How to Be Animal

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THE INDELIBLE STAMP

Man with all his noble qualities, with sympathy which feels for the most debased, with benevolence which extends not only to other men but to the humblest living creature, with his god-like intellect which has penetrated into the movements and constitution of the solar system – with all these exalted powers – Man still bears in his bodily frame the indelible stamp of his lowly origin.

Charles Darwin

The world is now dominated by an animal that doesn't think it's an animal. And the future is being imagined by an animal that doesn't want to be an animal. This matters. From the first flakes chipped from stone in the hands of walking apes at least several million years ago, history has arrived at a hairless primate with technologies that can alter the molecules of life.

These days, humans are agents of evolution with far greater powers than sexual selection or selective breeding. Thanks to breakthroughs in genomics and gene-editing technologies, the biology of animals, including humans, can be rewritten in various ways. We have created rodents with humanised livers or brains partly composed of human cells. We've made salmon that grow to our timetable. Scientists can sculpt DNA to drive lethal mutations throughout a whole population of wild animals.

Meanwhile, the rest of the living world is in crisis. In our oceans, our forests, our deserts and our plains, many other species are declining at unprecedented rates. In geological terms, we're an Ice Age, a huge metamorphic force. Our cities and industries have left their imprint in the soil, in the cells of deep-sea creatures, in the distant particles of the atmosphere. The trouble is we don't know the right way to behave towards life. This uncertainty exists in part because we can't decide how

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other life forms matter or even if they do.

All that humans have tended to agree on is that we are somehow exceptional. Humans have lived for centuries as if we're not animals. There's something extra about us that has unique value, whether it's rationality or consciousness. For religious societies, humans aren't animals but creatures with a soul. Supporters of secular creeds like humanism make much of their liberation from superstition. Yet the majority rely on species membership as if it is a magical boundary.

This move has always been beset by problems. But, as time has passed, it has become harder to justify. Most of us act according to intuitions or principles that human needs outrank those of any other living thing. But when we try to isolate something in the human animal and turn it into a person or a moral agent or a soul, we create difficulties for ourselves. We can end up with the mistaken belief that there is something non-biological about us that is ultimately good or important. And that has taken us to a point where some of us seek to live for ever or enhance our minds or become machines.

None of this is to say that there aren't clear differences between us and everything else. Our conscious encounter with the world is a breathtaking fact of how life can evolve. We chat together about abstract concepts and chip images of ourselves out of rock. Like the beauty that a murmuration of starlings possesses, our experience seems to be more than the sum of our parts. From childhood onwards, we have a sense of identity, a kaleidoscope of memories. The sorts of skills and knowledge we bring into play in living and reproducing include the ability to fantasise and deceive, control certain urges and imagine the future. Through a blend of senses, emotions, hidden impulses and intimate narrative, we dream and we anticipate. The human mind is an amazing natural phenomenon. Yet our kind of intelligence – having a subjective consciousness, among other things – does more than just enrich our experience of life. It provides far greater flexibility in our behaviour than might be possible without it, most especially with each other.

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Little wonder then that we have spent much of history asserting that human experience has a meaning and value that is lacking in the rigid lives of other animals. Surely there is something about us that can't be reduced to simple animal stuff? Some might say that stripped of culture we become more obviously akin to the other creatures on Earth, relying on wits and body to get the energy to remain alive. Many works of art have aimed to teach that lesson, needling the imagination with the image of a human at the mercy of the forces of the natural world. But even so, we recognise that this individual has a potential for awareness that is unique in what we know – so far – of life in the universe. Here we have it. The exhilarating oddness of being something so obviously related to everything around us, and yet so convincingly different.

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We are the mythical being our ancestors once painted on rock – a therianthrope, part animal, part god. There is the animal body, the bit of us that bleeds and ages, and then there is the exceptional bit that seems to come from our intelligence and self-awareness, our spirit. As American political scientist George Kateb has written, we are 'the only animal species that is not only animal, the only species that is partly not natural'. This idea can be found everywhere. We are animals as we embrace and as our bloodied newborns slide from the bodies of women but not when we make vows. We are animals as we bite into the flesh of our meal but not in the workplace. We are animals on the operating table but not when we speak of justice. This split in the human condition, we are told, has not only saved us from the meaningless lives of other creatures but forms the basis of the world we inhabit. It has raised us to the highest position in a hierarchy of life. It has left us with the impression that the human world is rich while the animal world is its pale shadow. And this has opened the way to a worldview in which our flourishing is the ultimate good.

It is, of course, perfectly possible to believe that humans are animals with no special origin or meaning, even peculiarly rapacious animals that the world would be better off without. But people rarely behave in accordance with this view – in other words, they usually continue to live as if the human world has meaning and rules of conduct that can be better or worse.

