self-transformation, sponsored opulent conferences on quantum mechanics at his San Francisco mansion. Members of the Fundamental Fysiks Group and Nobel laureates both enjoyed Erhard's patronage despite some physicists' concerns about Est's practices. Michael Murphy, founder of the Esalen retreat on the California coast, sponsored workshops at which physicists alternated their hot-tub discussions of quantum mechanics with massages and, in some cases, LSD trips.

A third New Age activist and impresario, Ira Einhorn, somehow persuaded senior executives at Bell Telephone that the company should copy and mail the latest papers on quantum mechanics to some 300 people — an early postal version of an e-mail distribution list. This arrangement came to an abrupt end when the police discovered the decomposing body of Einhorn's girlfriend in a trunk in his apartment.

Interspersing entertaining anecdotes with explanations of concepts in quantum physics, Kaiser's book can be read on many levels. At its most challenging, it is an intellectual history of quantum mechanics. But it is also a yarn about an eccentric group of physicists who refused to be defeated by their marginalization within their own discipline. And, as social history, it offers a window onto one of the most colourful periods of twentieth-century US history.

The book makes important observations about the social dynamics of physics in the United States during the cold war. Kaiser argues that, even as military patronage pumped massive financial resources into physics, the discipline's horizons shrank. University physicists disdained the philosophical questions that had enlivened pre-war European physics and developed a narrowly instrumentalist pedagogy that sometimes became a straitjacket.

Kaiser describes some students holding secret meetings to discuss quantum mechanics behind their advisers' backs, having been warned that "thinking seriously about foundations was a waste of time and a detriment to one's career". He also notes that the editor of *Physical Review* banned articles discussing interpretations of quantum mechanics; a brilliant experiment on Bell's theorem by John Clauser was scarcely cited because of the prevailing orthodoxy. Clauser was told that his experiment was not "real physics", and he had a terrible time on the job market. By contrast, the heroes of Kaiser's story "strove to expand the physics profession's collective mental space". This is an equally apt description of Kaiser's approach in this illuminating book. ■

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EVOLUTION

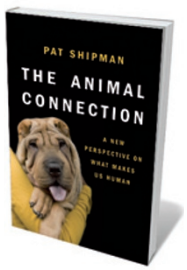
The long trek to domesticated bliss

Our fondness for fauna comes from an evolved human need to nurture, argues **Juliet Clutton-Brock**.

In *The Animal Connection*, palaeoanthropologist Pat Shipman describes how humans have been connected with animals for the past 2.6 million years, and how this relationship distinguishes us from other animals. She argues that the evolution of human behaviour was driven by this connection in three stages: toolmaking, language and domestication of animals and plants. But Shipman's book is more a review of what has long been known than the "New Perspective" promised by its subtitle.

Shipman starts by outlining the characteristics that separate the fossil hominin *Ardipithecus ramidus* — found in Ethiopia and dated to around 4.2 million years ago — from other primates. Continuing on through the australopithecines, she describes how, from 2.6 million years ago, "Hominids transformed rocks into stone tools and stone tools transformed hominids from bipedal apes that are [*sic*] basically herbivorous into predators". This was the beginning of the animal connection, accompanying the evolution of *Homo erectus* and its expansion out of Africa.

Shipman goes on to discuss the evolution of human language, the origin of symbolism and the theory of mind. She proposes that language followed from the need for humans to communicate animal-related information in their quest for food. Language "allowed humans to talk about animals and in time, with animals", she says.



The Animal Connection: A New Perspective on What Makes us Human
PAT SHIPMAN
W. W. Norton: 2011. 336 pp. $26.95, £20

Towards the end of the Pleistocene, around 32,000 years ago, came the first domestic dogs. The cultivation of plants and the domestication of livestock in many parts of the world followed in the early Holocene. Shipman describes what is known about this process, including arguments around the outdated view that the primary motive for domestication was the provision of meat. She also explores 'self-domestication' — the theory that, from

W. R. BILENDUKE/GETTY

Domesticated 32,000 years ago, dogs remain central to many societies, including the Inuit.

scavenging around human settlements, wild animals gradually became habituated, were selected for tameness, and over generations became domesticated. Shipman outlines the distinction of true domestication from taming as "the permanence of the change in the wild animal". Yet she misses what I believe is the essence of why humans relate so readily to animals, which is supported by Sarah Blaffer Hrdy in her book on the evolution of hominins as cooperative breeders, *Mothers and Others* (Harvard University Press, 2009).

