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Beyond biology and culture. The meaning of evolution in a relational world

I

It has become part of the accepted wisdom of our age that the modern scientific understanding of human beings, and of their evolution, was inaugurated by Charles Darwin in two epoch-making works, *The Origin of Species* (1859) and *The Descent of Man* (1871). What is less often realised, however, is that these were works of very different kinds. In *The Origin of Species* Darwin had little to say about human beings, and nothing at all about evolution. His was an argument, rather, about 'descent with modification' – the accumulation of differences over many generations in populations of genealogically related individuals. According to his theory of variation under natural selection, differences favourable to the reproduction of their carriers under prevailing environmental conditions – in so far as they are transmissible to offspring – will tend to become established, while those less favourable gradually disappear. Only subsequently, in part persuaded by his friend and rival Alfred Russell Wallace, did Darwin begin to substitute the word *evolution* for 'descent with modification'. The substitution, however, was founded upon a colossal mistake, originally perpetrated by the philosopher Herbert Spencer. Spencer had imagined that the theory of natural selection – or what he called 'the survival of the fittest' – offered independent confirmation of the law of evolution, a principle of progressive development that was supposed to operate across all spheres of life. When he came to write *The Descent of Man*, Darwin took on board much of Spencer's vocabulary and, in so doing, fell for the same error. It has been compounded by generations of biologists ever since (Ingold 1998a: 80–1).

In *The Descent of Man*, Darwin set out to explain what, in his earlier work, he had taken for granted, namely the pre-eminence of human beings *vis-à-vis* the rest of the animal kingdom. Throughout the *Origin*, Darwin had pictured himself as a spectator, watching the panorama of nature unfold before his eyes. There is, as he wrote in the final sentence of the book, 'grandeur in this view of life' (Darwin 1872: 403). But this is not a view available to non-human animals. While they appear destined to live more or less *within* the world of nature, Darwin could write as though he himself were *above* it, and could observe it in the manner of a spectacle. Yet Darwin was a man. How was it, then, that human beings – or at least the more civilised among them – could reach such an exalted position? Whereas in *The Origin of Species*, Darwin had described the view from the summit, in *The Descent of Man* he offered an account of the climb (Ingold 1986: 49). In an idiom shot through with the moral attitudes of his day, he now sought to establish a single scale, running all the way from the most primitive of animals

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to the most advanced of humans, along which could be charted the rise of reason or intellect, and its gradual triumph over the shackles of instinct. Where Darwin differed from many (but by no means all) of his predecessors was in both attributing powers of reasoning to subhuman animals and recognising the powerful sway of instinct even on the behaviour of human beings. The beginnings of reason, he argued, could be found far down in the scale of nature, but only with the emergence of humanity did it begin to gain the upper hand.

Thus for Darwin and his many followers, the evolution of species *in* nature was also an evolution *out* of it, in so far as it progressively liberated the mind from the promptings of innate disposition. Ever since, science has cleaved strongly to the view that humans differ from other animals in degree rather than kind. Darwin, it is said, finally showed us that the idea of an absolute Rubicon separating the human species from the rest of the animal kingdom is a myth. He did not, however, dispense with the dichotomy between reason and nature, or between intelligence and instinct; rather his whole argument was couched in terms of it. His point was simply that the possession of reason – or the lack of it – is not an all-or-nothing affair distinguishing all humans from all non-humans. In evolutionary terms, Darwin thought, reason advanced by a gradual, if accelerating ascent, and not by a quantum leap. 'We must admit', he observed, 'that there is a much wider interval in mental power between one of the lowest fishes . . . and one of the higher apes, than between an ape and a man; yet this interval is filled by numberless gradations' (1874: 99).

