

Our long affair with animals has been a driving force in human evolution, says Pat Shipman

Creature contacts

TRAVEL almost anywhere in the world and you will see something so common that it may not even catch your attention.

Wherever there are people, there are animals: animals being walked, herded, fed, watered, bathed, brushed or cuddled. Many, such as dogs, cats and sheep, are domesticated but you will also find people living alongside wild and exotic creatures such as monkeys, wolves and binturongs. Close contact with animals is not confined to one particular culture, geographic region or ethnic group. It is a universal human trait, which suggests that our desire to be with animals is deeply embedded and very ancient.

On the face of it this makes little sense. In the wild, no other mammal adopts individuals from another species; badgers do not tend hares, deer do not nurture baby squirrels, lions do not care for giraffes. And there is a good reason why. Since the ultimate prize in evolution is perpetuating your genes in your offspring and their offspring, caring for an individual from another species is counterproductive and detrimental to your success. Every mouthful of food you give it, every bit of energy you expend keeping it warm (or cool) and safe, is food and energy that does not go to your own kin. Even if pets offer unconditional love, friendship, physical affection and joy, that cannot explain why or how our bond with other species arose in the first place. Who would bring a ferocious predator such a wolf into their home in the hope that thousands of years later it would become a loving family pet?

I am fascinated by this puzzle and as a

palaeoanthropologist have tried to understand it by looking to the deep past for the origins of our intimate link with animals. What I found was a long trail, an evolutionary trajectory that I call the animal connection. What's more, this trail links to three of the most important developments in human evolution: tool-making, language and domestication. If I am correct, our affinity with other species is no mere curiosity. Instead, the animal connection is a hugely significant force that has shaped us and been instrumental in our global spread and success in the world.

The trail begins at least 2.6 million years ago. That is when the first flaked stone tools

"The human-animal link makes sense of three of the most important leaps in our development"

appear in the archaeological record, at Gona in the Afar region of Ethiopia (*Nature*, vol 385, p 333). Inventing stone tools is no trivial task. It requires the major intellectual breakthrough of understanding that the apparent properties of an object can be altered. But the prize was great. Those earliest flakes are found in conjunction with fossilised animal bones, some of which bear cut marks. It would appear that from the start our ancestors were using tools to gain access to animal carcasses. Up until then, they had been largely vegetarian,

upright apes. Now, instead of evolving the features that make carnivores effective hunters – such as swift locomotion, grasping claws, sharp teeth, great bodily strength and improved senses for hunting – our ancestors created their own adaptation by learning how to turn heavy, blunt stones into small, sharp items equivalent to razor blades and knives. In other words, early humans devised an evolutionary shortcut to becoming a predator.

That had many consequences. On the plus side, eating more highly nutritious meat and fat was a prerequisite to the increase in relative brain size that marks the human lineage. Since meat tends to come in larger packages than leaves, fruits or roots, meat-eaters can spend less time finding and eating food and more on activities such as learning, social interaction, observation of others and inventing more tools. On the minus side, though, preying on animals put our ancestors into direct competition with the other predators that shared their ecosystem. To get the upper hand, they needed more than just tools and that, I believe, is where the animal connection comes in.

Two and a half million years ago, there were 11 true carnivores in Africa. These were the ancestors of today's lions, cheetahs, leopards and three types of hyena, together with five now extinct species: a long-legged hyena, a wolf-like canid, two sabretooth cats and a "false" sabretooth cat. All but three of these outweighed early humans, so hanging around dead animals would have been a very risky business. The new predator on the savannah would have encountered ferocious competition for prizes such as freshly killed antelope. Still, by 1.7 million years ago, two carnivore species were extinct – perhaps because of the intense competition – and our ancestor had increased enough in size that it outweighed all but four of the remaining carnivores.

Why did our lineage survive when true carnivores were going extinct? Working in social groups certainly helped, but hyenas ➤

and lions do the same. Having tools enabled early humans to remove a piece of a dead carcass quickly and take it to safety, too. But I suspect that, above all, the behavioural adaptation that made it possible for our ancestors to compete successfully with true carnivores was the ability to pay very close attention to the habits of both potential prey and potential competitors. Knowledge was power, so we acquired a deep understanding of the minds of other animals.