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Perhaps it ought to end there. Yet we remain haunted. Many of our most common beliefs spring from an underlying refusal to accept that we are organic beings. Our kind of awareness has left us uncomfortable with the facts of an animal life. Animals suffer and die according to random events. Being a creature related to everything from an oak tree to a jellyfish brings with it threats like pathogens, injury, physical change and – for us – moral uncertainty. All that we love and value must be tugged out of an untamed landscape. This is both frightening and confusing. From this perspective, being animal is an embarrassment. Worse still, it is a danger.

Yet history has given us hope that we are different from the rest of the earthly rabble. What we truly are will save us from the fate of animals. Where other animals must suffer and perish, we have the gift of deliverance, whether into heaven, a glorious future or even merging with machines. We can be more than our animal bodies or our organic nature. What is important about us is somehow protected from the natural forces over which we fear we have no power. But this creates a strange amnesia. In convincing ourselves that there's a real and radical dividing line between us and all other organisms, we seem an impenetrable mystery.

Because of this, our relationship with being an animal is nothing less than bizarre. Most of us feel a frisson of anxiety that we live in a topsy-turvy world. Many of the things we most value – our relationships, the romantic sensations of attraction and love, pregnancy and childbirth, the pleasures of springtime, of eating a meal – are physical, largely unconscious and demonstrably animal. The things we most want to avoid – suffering, humiliation, loneliness, pain, disease, death – are born of animal instinct and the shared needs of an organism. Which is the truest part of the human experience, the animal, bodily feelings or the mental flickers of a wilful, storytelling intelligence? The trouble for us is that none of it quite makes sense. In our layered experience of the world, it's possible to believe we have left behind the blunt realities of being animal. Nothing could be further from the truth. Human life may be a

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blend of biology and dreams, but these dreams are still animal dreams. They are not separate to the bodies from which they arise. It's nonsense that our gifts have made us something that isn't animal.

So it is that we live behind a hidden membrane through which – at any moment – one of us may tumble to find ourselves on the other side. Opening our eyes, we face the truth of what we are, a thinking and feeling colony of energy and matter wrapped in precious flesh that prickles when it's cold or in love. We are a creature of organic substance and electricity that can be eaten, injured and dissipated back into the enigmatic physics of the universe. The truth is that being human is being animal. This is a difficult thing to admit if we are raised on a belief in our distinction.

What is different for our generation is that we now know something that would have been blasphemous until very recently in human history. We know not only that the Earth is not the centre of the universe but that we are not the centre of life. Instead, we are an animal that finds itself aware of being an animal bound into the dark tissues of time and energy. The human species is an integrated part of the life on our planet, not an exceptional creation by itself.

If we had stayed in small bands on the African savannah, perhaps this knowledge would have had little consequence. As it is, there are now billions of us spread across all continents of the Earth. Nowadays, technological and industrial advances have distanced us from and, increasingly, medicalised our animal nature such that some of us treat our bodies as a malfunctioning part of us. The ongoing truth of our state can come as a shock. We are surprised by our frail flesh, the susceptibility of our bodies to desire as much as to disease. We spend millions to slow the ageing process, even more on the battle with ill health, and we are living through a determined project to remove reproduction from the messy chaos of our bedrooms and a mother's womb.

In our current industrial revolution, we have turned to the engineering of life in our pursuit of human wellbeing. It's hard to

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overstate the significance of this. Technologies that target our biology are constant reminders that we are animals. This is a problem for those who don't want to be one. A technological revolution that exploits the anatomy, physiology and behaviours of living organisms may be incompatible with human psychology. What we risk is a runaway process where our fear of being animal causes us to hammer out a more frightening world – not frightening in the sense that the world is nastier or more violent, but in a paradoxical reliance on technologies that aggravate the existential fears beneath us.

There's every reason to believe that when faced with a threatening reality, we will seek greater separation between us and the rest of nature. What form this separation might take is uncertain. One choice might be to do away with other animals or bring more of them out of a wild state and into submission. An easier course of action could be to put even greater accent on human exceptionalism, either by trying to make us superhuman or by shoring up our comforting beliefs. But yet another possibility is to do away with humans instead. It's easy to dismiss any one of those choices as overblown until we look around us. Each of them is being actively explored.

Of course, it's tempting to think that the uneasy relationship humans have with being animal is but an invention of modern civilisations or of a narrow band of philosophers. After all, the Lakota prayer *Mitákuye Oyás'iŋ*, most often translated as 'all are connected', is importantly different to that of the Roman Catholic catechism of the human person as *Imago Dei*. Some cultures amplify human distinction more than others. In light of this, some of the general statements in this book will refer more to the ideas of those civilisations. But the struggle with being animal isn't only a figment of culture. Our ideas are shaped around the anvil of human nature. These days, some say there's no such thing as human nature. But that is true only up to a point. Many things in our world work because we are – for want of a better description – a group of animals similar enough to be called a species. Our ideas about ourselves matter enormously, but they don't leave us untouched by

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common biological or psychological characteristics. The diverse ideologies of the world have attempted to solve some of the troubles that can come from being animals. But these are not just problems that evolutionary history creates for our redemption. We are a species that ponders its own condition. The underlying difficulties of being an animal remain no matter what culture or era a person is born within. We all face real worries and dilemmas as a consequence of being alive among a multitude of lives.

