to cry over the particulars in life – the whole thing warrants tears. His life as Emperor Nero's advisor was probably not much fun, except at the start. Subsequently, after he was sacked from that role and had retired, he was suspected of conspiring against Nero, who later went stark raving mad.

So if Seneca was a pessimist and a Stoic, he had good reason to be. However, he did manage to leave us with many elegant and wise maxims, for example: “Anger is an acid that can do more harm to the vessel in which it is stored than to anything on which it is poured”; or “It is more fitting for a man to laugh at life than to lament over it”. Another great thinker from antiquity, Pliny the elder, who died when Mount Vesuvius erupted in 79 AD, thought that humans can only do one thing that they do not need to be taught. He seems to have forgotten that babies scream without needing to learn how to first.

Darwin also pondered on the significance of crying but, unusually for him, was reticent about its evolutionary role. His view was that besides moistening the eyes, which could be useful at times, crying could provide comfort and relief. He also noted that the tendency to cry differs between cultures quite extensively.³ While Englishmen rarely cry, except in a state

of profound sorrow, men on the European continent cry more readily. Darwin also noted some similarities between crying and laughing. As we all know, you can laugh until you cry, and we can also react with laughter to serious situations.³

Why would crying have developed from the evolutionary perspective? There are different theories, but basically we still know very little, and the considerable cultural differences are precisely what complicate the picture. No doubt there is something in the fact that we have “a good cry” to lessen tension, frustration and grief. But this can hardly be more than a partial explanation, and many people don’t let out their emotions in this way. It is also hard to believe that crying is a way of cleansing unwanted substances from the body. On average, only one millilitre of fluid is produced when a person cries – and tears have approximately the same composition as other bodily fluids.² According to one theory, oxytocin, the ‘love hormone’, increases from crying, but this is controversial. There are also studies showing that testosterone suppresses the production of tears.

Crying is also difficult for actors to produce on demand, and crying could be regarded as a sign of sincerity. It is difficult to pretend to cry in a credible manner, as suggested by the idea of *crocodile tears* and of *professional mourners*. The most likely explanation is that crying has a social function for our very social species. While crying was initially the body’s way of dealing with injury and illness, our empathy with the sick, which seems to be innate to some extent, could it be that this has led to crying evolving into a social signal that we need help and sympathy?

The fact that it is the eyes that send this signal and not any other body part – even visible parts such as the lips or nose (a runny nose definitely does not send the same social signals!) – may have to do with human eyes being very special; *mirrors of the soul* that they are. Humans have highly developed whites of the eyes, which probably have a social significance in theory of mind (ToM), i.e. the ability to read and anticipate the reactions and thoughts of others. It is easier to see the direction of the other person’s gaze because the whites of the eyes reveal this. Studies also show that a face with visible tears engenders more sympathy than one without, in particular where there are visible injuries, even those that would otherwise generate revulsion.²

It is well known that women and men cry in different ways, and that women cry more often. Perhaps crying in women is a signal that they are not sex objects, but a person in need of comfort and assistance? This view is

supported by an article in the journal *Science*, in which it was shown that men's sexual arousal decreased when they were exposed to women's tears.⁴

Men are allowed to cry in specific contexts with ritual elements such as at football matches, where they are also allowed to hug and kiss each other. Sweden's Deputy Prime Minister Åsa Romson cried at the press conference in November 2015 that announced a whole new refugee policy, while the Prime Minister did not weep. Romson's crying was hotly debated, but seems to have been accepted, and I do not believe that would have been the case if PM Stefan Löfven had cried. But perhaps I am wrong.

Well-timed crying can boost a man's reputation, and former US President Obama cried in public on several occasions. It also seems that this applies to men in high-ranking positions but not to men of low status, who do not have much to gain from crying.

Laughter and language and other things

What about laughter then, which in a way is the opposite of crying? Animals seem to be able to laugh, at least there is something similar to human laughter in primates such as chimpanzees. According to evolutionary psychologist Robin Dunbar, this may have developed as a way of improving group cohesion when *grooming* (picking bugs out of the fur of other members of the flock) is not doing the job.⁵ Or as the saying goes: If you want to tell people the truth, you have to make them laugh, otherwise they'll shoot the messenger. Right there is another possible explanation for the evolutionary background of laughter.

Many larger mammals employ complex signals that convey complicated messages, in other words language in some sense. Very complex languages have been described in animals, and not just in apes. Using algorithms, Israeli zoologist Yosef Prat and colleagues demonstrated that a certain species of bats, which live close together in colonies, chat to each other as individuals about this and that, and appear to be able to quarrel over such things as a sleeping place!⁶ But language in humans, as far as is known, is more complex than in all other animals. And our ability to use symbols like we do is not known except in us, as discussed by scientist and writer E. O. Wilson in an interesting book published in 2017.⁷ However, in the same book, a gorilla is described that uses sign language. The subject of the book is creativity, which is uniquely advanced in humans, although as Wilson points out, it is present in some form in some animals.⁷

Man has a large brain, much larger in relation to our body size than in all other animals. Some animals also have large brains, such as our closest relatives among the great apes, but large brains occur even in animals that are more remote from us in evolutionary terms, such as the dolphin. Evidently for many species having a large brain has been good for reproduction, even if in humans this has gone much further.