Now the idea that no radical break separates the human species from the rest of the animal kingdom is an ancient one, going back to the classical doctrine that all creatures can be placed on a single scale of nature, or what was called the 'great chain of being', connecting the lowest to the highest forms of life in an unbroken sequence (Lovejoy 1936). Initially the idea was that each species was immutably fixed in place, from the moment of creation, at a particular position on the chain, such that not a single position remained unfilled. It was the French naturalist and originator of the term 'biology', Jean Baptiste Lamarck, writing in the early decades of the nineteenth century, who set the chain in motion. He thought of it as a kind of escalator, on which organisms are continually working their way up the scale of nature, while new ones arise at the bottom to make their way up in their turn. Darwin, in his theory of evolution by natural selection, replaced the image of the single chain with that of a branching tree, but the idea of gradual change remained (Ingold 1986: 5–9). According to the view of the evolution of our species that you will find in any modern textbook, our ancestors became human by degrees, over countless generations. An unbroken sequence of forms is supposed to link the apes of some five million years ago, from which both human beings and chimpanzees are descended, through the earliest hominids of two million years ago, to people like you and me – certified humans of the species *Homo sapiens*.

II

As an account of human biological evolution that may be all very well, but what about human history? Theorists of the eighteenth-century Enlightenment tended to think of human history as the story of man's rise from primitive savagery to modern science and civilisation. The idea that human reason would rise and eventually triumph over

the brute forces of nature was the centrepiece of their philosophy. Yet they were also committed to the doctrine that all human beings, in all places and times, share a common set of basic intellectual capacities, and in that sense may be considered equal. This was the doctrine of the 'psychic unity of mankind'. Differences in levels of civilisation were attributed to the unequal *development* of these common capacities. It was as though allegedly primitive peoples were at an earlier stage in the pursuit of a core curriculum common to humankind as a whole. In short, for these eighteenth-century thinkers, human beings differed in *degree* from other creatures with regard to their anatomical form, but nevertheless were distinguished in *kind* from the rest of the animal kingdom in so far as they had been endowed with minds – that is with the capacities of reason, imagination and language – which could undergo their own historical development within the framework of a constant bodily form (Bock 1980: 169, Ingold 1986: 58).

The immediate impact of Darwin's theory of human evolution, as set out in *The Descent of Man*, was to subvert this distinction. The scientist and the savage, Darwin insisted, are separated not by the differential development of intellectual capacities common to both, but by a difference of capacity comparable to that which separates the savage from the ape. 'Differences of this kind between the highest men of the highest races and the lowest savages', he wrote, 'are connected by the finest gradations' (Darwin 1874: 99). And these differences were, in turn, a function of the gradual improvement of a bodily organ, the brain (1874: 81–2). Throughout human history, the advance of civilisation was supposed to march hand-in-hand with the evolution of the brain – and with it the intellectual and moral faculties – through a process of natural selection in which 'tribes have supplanted other tribes', the victorious groups always including the larger proportion of 'well-endowed men' (1874: 197). This was Spencer's 'survival of the fittest'. The hapless savage, cast in the role of the vanquished in the struggle for existence, was sooner or later destined for extinction.

Darwin's commitment, in *The Descent of Man*, to an imperialist doctrine of progress according to which the morally and intellectually well-endowed are bound to supplant their inferiors, not only ran counter to the whole argument of *The Origin of Species*, but was also deeply racist. Whereas in the *Origin* Darwin had shown that the mechanism of natural selection always operates in such a way as to make species better adapted to their particular environmental conditions of life, in the *Descent* he argued that it would inevitably bring about absolute advance along a single, universal scale from the lowest of animals to the highest of men (1874: 194), regardless of environmental conditions, leading from instinct to intelligence and reaching its ultimate conclusion in modern European civilisation. In bringing the rise of science and civilisation within the compass of the same evolutionary process that had made humans out of apes, and apes out of creatures lower in the scale, Darwin was forced to attribute what he saw as the ascendancy of reason to hereditary endowment. For the theory to work, there had to be significant differences in such endowment between 'tribes' or 'nations' – or between what we might today call populations.

Conversely however, if there were no such differences then the theory could not work, as Wallace, the co-discoverer of natural selection, found to his cost. Fired by a democratic ideal of freedom and equality for all nations, Wallace had the advantage of a much greater familiarity and sympathy with the ways of 'primitive' people than Darwin ever had. So impressed was he by the wealth and diversity of their cultural achievements that he felt sure they must be the work of superior brains. But how could natural selection have produced brains apparently capable of so much more than

was actually required under the simple conditions of primitive life? 'Natural selection', Wallace wrote, 'could only have endowed savage man with a brain a little superior to that of an ape, whereas he actually possesses one very little inferior to that of a philosopher' (1870: 356). His notorious conclusion, to Darwin's dismay, was that only a creative intelligence would come to think of preparing the savage for civilisation in advance of his achieving it (Pels 2003: 255). For this apparent capitulation to creationism, subsequent generations of evolutionists would unfairly banish Wallace to the sidelines of the history of their science.