Out of Africa

Another significant consequence of becoming more predatory was a pressing need to live at lower densities. Prey species are common and often live in large herds. Predators are not, and do not, because they require large territories in which to hunt or they soon exhaust their food supply. The record of the geographic distribution of our ancestors provides more support for my idea that the animal connection has shaped our evolution. From the first appearance of our lineage 6 or 7 million years ago until perhaps 2 million years ago, all hominins were in Africa and nowhere else. Then early humans underwent a dramatic territorial expansion, forced by the demands of their new way of living. They spread out of Africa into Eurasia with remarkable speed, arriving as far east as Indonesia and probably China by about 1.8 million years ago. This was no intentional migration but simply a gradual expansion into new hunting grounds. First, an insight into the minds of other species had secured our success as predators, now that success had driven our expansion across Eurasia.

Throughout the period of these enormous changes in the lifestyle and ecology of our ancestors, gathering, recording and sharing knowledge became more and more advantageous. And the most crucial topic about which our ancestors amassed and exchanged information was animals.

How do I know this? No words or language remain from that time, so I cannot look for them. I can, however, look for symbols – since words are essentially symbolic – and that takes me to the wealth of prehistoric art that appears in Europe, Asia, Africa and Australia,

“Domestication emerged as a natural progression of our close association with other species”

FERDINANDO SCIANNI/MAGNUM PHOTOS



If domestication was about getting a secure food supply, why did we start with dogs?



MIKKEL OSTERGAARD/PANOS PICTURES

Our family and other animals

Across the globe and over thousands of years, humans have domesticated scores of animal species, using a deep insight into their lives to alter aspects of their behaviour, physiology and life cycle

starting about 50,000 years ago. Prehistoric art allows us to eavesdrop on the conversations of our ancestors and see the topic of discussion: animals, their colours, shapes, habits, postures, locomotion and social habits. This focus is even more striking when you consider what else might have been depicted. Pictures of people, social interactions and ceremonies are rare. Plants, water sources and geographic features are even scarcer, though they must have been key to survival. There are no images showing how to build shelters, make fires or create tools. Animal information mattered more than all of these.

The overwhelming predominance of animals in prehistoric art suggests that the animal connection – the evolutionary advantages of observing animals and collecting, compiling and sharing information about them – was a strong impetus to a second important development in human evolution: the development of language and enhanced communication. Of course, more was involved than simply coining words. Famously, vervet monkeys have different cries for eagles, leopards and snakes, but they cannot discuss

dangerous-things-that-were-here-yesterday or ask “what ate my sibling?” or wonder if that danger might appear again tomorrow. They communicate with each other and share information, but they do not have language. The magical property of full language is that it is comprised of vocabulary and grammatical rules that can be combined and recombined in an infinite number of ways to convey fine shades of meaning.

Nobody doubts that language proved a major adaptive advantage to our ancestors in developing complex behaviours and sharing information. How it arose, however, remains a mystery. I believe I am the first to propose a continuity between the strong human-animal link that appeared 2.6 million years ago and the origin of language. The complexity and importance of animal-related information spurred early humans to move beyond what their primate cousins could achieve.

As our ancestors became ever more intimately involved with animals, the third and final product of the animal connection appeared. Domestication has long been linked with farming and the keeping of stock animals, an economic and social change from hunting and gathering that is often called the Neolithic revolution. Domestic animals are usually considered as commodities, “walking larders”, reflecting the idea that the basis of the Neolithic revolution was a drive for greater food security.

When I looked at the origins of domestication for clues to its underlying reasons, I found some fundamental flaws in this idea. Instead, my analysis suggests that domestication emerged as a natural progression of our close association with, and understanding of, other species. In other words, it was a product of the animal connection.