Man is often violent and warlike – is this something that differentiates us? This is not the case of course. Chimpanzees exhibit such behaviour, which is well documented. Young males carry out raids during which they brutally kill or maim other chimpanzees from a neighbouring flock. Violence is common in the animal world. The wolverine is an example from Sweden. A wolverine is apparently able to kill a whole flock of reindeer where the frozen crust on top of the snow is able to bear the wolverine's broad paws, but not the reindeer's hooves, which sink through it. Even if the bloodthirsty reputation of the wolverine is exaggerated, one can say at least that nature, 'red in tooth and claw', does not have a built-in mechanism that prevents cruelty and 'unnecessary' killing – or suffering for that matter.

And what about other human talents such as the arts, sciences and mathematics? Are these uniquely human? Here it is undoubtedly difficult to see what there is in the animal world that might correspond to these phenomena. But this might not be true. One could contemplate that art has to do with play, which many animals engage in, particularly when they are young.

This playfulness is reinforced by our juvenilization, to which I will return. A great deal of our time today is spent on entertainment and relaxation, and more and more people work with the kinds of things that are not needed from a more biological point of view, but which have to do with entertainment – play in other words. The innate playfulness of human beings may in fact increase in the future, and juvenilization may grow as more and more jobs are taken over by robots.

Science and mathematics are typically human activities, but may also have to do with the kind of analytical intelligence and assessment of the environment that can also be seen in animals in one form or another.

Mark Twain described Man as a religious animal, and religion is definitely something that is found only in human beings. But Darwin did not agree. In his view, even his dog had a kind of rudimentary religious sentiment.⁸

Something else that is typical of humans is the enormous significance of

culture – in concert with natural evolution. Culture has been the environmental factor that natural selection in humans has had to play with, and to quite a large extent. We now live in a world that is increasingly populated and impacted by human beings, and this is what differentiates us the most from other animals, I think. Culture is the backdrop against which natural selection plays out, and cultural evolution can probably be described from the perspective of the theory of evolution. On the other hand, it is not just us humans who have culture in the broad sense of the term. Culture is well documented among other species. An example is chimpanzees that have learnt how to use tools from each other, and where there appear to be different cultures in this respect within different communities.

Culture develops cumulatively, with knowledge being transferred between the generations. Instead of having to learn everything from scratch ourselves, we learn from Mum and Dad and/or their parents and when kids get older, from other relatives and also from their peers. Many species have a system whereby the young learn from their parents (in general, their mothers). But in humans, this system of child-raising and learning has been vastly developed, and has taken over more and more as an environmental factor that influences which individuals (and gene variants) are reproduced most frequently (statistically and over the long term), and under this system the older generation is a factor to be reckoned with. Storytelling is central in all cultures: creation myths, god myths, and other stories. The great importance that this has for human beings is probably unique in the animal world, and it is difficult to know whether some kind of precursor to storytelling exists among animals.

In simplistic terms, those individuals who are better at assimilating culture have slightly more children and grandchildren on average. And if these small differences in reproduction continue over many generations, the effects become exponential and gradually enormous. This is one of Darwin's greatest insights. A single pair of mice or rats can give rise to thousands of individuals in a relatively short period – one year. But very few of these survive and reproduce themselves – otherwise the Earth would quickly be overrun by these rodents.

Sex, drugs and rock 'n' roll – are these things that separates us from animals? Sex is an animal phenomenon, but evolution has a habit of utilising what is at hand for all kinds of things, for both business and pleasure. But bonobos (pygmy chimpanzees), our closest relatives, doubtless have more sex than humans on average. Drugs are used more systematically by humans but, as I will return to later, animals are also given to strong drink and other

things offered in nature. Rock ‘n’ roll? Well, maybe. But music has a deep evolutionary history, even if no animals are as musical as we are. These three classic behaviours differ between humans and animals **but** mostly only in degree.

Thus, Darwin found it difficult to demonstrate anything that really differentiated humans from animals. The best he could come up with besides crying was blushing. On the other hand, he noted that the actual physiology that causes the increased blood flow through the small vessels and capillaries associated with blushing also exists in animals, but may not be used in the same way as in us. But while crying has a physiological basis in animals, as a protective mechanism when something gets in their eyes, it is more difficult to understand the previous history of blushing.

Johann Wolfgang von Goethe, one of Germany’s brightest minds of both the Romantic and Classical periods during his long life (1749–1832), was a very versatile man, which he was well aware of, and could describe himself as a natural scientist, statesman and author of fiction in that order – with some justification he held in high esteem his studies in the natural sciences.

He also made real discoveries such as the incisive bone of the face. It had previously been thought that the lack of this bone was something that differentiated humans from other animals. But Goethe was able to show that there was no difference in this respect, which paved the way for Darwin’s position that humans and animals had a common origin.