This book is a defence of what it means to be an animal. It doesn't involve belittling us or losing sight of the obvious differences that mark us out. Nor does it result in a confused preference for what might be thought of as natural. Rather, this is an argument for a deeper understanding of how we think about life. Our animal origin is the story of our place in the world. It's the basis of how we give meaning to our existence. This is an impossible task without first accepting that humans are animals. This should be straightforward, yet it isn't. In truth, we live inside a paradox: it's blindingly obvious that we're animals and yet some part of us doesn't believe it. It's important to try and make some sense of this. And then, once we accept that we're animals, to think about what flows from that.

In a poem written in 1980, Galway Kinnell writes of how living things must contain within them a kind of self-love for their own unique biological form. In a way, this is the principle of survival. But he recognises that 'sometimes it is necessary/to reteach a thing its loveliness'. What follows is an attempt to make sense of the kind of being that we are. Yet it's more than that. It's an invitation to refresh in our minds the loveliness of being animal.

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THE DREAM OF GREATNESS

And yet is not mankind itself, pushing on its blind way, driven by a dream of its greatness and its power upon the dark paths of excessive cruelty and excessive devotion. And what is the pursuit of truth, after all?

Joseph Conrad

Falling upwards

Humans are part of a long process of emerging life, one that binds us to everything we see around us. 'From so simple a beginning,' declared Charles Darwin at the close of *On the Origin of Species*, 'endless forms most beautiful and most wonderful have been, and are being, evolved.' We don't yet know how the first living cells got going in the early stages of the Earth's history. Our world was then a rugged, mineral place, without hunger or judgement or any of the outrageous colours of a land with grasses and flowers. It is worthwhile to imagine standing in this smoking world, slammed by asteroids, and unthink the emergence of life. Somehow, in the heat of the deep-sea vents or in the shallow pools of that rough, smoking surface, primitive cells began to stir and gather through the peculiar business of energy conservation and flow.

'Life is, in effect, a side-reaction of an energy-harnessing reaction,' says biochemist Nick Lane. Or, as Austrian physicist Erwin Schrödinger put it in a series of public lectures he delivered in 1943 at the same time as the bloodiest battle in wartime history was coming to its close in Stalingrad, living matter seems to avoid 'the rapid decay into the inert state of "equilibrium"'. Whether or not we think of this kind of chemical event as rare or inevitable, we can identify it as one of the essential things that separates the living from the non-living.

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Just as all life as we understand it persists by drawing on its environment – be it the barium-rich waters of a hydrothermal vent or the inside of an animal's cell – all known forms of life on Earth have the same rudimentary biochemistry. Life also shares heredity, which is to say that we can distinguish the glistening liveliness of a cresting wave from the organisms that might be carried in its waters because, while both require energy for their form, only life makes a child in likeness to its parent. Whether *E. coli* or an elephant, new life is generated from the divisions of a single cell. What is more, all living cells on our planet store the details of inheritance in deoxyribonucleic acid and involve certain chemical reactions accelerated by ribonucleic acid molecules.

More than three billion years ago these protocells likely became the first kind of bacterial life on Earth. Long before animal eyes could make sense of the landscape before them, the Earth's oceans were a vast bacterial kingdom. In time, evolution generated a fascinating change: pillars of rock colonised by cyanobacteria, tiny strands of bluish living entities that were doing something that would change the world – exploiting sunlight to stimulate their life cycle, producing oxygen in return. As these communities of bacteria grew, the cumulative effects of their presence made possible photosynthesising plants and the lungs of mammals like us, while limiting the opportunities for others like the beautiful *Spinoloricus cinziae*, an animal discovered only a few years ago in the Mediterranean Sea that is adapted to a life without any oxygen at all.

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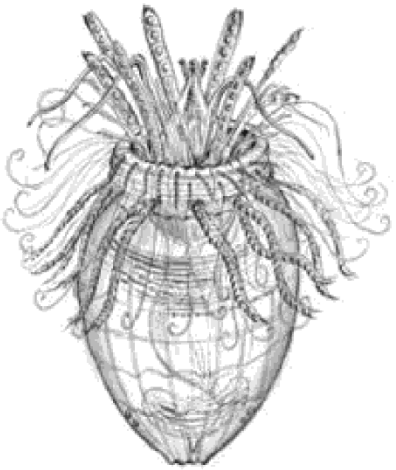

In 1967, American evolutionary biologist Lynn Margulis advanced the idea that animals and plants, as distinct from the first bacterial forms of life, owe much of their origins to an event called endosymbiosis. This is a process whereby one cell consumes another but without digesting it. There was considerable resistance to Margulis's theory, and it took corroboration through genetic studies more than a decade after she published her work before the theory became orthodoxy. The evidence for endosymbiosis is the presence, inside animal cells, of mitochondria and chloroplasts that divide independently and have their own DNA. Our mitochondria, absorbing nutrients and reservicing them as energy, are the ghosts of bacteria that our ancestors once ingested.

