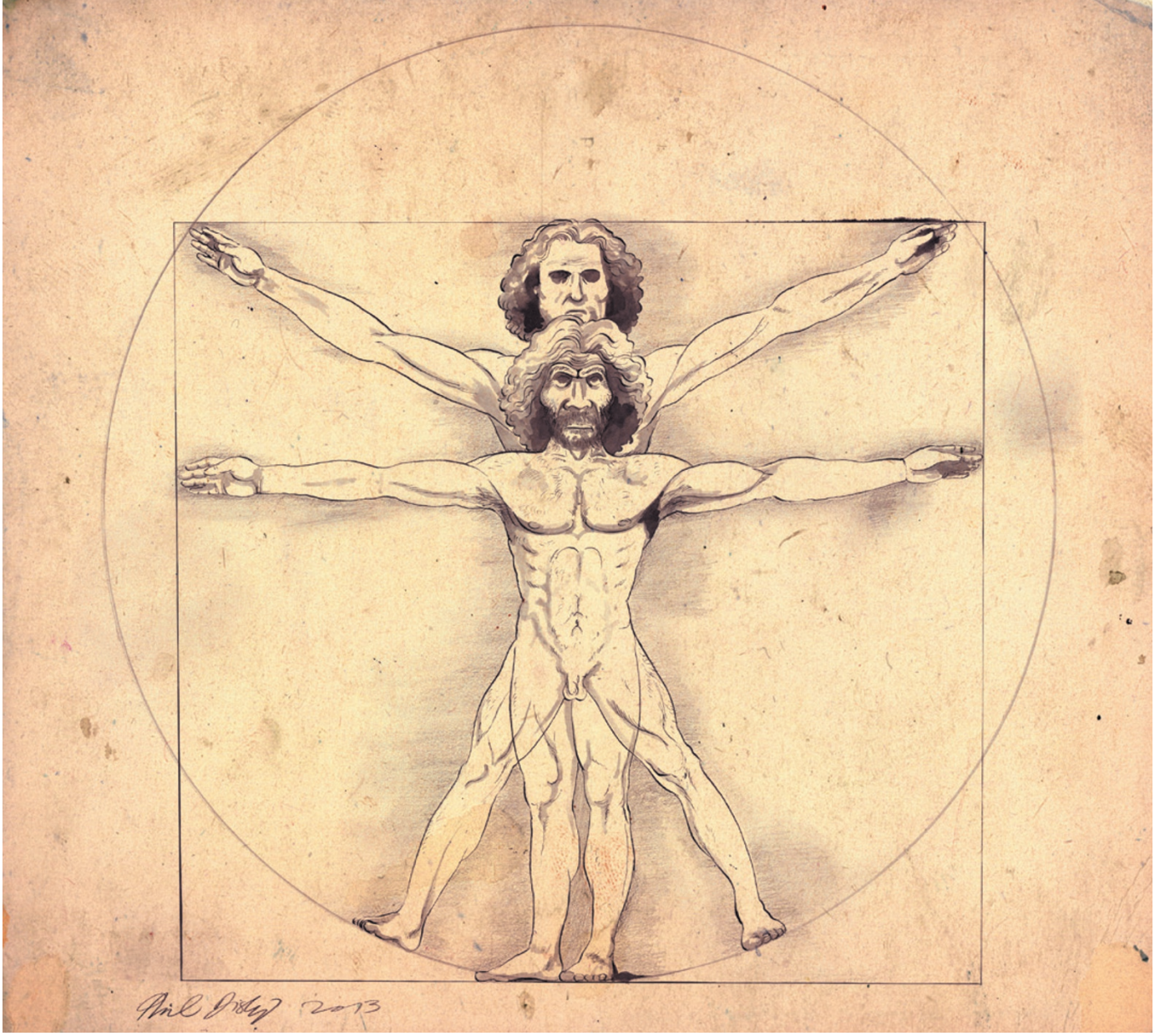

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HUMAN EVOLUTION

Us and them

Tim Radford contemplates three fascinating studies on what it means to be human.

"The proper study of mankind is man", sang the poet Alexander Pope. Of course, he knew nothing about tool-using chimpanzees, language-manipulating gorillas, self-recognizing orang-utans or problem-solving New Caledonian crows. Nor had he heard of extinct hominins, hunter-gatherer energy budgets, Palaeolithic artefacts, the significance of sweat glands or the evolutionary rewards of cooking, bipedalism and long-distance running.

Still, when he wrote in his 1732 *Essay on Man* about a being "placed on this isthmus of a middle state, a being darkly wise, and rudely great", he demonstrated what Thomas Suddendorf, author of *The Gap*, calls the "two foundational capacities" (think of them as legs) that help us to stride the divide between ape and human minds. Humans share the capacity to compose scenarios and nest them within each other, and the urge to communicate. Other social animals co-operate, deliver alarm calls and trade information. But none seems to match the human drive to link minds, to travel mentally in time, to tell stories, stir emotions, ask questions, compose poems or write books about what it means to be human.

This certainly looks to be the reason why *Homo sapiens* now constitutes eight times the biomass of all other wild terrestrial vertebrates combined. And it also sheds light on why one species, initially formed by the blind forces of natural selection acting upon random mutation, might be about to step

The Gap: The Science of What Separates Us from Other Animals
THOMAS SUDDENDORF
Basic Books: 2013.