One could scarcely imagine that a purely physical fundamental difference would exist between humans and other animals, even when it comes to the construction of the brain, which I will return to later. However, a remarkable difference between humans and apes is the large muscle that forms the buttocks, the *gluteus maximus* muscle. This is essential for the type of long-distance running that some researchers consider to be our predecessors’ way of catching their prey – by simply tiring them out when it was difficult to attack them directly with spears and other weapons. This muscle is very large in humans and is not essential to any great degree for walking, but is for running.⁹ But even here, the difference is in degree not species between humans and animals.

Perhaps DNA is the only way to distinguish every human from every animal, but I am not convinced that Plato would have been impressed, not to mention Diogenes.

The very existence of a self is hardly something that fundamentally

differentiates humans from animals either, even though there is a difference in degree here – which is one focus of this book. That animals have personalities is clear – just ask many dog owners. That animals can also act rationally and in some sense act sensibly is also clear. This mental faculty must have had some evolutionary advantage, and on the contrary we might well be surprised that it is so little developed, even in humans.

Can one then say that there is such a thing as human nature? Could that be a conclusion of this line of reasoning? Can this be delineated with any degree of precision, and are there constants that run through all groups of humans which are clearer in humans than in other animals – even if, in the spirit of Darwin, they can be demonstrated in some rudimentary form in animals?¹⁰ I am inclined to answer yes to this question, for although mankind is adaptable (which is part of our nature), we cannot liberate ourselves from our evolutionary history.

There are scientists who have made lists of hundreds of such constants as characterising humans all over the world, regardless of their cultural backgrounds. Against this view is what evolutionary psychologist and researcher Steven Pinker has called the Standard Social Science Model,¹¹ which claims that the human being is, to put it simply, a social construct. Proponents of this model are also critical of a purely biological world view, and uses ‘biologism’ as an umbrella term and as an invective.

Our social faculties, and the odd mixture of altruism and egoism that is our genetically conditioned fate, have resulted in sets of rules – taboos, laws and morality – existing everywhere among human beings.

Something that is also linked to our highly developed social faculties (which in themselves can be said to be part of our nature) is our comparatively odd eating behaviours in relation to other animals. We enjoy our mealtimes, around which we have developed culinary arts, recipes and rituals. Human sexual behaviour (and its associated characteristics) are also remarkable. Women’s ovulation is concealed, and a number of theories exist on why this is so; and furthermore, humans have a preference for having sex in private. Our propensity to gossip also has to do with our social faculties.

Looking at the humans as individuals, adaptability comes into focus. It has led to humans inhabiting the entire world, except the Antarctic. Other typical characteristics, innate propensities and characteristics include altruism and even egoism; classifying people as ‘us and them’ where the basis of this division can vary however; the ability to rapidly identify the

gender and age of people; an enduring interest in storytelling – fiction, religion, etc.; at least statistical differences in how the sexes behave and are expected to behave; the tendency of our senses to report some things more than others to the brain; and aggression and violence when a group that constitutes an ‘us’ is threatened, which can be the family, extended family, kin, team or nation.

Criticism of biological determinism or ‘biologism’ is often directed against something that almost no longer exists, and may seem like a straw man that is easily attacked. At the beginning of the last century, there were real biological determinists, hardcore eugenicists, but they are fewer today. On the contrary, for many decades now a number of researchers and writers have been seeking to bridge the gap between these different approaches, but they mostly come from the biological determinism quarter. On the other hand, as far as I can see, there is little or no equivalent interest among representatives of the Standard Social Sciences Model, and the definition of gender studies often excludes biology *a priori*.

With that said, I am happy to leave this hardly constructive discussion and focus on more concrete matters (of the solvable kind, which is the hallmark of the sciences) to speak with immunologist Peter Medawar.¹²

CHAPTER TWO

THE THEORY OF EVOLUTION AS SUCH: DARWIN'S ALGORITHMS

Charles Darwin formulated his theory of evolution as early as the 1830s in his notebooks, but published nothing about it until 1858, at which time he published together with his younger colleague, naturalist Alfred Russel Wallace. The history behind this is well known and has been retold many times: Wallace sent a letter to Darwin in which he described the theory of evolution and natural selection. It is interesting and perhaps something of an accident of history that it was to Darwin that Wallace sent his letter. One reason for doing so was that Darwin was a well-known and esteemed natural scientist and author, but Wallace might very well have sent his letter to someone else, in which case the history of science would most likely have been somewhat different and Wallace might have enjoyed a more prominent place in it. A solution not unlike the judgement of Solomon was arrived at, from which Darwin profited the most. They published the theory together in a modest scientific work in 1858 that attracted little attention,¹³ unlike Darwin's sensational book *On the Origin of Species by Means of Natural Selection* when it was published in 1859.

