zees, these creatures can produce acoustic output that is a sufficiently good approximation to human speech that a few sounds or 'words' can be interpreted as speech. They do so using mechanisms that are variously different from our own. Nobody claims that their vocal output is in all respects indistinguishable from our own, or that their vocalizations encode the phonological features that underlie human speech capacity. The point is simply that acoustic waves that resemble human speech can be produced by a wide range of very different mechanisms.

As to the Neanderthals, I am inclined to agree with Lieberman that they probably had some limited speech and language capacities. Perhaps they spoke Kabardian? But the evidence is as limited as their purported speech. Concerning the evidence from fossils, Du Brul[22] has claimed that Lieberman's reconstructions imply a creature that could not open its mouth, let alone talk, and concludes that "the structure of the Neanderthal skull has been seriously misinterpreted". Lieberman and colleagues seem remarkably sure about the cerebral morphology and cognitive capacities of a species that has been dead and gone for a very long time.

Returning to the matter of the hyoid, I quote Luchsinger and Arnold[23]: "If the hyoid bone has to be removed for surgical reasons, its absence is not noticed in any manner." Unfortunately, no reference is given for this remarkable assertion. Could some kindly surgeon (and speech scientist) please tell me if it is true?

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Seeing red in Queensland

SIR—Archaeologists studying rock paintings have commented on differences in the colours of paint used through time[1,2], with an apparent dominance in early paintings of reds over yellows. Study of rock paintings in north-western Queensland, Australia, such as the one shown here, has revealed that the art is undergoing a change on the rock face — goethite ($\alpha FeOOH$), a yellow to brown mineral, is being converted to the red mineral haematite (αFe_2O_3). We have also discovered rounded, goethite-dominated ochre fragments which, where exposed to extremes of weather, are being converted to haematite. Thus, under suitable conditions, the reaction: $2\alpha FeOOH \rightarrow \alpha Fe_2O3 + H_2O$ is sufficiently rapid to influence the colouring of rock paintings.

Are some of the yellow–brown, brown and deeper colours in this Queensland rock art darker than they were originally?

The reaction has been studied to evaluate the relative stabilities of haematite and goethite. It has been shown that low relative humidity[3], elevated temperature (>40 °C; ref. 4) and fine grain size (<1 μm; ref. 5) all promote goethite instability. Climatic data[5] and our grain-size measurements are compatible with the abundance of haematite in older paintings and haematite forming from geothite in ochre fragments.

Rosenfeld[1] has drawn attention to the dominance of red in early paintings, but our studies suggest that this is not necessarily an indication that the paintings were monochrome red when applied. Perhaps yellow paint survives only in certain environmentally favourable conditions such as those found in low-temperature, humid, deep caves.

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Is cold fusion hot?

SIR—Observations of 2.5-MeV neutrons during the electrolysis of D_2O with palladium or titanium cathodes[1] have inspired non-standard models of $d+d \rightarrow {}^3He+n$ fusion. We suggested a less iconoclastic model[2], 'microscopically hot' fusion, in which deuterons are accelerated in local electric fields before fusing. In this case, $d+t \rightarrow {}^4He+n$ fusion will be favoured over d-d fusion and yields a 14-MeV neutron more easily detected above background. Here we point out that experiments with tritium, judiciously pursued with proper regard for safety, may not only provide a decisive test of cold versus hot fusion but might also distinguish between different conditions of hot fusion.

As early as 1986, Derjaguin's group reported 2.5-MeV neutrons from sharply struck LiD crystals[3]. These neutrons were presumed to come from the fusion of deuterons heated in micro-pockets of plasma or accelerated to keV energies by electric fields. Such fields are associated with charged surfaces or isolated fragments induced by cracking. Deuteriding of a Pd or Ti cathode during electrolysis causes it to swell and distort and sometimes become brittle; hence we suggested (ref. 2) that the resulting fusion neutrons might have origins similar to those from mechanically shocked LiD. Bursts of neutrons, and neutron production by other ways of shocking deuterated Ti or Pd were predicted[2] and have now been found[4,5]. One objection to this model has been that, unlike LiD, deuterated Pd and Ti are not insulators, so that conduction electrons might be expected to quench any build-up of charge. But the Derjaguin group now reports generation of neutrons during the impact fracture of deuterated transition metals, including Ti (ref. 6). Also, model calculations suggest that a crack propagating with only ~10% of the speed of sound in Ti will outrun the electron current seeking to balance the charge[7].

To obtain further predictions, we note that there are two sub-types of microscopically hot fusion: (1) heating (characterized by a high temperature) as would occur in a micro-pocket of plasma, and (2) acceleration (characterized by single-particle energies) as would occur across a crack. In case 1 the motion of both d and t nuclei is important; the cross-sections are calculated by[2]

$$\sigma_{a\leftrightarrow b} = \frac{S}{E_{c.m.}} \exp\left(-31.3\sqrt{\mu / E_{c.m.}}\right) \quad (1)$$