Humans, Blaffer Hrdy says, alone among the great apes, readily nurture each other's children. Without this help, few children in hunter-gatherer societies would survive to adulthood. There are many examples of hunter-gatherers extending the shared care of their infants to the adoption of young animals. So the human desire to enfold other species within our societies may be explained as having evolved from the combined instincts for nurture and domination.

I believe that the inborn human desire to nurture children and animals was followed by the domestication of dogs, and all the livestock animals whose social behaviour allowed it, in hunter-gatherer societies that were under pressure in the early Holocene from population growth and climate change. Shipman describes the conventional theory that domestication follows from the selection by humans of favoured attributes. I see the process as more complicated and in two parts: biological and cultural.

It is now accepted that some wild animals have cultures, that is, the inheritance of learned behaviour. With taming, an animal is brought into a protected place where it learns a new set of social relationships, as well as new feeding and reproductive strategies. Biological domestication is complete only when this 'culture' becomes heritable.

Shipman ends with the conviction that the ancient, innate connection between humans and animals is grossly underestimated in today's urban landscape. I see little evidence for this. Despite the inexorable spread of megacities and factory farms, the connection with both domestic and wild animals still occupies the minds and lives of innumerable people around the world. ■

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ASTRONOMY

Supernova century

Jay Pasachoff relishes a novel that brings to life the scientific stars of the 1600s.

Somewhat eclipsed in popular culture by his great Italian contemporary Galileo Galilei, Johannes Kepler is finally achieving the iconic status he has long held in science. In 2009, the seventeenth-century German astronomer was the subject of an opera by US composer Philip Glass (*Nature* **462,** 724; 2009). Now, Stuart Clark's novel — the first in a trilogy about famous astronomers — puts fictional flesh on the bones of Kepler's life and times to enjoyable effect.

Only 60 years or so after Copernicus provided the idea of the heliocentric Universe, Kepler worked out the orbits of the planets. The story told in *The Sky's Dark Labyrinth,* which takes its name from a phrase in Galileo's 1623 book *Il Saggiatore* (*The Assayer*), is well known. Kepler assisted aristocratic court astronomer Tycho Brahe in Prague, taking over Tycho's precise observations of Mars and its changing position in the sky. From these studies, Kepler deduced his three laws of planetary motion, the first two of which he published in *Astronomia Nova* (*The New Astronomy*) in 1609, the same year that Galileo first pointed his telescope skywards.

Clark depicts the clash of two strong personalities: the haughty Tycho, and Kepler, whose confidence in his own mathematical abilities never wavered. He draws, too,

Astronomer Johannes Kepler in his final decade.

The Sky's Dark Labyrinth: A Novel
STUART CLARK
Polygon: 2011. 272 pp. £12.99

on the interaction of each with Rudolph II, the Holy Roman Emperor, who became Kepler's patron and whose name is commemorated in the Rudolphine Tables (1627). These were produced by Kepler using the laws of planetary orbits, which he derived on the basis of Tycho's observations. Working with these 'planetary tables', Kepler accurately predicted that transits of Mercury and of Venus would occur in 1631. The first of these was observed in Europe, but he did not realize that there would soon be a second transit of Venus, in 1639. (The next transit of Venus will be visible from Earth on 5–6 June 2012, depending on the observer's location; the following one is not until 2117.)

The author paints the conflicts between Lutherans and Catholics that drove the Lutheran Kepler from Graz to Prague, and that helped govern how Pope Urban VIII treated Galileo. Clark describes the blood that literally flowed during the internecine warfare between Rudolph II and his brother, Matthias, as the latter's troops attacked while Kepler and his family cowered in the city — evoking parallels with battles today.

My wife and I have made several astronomy-related pilgrimages: to Prague to see the plaque over Kepler's lodgings and his joint statue with Tycho; to dine at the Golden Griffin where Tycho lodged for a time, now a restaurant and hotel; to visit a monument (we found it defaced) to Kepler in Regensburg, Bavaria, possibly near where his bones were originally buried until they were lost; and to see the house in Regensburg where Kepler died in 1630, now a museum. I was also able to help the Houghton Library at Harvard University in Cambridge, Massachusetts, acquire the only known copy of Kepler's 1603 almanac.

As Clark emphasizes, 1603 was thought to be particularly auspicious at the time. Rudolph II is quoted as saying, "Eight hundred years earlier, Charlemagne founded Europe; eight hundred years before him, Christ was born." Soon thereafter, Kepler saw a supernova — the last seen in our

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