Darwin came from a wealthy family and lived as a private gentleman after he married his cousin Emma Wedgwood and subsequently fathered 10 children. Although he kept his theory of evolution with natural selection as its mechanism secret for many years, he wrote prolifically – books as well as purely scientific texts. He is in fact a writer well worth reading, which became apparent in the account of his travels that he published after five incredible years (1831-1836) travelling to South America and other places. But his other books are also well-written and often exciting; constructed with rigorous logic but containing many digressions.

Darwin was interested in everything and anything, and collected facts wherever they were to be found. He was an inquisitive man at his desk, or in the huge garden where he conducted experiments, or on his walks in the surrounding countryside, where he conversed with all manner of people from all walks of life. He got very useful information from local farmers

about breeding for example. From a young age, he was interested in all kinds of tiny creatures such as beetles and worms. His children were sometimes called in as his research assistants.

He was sickly, often bedridden with digestive problems and other ailments of an unclear nature. The cause has been speculated as anything from hypochondria to a parasitic infection contracted in South America that he never managed to shake off. The latter implies a secondary morbid gain, as doctors usually describe the advantages that an illness might bring, as long as it remains manageable. Illness can be a reason to avoid social life. Many great writers have been patients at sanatoriums due to tuberculosis, where they have had the opportunity to read and write a great deal, to take just one example of a secondary morbid gain.

Darwin waited a long time to publish his central theory of natural selection, in fact until he was forced to; otherwise Wallace would have got much of the glory. Publishing was important, then as it is now.

The theory of natural selection has three elements:

1. There is variation in different characteristics between individuals within each species.
2. This variation is in part inherited.
3. Depending on environmental pressures, different individuals will experience greater or smaller difficulties in surviving and reproducing.

Based on this, Darwin constructed a whole new world view, where God was not required to explain nature and the origin of species. Darwin knew this very well, and it plagued him because his wife was a devout Christian and he too seems to have been devout, at least in his early years. He was not known as an outspoken atheist. Perhaps one could describe him as agnostic. This question has been widely debated. Most people, even intellectuals, were religious at that time, although without having reflected on it much, it seems.

On the other hand, reasons to believe in God do not all just disappear as a consequence of Darwin's theory of evolution. In his publications, he hinted that there could be an original causality that breathed life into the process that natural selection then took care of. But at the same time, he thought that life had probably arisen in 'a warm little pond', and it's difficult to believe that in his later years, Darwin would not have rejected the divine in his explanations of how nature developed and functioned. On the other hand,

as far as I know, he never expressed an opinion on the non-living part of nature. The laws of physics are usually a refuge for the doubters and sceptics who still want to preserve the divine in nature.

The famous 17th century philosopher Baruch Spinoza stood for something similar: God is found in nature, in matter, and the laws of nature are in some way manifestations of Him. But Spinoza was hounded by and excluded from the Jewish community in Amsterdam for his progressive ideas, which entailed both a strict rationalism and a questioning of the Bible. They feared being persecuted by the predominantly Christian society in which they lived, and they wanted him to keep his ideas to himself, which he refused to do. He also said no to a post in philosophy and supported himself as a glass grinder, which gave him the opportunity to continue his progressive ideas – albeit rather discreetly. Unfortunately, this led to his premature death due to inhaling the tiny particles of glass that arose from his work. In my view, Spinoza's view of God, in all its rational elegance, is difficult to understand. What does it actually mean that God is in everything? Does such a concept of God have any meaning? Isn't Spinoza in fact an atheist?

Nowadays there are serious physicists – one example is Lee Smolin – who talk about how astonishingly perfectly adapted to life the laws of nature are.¹⁴ If they had been only slightly different, if the constants had been adjusted ever so little, nothing would have been able to live. Here too, there is quite an interesting answer for those who desire to see God in nature. But it could be that even the laws of nature developed through a kind of natural selection where those that 'functioned' best, in the sense of propagating best in the 'proto-universe', are those that then established themselves and are apparent even in our small corner of the cosmos. Added to this are all sorts of theories in modern physics according to which the universe is constantly forming or hiving off, and becoming part of the multiverse, the components of which, with their small differences and a pattern of heredity, might then also be subject to natural selection: Darwin's algorithms as Daniel Dennett, American philosopher and evolution theorist, called them. A modern-day Spinoza might say that Darwin's algorithms, the principles of natural selection, are in fact God – that is how life came into existence, how it was "created". But this line of reasoning would run into similar problems to Spinoza's.

Do Darwin's theories render a belief in God (or gods) impossible? I don't think so, but it does become more difficult – which is not necessarily a drawback of course for the religious or interested person, who must then further hone his or her faith and arguments. Furthermore, one should

probably consider searching in worlds other than the material one or, more specifically, the world that the natural sciences study. It is astonishing to see how *creationism*, in one of its incarnations as *intelligent design*, appears to be gaining ground. This goes hand in hand with religious ideology that is not open and inquiring in relation to existential questions, but closed, dogmatic and dictatorial. In actual fact, there is no support at all for creationism in the sciences. Richard Dawkins and many others have written eloquently about this, and I don't intend to dwell much on this issue. What is interesting is not trying to understand *what* is claimed but rather *how* such an ideology could appeal to so many people.