For in his estimation of the intellectual capacities of so-called 'savages', Wallace was right and Darwin was wrong. The term 'savage' was generally applied by nineteenth-century anthropologists to people who lived by hunting and gathering. We now recognise that the brains of hunter-gatherers are just as good, and just as capable of handling complex and sophisticated ideas, as the brains of western scientists and philosophers. Nevertheless racist notions about the innate mental superiority of European colonisers over indigenous peoples were remarkably persistent in biological anthropology. We should not forget that the idea of eugenics – that human capacities could be improved through a deliberate policy of breeding – enjoyed a certain respectability in scientific circles until the time of the Second World War. It was the war, and above all the atrocities of the Holocaust, that finally laid that idea to rest. What was self-evident to Darwin and most of his contemporaries, namely that human populations differed in their innate intellectual capacities on a scale from the primitive to the civilised, is no longer acceptable today. Darwin's view that the difference between the savage and the civilised man was one of brain-power has given way in mainstream science to a strong moral and ethical commitment to the idea that *all* humans – past, present and future – are equally endowed, at least so far as their moral and intellectual faculties are concerned.

But this has left the Darwinians with a problem. How can the doctrine of evolutionary continuity be reconciled with the new-found commitment to universal human rights? If, as Article 1 of the Universal Declaration of Human Rights states, all humans are alike in their possession of reason and moral conscience – if, in other words, all humans are the kinds of beings who, according to western juridical precepts, can exercise rights and responsibilities – then they must differ in kind from all other beings which cannot. And somewhere along the line our ancestors must have made a breakthrough from one condition to the other, from nature to humanity.

III

Faced with this problem, there was only one way for modern science to go – that is, back to the eighteenth century. Indeed the majority of contemporary commentators on human evolution appear to be vigorously, if unwittingly, reproducing the eighteenth-century paradigm in all its essentials. There is one process, of evolution, leading from our ape-like ancestors to human beings that are recognisably of the same kind as ourselves; another process, of culture or history, leading from humanity's primitive past to modern science and civilisation. Taken together, these two axes of change – the one evolutionary, the other historical – establish by their intersection a unique point of origin, without precedent in the evolution of life, at which our ancestors are deemed

to have crossed the threshold of true humanity and to have embarked on the course of history. And standing at the threshold, at the point of origin when history diverges from evolution, and culture from biology, is the figure of the primitive hunter-gatherer, today's equivalent of the eighteenth-century's savage.

Whenever scientists are concerned to stress the evolutionary continuity between apes and humans, the humans are almost always portrayed as ancient hunter-gatherers. According to a now widely accepted scenario, it was under conditions of hunter-gatherer life, hundreds of thousands of years ago in the Pleistocene era, that the biological and psychological capacities evolved that are supposed to have made us human. Once established they have remained with us, as a legacy from our evolutionary past. Thus every one of us is said to carry, as a fundamental part of our biopsychological make-up, a set of capacities and dispositions that originally arose as adaptations to hunting and gathering in Pleistocene environments. The doctrine of psychic unity, it seems, was right after all, or as John Tooby and Leda Cosmides declare in their manifesto for the brave new science of evolutionary psychology, 'the psychic unity of mankind is genuine and not just an ideological fiction' (1992: 79).

Following this line of argument, so far as their evolved capacities are concerned there should be little to distinguish today's scientists and engineers from the hunter-gatherers of the Upper Palaeolithic. What makes them different, apparently, is a separate process of history, or what many have taken to calling cultural (as opposed to biological) evolution. Yet this very distinction implies that at some point in the past, history must have 'lifted off' from a baseline of evolved human capabilities. Short of supposing an unfathomable quantum leap or – with Wallace – invoking the miraculous intervention of a creative intelligence, there seems no alternative but to imagine a historical trajectory that rises inexorably from a point of emergence, gathering pace as it does so, leaving the biological constitution of the organism, confined to the slow lane of evolutionary change, far behind.

