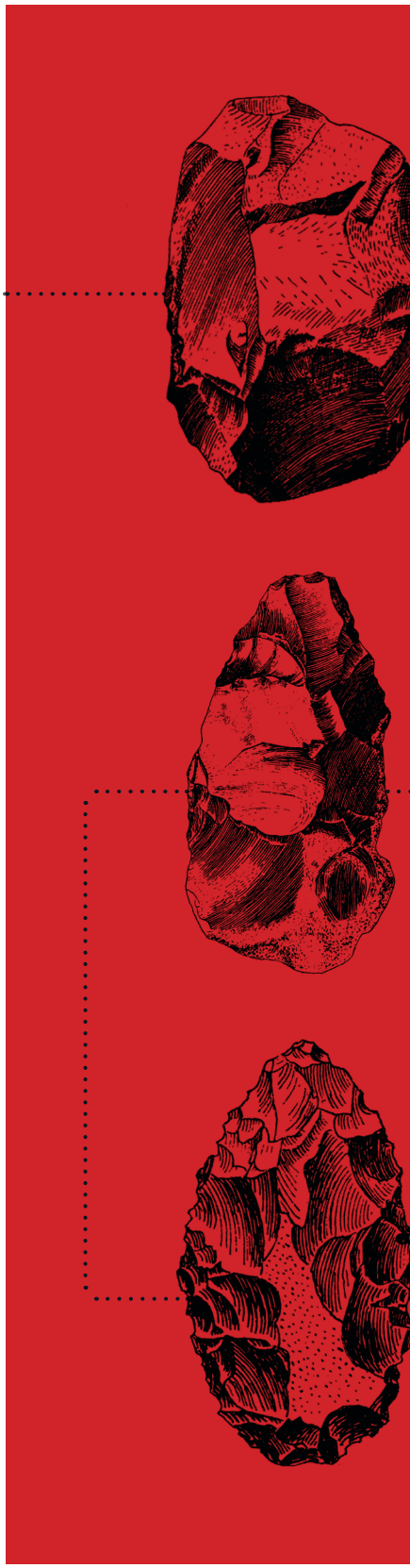
The story in the stones

How did a simple ape become the smartest creature on Earth? **David Robson** chips away at the truth



SPARKS fly as stone meets stone, and shards of rock ricochet off the furniture around me. Each strike makes me flinch, but Bruce Bradley is the picture of cool concentration as he chips away at his axe head. It is, after all, a skill he has been honing since before he can remember. "I was a natural born flint-knapper. Laugh at that if you want, but I've got video to prove it." As a baby, he says, he was often seen banging two rocks together in his parents' garden. Then, when his family moved to Arizona, he developed his talents by copying the Native American arrowheads scattered across the desert.

Decades later, Bradley makes stone tools spanning the breadth of human history. His workshop at the University of Exeter, UK, is full of this handiwork. Piles of rocks line the walls, and to one side a deerskin with a dark stain hangs on a wooden frame. It was butchered using some of his team's handmade tools, he tells me. "We've got a freezer out there full of dead parts – you could eat them if you wanted."

My interests lie elsewhere. The stone tools on the table in front of me are not just useful, they tell the story of our journey from simple ape to thinking human. Previous attempts to trace the history of the mind have relied on speculation as much as hard evidence but, over the past three years, Bradley's Learning to be Human project has taken a more precise approach to looking inside the heads of the people who made these tools. Combining findings about stone-tool construction with neuroscience, psychology and archaeology, we can now estimate the origins of distinctly human mental abilities, such as when we first began to order our thoughts and actions, when our visual imagination blossomed, when we started to think about the past and future, and when we first played make-believe. There are even hints about the emergence of our capacity for patience, shame and suspicion – and the nature of our ancestors' dreams.

People have long sought a "secret ingredient" unique to human intelligence that could explain our extraordinary cognitive abilities. Most recently, the spotlight has fallen on size – the idea that a big brain is the key. However, it is becoming increasingly clear that there is no secret ingredient. Instead, our peculiar way of thinking results from a reorganisation of the different brain regions, as much as from their expansion (see "Size isn't everything", p 38). What's more, this began long before we diverged from chimps, around 6 million years ago. Indeed, comparable but more modest changes can be seen in many of our nearest relatives. "In a way we're just an extreme great ape," says Jeroen Smaers at Stony Brook University, New York, who last year compared the brain evolution of 17 species of primates.

So what accelerated this evolution in our ancestral line beyond what was happening in other apes – and how did this give rise to new ways of thinking? Only by re-examining the archaeological record can we map out that path. And that's why I am in Bradley's workshop.

He pauses in his work to show me three stone tools. The first and crudest of them is a jagged rock that signals perhaps the first landmark moment in that journey. Aside from walking on two legs, our earlier ancestors were distinctly ape-like, and like chimps and other primates, they probably had limited tool use, picking pebbles off the ground to crush nuts. But things change about 2.6 million years ago, with *Australopithecus garhi*. Rather than just using nature as they found it around them, ›