offspring and parents. Mock argues that in a "really compelling case" of parent–offspring conflict, selection would produce the optimum outcome for offspring with a corresponding reduction in parental fitness. I think this is far too narrow an interpretation, and results from a failure to distinguish between the genetic battleground identified by Trivers, and the resolution of the conflict that we see in nature.

For example, it has been argued that the presence of parent–offspring conflict means that the only evolutionarily stable way in which young can communicate their requirements for food to their parents is by using costly signals. This would explain why the begging calls of baby birds may be energetically expensive to produce, or risk attracting predators. If true, the theory has told us something new about a situation where the optimum outcome for parents is achieved, though at a cost. Mock says little about this type of honest signalling by offspring, and in places is, I think, unfairly dismissive. This is a shame, as these ideas can explain many of the same phenomena as sibling conflict, and the two processes almost certainly operate together. Behavioural ecologists such as Mock have pointed to the difficulty of testing honest-signalling theory, but I think this should be viewed as a challenge rather than a reason to dismiss it.

With this one caveat, Mock has done a superb job in bringing a large area of contemporary behavioural ecology to both a biological and a general audience. It will stimulate a new generation of fieldworkers and inspire theoreticians to try to understand the complex interplay of natural selection acting simultaneously on different members of the family. For a general reader, it will explain how modern evolutionary theory is tested in the field and give a real flavour of the life a field biologist. It deserves to be read by everyone interested in the evolution of family life. ■

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Warming to a historical theme

The Long Summer: How Climate Changed Civilization
by Brian Fagan
Granta/Basic Books: 2004. 284pp. £20/$26

Jeremy A. Sabloff

Archaeology has numerous goals, which include constructing histories of peoples' cultures through space and time, offering an appreciation of the achievements of past civilizations, and providing historical contexts, both cultural and ecological, for modern events and processes. Writing about such issues for the public can be a challenge, but Brian Fagan is one of the world's most accomplished and prolific popularizers of this complex discipline. As he has shown in a variety of books, he has the knack of making arcane archaeological information accessible to broad audiences. Coupled with his broad knowledge of world prehistory, this skill allows him to show how the distant past is relevant to current concerns.

One of the most pressing concerns today is global climate change. In *The Long Summer*, Fagan provides an enlightening context for this key modern problem through a clear-headed discussion of the past 15,000 years of climatic warming, which has been enriched by great advances in climatology. He goes on to show how this climatic trend has influenced, but not determined, the development of complex civilizations.

Fagan states that "human relationships to the natural environment and short-term climatic change have always been in flux", and that we have become increasingly vulnerable to the effects of climate change, thanks to population growth, urbanization and the global spread of industry. He argues that our attempts "to cushion ourselves against smaller, frequent climate stresses…have consistently made us more vulnerable to rarer but larger catastrophes". This argument leads him to conclude that: "the present problem of global warming is neither proof of late capitalism's intent to commit industrial-strength sins against Mother Earth nor a hallucination imposed on the world by anti-business activists. It is simply a reflection of the scale of our vulnerability, the scale on which we must now think and act."

The environmental climate trajectory that Fagan describes is not a simple one; it has numerous short and long perturbations. The number of places, environmental events and cultures discussed can be daunting and occasionally confusing, and the complex story sometimes seems to get the better of even such a skilled storyteller as Fagan. But perseverance pays off, as Fagan manages to draw the diverse pieces into a coherent narrative and keep the reader on track. Moving forwards in time, Fagan examines the development of cultural complexity in selected time periods from 15,000 years ago to the present day, and in different regions of the globe from the Near East to the Andes.

Fagan offers many examples of how changes in climate have influenced cultures from hunters and gatherers to complex civilizations. One of the common factors is that environmental shifts in one region of the world can have profound effects in distant regions of the globe. For instance, the collapse of the Laurentide glacier in northern Canada around 6200 BC had profound affects in the eastern Mediterranean and Anatolia, even triggering a drought lasting four centuries, which in turn had a major cultural impact on Anatolia.

Fagan also offers gripping examples of the key role of climatic change in such diverse topics as the rise of settled villages in the Near East some 11,000 years ago, the early growth of cities in ancient Sumer and Egypt in the fourth millennium BC, and the fall of the Roman Empire by the end of the fifth century AD.

Experts in different areas may take issue with Fagan over the details of the changes in the regions that they know best. Clearly Fagan has had to paint with a broad brush,

but even though scholars might nitpick on the specifics, the overall picture he creates is argued convincingly.

Fagan concludes the book with a brief review of the evidence that recent years have seen accelerated warming. "With the Industrial Revolution, we took a great stride into an era in which we are frighteningly exposed to potential cataclysm, enhanced by our own seeming ability to warm the earth and increase the probability of extreme climatic events." What lesson has he gleaned from his historical review? "Like many civilizations before us, we've simply traded up in scale, accepting vulnerability to the big, rare disaster in exchange for a better ability to handle the smaller, more common stresses such as short-term droughts and exceptionally rainy years." He worries that, terrible as the death tolls have been in recent years from famines and natural disasters, the potential demographic tragedies from the inevitable climatic swings of the future could be simply horrific — especially as governments around the world do not seem to be paying enough attention to this probability.

Whether or not one agrees with Fagan's conclusions, his arguments are clearly drawn and deserve careful scrutiny. *The Long Summer* is a compelling and fascinating book that should interest a broad scholarly audience and general readers alike. ■

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Together forever?