This kind of scenario has been invoked on countless occasions, but it raises a host of awkward questions. If human history has a point of origin, what could it mean to have been living close to that point, or even at the crucial moment of transition itself? Were such people semi-cultural, gearing up for history? How can one conceivably distinguish those actions and events that carried forward the movement of human history from those that set it in motion in the first place? Indeed it is hard not to see, in the image of our hunter-gatherer ancestors looking out upon the dawn of history, the reflection of a decidedly modern political rhetoric. And it has set prehistorians on a frantic and much publicised search for the time and place of emergence of what are euphemistically called 'anatomically modern humans' – that is, people who were *biologically* indistinguishable from ourselves even though *culturally* still at the starting block. Their appearance is said to mark nothing less than the 'human revolution' (Mellars and Stringer 1989).

So after all that, the paradox remains. Short of reverting to the racially stratified scenario of Darwin, with its populations of more or less well-endowed men, the only way in which humans can be made to appear different in degree, not kind, from their evolutionary antecedents is by attributing the movement of history to a process of culture that differs in kind, not degree, from the process of biological evolution! The division between nature and reason is still there, but is now shifted onto that between the exotic hunter-gatherer and the western scientist, the former epitomising a view of humanity in the state of nature, the latter the triumph of human reason *over* nature. Even today, there are scholars – many of whom would call themselves scientists – who

assert that through the study of hunter-gatherers, whether ancient or modern, we should gain a window on evolved human nature which is obscured, in the study of societies of other kinds, through the subsequent accretions of culture and history (Clark 1990).

Where, then, does this human nature lie? How come that these capacities with which we are all supposed to be innately endowed have been faithfully handed down, over tens of thousands of years, apparently immune to the vagaries of history? For most contemporary students of human evolution the answer is simple: because they are in the genes.

IV

Now this response is palpable nonsense, and should be treated with the ridicule it deserves rather than paraded as one of the great discoveries of the twentieth century. That it nevertheless continues to enjoy the full backing and authority of established science is due to a fundamental confusion surrounding the concept of 'information', and it is important to spell this out.

Strictly speaking, the gene is a particular segment of an immensely long molecule called DNA that is found in the nucleus of every cell of the body. Crucially, genes regulate the manufacture of proteins, which are the principal materials from which organisms are made. However evolutionary biologists frequently refer to the gene in another sense, as carrying information that encodes a particular trait or character. This is the so-called 'Mendelian gene' (Dunbar 1994: 762). Taken together these Mendelian genes add up to a kind of character specification for the organism as a whole, technically known as its *genotype*. How came it, then, that lengths of DNA in the genome came to be identified, under the same concept of the gene, with information coding for particular traits making up the genotype?

In the commonly understood, vernacular sense, information refers to the semantic content of messages transmitted from senders to recipients. It is the meaning attached by the sender to the message, intended for its recipient. But it was not by extension from this vernacular usage that the concept of information entered biology. Rather, its source lay in the theory of information as it had been developed in the 1940s by Norbert Wiener, John von Neumann and Claude Shannon. In the specialised sense employed by information theorists, 'information' has no semantic value whatever; it does not *mean* anything. Information, for them, meant simply those differences, in the input to a system, that make a difference in terms of outcome.This point, however, was entirely lost on the molecular biologists who, having realised that the DNA molecule qualified as a form of digital information in the technical, information-theoretic sense, immediately jumped to the conclusion that it could therefore be treated as a *code* with a specific semantic content. Despite repeated warnings from the information theorists themselves against conflating the technical sense of information with its vernacular counterpart, the scriptural metaphors of message, language, text and so forth soon took on a life of their own, and the original confusion upon which they were based rapidly faded from view (Kay 1998).

In truth, the DNA of the genome does not encode anything: there is no 'message'. What, then becomes of the genotype? By definition, and as opposed to the manifest form

of the organism – otherwise known as its *phenotype* – the traits comprising the genotype are assumed to be wholly independent of environmental context, and to be already in place at the point of inauguration of a new life-cycle. But how have they come to be put there? It is one thing to observe that in the context of the cell, DNA undergoes a process of replication, quite another to suppose that this is tantamount to the replication of a character specification for the organism. For the only 'reading' of the DNA lies in the growth of the organism itself, a process technically known as ontogenetic development resulting in the phenotype. In their efforts to prove that the properties of organisms have evolved by natural selection, however, biologists have set out to redescribe the characteristics of these organisms in a way that factors out all variation ostensibly due to environmental experience. That is, they have sought to produce, for each, an abstract, context-independent specification. This abstraction is then 'read in' to the genome – as if it had a concrete presence in there – so that ontogenetic development itself can be seen as a 'reading off', under particular environmental conditions, of a pre-existing specification. The circularity of this argument needs no further elaboration, and is one reason, of course, why it has proved so hard to refute.