Imagine again standing in the same spot as in the smoking, lifeless Earth but that now it is the Cambrian era, around five hundred million years ago, and the animals have arrived. The seas contain creatures like the anomalocaridids, ornate, shrimp-like animals with two curled appendages for spooning other animals into their mouths. This is the moment most of the major animal phyla appear in the fossil record, followed by a massive phase of diversification. One theory for this explosion of life is that free oxygen was less limited. Newer research posits that there was a surge in calcium concentrations in the water. Still others hypothesise an arms race between predator and prey, and the

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evolution of eyesight. Nobody is entirely sure.

Yet the extraordinary diversity of life forms that we find in the Burgess Shale – the mineralised skeletons, the male and female anatomies of many of the species, the barbed or grasping shapes of the hunter and the hunted – show us how ensnared we are in a vast system of energetic interactions. The usual state of affairs is for living beings and the environments in which they survive to be subject to change and to death. Life forms may temporarily resist, but they can't do this for ever.

NASA scientist Michael Russell, who has a beautiful copy of the *Great Wave off Kanagawa* on the wall of his office, once counselled me to remember that life is 'an entropy generator'. In other words, life decreases its internal entropy by using free energy from its surroundings and dissipating this as heat that, in turn, generates greater entropy in its environment. Entropy is a measure of how dispersed energy is among the particles in a system. For anyone who is not literate in physics, this can mean very little. Paul Simon is instructive in this situation. As he puts it in a song from 1972, 'Everything put together/sooner or later falls apart . . .' Think of a gin and tonic. The frozen water of the ice cubes has a lower entropy than the spiritous sea that surrounds it. The atoms in the gin are free to slosh about and take on the shape of whatever glass they're poured into, but the atoms in the ice are less randomly arranged and only lose their shape when energy in the form of heat loosens them up.

The ordered appearance of a life form can be understood as a temporary state of low entropy created by finding and using energy. In physics, eating other animals makes perfect sense once enough of them are swimming around. In a fun paper written by biologist Alexander Schreiber in an effort to counter the misconceptions of anti-evolutionists, he summarises the exchanges of energy and waste among animals and the environment: 'all organisms maintain their low entropy status by "eating" free energy and "pooping" entropy'. While energy is needed for the regulatory processes of our bodies, disorder must be exported in the wastes that we separate and expel. Perhaps even

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consciousness, Russell speculates, may be a means of 'using up excess energy'.

Meanwhile, the physicist Jeremy England has argued recently that reproduction in organisms is 'a great way of dissipating [energy]'. He has devised the theory that the second law of thermodynamics, or the law of increasing entropy, might cause matter to organise in lifelike ways. Should it turn out to be true, it will expose an underlying, shared process between life and non-life, a curious commonality between snow leopards and snowflakes. 'It is very tempting to speculate about what phenomena in nature we can now fit under this big tent of dissipation-driven adaptive organization.'

Life on our planet can be arranged, more or less, into autotrophs and heterotrophs, organisms that exploit energy from the sun or chemical reactions, and organisms that take energy from those who've already captured it. What is unusual about our species is that we've been able to use more and more energy without having to evolve into a different species. We've achieved this through a combination of social learning, complex culture, and technologies. We don't have to speciate to gain the claws of an allosaurus; we can share information to design a warhead or a power station. In other words, we change our tools rather than our bodies. Fire and spears did the trick for hundreds of thousands of years, until we devised the domestication of our food sources. The next big shift came in the mechanisation of processes that gave us the Industrial Revolution. This enabled us to draw ancient deposits of organic energy out of the Earth and burn them.

It took most of human history to reach a population of one billion. Immediately after the onset of the first Industrial Revolution, our global population grew by more than 50 per cent. Agricultural production doubled in the hundred years leading up to 1920. After 1920, it doubled closer to every decade. By the latter half of the twentieth century, our population began growing by around a billion every ten or fifteen years. The major limits on the growth of groups of living beings are usually food availability, competition, predators and pathogens. But our rising

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populations led to a scientific renaissance. Over the past hundred years or so we've uncovered some incredible methods for extending our lifespans and limiting the dangers of things like disease. Historians have nicknamed this era the Great Acceleration. It has given us everything from antibiotics to gene editing.

