If the SF halflife of ^{238}U is 10^{16} yr (ref. 17) man should experience a disintegration about once every three weeks.

A new nucleus might not survive compression. But if each disintegration during decompression, or during the preceding period at raised ambient pressure were to cause an attack of decompression sickness, a large group of men working eight-hour shifts at pressure should experience a bends rate of about 2.2% of man-decompressions. At the Tyne Road Tunnel men were working for some months at pressures of 27–29 pound inch^{-2} gauge. Of the 5,465 man-decompressions recorded after shifts of 8 h or more at these pressures, some 118 resulted in an attack of bends[19], giving a rate of 2.16%.

One mechanism for the stabilisation of new nuclei is an 'organic skin'[20,21], though in our case high temperatures are involved so fission-induced cavities may well be surrounded by a coagulavelum[22] of denatured protein. Certainly, an abundant supply of suitable macromolecules is to be found in most body fluids. The body burden of uranium resides mostly in bone[18,23]. The commonest symptom of acute decompression sickness (the bends) is described as a diffuse pain associated with bones, and the most important chronic consequence of hyperbaric exposure is Caisson disease of bone. In dogs, the ends of the long bones retain more uranium than the shaft[23], and both in dog[23] and in man[24] the element is mainly found on the surfaces of cancellous bone and the endosteum. Both are sites associated with the lesions of Caisson disease of the femur and humerus.

There can be considerable geographical variation in the total α activities of human bone ash samples[25]. If a similar variability in the uranium content—and therefore in the formation rate of fission-induced nuclei—could be discovered and correlated with the observed variation in individual susceptibility to decompression sickness, it may become possible to prove or refute our hypothesis. From our comprehensive records of diving experience and work in compressed air[26] it is easy to select men who are particularly resistant or susceptible, though estimation of the body burden of uranium in live men without occupational exposure is less easy. The traditional method is to determine the uranium content of urine[27,28], and despite uncertainty in relating the excretion rate to body burden, it seems probable that body burdens may be compared usefully in this way.

We thank ICI Ltd for the hydraulic cell, Sherwood Medical Industries Ltd for the syringes, the Department of Medical Physics, Royal Victoria Infirmary for the thorium salt, Messrs J. Cook and R. Liddle for assistance, and Dr E. I. Hamilton and Professor R. B. Evans for advice. This work was supported by a Medical Research Council Programme grant.

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Received May 8; revised October 3, 1974.

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Pleistocene date for man in Tasmania

THE Pleistocene colonisation of Tasmania has long been predicated[1,2] but no dated human occupation sites of that age have been reported before. The excavation of a cave site on Hunter Island[3], 6 km off the coast of north-western Tasmania (40° 34′S, 144° 45′E; Fig. 1) has yielded the first radiocarbon date of Pleistocene age from a human occupation site in Tasmania.

The Cave Bay Cave is a large sea cave in a slate cliff containing an undisturbed deposit rich in faunal remains and with signs of human occupation. In a preliminary cutting 1.75 m deep, the top 25 cm were found to contain abundant evidence of man: hearths, lenses of marine shell and quartz flakes were present, and the bones of seabirds predominated. Below this level, evidence of human occupation was sparse. The deposit was still rich in faunal remains but seabirds were absent whereas native rodents and small marsupials were

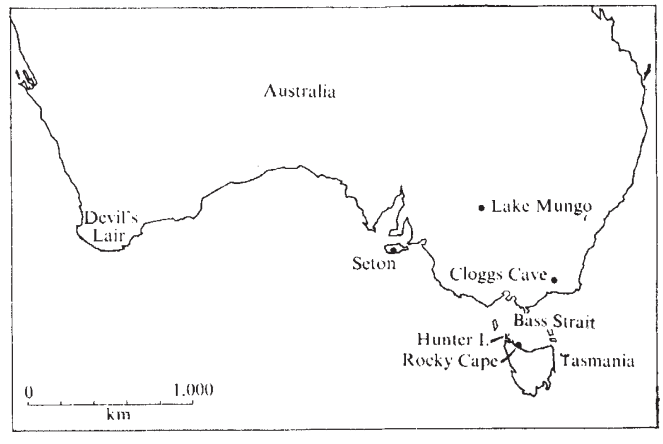

Fig. 1 Southern Australia.