Nothing better illustrates this tendency to transpose, into the organism, a set of abstract specifications derived from our external observation of them, than the fate of the concept of biology itself. Referring initially to the procedures involved in the scientific study of organic forms, 'biology' has come to be seen as a set of directives – literally a *bio-logos* – supposedly residing in the organisms themselves, and orchestrating their construction. For any particular organism this bio-logos is, of course, its genotype. Herein lies the explanation for the commonplace, though highly misleading identification of 'biology' with genetics. The very notion of biology has come to stand in for the belief that at the heart of every organism there lies an essential specification that is fixed from the start and that remains unchanged throughout its lifetime. To be sure, this specification is taken to be open-ended, affording scope for the developmental outcome to be conditioned by environmental circumstances. But understood in this sense – as components of a conditional specification – the genes are, as I have shown, entirely imaginary.

Now what applies to organisms in general must surely apply in particular to those organisms we call 'human'. The human genotype, in short, is a fabrication of the modern scientific imagination. This does not mean, of course, that a human being can be anything you please. But it *does* mean that there is no way of describing what human beings *are* independently of the manifold historical and environmental circumstances in which they *become* – in which they grow up and live out their lives. As we all know, these are extremely variable. But what are the implications of this view for our understanding of culture and history?

V

In order to answer this question, it will help first to spell out a view of the relation between human nature and culture which is quite commonly found, especially in the writings of biological anthropologists and evolutionary psychologists. According to this view, there are two kinds of inheritance in human populations that run in parallel. One is said to be 'biological', the other 'cultural'. Biological inheritance works through

the transmission of genetic information encoded in the DNA; cultural inheritance is more or less independent of genetic transmission and takes place through a process of social learning (Durham 1991). Take a couple of apparently uncontroversial examples. I can walk and I can play the cello. Bipedal locomotion is generally regarded as a species attribute of *Homo sapiens*, an integral part of our evolved human nature. Cello-playing, by contrast, is surely a cultural skill with a very specific background in the European musical tradition.

But human beings are not born walking, nor do they all walk in the same way. There is, as Marcel Mauss observed in his famous essay of 1938 on 'techniques of the body', no *natural* way of walking (Mauss 1979: 102). In Japan, at least traditionally, it was conventional to walk 'from the knees', in what looks to us like a rather shuffling gait, but one that actually makes very good sense when your footwear is sandals, and when you have to walk on very steep terrain, as is common in the Japanese countryside, especially when carrying heavy loads slung from either end of a long, supple pole balanced across one shoulder. We in Europe, by contrast, are taught to walk from the hips, and not from the knees, while keeping the legs as straight as possible. And our carrying devices, from rucksacks to suitcases, are designed with this posture in mind (Kawada n.d.; Ingold forthcoming).

Are these inflections of walking culturally acquired supplements to a universal capacity for bipedal locomotion already imparted to the human body by the genes? Surely not. For walking is not a compound of pre-existing and add-on components, but a skill that is gradually incorporated into the *modus operandi* of the human organism – mainly but not exclusively in the first few years of life – through practice and training within an environment that includes skilled care-givers, along with a variety of supporting objects and a certain terrain (Ingold 2000: 375). It is, in that respect, the outcome of a process of development. It is because people encounter different developmental circumstances that they walk in different ways. But is it any different with my ability to play the cello? This, too, is a bodily skill, likewise established through practice. Of course I had a teacher, and we may say colloquially that my teacher passed on his skills to me. What he did not do, however, was *transmit* them to me, as advocates of the orthodox view would say, by *non-genetic means*. He did not send me abstract, decontextualised messages, encoded in symbolic media, specifying rules of play which I had then to execute in my performance. He would rather place my hands around the bow, and my fingers on the fingerboard, so that I could experience for myself the relation between the movement of my right arm and the vibrations of the strings, and between the muscular tensions in the left hand and the resulting intervals of pitch. My ability to play the cello was not transmitted to me any more than was my ability to walk. I grew into it.