But as our populations and needs increase, so do our effects on crucial aspects of the Earth's systems. Much of this is common knowledge. Today the world is loosely divided into pessimists, who see an inevitable collapse on the horizon; optimists, who believe things will stabilise and that we will use reason to reshape a more sustainable world; and futurists, who don't like the look of either scenario, and seek investment for our escape. So it is that some of us are clanging the warning bells, some are designing clean energy, and the rest are trying to move to Mars. These are our times.

One thing we can be certain of is that our planet will one day be lifeless again. If we dream with the Earth for a moment, we can see that mass extinctions of life forms have happened occasionally, mostly due to comets and asteroids or Ice Ages caused by axial tilt, with carnivalesque consequences for the next generation of creatures. But it will not always be so. Hundreds of millions of years into the future, the higher quantities of solar radiation will have precipitated genetic and structural changes that will restrict photosynthesis. From a wild medley of plants like the ancient *Nothia aphylla*, stamped into the Rhynie chert in northern Scotland, there will be a shrinking stock of plant life and, eventually, none. The death of plants will ensure the end of much other life. We tend to be reckless or forgetful of plants, but they ground the potential for multicellular animals like us. Without them, we're lost.

Spin out to a few billion years from now, and the dynamic spiralling, convecting currents in the Earth's core, roiling molten forms of the elements that gave us the Iron Age and a coin imprinted with the words *In God We Trust*, will stop driving the magnetic field. With this will come the loss of those protective mechanisms we take for granted, along with the withering effects of solar wind. Our atmosphere of sunny days

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and breezy autumn mornings will be destroyed. Our oceans will evaporate. Before this perhaps there might have been some hardy survivors like *Deinococcus radiodurans*, nicknamed 'Conan the Bacterium', capable of enduring the most aggressive of conditions. But over greater timescales the surface of the Earth will melt, and all life will be at an end.

Still, to this day, none of us truly knows why we are here or what lies at the heart of the cosmos. One thing we do know is that living things and the forces that help bring them into existence can be nasty, even catastrophic. In one sense, biology seems to come out of violence, whether that is about energy or extreme heat. The solar system and the Earth's environments commit horrors on animals, even as they allow for new diversity and change. The village-sized comet that created the Chicxulub crater and temporarily reduced biodiversity on Earth also made way for new creatures, including us. From one point of view the asteroid is an evildoer, but from ours it is a godsend.

And yet we live according to rules about what is good and right. We feel strongly that our love and experience have value. Few of us seriously wish to challenge such a view. Yet it remains difficult to ground the significance of who we are and what we do when there doesn't seem to be anything straightforwardly good about the world from which we're born. When we look out there at the trees twisting in the wind, their leaves freckled with fungi, a bird nearby smashing the shell of a snail to get at the soft creature inside, we can struggle to find reasons for the meaning we give to life. When we try to find some kind of fundamental goodness, we come up against viruses, bacteria, pests and predation that challenge this at a profound level, even though they can lead to outcomes that, from our perspective, are positive. How much are we a part of all this?

The fact is that the moods and sensations that bring such intensity to our experience come from the raw materials of the world before us. We find the gentle dance of the trees beautiful and the meat of the bird

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might be delicious to us. The provenance of all we enjoy is a sequence of events and processes that have no obvious concern for what we now think of as the rightness or wrongness of something. Whether we like it or not, what we think is important in life seems to originate in a world that lacks any obvious moral sense.

Last summer I visited a dig in the Utah desert, where dinosaur bones were being worked out of the riverbeds along which the animals they belonged to once lumbered, searching for food and opportunity. There is an important mental shift that happens when dinosaurs are no longer curated objects in museums. One femur the palaeontologist was slowly scraping free stood taller than my child. But it wasn't only the legs that were massive. What was also laid bare was the enormous size of the teeth and the claws, the practical viciousness of them. This, I thought to myself, is what the need for energy can give you.

Shortly before we left, the young man showing us around pointed to some darker lines in the rocks across the way. 'We're not sure yet,' he said, 'but they could be evidence of early mammals.' My husband and I squinted at the cindery rocks – the burrows, perhaps, of the small, night-dwelling insectivores that might have become the class of warm-blooded, milk-bearing animals to which we belong.

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Underlying arrangements of energy can push matters temporarily in the direction of expert killers like *T. rex* or favour superorganisms like ants. Either way, there are forces at work that don't suggest an onward movement or the inevitability of kindness. There's at least as much suffering as pleasure and as much distress as tenderness in the evolution of life. In the wild, where brains need to be a touch larger than among domesticated creatures, the dance of hunter and prey is a ceaseless fount of innovation. The ratcheting of intelligence or behaviour in the wild is often down to death-dealing of one kind or another. It is a stark truth that the majority of the newborn of other animals will not survive their first year of life. Evolution is sensible enough to spare the mother salmon any lasting attachment to the hundreds of eggs she may lay in each clutch, only 2 per cent of which will reach adulthood. It is better not to know what comes of the remaining 490 or so out of around five hundred that will end up in the stomachs of other creatures, even of other salmon, and on the blinis of humans at cocktail parties.