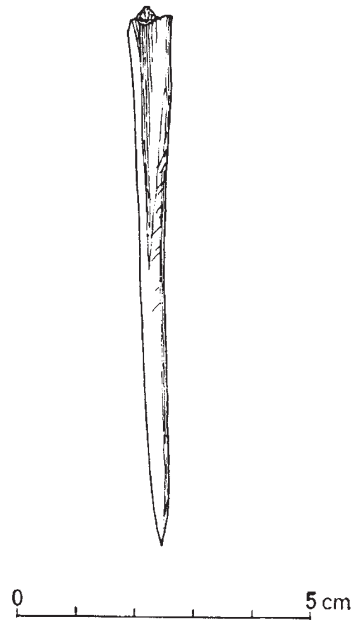

Fig. 2 Bone point found in Pleistocene deposits in Cave Bay Cave.

abundant. There were also some larger marsupials, some of which are not now found on Hunter Island, including the native cat (*Dasyurus* cf. *viverrinus*). A bone point and two pieces of flaked quartz—convincing evidence of the presence of man—were found between 80 and 100 cm below the surface. The bone point is a ground and polished piece of macropod fibula (Fig. 2). Associated charcoal has been carbon dated to 18,550±600 b.p. (ANU-1361).

The final maximum of the last glaciation was responsible for lowered sea levels about 18,000 yr BP and Hunter Island would have been a hill on a land bridge between Tasmania and the Australian mainland[4].

Similar sites in southern Australia with Pleistocene dates, bone artefacts and good faunal preservation are Clogg's Cave at Buchan in south-eastern Australia (17,720±840 b.p., ANU-1044)[5], the Seton site on Kangaroo Island, South Australia (16,100±1,000 b.p., ANU-1221; ref. 6 and R. J. Lampert, personal communication), and the Devil's Lair, Western Australia (24,600±800 b.p., SUA-31)[7]. All of these sites have been the haunt of non-human predators who have contributed their own share of faunal remains. In the Cave Bay Cave, the abundant remains of rodents and small marsupials in the lower levels were probably deposited as pellets regurgitated by owls, and the native cat has probably contributed the bones of larger animals such as bandicoots and possums, which show distinct signs of non-human gnawing.

At Clogg's Cave, the Seton site and the Devil's Lair, there is evidence of the presence of the Tasmanian wolf and devil (*Thylacinus cynocephalus* and *Sarcophilus harrisii*) although there is so far no sign of them at the Cave Bay Cave. The immediate difficulty generated by the presence of these carnivores is that of discriminating the food remains of man from those of the other predators.

A more intriguing problem is suggested by a comparison between these sites and post-Pleistocene cave sites; for instance, the Rocky Cape sites of north-western Tasmania[1]. There, a total of 6 m of shell midden deposit has built up over the last 8,000 yr and there is no evidence of the presence or action of predators other than man (ref. 1 and Rhys Jones, personal communication). There is generally much sparser evidence of human occupation at the older sites in terms of artefacts and stratigraphic features than at Rocky Cape. It seems that Pleistocene man in southern Australia made less intensive use of cave and shelter sites than his post-Pleistocene descendants. Another important human occupation site of Pleistocene age and with faunal remains preserved is at Lake Mungo—an open site where people camped on the beaches of a lake[8].

The Cave Bay Cave has implications not only for an understanding of the ancestry and development of the unique Tasmanian culture[2], but also for the ecology of Pleistocene man in Australia.

This investigation is part of a project supported by the Australian National University[3].

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Received September 23, 1974.

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Identification of metabolic dechlorination of highly chlorinated biphenyl in rabbit

CHLOROBIPHENYLS with one to four chlorine atoms per molecule are metabolised by certain animals, plants and microorganisms but the more highly chlorinated biphenyls are rather resistant to metabolic change[1].

Organochlorine compounds may be identified at low concentrations in crude extracts of natural samples by a high resolution mass spectrometric method involving photoplate detection[2–4]. The method is based on the facts that first, in conditions of high resolution each ion of unique molecular composition is recorded individually and, second, the relatively large mass deficiencies (the actual mass being lower than the closest nominal mass) of both chlorine isotopes. The accurate mass for ^{35}Cl for instance is 34.9688 which accounts for a mass deficiency of -31.1×10^{-3} mass units (m.u.), the the corresponding value for ^{37}Cl being -34.1×10^{-3} m.u. These mass deficiencies cause the exact mass of ions which contain these atoms to be at lower masses than ions of the same nominal mass which contain only atoms (that is C, H, N, O) present in most biological molecules. Thus, the high resolution photoplate technique is capable of detecting chlorine-containing mass deficient ions in crude biological extracts. As the photoplate acts as an integrating ion detector it is possible to identify compounds present in low concentrations ($\leqslant$ 0.01 p.p.m.).

This method has now been applied to the unambiguous identification of metabolites from organochlorine compounds[5] including the detection of trace components. After the usual dosing of the animal, urine, faeces or organs to be examined were extracted with a suitable solvent and a small portion (10–20 μg) of the dried extract was placed in the mass spectrometer sample tubes. Mass spectra from the sample were then obtained by exposing photoplates to ions derived from the crude extract for up to 30 min or