As Bertrand Russell dryly pointed out, one need only go to a children's hospital – one might update this to hospitals taking care of children with certain forms of childhood cancer – to doubt that there is a God who is both omnipotent and benevolent.

In his youth, Darwin thought about becoming a vicar for a while – as such he would have had a secure and good income, and many vicars were prominent scientists at the time. Before that, he tried to study medicine, but found it difficult to cope with the blood and the dissections. According to Darwin himself, he was rather unintelligent, which is not necessarily indicative of false modesty. He was slow and methodical, turning problems that he faced over and over in his mind before he drew any conclusions. Despite this and despite his poor health, he was astoundingly productive with his many books and articles, as well as a huge body of correspondence with the scientific authorities of the world at that time.

His interdisciplinary inclinations and broad interests were the basis of all his discoveries, combined with his extraordinary powers of observation. One conclusion that one might well draw from Darwin's labours as a scientist is that if you want to make real progress in research, you should leave the extroverts or introverts with eccentric ideas, or those who don't fit into society in other ways, to their own devices, but within broad boundaries. You should also allow students to read widely and freely in a variety of fields that are seemingly not linked.

Darwin operated in an intellectual environment that is difficult to surpass: England at or near the peak of its power as an empire and Cambridge University where he studied. In addition, there were learned societies and debate clubs. Darwin belonged to the English upper class, and had a substantial fortune in the form of both land and money, so he never needed to apply for research funding. The journey he made in his youth, close to

around the world with his primary destination being South America, was key for him. It was on this journey that he made many of the observations which then became the basic material from which his great theory was constructed. A classic example is the finches on the Galapagos Islands, which differed from each other because they had adapted to the varying conditions on each of the islands.

His other important source of inspiration was economics, in particular the British economy, with leading figures such as Adam Smith and Thomas Malthus. The latter is known for his depressing theory that humanity is doomed to recurrent misery because the population tends to rise, resulting in perpetual states of disease and war. This theory, or perhaps prophecy, has proved to be, although not entirely wrong, at least very shaky because in contrast to animals, man can take control over his reproduction. We can also improve other circumstances which might otherwise increase the risk of disease, such as ordinary sanitation and the entire development of modern medicine.

The third factor for Darwin's theories was knowledge of animal breeding, which he gained by taking an interest in his immediate surroundings and the farms there. Farmers knew very well what a formidable force breeding is, in other words artificial or 'unnatural' selection, where people and not the environment do the selecting.

Darwin made an important addendum to and expansion of his theory of evolution that he had put forward in 1859 in *On the Origin of Species* in his other major work, *The Descent of Man* from 1871. In this work, he describes, right in the midst of Victorian England, sexual selection. Many of his compatriots must have choked on their tea when they realised what this father of ten was actually saying.

With his system for plant sexual reproduction, Carl von Linné (also known as Linnaeus and probably Sweden's foremost scientist) lay the foundation for systematic plant breeding. He fared worse with animals. His focus was on stamens and pistils, reproduction in other words, and Darwin was a great admirer of Linnaeus. What Darwin meant by *sexual selection* was that in this particular variant of natural selection the 'environment' was the other sex. Survival and the fight for survival were then not the focus, but appeal to the other sex. Darwin believed that, as with most animals, women do most of the selecting.

This is where beauty comes into the theory, attractiveness 'without utility'. Pure economism in nature, where everything happens in the best possible

way and where the best adapted to nature's circumstances do best, is not consistent with what happens in the real world. In fact, here one comes into contact with a true wellspring in the history of ideas, which Voltaire immortalised in his novel *Candide ou l'Optimisme* ("Candide or Optimism") from 1759. In *Candide*, Dr Pangloss, the philosopher reminiscent of Leibniz, publishes a text about how reality, although it may seem imperfect, even cruel, brutal and pointless, nonetheless has some order, there is justice, and all is for the best. Stephen Jay Gould, evolutionary biologist and palaeontologist criticised this view and wrote elegantly about it. One has to admit that this Panglossian delusion has also played a part in the history of evolution, in particular among Social Darwinists, who believe that one ought not to help the poor because they don't stand a chance anyway, and by helping them with public funds and welfare you are simply prolonging their agony.

This kind of attitude – that the world tends to be rationally organised and if left to itself becomes the best it can possibly be and is reminiscent of Dr Pangloss – can be found in many economists and some religious figures. The former tends to think that the market solves all problems for the best; that things adapt to the given circumstances and if these forces are just left alone, an optimum balance will arise. Correspondingly, the major religions of the world have been plagued by the idea of God's omnipotence, often resulting in their representatives having to play devil's advocate, explaining all kinds of evil in the world as either things that must exist or things that, on the whole, are not all bad.