Now if, as I have suggested, those specific ways of acting, perceiving and knowing that we have been accustomed to call cultural are enfolded, in the course of ontogenetic development, into the constitution of the human organism, then they are equally facts of biology. A skill like playing the cello, being a property of the organism established through practical experience in an environment, is every bit as 'biological' as walking on two feet. Cultural differences, in short, are not *added on* to a substrate of biological universals; rather they *are* themselves biological (Ingold 1998b: 28–9). Not long ago, such a conclusion would have been inconceivable. In 1930, no less an authority than Franz Boas had declared that 'any attempt to explain cultural form on a purely biological basis is doomed to failure' (Boas 1940: 165). Thenceforth, the absolute independence of

cultural variation from biological constraint became a fundamental tenet of disciplinary integrity, one of the few things on which virtually all social and cultural anthropologists were agreed. Indeed it has served us well in our efforts to resist some of the more extreme forms of determinism, for example in debates about the alleged hereditary basis of intelligence, or about the influence of sex on gender. But it is now high time to put this tenet in question. To return to the example of a culturally specific skill like playing the cello: as a property of the organism, the outcome of a process of development, is this not fully admissible as a biological characteristic? Despite Boas's strictures, there is nothing wrong with accounting for this or any other aspect of cultural form on a 'purely biological basis', so long as the biology in question is of development, not genetics.

Evidently the source of the problem is not the conflation of the cultural with the biological, but the reduction of the biological to the genetic. And this reduction, I contend, still lies largely unchallenged at the heart of modern evolutionary theory in its current, neo-Darwinian incarnation. True, most evolutionary biologists are quick to deny all charges of genetic reductionism. 'Of course', they will say, 'the human organism, like any other, is the outcome of a developmental process'. But in the same breath they will attribute this development to a *complex interaction* of 'biological' and 'cultural' factors, operating in a given environment. And if you ask how biological and cultural factors are distinguished, they will say that the former are genetically transmitted, whereas the latter are transmitted by such non-genetic means as imitation or social learning. Thus, despite their initial denials, biology is tied to genes after all, as indeed the logic of neo-Darwinism requires. The implied essentialisation of biology as a constant of human being, and of culture as its variable and interactive complement, is not just clumsily imprecise. It is the single major stumbling block that up to now has prevented us from moving towards an understanding of our human selves, and of our place in the living world, that does not endlessly recycle the polarities, paradoxes and prejudices of western thought.

If genes interact with anything, it is with other constituents of the cell, which interacts with other cells in the organism, which interacts with other organisms in the world. It is out of this multilayered process that the capacities of living beings emerge. In other words, these capacities are outcomes of the whole *developmental system* comprised by the presence of the organism, with its particular genetic and cellular composition, in its environment (Lewontin 1983; Oyama 1985). Thus the forms and capacities of all organisms, human beings included, are not prefigured in any kind of specification, genetic or cultural, but are emergent properties of developmental systems. At whatever stage in the life-cycle we may choose to identify a particular capacity – even at birth – a history of development already lies behind it (Dent 1990: 694). More importantly, people do not live their lives in a vacuum but in a world where they are surrounded by other people, objects and places, together making up what is usually known as the environment. Growing up in an environment largely shaped through the activities of their predecessors, human beings play their part, through their intentional activities, in fashioning the conditions of development for their successors. This is what we call history.

It is my contention that there is no human nature lurking inside us that has somehow escaped the current of history. Of course, we all carry our complement of genes, but these do not set us up with a constitution all in place, ready to interact with the outside world. It is make-believe to think that lengths of DNA can turn themselves into 'innate capacities', whether of body or mind, before the process of development

has even got underway. As all sensible biologists have long recognised, the dichotomy between nature and nurture is obsolete. But it is not enough to say, instead, that we are products of nature *and* nurture, as though these were separate things – genes on the one hand, environment on the other – that then interact to form the organism. For genes do *not* interact with the environment (Keller 2001). As Daniel Lehrman pointed out many years ago, the interactions from which the development of an organism proceeds are not between genes and environment but between *organism* and environment, and the organism is not a constant but the continually changing embodiment of a whole history of previous interactions that have shaped its life course to that point (Lehrman 1953: 345). Nor is the environment a constant for it, too, exists only in relation to the organisms that inhabit it, and embodies a history of interactions with them.