Yet the suffering and death that predators bring can be supportive of the overall ecosystem, with its abundance and richness of species. Predation exists at all levels of a natural system so enormous and vigorous that it's almost impossible to single out one animal or predict its effects. Predation can alter everything from disease dynamics in populations of animals to the sequestration of carbon. The classic example of the general effects of predators was the reintroduction of wolves to Yellowstone Park in 1995. The presence of the wolves set rolling a sequence of changes that are still making themselves known today. The last wolves of the area were killed by trappers in the 1930s. In their absence, numbers of elk increased. Once the wolves were back, the elk started moving around more, willow stands grew back that had been intensely grazed, restoring a food source for beavers, who spread and altered the stream dynamics, inadvertently providing habitats for fish and songbirds. And wolf kills also began to supply extra food for a host of scavengers, from ravens to grizzly bears. From the measure of biodiversity, the wolves are necessary and good. But that doesn't make

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nature. They are methods to save humans from the difficulties that nature's amorality presents to us. The idea may take on different hues in different times and places. But there's always something transcendent about humans that rescues us. In this way, the major theories about the significance of human lives have the distinct whiff of psychological necessity rather than rational clarity.

Those reacting against the individualism inherent in Western democracies have tended to over-romanticise the realities of human and animal relationships in other cultures. It's certainly true that humans are far from identical in their views. Indeed, some animistic traditions extend value and personhood into plants, as well as other animals. Today, many of these kinds of smaller societies face pressures and persecution. The complexities of their perceptions and practices are often obscured. On the other hand, although many of the larger non-Western traditions see both humans and animals as inheritors of a spiritual realm, even in a belief system like Buddhism, whose history has involved plenty of internecine war and animal consumption, rebirth into another animal isn't a cause for celebration. So, too, the image of the vegetarian followers of Hinduism is far from the reality of people's lives. In India, where 80 per cent of the population identify as Hindu, only around 20 per cent have a vegetarian diet. Nor are humans and other animals alike in their spiritual worth. In the Taittiriya Upanishad the god Shiva makes clear that humans are unique in their ability to act on knowledge.

In any case, for our increasingly connected populations and economies, some ideas about human life have become almost universal. Today, human dignity as something we both possess and as an exclusive set of guidelines for how we should behave has spread around the world. In discussing the landmark South African court case against capital punishment, *State v. Makwanyane*, judge Kate O'Regan noted that 'recognizing a right to dignity is an acknowledgement of the intrinsic worth of human beings'. The concept we now use was written into the psyches and legal instruments of European nations while families were

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still repatriating those who died in the Second World War. In the 1949 German constitution, it is stated that 'the dignity of man shall be inviolable'.

Yet a little background is edifying. In German, the word for 'dignity' is *die Würde*, closer in English to 'worth'. Dignity itself comes from an ancient Roman concept for the influence, mastery and character that males – not females – gathered throughout their lifetime. Just as the word 'value' in English is a somewhat uncomfortable blend of reputation and moral integrity, concepts of worth and dignity have always been associated with status. The Old French word *value* as a social principle was loaned from the eighteenth-century aesthetic and monetary assessments of paintings and enters modern parlance around the time millions of Europe's young men were being blown to pieces in the clays of France and Belgium.

The modern concept of 'worth' as special or intrinsic value was once attached to the Old English notion of 'manworth', which ranked humans according to the price one might give to the lord if one of his men was killed. First used in the laws of Hloðhaere and Eadric, this blood money was worked out not only in terms of compensation to be paid for the loss of various parts of the body, the legs or hands and so forth, but also the social rank of an individual. A nobleman like a thane might result in 1,200 shillings in compensation. A ceorl, a free individual who wasn't considered nobility – which gave us the term 'churlish' – was worth a mere 200. There was little or no value to the life of a servant. When it comes to what matters, societies have always struggled to unpick what we prize from power, wealth and status.

But the real difficulty comes from globalising an idea that fails to make adequate sense of what we mean by goodness in the first place. How do we decide that we are a good life form? At present, humans have defiled their home so thoroughly that the World Health Organization attributes seven million premature deaths to air pollution each year. That's more than ten times the number of deaths caused by anopheles mosquitoes. Our destruction of habitats has been so extensive that a

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review published in 2020 revealed the loss of two-thirds of the planet's vertebrates, based on long-term trends in population numbers. We can quibble over the figures, but the fact is our destructiveness obscures what is good about us. It begins to look as though dignity or whatever notion of transcendence we tell ourselves we possess is good only at our convenience. Not only that, but it's only good occasionally, and often only for some of us. Given this background, how do we decide that anything we do is much different from a shark's ampullae of Lorenzini, the sense organs that allow it to feel the electrical field of its prey? Unique, maybe. But good?