Nature is not in fact particularly economical with resources. There might not be any free lunches, but there are both expensive and cheap ones, for which others can well pay. The beauty of the peacock's tail plumage is one such example, where what appears to be a useless evolutionary innovation not only exists but is advantageous, because the females find it beautiful. But it is in fact difficult to understand why a fox would not find it easier to locate a male peacock with his luxurious tail plumage than an unimpressive, brownish grey, reasonable-sized and inconspicuous male that blends well into his surroundings and therefore ought to win out over the colourful one. But that's not the case. Here, one might add that just because a highly developed characteristic can be advantageous for the individual within a species, this does not necessarily mean that this characteristic benefits the species as a whole. That this can be so is illustrated with the case of the extinct Giant Irish Deer by Darwin-inspired economist Robert Frank.¹⁵ The males developed enormous antlers, which ultimately were detrimental to the species itself, which died out.

I think that Darwin's addendum to the theory of evolution concerning sexual selection has consequences that we have only just seen the beginning of in our understanding of nature – including our own human nature. Bodies and minds are only reasonably adapted to a dynamic environment. Just think about all the ailments that afflict us before inexorably we die, and all the mental suffering that almost all of us must struggle with at least one time in our lives, and which causes some of us to go under.

Here is in fact a mechanism – natural (and sexual) selection – of astonishing explanatory value. Darwin's elegant theory can be described as a series of instructions, algorithms, where DNA is only one special case. In actual fact, according to Daniel Dennett, these algorithms are applicable whenever the conditions for natural selection exist. They don't even need to be about something that we would view as tangible phenomena, like DNA, but may equally apply to the world of culture.

I myself believe that Darwin's algorithms have an enormously disruptive power when applied outside the biological area in which they were first spawned. It's quite an unpleasant thought to think that our selves – consciousness, the world of ideas and culture itself – might also be subject to Darwin's algorithms. In that case, it might appear to degrade our common sense and ourselves.

Darwin's thinking and the theory of evolution has a natural place in the Enlightenment project in a broad sense, and it is surely why its opposite, in the form of postmodernism and post-structuralism à la Michel Foucault and other philosophers of his ilk, barely discuss either evolution or human nature. It appears to be central to this kind of thinking that there is no such thing as human nature: we are social constructs made by the powers that be, a diffuse entity – a “structure” – that shapes us as it wishes. Nor do other branches of philosophy that dominate today in most countries, such as ethics, appear to count evolution as something of any relevance. The same applies to the social sciences, including economics in its dominant incarnations.

Against this stands a kind of thinking grounded in the theory of evolution and the sciences, which believes that although human nature is adaptable, and our adaptability is part of the evolutionary triumph that our conquest of almost the entire earth has entailed, we are nonetheless biological creatures, apes, with many of our features and characteristics being demonstrable in other mammals too. This is one of Darwin's greatest insights: much of what we like to see as typically human can be shown in some former another as

having an animal origin. We are the result of evolution and traces of our “low origin”, in Darwin's own words, can be demonstrated all over the place. Or as the doyen of sociobiology American zoologist Edward O. (E.O.) Wilson, expressed it in *On Human Nature* (1978)¹⁶:

“Can the cultural evolution of higher ethical values gain a direction and momentum of its own and completely replace genetic evolution? I think not. The genes hold culture on a leash. The leash is very long, but inevitably values will be constrained in accordance with their effects in the human gene pool. The brain is a product of evolution.” Edward O. Wilson

Genes and genetics

In Charles Darwin's time, nothing was known about genes and very little about genetics and heredity in general, making Darwin's efforts even more impressive. He managed to formulate his theories without this knowledge. He was aware that this was a shortcoming in the theory of evolution and could be its Achilles heel; and he made great efforts to understand the mechanisms of inheritance – without the inheritance of characteristics, the theory of evolution cannot work. Interestingly, Darwin was a Lamarckist to some extent. In imitation of the great French naturalist and pioneer Jean-Baptiste Lamarck (1744-1829), Darwin believed that environmental factors to some extent could directly affect hereditary, and in his world view were conveyed by what he called gemmula, small particles produced in the body and transported to the genitals.

Today when epigenetics is discussed and where environmental factors can actually make their mark on genes in the form of methylation, a sort of direct labelling of genes, we must admit that Lamarck had some merit. Although the environment can affect genes directly, it is only for one or a few generations forward, and as far as we know no further than that.

Gregor Mendel (1822-1884) in Brno, currently part of the Czech Republic, was working at about the same time as Darwin with research comparable with Darwin's in its significance. Mendel was a monk and had large plantations where he focused on legumes and how their characteristics were inherited. What he noticed was that inheritance was not just a simple mix of the male and the female (in this case plant) characteristics, but were transmitted by discrete units which we now know are genes, and he selected simple ones, based on colour and shape.

If this knowledge had become generally known and not fallen into oblivion because Mendel published very little, and then only in an obscure local

periodical without any wider distribution, and because he subsequently retired to become a prosperous high-ranking administrator at the monastery, the fantastic development in biomedicine that we see today would have been able to get started several decades earlier.

