

“Agents can be made to behave something like real people: prone to error, bias, fear and other foibles.” Joshua M. Epstein

and the Institute of Public and Environmental Affairs in Beijing. So we have every reason to look forward to more informed public participation in environmental issues, stimulating local governments to embark on a path to a greener China.

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Mystery ape: other fossils suggest that it's no mystery at all

SIR — Russell Ciochon, in his Essay ‘The mystery ape of Pleistocene Asia’ (*Nature* **459**, 910–911; 2009), makes passing reference to the Late Miocene ape *Lufengpithecus*, which is known from Lufeng in the Chinese province of Yunnan. Ciochon then immediately discounts the significance of *Lufengpithecus* because “the age was wrong”. This assumption, however, leads up a blind alley.

Ciochon and his colleagues initially ascribed the teeth of a fossil found at Longgupo — in neighbouring Sichuan province — to *Homo* (W. Huang *et al.* *Nature* **378**, 275–278; 1995). Now he proposes a “mystery ape” to account for the Longgupo specimen and other similar material he recently observed in southern China.

He dismisses the possibility that these remains belong to descendants of *Lufengpithecus*. Yet it seems very likely that they do. The fauna recovered from Lufeng and Yuanmou, also in Yunnan — which have produced abundant fossils of *Lufengpithecus* — have also produced faunal remains directly ancestral to the *Stegodon–Ailuropoda* fauna of Pleistocene southern China (Z. Q. He and L. P. Jia (eds) *Yuanmou Hominoid Fauna*; Yunnan Science and Technology, 1997).

As both the Pleistocene apes *Gigantopithecus* and *Pongo* of southern China assuredly had Miocene antecedents, then so did Ciochon’s mystery ape. Given their morphological and dimensional similarities, there is every reason to suspect that the mystery ape is none other than a descendant of *Lufengpithecus*, as originally proposed (for example, D. A. Etlér *et al.* *Hum. Evol.* **16**, 1–12; 2001). Mystery solved.

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Mystery ape: a call for taxonomic rigour

SIR — The Essay by Russell Ciochon on ‘The mystery ape of Pleistocene Asia’ (*Nature* **459**, 910–911; 2009) and the accompanying News story ‘Early man becomes early ape’ (*Nature* **459**, 899; 2009) announce that Ciochon has changed his mind about the taxonomic assignment of a 1.9-million-year-old hominoid partial jaw. But on what evidence is this reassignment based?

Whereas Ciochon and his colleagues originally considered the fossil on the *Homo* line (W. Huang *et al.* *Nature* **378**, 275–278; 1995), Ciochon now thinks it represents a “mystery ape” and that there is a group of them out there waiting to be discovered.

Although the News story included a photo and illustration of the fossil, I was unable to discern any evidence in either piece for taxonomic justification of the reassignment. I’m not a hominid expert so I’m not qualified to agree or disagree; I would just like to know if there are any anatomical characters — ‘synapomorphies’, in systematic parlance — that form the basis for this revised judgement, as one would expect for any taxon. If this is merely going with what other people thought, it is unclear why it

is considered newsworthy.

Could one not certify what synapomorphies this fossil possesses, and place it at that particular node on the phylogenetic tree? Uncertain characters could then suggest further refinement if more information comes to light. How can one know that there was a “diversity” of Pleistocene mystery apes in southeast Asia without this kind of systematic rigour?

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Human uniqueness and the denial of death

SIR — Marc Hauser’s Horizons article ‘The possibility of impossible cultures’ (*Nature* **460**, 190–196; 2009) carries an implicit assumption that cardinal aspects of human uniqueness arose by positive natural selection because they were beneficial to ancestral hominins. But this may not be the whole story.

Among key features of human uniqueness are full self-awareness and ‘theory of mind’, which enables inter-subjectivity — an understanding of the intentionality of others (see, for example, N. J. Emory and N. S. Clayton *Annu. Rev. Psychol.* **60**, 87–113; 2009). These attributes may have been positively selected because of their benefits to interpersonal communication, cooperative breeding, language and other critical human activities.

However, the late Danny Brower, a geneticist from the University of Arizona, suggested to me that the real question is why they should have emerged in only one species, despite millions of years of opportunity. Here, I attempt to communicate Brower’s concept.

He explained that with full self-awareness and inter-subjectivity would also come awareness of death and mortality. Thus, far

from being useful, the resulting overwhelming fear would be a dead-end evolutionary barrier, curbing activities and cognitive functions necessary for survival and reproductive fitness. Brower suggested that, although many species manifest features of self-awareness (including orangutans, chimpanzees, orcas, dolphins, elephants and perhaps magpies), the transition to a fully human-like phenotype was blocked for tens of millions of years of mammalian (and perhaps avian) evolution.

In his view, the only way these properties could become positively selected was if they emerged simultaneously with neural mechanisms for denying mortality. Although aspects such as denial of death and awareness of mortality have been discussed as contributing to human culture and behaviour (E. Becker *The Denial of Death*; Free Press, 1973), to my knowledge Brower’s concept of a long-standing evolutionary barrier had not previously been entertained.

Brower’s contrarian view could help modify and reinvigorate ongoing debates about the origins of human uniqueness and inter-subjectivity. It could also steer discussions of other uniquely human ‘universals’, such as the ability to hold false beliefs, existential angst, theories of after-life, religiosity, severity of grieving, importance of death rituals, risk-taking behaviour, panic attacks, suicide and martyrdom.

If this logic is correct, many warm-blooded species may have previously achieved complete self-awareness and inter-subjectivity, but then failed to survive because of the extremely negative immediate consequences. Perhaps we should be looking for the mechanisms (or loss of mechanisms) that allow us to delude ourselves and others about reality, even while realizing that both we and others are capable of such delusions and false beliefs.

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