Love like an orangutan

Of course, it's a cheering thought that only human tendencies have full moral status, but it's difficult to square with the fact that we're animals. For centuries now secular and scientific thought has sought to out-climb the mire of an amoral Earth. Cognisant of the painful or distressing aspects of how living things overcome the problems of survival, thinkers have tried to turn our morality into an abstract. We are told we can't use nature or natural traits to determine what is good. In philosophy, this has become known as the 'naturalistic fallacy'. In essence, the fallacy claims to show why it's hard, if not impossible, to divine what we ought to do or value from how something is in nature. This has given us our modern belief that moral ideas are human achievements that exist beyond our biology. This seems like common sense.

But the idea that we can approach the moral experience of humans as an abstract that has no relationship to the fact that we're animals suffers from severe problems in its internal logic. The modern desire for a break, an unbreachable gap between us and the rest of our planet's life, is ultimately a desire for a psychological and moral boundary that can both satisfy us and make sense of the world we want.

The fact is that much of what we value is bound up with being animal. Think of the bond between parents and children. It's true that

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we love our children because of who they are, their unique identities, and not only because of the interplay of hormones in our bodies. Love isn't just some chemical ruse. For humans, it is natural for our love to involve history and insight. But imagine what it would mean to take the love of a child and turn it over to a machine, a bunch of algorithmic content, the kind of assembly of images that our smartphones come up with to summarise a year of our lives, rather than the animal compulsions, reasons, motivations and feelings that get love kick-started. The fact that we give each other love and support is a condition not of our rationalising but of our compulsions as animals.

Other animals may experience only the sensations of what we call love, but how far can we stretch the argument that they are without moral weight? Orangutans are remarkable for having a life history not dissimilar to our own, at least in terms of mothers and children. Their pregnancies last a little under nine months. Infants remain with their mother, clinging to her body, feeding on her milk, for the first few years. They stay close, learning from her, for upwards of ten years, and make visits to her even after they are independent. Some claim we mustn't call these behaviours love. Perhaps that is fair. But it defies belief that these instincts aren't accompanied by feelings. The question is: do feelings matter? Do orangutan females nurture their children at a cost to themselves for so many years because they love them? Or because their biology creates necessity? What we can say is that their biology has given them reasons to behave in this way. It is how their children will survive and thrive.

Some argue that the parent–child bond is actually a roadblock to moral behaviour, pushing us to favouritism, even tribalism. But, for humans, tending to our young is not only about their physical and mental wellbeing, it is also constrained by the energetic costs to the caregiver. It is a role still largely undertaken by women, and an activity of such profound value to society that it remains staggering that not only do we not pay our mothers but often penalise them for taking time off. Even the focused, personalised element to child-rearing has its own logic.

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It not only benefits the child's developing sense of self but it is also determined by the time and energy love requires, particularly of women. At least, that's how it is for mammals like us.

The ultimate question about what is right is often then not whether it's natural but whether it's beneficial. The complication for us is in making sense of what that means. When we speak of benefits and goods, we often include more complicated assumptions about the relative value of the recipients of these goods. People are usually certain of their point of view, but solid facts are harder to come by. Either way, an absolute break with us and other animals is difficult to justify. The claim is easy enough to accept when it comes to a stinging nettle or a fungus, but it feels more problematic when thinking of other animals. Once you arrive at a being like an elephant – large-brained, aware, sensitive to its offspring, very different in outward form to us but quite similar in many other ways – on what grounds should we be convinced of an absolute border? And yet most of us are convinced.

The problem for us is that it isn't true. Whether there's a creator or not isn't the issue. Evolution by common descent doesn't prove or disprove the presence of God. And nor is there anything wrong in recognising that our unique biology is important to us. Humans needn't be superior or supernatural to have unique needs. But none of this cancels out the feelings and needs of other animals. For those of us who wish to live without magic or myth, who pride themselves on the truths of science, our relationship to the rest of life on our planet is a problem we have not yet made sense of. The minds of other animals, despite clear evidence that we are surrounded by a multitude of alternative psychologies, continue to be put to one side. Those who wish to believe in the moral progress of human civilisation must recognise that our relationship to other animals still largely lingers in the cold.

Some argue that we have no duties to other life forms because they can't reciprocate our acts of compassion. Certainly, it's harder to care a great deal without a return. But this is an excuse, not a reason. The only way to avoid the spread of moral compassion into the lives of other

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sapiens form part of an anthropic principle. In other words, the universe came about somehow so that we could come about. But this kind of reassurance is a gamble. A little time and exploration have tended to shatter such hopes. This is especially true when there are so many unknowns.