At the beginning of the twentieth century, Mendel was rediscovered and genetics developed rapidly and it was soon possible to further clarify the links that Mendel had first demonstrated. On the other hand, Darwin's teachings ended up in the doldrums a couple of decades after his death in 1882. Plenty of people – researchers, politicians, ideologues – exploited his teachings for their own purposes, which often had to do with social issues and where it was thought that society shouldn't take care of its weakest members. Because after all they were doomed by evolution. Thus, Social Darwinism was born, all manner of racist offshoots and finally Hitler and Nazism.

Besides being a brilliant scientist, Darwin himself was also a man of his time, and you can find examples of what would now be classified as sexism and racism in his writings. But in this context, a mild relativism, of a post-modernist sort perhaps, is actually appropriate: we are all influenced by the times in which we live, by our point of view and certainly also by our interests – economic and otherwise. But only to a certain extent. True science does not care about the messenger but aims to increase knowledge objectively. Darwin himself was great opponent of slavery. It is true that in his principal work on human development and evolution *The Descent of Man*, he discussed whether it was wrong to help the poor, the mentally handicapped and other down and outs in society, in particular because they then recent passing on their poor genes. But he nevertheless arrived at the opposite view, and appears to have believed that compassion is also part of our biological heritage.

There were also other much more benign interpretations of Darwin where a common denominator was often toning down or not even understanding or acknowledging natural selection as a mechanism. Instead evolution itself was the focus. Such an individual was Asa Gray (1810-1888), a renowned botanist and Harvard professor who developed very good contact with Darwin; one could probably describe them as friends. A letter that Darwin wrote to Gray in 1857 played an important role in posterity's understanding of Darwin as the founder and discoverer of the theory of evolution. This was because it was written before Wallace's letter to Darwin on natural selection, which ought to show that Darwin was first. After all, a letter to another researcher is a bit more than an armchair creation that had collected

dust since the 1840s in a drawer because Darwin had delayed publishing his ideas and findings on evolution and natural selection.

But Gray found **it** difficult to swallow Darwin's natural selection, which then made God redundant in nature, even though he shared Darwin's ideas on evolution itself, which Gray was also a supporter of, but without excepting Darwin's explanation all the way.

Stephen Jay Gould versus Richard Dawkins

Stephen Jay Gould, the American palaeontologist and Harvard professor who died early in 2002, is an interesting representative of the more American tradition that Gray stood for. The conflict between him and British evolutionary biologist Richard Dawkins is both entertaining and enlightening.

In brief, Gould thought that Dawkins exaggerated the significance of genes and leaned towards something he called *adaptationism*. In his view, Dawkins and other thinkers in that tradition had a blind faith in the role of natural selection and the adaptation of organisms to their environment, and not enough insight into how much of what happens in nature is random and does not lead to anything in particular. Furthermore, Gould thought, development is greatly restricted to the few opportunities presented by the circumstances and history and can only occur along predetermined lines that we cannot do much about. Evolution can only build on what exists and this is not much of *everything that could have existed*. I do not believe that Dawkins and Gould differ as much as they might seem to from seem their biting debate. The differences are mostly of nuance in how strongly they emphasise adaptation and natural on the one hand and chance, whim and limited mobility on the other hand in nature.

Added to this, like Gray Gould was of the opinion that Darwin's theory of evolution does not have very much to say about the possible role of God in evolution. Gray and his successors believed that natural selection was the mechanism of the divine to produce man. My own view is that such an argument easily becomes a game of words, which is often what happens with variants of pantheism. If God is everywhere and in everything, it becomes difficult to understand what He or She is or even if the concept has any place in the explanatory models. On the other hand, pantheism is a beautiful and poetic philosophical model!

No God is needed in Darwin's system as regards the development of nature and species, about as little as in the replies of French physicist Pierre Simon

de Laplace (1749-1827) to Napoleon, when Napoleon had informed himself about the great man's theories and asked where God was in all of this. Laplace replied: "I have no need of that hypothesis." So it is too with Darwin's theory: it is far-fetched and unnecessary to mix God up in it. Why would God choose such a laborious and risky way to create mankind, which was also close to failing on several occasions because humans almost died out? Or did completely. Neanderthal man was as much human as we and disappeared – even if they remain as small portions of our genes. Why in that case did God decide they should die out? Or perhaps He didn't decide anything at all but was subject to evolution's usual mechanisms; but in that case He is perhaps a more reserved, even hidden, God.

I don't believe that religion has much to gain here – any longer – when it comes to evolution. But on the other hand, which I will return to, the theory of evolution does not disprove religion and God in general at all, as long as these do not enter into the domains that the theory of evolution studies, and explain much better, but keep to a symbolic world and to existential and metaphysical questions.

There is of course a great wisdom laid down in the major world religions, which Dawkins and today's 'neo-atheists' often ignore. These have been chiselled out over a long time and become subject to interpretations and scrutiny. Even a Gentile can benefit from some of it. Just think of the seven deadly sins in Catholicism: pride, greed, lust, envy, gluttony, wrath and sloth. It is not an unreasonable assumption that warnings against these sins, and the Ten Commandments, have something to say to people even in a secular environment. The book of Proverbs warning that "Pride goes before a fall" is something we often see in our time.