VI

Let me return to my capacities to play the cello and to walk in the way I do. The one, I have argued, is just as much a biological property of the organism-that-I-am as the other. Now if, by evolution, we mean differentiation and change over time in the forms and capacities of organisms, then we must surely allow that a skill like cello-playing has evolved, as has the skill of walking in a certain way. No-one, however, would seriously suggest that people from different backgrounds walk in different ways, or play different musical instruments, because of differences in their genetic make-up. But nor does it make sense to suppose that these differences are due to something else, namely culture, that overwrites a generalised biological substrate. Walking and cello-playing are no more the operations of a mind impregnated by culture than they are of a body designed by natural selection. They are rather developmentally enhanced achievements of the whole organism-person, at once body and mind, positioned within a field of relations with the manifold human and non-human constituents of its environment. And to account for these achievements, what we need is nothing less than a new approach to evolution, one that sets out to explore not the variation and selection of intergenerationally transmitted attributes, but the self-organising dynamics and form-generating potentials of relational fields (Ingold 2000b: 243).

Adopting this approach, we no longer have to posit a radical break between evolution and history, or between biological and cultural evolution, nor need we imagine a point of origin where the one rises up from the other. For history, it appears, is no more than a continuation into the field of human relations of a process that is going on throughout the organic world. Put in the most general terms, it is a process in which organisms or persons come into being with their particular forms and capacities and in which, through their environmentally situated activities, they condition the development of other organisms or persons to which they relate (Ingold 1998a: 95). This process is happening all around us all the time, in the very historical unfolding of our lives. The forms of language, for example, emerge through people's activities of talking to one another; thus language evolves even as we speak. Likewise the capacity of the feet to carry us over varied terrain, and that of the hands to deliver precise movements, evolve as we walk around and use tools or play instruments. Neither language, nor bipedality, nor tool-use is given as a fixed attribute of human nature, outwith the current of speaking, walking and tool-using (Ingold 2002: 63).

What, then, of natural selection? We cannot credit natural selection with the evolution of the genotype, since there is no genotype to evolve. I do not deny the existence of the genome, or that cumulative changes may take place, over successive generations of a population, in the frequencies with which particular genes are represented therein. These changes can be explained, at least in part, by natural selection. But as we have seen, there is no link between, on the one hand, changes in gene frequencies, and on the other in the forms and capacities of organisms, that is independent of the dynamics of development. It follows that while natural selection may occur *within* evolution, it does not *explain* evolution. Only by going beyond the theory of evolution through variation under natural selection, and by considering the properties of dynamic self-organisation of developmental systems, can we hope to discover the possible consequences of those changes that *can* be explained by natural selection for the evolutionary process itself (Ingold 2001: 125).

The root source of the explanatory poverty of neo-Darwinian theory is not hard to find. It lies in what one of its principal architects, Ernst Mayr, calls 'population thinking' (Mayr 1982: 45–7). Modern biology, Mayr insists, requires us to think of evolutionary change as aggregated over populations of numerous discrete individuals, each of which is uniquely specified in its essential constitution independently of, and prior to, its life in the world. This way of thinking, however, systematically disrupts any attempt to understand the generative dynamics of developmental systems. How, after all, can one hope to grasp the continuity of the life process through a mode of thought that can only countenance the organic world already shattered into myriad fragments? All it can do is count up the pieces. What we need, instead, is a quite different way of thinking about organisms and their environments. I call this 'relational thinking'. It means treating the organism not as a discrete, pre-specified entity but as a particular locus of growth and development within a continuous field of relationships. It is a field that *unfolds* in the life activities of organisms and that is *enfolded* in their specific morphologies, powers of movement and capacities of awareness and response (Ingold 2002: 56–7).

