

Lingappa and colleagues¹ of transmembrane intermediates with tetracaine suggested to us² that overdigestion may have occurred and that the processes described might be occurring inside the membrane. Although tetracaine does not inhibit the proteolysis of proteins spanning the lipid bilayer^{2,4}, it could alter the structure of the translocation pore and affect proteolysis of proteins anchored in the pore, the topology that Lingappa and colleagues now envisage for apo B^{3,5}. We have therefore carried out reactions with tetracaine present throughout the translation reaction, and find that it does not inhibit protein synthesis, processing or glycosylation. This does not seem consistent with tetracaine causing a gross structural change in the translocation pore.

Chuck and Lingappa have now described a protocol for trapping presumptive intermediates of translocation³. They say that this method is reproducible either with wheat germ or rabbit reticulocyte lysates; proteinase K or trypsin; and Ca²⁺ or tetracaine — that is, it fulfils the criteria we would have expected for demonstrating a transmembrane structure with large cytoplasmic domains⁵. Transcripts lacking termination codons are translated, generating proteins covalently linked at their C terminus to transfer RNA, which in turn may remain tethered to ribosomes^{4,6}. In this configuration, the ribosomes may remain bound to microsomal membranes with the translocation pore jammed open.

Chuck and Lingappa claim that some truncations reveal transmembrane domains, while others do not. For example, an intermediate is trapped between residues (1 → 400) but not residues (1 → 304) or (1 → 471), which they interpret as a pause signal between 304 and 400 with a restart signal between 400 and 471. If the concept of successive pause and restart signals is correct, it is easy to explain the complete translocation of apo B17 translated with a stop codon as we observed². We find it harder to understand, on the basis of Lingappa's current model, why apo B15 with a stop codon should have paused at multiple sites in the work reported in ref. 1, however, as if successive restart signals were unrecognized by the translocation apparatus. In our opinion, the latest data of Lingappa and colleagues do not distinguish between the 'trapping' of transmembrane intermediates due to absence

of downstream restart sequences and interference of the normal process of translocation by the transfer RNA moiety. We believe that the apparent translational pausing observed by Lingappa and colleagues may be secondary to translational pausing, which we find can be greatly increased with transcripts lacking stop codons.

Although we received an offer of exchange of reagents from Chuck and Lingappa in a letter to us in October 1991 after publication of our paper, we did not perceive such an offer in correspondence we received from *Nature*.

We still believe that cotranslational insertion into the inner leaflet of endoplasmic reticulum is probable. Whether

or not there are transient discontinuities in translocation that can be revealed (or produced artefactually) by *in vitro* translation, we have seen no evidence for the stable post-translational transmembrane intermediates under the conditions reported in ref. 1.

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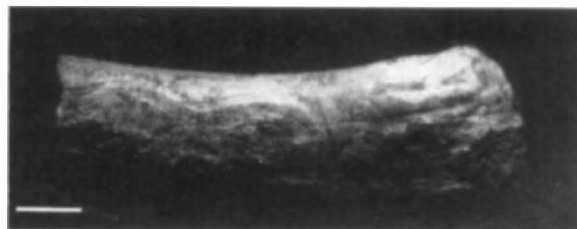
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Palaeolithic art found in China

SIR — A decorated antler fragment has recently been recovered from a 13,000-year-old upper palaeolithic occupation layer in Longgu Cave near Xinglong, Hebei Province, China¹. It bears three distinctive, carefully engraved and complex non-iconic patterns. Traces of a thick ochre coating are partly preserved under calcium carbonate encrustation. The 14-cm-long object was fashioned from antler of *Cervus elaphus canadensis* and weighs 104 g. A small amount of its spongy interior has been dated by accelerator mass spectrometry. The radiocarbon age of 13,065 ± 270 before

artificially perforated stone disk, presumably a pendant. At 28,135 ± 370 years BP, it is one of the earliest drilled stone objects in the world. About 120 perforated objects previously found in the Upper Cave at Zhoukoudian, near Beijing, are more recent. Palaeolithic disk beads made from ostrich eggshell, similar to those found in India³ and Africa, occur in the Gobi Desert as surface finds.

The antler fragment, the first object of palaeolithic art found in China, adds weight to the hypothesis that most graphic art of the Pleistocene is non-figurative or 'geometric'⁴. Outside the southwest of Europe, true two-dimensional representational depiction is almost entirely lacking in palaeolithic art. In Asia, only two instances of it are known³. Even in the Franco-Cantabrian region, figurative representations are outnumbered about three times by non-



Palaeolithic antler fragment from Longgu Cave, Hebei Province, China. Scale bar, 2 cm.

present (BP) confirms that of the occupation layer.

One of the three engraved designs consists of four sets of six or seven parallel wave lines, the other of an elaborate figure eight motif (see figure) while the third pattern is an arrangement of parallel and zigzag lines enclosing two elongate panels of oblique crosshatching. The bold layout of all three designs and the excellent workmanship suggest the hand of a highly experienced artisan, backed by a sophisticated tradition of producing such non-representational art.

Previous reports of portable palaeolithic art in China have been refuted. Examination of a sample of markings on some 600 bone fragments from Shiyu, Shanxi Province², has shown that they are the result of several taphonomic processes¹. However, the upper occupation layer of that site has yielded an

figurative art.

Moreover, pleistocene art is found in all continents except Antarctica, and its beginnings may predate the Aurignacian of Europe in two or three continents. Therefore the attention given to the western European art body, at the expense of all other arts of roughly similar antiquity, is scientifically inexpedient and has created a distorted picture of early art development. It accounts for one of several strongly established biases in this area of research.

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