dues in several proteins must be analysed before one cladogram can emerge as the clear choice.

Benveniste and Todaro's paper, also in this issue of *Nature* (page 101), concludes that during most of the Pliocene era, man's direct ancestors lived in Asia, or at least not in Africa. Therefore they would argue that the recent fossil finds by Richard Leakey in Kenya and by Johanson and Taieb in Ethiopia (announced at a news conference two months ago, but not yet published) that appear to push African records of *Homo* back into the Pliocene may not be the ancestors of our present day species.

Benveniste and Todaro's conclusions arise from ingenious arguments based on tenuous evidence. They have used the technique of DNA hybridisation by which the melted strands of DNA will reanneal with complementary sequences. When melted DNA from two species is allowed to reanneal only complementary nucleotide sequences will do so, and the degree of mismatching within those sequences can be measured as the depression in melting temperature in the 'hybrid' DNA compared with that of truly homologous DNA. Thus the degree of genetic relatedness of species is determined by the extent of DNA hybridisation, and by the temperature at which 50% of the hybrid becomes dissociated. Benveniste and Todaro's annealing studies of DNA prepared from tissues of humans and apes broadly confirm earlier work, notably of Kohne and his associates at the Carnegie Institute of Washington, that the non-repetitive DNA sequences of man are more closely related to those of the African great apes, the chimpanzee and gorilla, than those of Asian apes. So far so good, in that these sophisticated biophysical studies of genetic material are consistent with, though perhaps less discriminating than, the morphological studies of classical primatologists or the eyes of children visiting the zoo.

Benveniste and Todaro then proceeded, however, to analyse a tiny fraction of DNA representing about 10^{-7} of the non-repeating sequences, and possessing the coding capacity for a small protein at the most. This set of sequences is distantly related to part of a C-type virus endogenous to baboons, that is, a virus whose genes are incorporated into the host DNA and which is therefore inherited as a Mendelian trait. By synthesising a radioactive DNA 'probe' complementary to the genes of the activated baboon virus one can screen for related 'viral' sequences by annealing the probe to DNA prepared from normal tissues of other species of primates, including man. About 9% of the probe anneals to chimpanzee and gorilla DNA but only 3% to human DNA and to that of Asian species of ape. The extent of annealing is so small and the mismatching so great, that the melting temperature of the hybrid DNA can only be estimated by a crude extrapolation. Benveniste and Todaro do not think that man is more closely related to Asian apes than African ones since the overall cellular DNA hybridisation patterns indicate the converse. Their thesis is that African apes have conserved a larger fragment of DNA related to the baboon virus than have either Asian apes or man; that this conservation of viral DNA sequences results from natural selection due to some factor in the African as opposed to the Asian environment; that this factor is the baboon virus itself (and that of ancestral baboons) transmitted as an infectious agent; and that the conserved DNA sequences somehow confer immunity to infection of the host by the baboon virus. If man was not exposed to the baboon virus during the Pliocene era, there would be no selection to conserve these DNA sequences and they would diverge as fast as 'viral' sequences have done in other non-African Old World primates.

To launch such a complicated hypothesis on the difference between 9% and 3% of grossly mismatched homology of DNA sequences seems farfetched. But Benveniste and Todaro show that it fits a general pattern in that sequences in Old World monkeys that are more closely related to the baboon virus have also diverged at a much higher rate among Asian species than among African species. Moreover the evolutionary arguments do not seem to me implausible, indeed they are familiar. There is some evidence in other species (chickens, for example) that endogenous viral gene expression can confer resistance to re-infection and there is also striking evidence from Benveniste and Todaro's previous studies (*Nature*, **252**, 456; 1974) that a C-type virus related to the baboon virus has been transmitted to the genome of the ancestor of the domestic cat (of North African origin) but not to an Asian species of the same genus.

Entertaining as these arguments are, on the basis of the evidence presented here they might have been more wisely restricted to the laboratory coffee room. The argument for man's Asian origin is based on the weak homology of a small fraction of a viral probe. There are no data to determine whether the conserved sequences in different African primates represent the same portion of the probe and indeed the viral sequences 'conserved' by natural selection actually diverge more rapidly than the non-repetitive host DNA as a whole.

An implicit corollary of Benveniste and Todaro's hypothesis is that man is susceptible to horizontal infection with C-type viruses of the baboon type, and that these viruses could be pathogenic to man. C-type viruses closely related to baboon viruses have been isolated from human leukaemic cells by Gallo and his associates and from fibroblastic cells by Panem and Kirsten. I have argued previously that zoonosis, ancient or modern, may be an important concept in the transmission of pathogenic C-type viruses, and that we should not be too perturbed to find that 'human' isolates resemble animal viruses. Benveniste and Todaro's paper hints that they may now be coming to the same opinion. □

A hundred years ago

AT the Crystal Palace Aquarium the hatching of the spawn of Axolotls has been successfully accomplished. There are three young "broods," and some still unhatched spawn, so that the changes in growth during the first few weeks can be seen all together.

A PLAGUE of Field Voles (*Arvoricola agrestis*) has recently visited some of the pastoral farms of Upper Teviotdale and the adjoining districts, which has led to the appointment of a committee of the Farmers' Club of the Locality for the purpose of estimating the amount of damage done. This was found to be very considerable, the vermin eating the pale and succulent bases of the grass, as well as the young shoots. No great destruction of other vermin has occurred in the district, so it cannot be said that the Voles have become particularly abundant from that cause. Similar plagues have before now occurred in the New Forest.

THE *Geographical Magazine* for May contains an article on the prospects for the Arctic Campaign of 1876. While we must be prepared for the necessity of the ships spending a second winter in the north, the writer thinks that possibly the *Pandora*, which goes out this month for news and letters, may meet them coming out of Smith Sound, "with their work done, their great enterprise completed." There is also an article, with map, on the Island of Socotra, which the British Government have arranged to occupy, and another by M. Venyukof on New Maps of Mongolia.

from *Nature*, **14**, 35, 36, May 11; 1876.