Man's best friend

First, if domestication was about knowing where your next meal was coming from, then the first domesticate ought to have been a food source. It was not. According to a detailed analysis of fossil skulls carried out by Mietje Germonpré of the Royal Belgian Institute of Natural Sciences in Brussels and her colleagues, the earliest known dog skull is 32,000 years old (*Journal of Archaeological Science*, vol 36, p 473). The results have been greeted with some surprise, since other analyses have suggested dogs were domesticated around 17,000 years ago, but even that means they pre-date any other domesticated animal or plant by about

Dog (*Canis lupus familiaris*)

32,000 years ago

East Africa

Hunting, guarding, herding, companionship, pest control, transport



Cat (*Felis silvestris catus*)

9500 years ago

Middle East, North Africa

Pest control, companionship



Guinea pig (*Cavia porcellus*)

7000 years ago

Peru

Meat, companionship



Horse

(*Equus ferus caballus*)

6000 years ago

Eurasian steppes

Transport, strength, milk, meat



Asian elephant

(*Elephas maximus*)

5000 years ago

Pakistan

Strength, transportation



Yak

(*Bos grunniens*)

4500 years ago

Tibet

Milk, strength, wool, meat



Budgerigar

(*Melopsittacus undulatus*)

150 years ago

Australia

Companion



5000 years (see diagram, page 35). Yet dogs are not a good choice if you want a food animal: they are dangerous while being domesticated, being derived from wolves, and worst of all, they eat meat. If the objective of domestication was to have meat to eat, you would never select an animal that eats 2 kilograms of the stuff a day.

A sustainable relationship

My second objection to the idea that animals were domesticated simply for food turns on a paradox. Farming requires hungry people to set aside edible animals or seeds so as to have some to reproduce the following year. My Penn State colleague David Webster explores the idea in a paper due to appear in *Current Anthropology*. He concludes that it only becomes logical not to eat all you have if the species in question is already well on the way to being domesticated, because only then are you sufficiently familiar with it to know how to benefit from taking the long view. This means for an animal species to become a walking larder, our ancestors must have already spent generations living intimately with it, exerting some degree of control over breeding. Who plans that far in advance for dinner?

Then there's the clincher. A domestic animal that is slaughtered for food yields little more meat than a wild one that has been hunted, yet requires more management and care. Such a system is not an improvement in food security. Instead, I believe domestication arose for a different reason, one that offsets the costs of husbandry. All domestic animals, and even semi-domesticated ones, offer a wealth of renewable resources that provide ongoing benefits as long as they are alive. They can provide power for hauling, transport and ploughing, wool or fur for warmth and weaving, milk for food, manure for fertiliser, fuel and building material, hunting assistance, protection for the family or home, and a disposal service for refuse and ordure. Domestic animals are also a mobile source of wealth, which can literally propagate itself.

MARTIN HARVEY/CORBIS



Hunting was the spur for our ancestors to acquire deep insights about other species

"If our species was born of a world rich with animals, can we flourish in one where biodiversity is decimated?"

Domestication, more than ever, drew upon our understanding of animals to keep them alive and well. It must have started accidentally and been a protracted reciprocal process of increasing communication that allowed us not just to tame other species but also to permanently change their genomes by selective breeding to enhance or diminish certain traits.

The great benefit for people of this caring relationship was a continuous supply of resources that enabled them to move into previously uninhabitable parts of the world. This next milestone in human evolution would have been impossible without the sort of close observation, accumulated knowledge and improved communication skills that the animal connection started selecting for when our ancestors began hunting at least 2.6 million years ago.

What does it matter if the animal connection is a fundamental and ancient

influence on our species? I think it matters a great deal. The human-animal link offers a causal connection that makes sense of three of the most important leaps in our development: the invention of stone tools, the origin of language and the domestication of animals. That makes it a sort of grand unifying theory of human evolution.

And the link is as crucial today as it ever was. The fundamental importance of our relationship with animals explains why interacting with them offers various physical and mental health benefits – and why the annual expenditure on items related to pets and wild animals is so enormous.

Finally, if being with animals has been so instrumental in making humans human, we had best pay attention to this point as we plan for the future. If our species was born of a world rich with animals, can we continue to flourish in one where we have decimated biodiversity? ■

Pat Shipman is adjunct professor of biological anthropology at Penn State University. Her book *The Animal Connection: A new perspective on what makes us human* is published by W. W. Norton & Company on 13 June