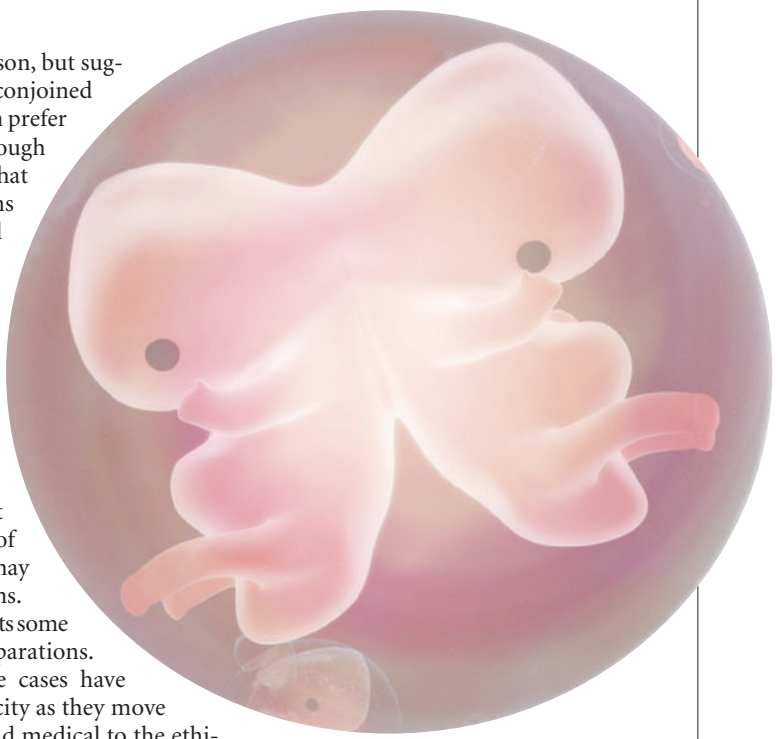
One of Us: Conjoined Twins and the Future of Normal
by Alice Dormurat Dreger
Harvard University Press: 2004. 224 pp. $22.95, £14.95

Jonathan Cole

Chang and Eng Bunker, the original (and self-styled) Siamese twins, travelled widely, married and had 22 children between them. As far as we know, they seemed happy with their conjoined state and only contemplated separation, late in their lives, to please their wives. A pair of American conjoined twins, Abigail and Brittany Hensel, who share one body, have required little medical care and live happily, enjoying swimming and cycling. And Yvonne and Yvette McCarther did not regard themselves as handicapped or deformed but merely different.

In *One of Us*, medical historian Alice Dormurat Dreger uses the personal accounts of such twins, and those of their parents and medical carers, to invite us to see conjoined twins as they see themselves. Many enjoy well-adjusted, rich lives, made possible by the development of cooperation strategies; these often work so well that Dreger suggests we could all learn from them. They find ways of becoming individuals, with different interests, while retaining a deep bond with their twin. As Lori Schappell says, "I'm a conjoined twin…but I do not live a conjoined life. The only time I think of it is when I'm interviewed. It's just an integral part of my life." Dreger suggests that although being conjoined is not preferable to being a singleton, conjoined twins generally accept it as part of their identity. The Iranian conjoined twins Ladan and Laleh Bijani were apparently the first in history to ask for a separation; most seem not to have contemplated it.

The types of conjoining vary, from the Bunkers' sharing of some abdominal organs to the joining of heads or pelvises. These differences are crucial when separation is contemplated. Dreger discusses whether surgery is done for medical reasons or for psychosocial reasons, to 'normalize' appearance. She admits that life can be easier for a singleton than a conjoined person, but suggests that many conjoined twins accept and even prefer being conjoined, although there is evidence that some conjoined twins have been grateful for separation. They may also be more vulnerable, as such operations are typically performed in childhood, before their consent can be obtained. Generalization is difficult, however, not least because, like the rest of us, conjoined twins may have differing opinions.



Dreger deconstructs some of the more recent separations. Although rare, these cases have attracted huge publicity as they move from the personal and medical to the ethical, religious, social and legal. Balancing long-term survival of one or both conjoined twins with their associated morbidity must be extraordinarily difficult. In discussing these high-profile cases, Dreger draws out the presumption that she finds underlying most singletons' opinions, whether medical or legal, that life as a conjoined twin is somehow less desirable. She asks us to compare saving one conjoined twin by accelerating the death of the other with asking one of two singleton twins to make a similar sacrifice.

In this, and throughout the book, runs the thread implicit in her subtitle, "the future of normal". She questions whether difference has to be viewed as an impairment and whether impairment is tragic. The mother of conjoined twins is quoted as saying that "the only tragedy is in their interpretation of the girls' situation, since Ruthie and Verena are happy kids". Disability arises not from the impairment but from the response to it in those around, and so is socially induced; it is "about a failure to build ramps [rather] than legs that don't move".

One consequence of viewing difference as an impairment is the pressure for medical intervention and normalization. The arguments that Dreger gives against these arose when the disabled borrowed from other rights movements to challenge restrictions imposed by difference, whether in anatomy, employment or gender orientation. Why, Dreger asks, "should people with unusual anatomies be treated as if their socially challenging bodies are inherently diseased?" Rather than guaranteeing a child a 'normal' body, we can "try to guarantee a just world".

These are huge questions, not least in considering the situation of any individual with impairment in the world as it is now, which guide the approach of medical workers. To those coming to these arguments afresh, they may prove quite a stretch. Dreger makes no claim to know all the answers but, by taking their side so eloquently, she invites us to see conjoined twins as "no more broken than the rest of us". This book is an eloquent and humane plea to see conjoined twins, and others with impairment and disability, as 'us' and not 'them'. ■

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