Our conception of evolution, then, is more topological than statistical. But only with such a conception, I contend, can we understand the evolutionary process from within, recognising that we ourselves are no more capable of watching from the sidelines than are creatures of any other kind, and that like them, we participate with the whole of our being in the continuum of organic life. This, however, means taking an unorthodox view not just of evolution but of life itself. It means treating organisms of all kinds, and not just humans, as beings rather than things. No longer, then, can we speak of organisms as 'living things', as though life were a qualifying attribute of objects to be identified with some feature of molecular composition such as DNA or carbon chemistry. Rather, every organism – like every person – should be understood as the embodiment of a particular way of being alive, of a *modus vivendi*. Life, if you will, is the creative potential of a dynamic field of relationships in which specific beings emerge and take the forms they do, each in relation to the others. In that sense, life is not so much *in* organisms as organisms *in* life (Ingold 1990: 215; 2002: 57).

Were Darwin here among us, I think he would approve. Few writers before or since have had a finer appreciation of the dynamic interrelationships of the organic world, or of the extent to which living organisms are mutually implicated in each other's existence. Yet he was unable to escape the straitjacket of a way of thinking that treated every creature as an entity whose essential nature is prefigured in advance of its own life-history. Combining this way of thinking with an unshakeable conviction in

the overwhelming superiority of his own kind, Darwin was led to propose an account of the evolution of human moral and intellectual faculties that, however well-meaning in intent, left a legacy of racist science. The contemporary appeal to universal human nature, in the name of evolutionary biology, is a defensive reaction to this legacy. But it is an appeal fraught with contradictions. While insisting on the continuity of the evolutionary process, it also reinstates the twin distinctions between biology and culture, and between evolution and history, setting an upper limit to the world of nature that humans alone appear to have breached. More than that, it asserts that human nature is fixed and universal while attributing its evolution to a theory – of variation under natural selection – that can only work if the individuals of a species are endlessly variable. That is why evolutionists find themselves in the curious position of having to admit that whereas in the non-human world, biology is the source of all variability and difference, in the human world it is what makes everyone the same!

Behind the popular rhetoric about how Darwin and Darwinism have changed for ever the way we see ourselves, lie the longstanding imperialist conceits of a western science that has written the essence of humanity in its own image, and that measures other people by how far they have come in living up to it. Thus if 'we' in the 'west' can do things that 'they' ('non-westerners') cannot, this is put down to the unequal development of capacities universal to the species; if 'they' can do things that 'we' cannot, this is attributed to the particularities of 'their' cultural tradition. Contemporary neo-Darwinism is shot through with double standards of this kind. In both its programme and its propaganda, however, it is fast sinking under the weight of its own contradictions. What I offer is something different, not a recycling of tired preconceptions but a genuinely new way of thinking about human beings and their place in the world, centred on processes of development and the dynamic properties of relational fields, that not only promises a new reintegration of social and biological anthropology, but also sets a radical evolutionary agenda for the twenty-first century. It will, I hope, inaugurate the coming-of-age of anthropology as a *science of engagement in a relational world*.

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Evolution by natural selection is one of the best substantiated theories in the history of science, supported by evidence from a wide variety of scientific disciplines, including paleontology, geology, genetics and developmental biology. The theory has two main points, said Brian Richmond, curator of human origins at the American Museum of Natural History in New York City.Â "In most cases, these difficulties are not due to something wrong or broken, but due to people living in an environment which is very different from the environment they evolved to function in." [If You Suck at Dating, It's Not You â€" It's Evolution]. What is Darwinâ€™s Theory of Evolution? The theory of evolution by natural selection was first formulated in Darwinâ€™s book â€œOn the Origin of Speciesâ€ in 1859. The study of cultural evolution is important beyond its academic value. Cultural evolution is a fundamentally interdisciplinary field, bridging gaps between academic disciplines and facilitating connections between disparate approaches. For example, the advent of technologies for revealing genomic variation has led to a plethora of studies that measure association between DNA variants and traits that have major cultural components, such as years of schooling, marriage choices, IQ test results, and poverty. Perhaps because of the perceived greater precision of the genomic data, these culturally Evolutionary biology is the subfield of biology that studies the evolutionary processes (natural selection, common descent, speciation) that produced the diversity of life on Earth. In the 1930s, the discipline of evolutionary biology emerged through what Julian Huxley called the modern synthesis of understanding, from previously unrelated fields of biological research, such as genetics and ecology, systematics and paleontology.