Chris Impey, an astronomer at University of Arizona, points to the fact that biology seems to emerge out of extreme niches. But what happens once you have biology? Are multicellular life forms inevitable under certain conditions? Or is it difficult to get from an amoeba to a horsetail fern? The relatively new science of exoplanets – planets that could host life – involves a range of assumptions about what makes somewhere hospitable. The hunt for Earthlike planets got started almost accidentally when NASA's Kepler space telescope team detected a rocky world in 1995. But the first true exoplanet, Gliese 581c, was discovered in 2007 by Michel Mayor and Didier Queloz. Since then, we've found thousands of them. On this basis, researchers have predicted that there may be ten to twenty billion habitable worlds in the Milky Way alone. These would be planets that are neither too hot nor too cold, with sources of water and energy. NASA is now searching for signatures of oxygen, water vapour, maybe even the burning of hydrocarbons.

But time is essential to life. It took several billion years before primitive animals evolved on Earth, and another several billion before we arrived at an animal with technologies like telescopes. Other animals on our planet have cultures and strategies for social learning, especially mammals. But mammals gained their opportunities to adapt in part down to release from predation when 90 per cent of life on Earth was disrupted or destroyed by a random meteorite. 'If we're the consequence of that opportunity to regain a niche,' says Impey, 'how common might such opportunities be?' For those who see it as a favourable expectation that we're not alone, it's frustrating that life may be uncommon in the universe. But others see it as a boon that we've failed to come face to face with E.T. The anthropic principle remains unchallenged while we're alone.

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One obvious way to resolve the debate over the anthropic principle is to deny the whole lot. The foundational text of Rabbinic Judaism influenced centuries' worth of scholars and led to the widely held assumption that the Earth was around 6,000 years old. The attraction of a young Earth is that it looks like a human planet, a place whose only history is that of the dominance of our species. But by the eighteenth century, Scottish geologist James Hutton had recognised that the natural processes of erosion and sedimentation called for a new vision of time, a time of rock and stone, what he called 'deep time'. And news began to spread of strange objects and even stranger bones dug out of the ground. Each decade brought to light more evidence of early forms of humans, threatening the conviction of generations of men and women that they were the mortals of a God-made world of recent history. The conclusion ought to have been unavoidable: not only had the landscape around us slowly evolved but so, too, had we.

But there are still millions of people for whom such facts remain a controversy. Young Earth creationism is remarkably prevalent among some branches of Christianity, particularly within the evangelical movements that have gained traction through popular TV shows. Since 1982, the US-based Gallup poll has been asking Americans for their beliefs on the evolution of humankind. Even among postgraduates, more than 20 per cent in recent years continue to believe humans were created in their present state less than 10,000 years ago. It's a reminder of how fiercely people can use their minds to deny an unwanted reality.

There's nothing new in this. There are plenty of examples throughout history of the trouble that fresh knowledge can cause for old hopes. In the decades of the great dinosaur hunters of the eighteenth century, scientists and thinkers had argued over the consequences of the finds. The bickering wasn't really a matter of controversial data but rather a psychological response to the threat the evidence posed towards cherished religious and mythical explanations for human origins. But decades of careful study of the geology of Europe and the Americas ultimately made it impossible to deny the Ice Age that must once have

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transformed landscapes and through which large, now-extinct animals like cave bears then roamed. The Earth itself became a giant creation story in which the characters were written in fossilised bone and in artefacts preserved in pages of soil and rock. The Earth was speaking over us with greater authority.

But nothing could prepare people for what Charles Darwin would bring. For the man who watched Darwin steadily tease out his evolutionary ideas while aboard the *Beagle*, the relatively late recognition that we share aspects of anatomy and behaviour with other animals because we share a common origin in the long-distant past caused the 'acutest pain'. Darwin and Captain Robert FitzRoy were already at odds on the grounds of politics. FitzRoy was a Tory and a supporter of slavery, while Darwin was a Whig and an abolitionist. FitzRoy strongly denied the new geological theories of the age of the Earth and refused to be drawn into the scepticism that was beginning to affect those around him. A famous anecdote has him holding up a Bible at the 1860 Wilberforce–Huxley evolution debate in the Oxford University Museum in order to denounce Darwin. According to onlookers, he told the crowd that 'I believe this is the truth, and had I known then what I know now, I would not have taken him aboard the *Beagle*'.

The anxiety after Darwinism was enormous. Darwin himself was susceptible to strong feelings of unease about his theories. In 1860, he wrote to the great American botanist Asa Gray. His sense that there is 'too much misery in the world' was causing him to question his faith. 'I cannot persuade myself,' he went on, 'that . . . God would have designedly created the *Ichneumonidae* with the express intention of their feeding within the living bodies of caterpillars.' If we and everything else belong to the landscape of parasites and meteors and blind exchanges of energy, then God must have made the world so. But, if that was the case, the world offered a much more complicated measure of our worth.

Much was made of the danger Darwinism posed to the literal truth of the dominant religions and creation myths of the world. But Darwin knew that his theories posed an even greater threat to moral beliefs. If we

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