The Story of the Human Body: Evolution, Health and Disease
DANIEL E. LIEBERMAN
Pantheon: 2013.

The Accidental Species: Misunderstandings of Human Evolution
HENRY GEE
University of Chicago Press: 2013.

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off the evolutionary treadmill altogether, and take control of its own future. That three authors — Suddendorf, Henry Gee and Daniel Lieberman — can take the same theme, address the same research and cite the same authorities to deliver three very different, complementary and equally enjoyable books is a measure of the fascination of the topic, complexity of the arguments and the fragility of the evidence so far.

Each author has made a scholarly career in the business of asking how we got here, and each approaches the question from a different perspective. Bipedalism has traditionally been seen as the starting point of humankind's long journey from prey to predator, and from Africa's Rift Valley to world domination. But for the psychologist Suddendorf it is something that can be disposed of in a couple of pages. As he tells us, bipedalism freed the hands to grip and throw, but it came with serious side effects, "including back problems and hemorrhoids".

For Gee, gate-keeper of the palaeontological papers in this journal, bipedalism is just one change among many — one peculiar posture adopted by a group of animals. He notes in *The Accidental Species* that the posture is seen nowhere else, "but one could say the same for knuckle walking in chimps and gorillas, brachiation in gibbons, and the four-handed swing of orangutans".

For the evolutionary biologist and barefoot runner Lieberman, however, bipedalism was a "monumental and consequential" shift. The two-legs-good, four-legs-bad effect is discussed on at least 40 pages of *The Story of the Human Body*; running, too, gets a good show. We are what we are because our bodies could do what they did. The legs of *Homo erectus* were 10–20% longer than those of the hominin *Australopithecus*, which meant the first humans could cover great distances at a lower energy cost. But longer legs make arboreal life difficult, so once humans got moving, they had to stay on the road. Lieberman argues that it is "not just incorrect but also dangerous to view modern human evolution as solely a triumph of brains over brawn". It was the hunter-gatherer physique that got us to where we are now. And today's burgeoning human ills — obesity, cardiovascular disease, cancer, sleep apnoea, terrible teeth, osteoporosis and so on — occur because we eat more generously than hunter-gatherers but work considerably less.

All three authors mention brain size, but Suddendorf points out that, when it comes to relative brain size, humans don't top the charts. There are mice and shrews in which the brain makes up an extraordinary 10% of overall body weight (the human proportion is 2%). So if brain capacity is what makes the difference, there should be some other scale that puts humans at the top. Suddendorf and Andrew Whiten have proposed one: an excess of absolute brain mass over and above that predicted by body size. Meanwhile, Gee points out that crows demonstrate a kind of calculation and craftiness that humans recognize. Because the common ancestor of birds and primates lived more than 250 million years ago, this "shoots a huge hole" in the idea that modern humans are very clever just because previous hominins were quite clever, and the ones before them only relatively so.

"Each author has made a scholarly career in the business of asking how we got here."

We can't ask the earlier hominins. *H. sapiens* once shared the planet with *H. erectus*, Neanderthals, Denisovans and the little Hobbit of Flores. They have all gone. The last man standing must now compose answers on the basis of only the slight, capricious and often ambiguous evidence that remains. Gee calls this "the Beowulf effect": Old English verse survives mainly in just four manuscripts, and one of them, which includes *Beowulf*, almost perished in a blaze in 1731. What if it had burned, uncopied? What then would we know about the song and story of the past?

Lieberman builds up a picture of vanished society by examining humankind as it is now. He looks at Tanzanian hunter-gatherers and the Kalahari Bushmen, and works backwards to shape an increasingly speculative story of how things might have been as foraging, scavenging, hunting and resourceful humans colonized even the most inhospitable habitats. Suddendorf is more concerned with the things we can learn from other surviving primates. Yes, apes cooperate, communicate, use tools, share knowledge, solve problems, demonstrate self-awareness and display emotions. But he carefully leaves open the big question: how much can you conclude from each case study? Gee, meanwhile, gazes into both past and future, and sees the idea of evolutionary upward mobility (or as Pope had it, "upward will he soar, and little less than angel, would be more") a profound misreading of Darwin.

Both Suddendorf and Lieberman directly address the question of natural selection in a world in which humans have seemingly taken control of nature, and ensured the survival of the not-so-fit. Puzzlingly, says Suddendorf, "the rich, successful, powerful, beautiful, and well-educated people seem to breed less, not more, than most of the rest of us". But he suspects humans could find more dramatic ways of cutting short their own success story, with a little help from war and famine. Lieberman would have us get up off our chairs, set down our books and chew tough fibrous stuff: our bodies may not be the best of all possible bodies, but they are the only ones we have, and we should look after them.

All three books would make marvellous gifts. *The Gap* is ideal for someone who already has a decent collection about human evolution. *The Story of the Human Body* is a readable introduction to the whole field and great on the making of our physicality. *The Accidental Species* is discursive, rich in good stories and terrible jokes, and a salutary reminder of how little we know. I shall hang on to all three. ■

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