observations of Brown *et al.*[11] on variability in crania of this species within the Turkana Basin.

Some researchers might 'solve' the inconsistency by naming a new species for the Konso population, but both the authors and I would caution against such an oversimplified approach. Neighbouring species of living animals are generally distinguished by a lack of gene exchange (interbreeding and mate-recognition). But this biological species concept (BSC) cannot be directly applied to modern animals that are separated in space or to fossils. In both of these cases, some specialists try to draw analogies with the BSC by studying the degree of variation and overlap among well-studied neighbour species. Others argue that any discernible difference in morphology implies that interbreeding would have been unlikely, thus according full species rank more readily (the phylogenetic species concept; PSC).

The sister taxa *P. boisei* and *P. robustus* are probably the most similar species pair within the Hominini (post-ape human lineage). The new sample from Konso opens, once again, the question of their taxonomic distinction — if the diagnostic features of both species co-occur in a single population sample, are they really different species? Only by re-evaluating character-state distributions across the robust australopiths can we hope to answer this question.

Looking at an even broader scale, the number of widely accepted species in our genus, *Homo*, has increased steadily, stemming in part from the PSC philosophy presented in a seminal essay by Tattersall[12]. Populations spanning the last 1 Myr were, for many decades, considered varieties of our own species *H. sapiens*. But the Neanderthals of western Eurasia (dating roughly from 200,000–30,000 yr) are now thought by many to represent a distinct species *H. neanderthalensis*, which had its roots in earlier European populations genetically isolated from African contemporaries.

The PSC advocates have recognized as many as three additional species in the interval between 1 Myr and 200,000 yr: *H. rhodesiensis* for the African populations, which are younger and more derived than *H. erectus*; *H. heidelbergensis* for European groups in the 500,000–200,000-yr range; and, most recently, *H. antecessor* for a European sample dating around 800,000 yr. *Homo antecessor* is said to show facial features that are reminiscent of *H. erectus* and some later populations, leading to the suggestion[13] that it is the common ancestor of all of the younger species. But that interpretation is based mainly on the face of a single subadult individual, with no idea of the variation (adult or juvenile) in that sample or in juveniles of either *H. heidelbergensis* or *H. rhodesiensis*.

As Suwa *et al.*[1] note, the Konso specimens underline the importance of understanding intraspecific variation before erecting new species based on single specimens or populations. Alternative taxonomies must be carefully considered against comparisons of modern and fossil variation. For example, it is still reasonable to include all Middle and Late Pleistocene *Homo* in *H. sapiens*, perhaps differentiated as spatio-temporal subspecies. Alternatively, the Neanderthal lineage in Europe and southwest Asia might be classed as a single species *H. neanderthalensis* (including *H. heidelbergensis* and, perhaps, *H. antecessor* as temporal stages). In such a model, the role of '*H. rhodesiensis*' is unclear, in part depending on whether it includes populations that were, ultimately, ancestral to modern *H. sapiens*, as the 'Out of Africa' hypothesis implies.

Even with the discovery of Neanderthal genetic material[14], we still cannot decide whether the Neanderthals were one of several related species in an extinct radiation, a single species close to our own, or a 'race' of *H. sapiens* (with that species redefined to include 2-Myr-old *H. erectus*). How are we to choose among these or other alternatives? One approach might be to compare variation within and among the several named samples to that found in modern humans (either quantitatively or in terms of character distribution), under the hypothesis that geographical variation today is broadly comparable to past spatio-temporal variation[15].

The Konso sequence has been carefully prospected for the past six years by a truly international team, with primary researchers from Japan, Ethiopia and the United States. It is perhaps fitting that a group which is so representative of modern human diversity should discover a fossil that helps us to understand the origins of that diversity. □

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Daedalus

The ears have it

What makes an animal an appealing pet? One requirement is a face that seems 'human'. Cats, dogs and other popular pets have faces reminiscent of human infants, and trigger protective emotions in us. They also convey emotions by signals which we ourselves recognize. Daedalus now points out that the converse is also true. Good pets must be able to react to us, and to interpret our expressions and behaviour correctly. This is a severe restriction. A grasshopper (say), even one with human intelligence, could never tame a cat; the cat could never interpret the grasshopper's signals as those of a fellow creature.

So DREADCO technicians have devised a set of radio-controlled 'pet-loving robots' with various facial, ocular and vocal abilities. Each robot, guided by its unseen controller, attempts to feed, stroke, talk to and exchange friendly behaviour with an initially naive cat, dog or other animal. Those robots which succeed in making a pet of their animal will reveal the emotional signals recognized by that animal. In particular, they may prove a thesis Daedalus has held for some time. Our animal-taming abilities are severely limited by the immobility of our ears.

Cats, dogs, horses, rodents and many other creatures can swivel or shape their ears in different ways. We interpret these movements, instinctively and correctly, in emotional terms. Flattened or backwards-pointing ears suggest aggression or distress; upright and forward-pointing ones show interest and friendliness. Pet animals must be greatly discouraged by the absence of such signals from ourselves.

So Daedalus is also experimenting with a special skull-cap equipped with large electromagnetically adjustable 'ears'. A handset allows the wearer to switch them to whatever emotion he wishes to convey. With luck, the cap will enable its wearer to reach an emotional closeness with any animal that also uses ear signals.

DREADCO's ear-cap, together with any further prostheses indicated by the robot program, will transform our relations with ear-signalling animals. The most unruly dogs, aloof cats, treacherous goats and indifferent gerbils will at last respond to human affection. The acid test will be the utterly untameable Highland wild cat, reputed to hate everything and everybody on sight. If the cap can reduce this furious beast to a purring fireside moggy, a new lawn in the Garden of Eden will indeed have been opened.

David Jones