Another difference between Gould and Dawkins are their respective views on the role of genes. Dawkins published *The Selfish Gene* in 1976, which had an unexpectedly great impact. Yet this was at a time when a lot of the intellectual debate was still dominated by socialists and (post-)Marxist theorists, when the knee-jerk reaction was to see what Dawkins presented as reactionary, biologicistic, and downright sexist. At roughly the same time as Dawkins published his best-selling science book, E. O. Wilson published his major work *Sociobiology: The New Synthesis* (1975)¹⁷ and was then subjected to all manner of attacks. A notorious such was when he was on a panel debating his own version of sociobiology in his recently published book, which interestingly only dealt with human sociobiology in its concluding chapter. The debate kicked off in Washington in 1978 and a political activist rushed up to Wilson, threw water on him, chanting: "E.O.

Wilson you can't hide, we charge you with genocide." This gentle researcher of ants and brilliant thinker did not take it too badly; in fact he is anything but a sexist, racist, right-winger. If anything, Wilson is a liberal, if he would allow himself to be categorised at all on the basis of a political ideology. My own view is that Wilson is the contemporary scientist and writer who most resembles Darwin today in the evolution genre, and the disposition in his book is reminiscent of Darwin's own. In *On the Origin of Species*, Darwin didn't actually talk about humans, even if this was what most who read it thought of. Only the very end did he point out that light would also be shared on the origin of humans.

My own belief is that serious scientists and writers generally do well to keep away from politics as it is today. Wilson has devoted a great deal of energy to projects to do with stopping many species from being wiped out from the Earth, and his books ought to be read by anyone who is interested in what kind of a remarkable creature Man is.

In Dawkins' first book, *The Selfish Gene*¹⁸ (1976), he claimed that the central unit in natural selection is in fact the gene and its variations through mutation. In many of his subsequent books, Dawkins has elegantly and convincingly elaborated on this line of reasoning, even if he sometimes goes a bit too far, particularly in exaggerating the selfishness of the gene – are not entirely convincing but highly marketable metaphor. In fact, he had considered using another title: *The immortal gene*.

Stephen Jay Gould opposed what he understood to be an excessive belief in the omnipotence of the gene, and in that he probably has a point. When Dawkins wrote the book, it had not been that long since the discovery of what DNA looked like. It was presented by Watson and Crick in 1953. But Gould went too far in the other direction by designating genes as a kind of bookkeeper that simply registered the changes that occurred.

At the time of writing, more than 40 years has passed since Dawkins' book was published and the term gene, which then seemed so clear and simple, is now more vague and complex. There was even belief in what has been called the central dogma: a gene causes the synthesis of a protein. Nowadays, we know that genes are complex, act in groups and are influenced by other genes. In addition, they can be temporarily influenced by the environment through epigenetic modifications and imprinting and are activated in various ways, and do not necessarily synthesise only one protein. This doesn't detract from Dawkins' central idea of the gene as replicator, without which evolution simply cannot function, and I don't

know of anyone who seriously discusses evolution who does not agree that genes are important.

American intermezzo

How then have humans arisen or alternatively developed? On this question there is an interesting history of ideas that includes not only Asa Gray who has already been mentioned, but even more so the great nineteenth century scientist Louis Agassiz (1807–1873). He was what we today would call a creationist. He believed in divine intervention in nature. A slightly more ominous aspect of his research was that he thought that the human races had been created separately. This is a theory that still has its advocates today, who believe that Man developed millions of years ago in different parts of the world and that their differences in appearance have existed for a very long time.

The dominant theory today, which has a great deal of support from studies of old skeletal remains and from DNA, is that Man arose about 300,000 years ago in Africa and then spread across Africa and – most likely starting approximately 100-200,000 years ago – then spread all over the world. Where “we” weren’t successful until maybe 60 000 years ago was where our spreading all over the world began in earnest, even if it’s conceivable that some few people did manage to get further earlier. While the ‘out of Africa’ hypothesis does hold in general terms, it has been complicated by recent findings which suggest that there may have been people of our kind in Asia far earlier than previously thought.

Agassiz was one of the most famous scientists of his time, and one might wonder whether his personality (like Asa Gray’s), more than his theories, has relevance for today’s widespread creationism in the USA, or what has been called in its new guise: intelligent design. At the same time there were significant differences between Gray and Agassiz: the former called himself a Darwinian, which was not the case with the latter. The theory of evolution and in particular Darwin’s greatest contribution, the theory of natural selection, has never been as well accepted in the USA as in Europe. It is said that you cannot become President of the United States or even a presidential candidate if you do not believe in God, at least ‘officially’, and I can also imagine that it would be difficult to be an advocate of science, in the form of the theory of evolution, even if that would not be enough, at least so far, to exclude you from becoming President. Atheism is a difficult subject – the word has a way of adapting itself to the environment – and in the USA being an atheist means that you are not only godless but possibly mean and downright evil.