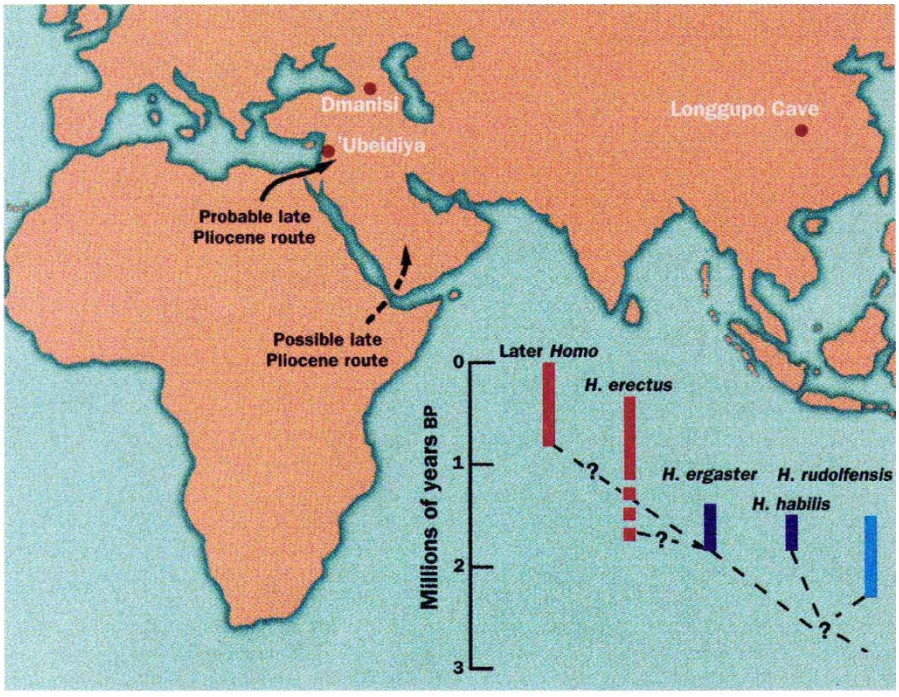

The evidence from Longgupo Cave in China, described by Huang *et al.*[2] and discussed here, suggests that hominids were established in Asia just after two million years ago. Given the primitive nature of the premolar teeth, it seems that the first hominid to occupy Asia may not have been *Homo erectus*, but perhaps a variant of *H. ergaster* or even *H. habilis*.

advanced hominid. The remaining elements of the mammalian fauna at Longgupo shed little light on the local environment of the site, although both woodland and more open-country taxa seem to be represented.

The hominid remains — part of the left side of an adult mandible and an isolated upper incisor — are meagre pickings from a taxonomic point of view. However, the mandibular fragment includes both the crown and the root of a premolar tooth (P_4), and they provide the best evidence about the affinities of the material. The crowns of the P_4 teeth of *H. erectus* are generally relatively simple and the teeth are usually single-rooted, like those of modern humans. In contrast, the Longgupo P_4 root is bifid for most of its length. This, and other features of the mandible and the dentition, suggest that the Longgupo hominid may be much more primitive than *H. erectus*[11]. This opens up the possibility that the first hominid to leave Africa was at least as primitive as *H. ergaster*[12], and implies that *H. erectus* may have evolved within Asia and then spread back into Europe and Africa.

In terms of overall patterns of mammalian movement, there is nothing inherently implausible about the age of the material and the implications that it holds for human dispersions from Africa. Hominid remains and lithic items from Dmanisi[13] in Georgia point to at least an initial presence at the gates of Europe by around the same time as the age of the Longgupo evidence. And it is clear that a Late Pliocene dispersion across Arabia, probably via the Levant, and perhaps through the Bab-el-Mandab straits, was possible for several mammalian taxa[14,15], while the presence of hominids in the Levant itself by 1.4 Myr ago is evident at the Israeli site of 'Ubeidiya[14]. The new report from Huang *et al.* adds weight to other, less well-substantiated claims that hominids travelled even further, and occupied China in the latest Pliocene some 1.9 Myr ago. □

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DAEDALUS

Flying boat

A MAGNETICALLY levitated monorail vehicle has a linear-motor system which generates a moving magnetic field beneath it. By moving endlessly downwards and backwards, the field repels a conducting track, levitating the vehicle and pushing it forwards at high speed.

Daedalus is now adapting the idea for nautical use. Salt water is a conductor, and could in principle support a magnetically levitated vehicle. It conducts so feebly, however, that a big, diffuse field would be needed, extending out and down through a huge volume of water. The small, tightly wound iron-cored or even superconducting magnets of normal maglev practice would be quite out of place here; huge, light, air-cored coils will be best for this job. The standard shore-based 50 Hz a.c. would be a poor choice of current too: sea water is a better conductor at high frequencies. Daedalus's system will work at many kilohertz. The upper limit will probably be set by distributed capacitance problems or radiation losses. DREADCO's engineers are already sketching designs for a wide, flat maglev hovercraft, only a few metres tall but with the area of an aircraft carrier, levitated and propelled by a mesh of wide, flat coils beneath its deck. With no wetted surface and no propellers, it will skim over the oceans silently, smoothly and very fast. In constricted waters, it will be amazingly manoeuvrable. Simple phase-shifts of its coils will send it forwards, backwards, sideways, or even spin it on its own axis.

The high speed and manoeuvrability of the new craft will be a boon to passengers. They may, however, find the voyage oddly disquieting. Largely salt water themselves, they will also experience the downward and backward drive of the craft's enveloping field, and may feel leaden, unbalanced, even glued to the decks — a useful safety feature in rough weather.

But rough weather should not be much of a problem. The maglev hovercraft must keep as close to the sea surface as possible, and Daedalus plans to achieve this by magnetically damping the waves. He is designing an interactive maglev system which, rather like dynamo braking on an electric train, captures the power of each rising wave-crest — thus flattening it out, and putting useful power into the coil above it. Fast sensing and switching between the coils will allow the outer ones to gain power by damping the waves, while the ones in the calm interior provide most of the levitation and thrust. Unlike all previous vessels, the maglev hovercraft will leave a calm wake behind it. David Jones