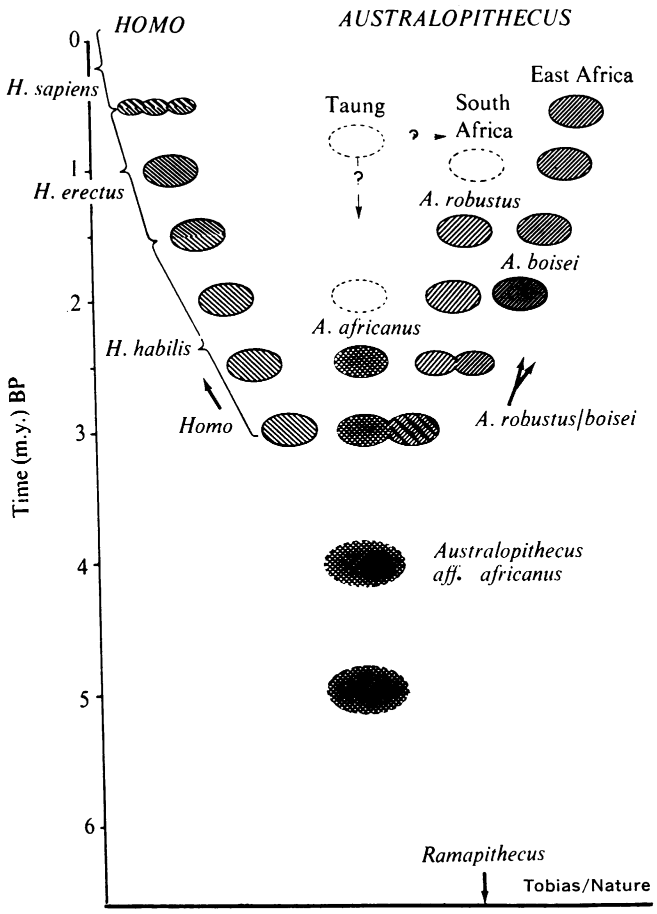
Shaking up the family tree

Like a willow, rather than an oak, the family tree of humanity continues to bend with the breezes of scientific investigation. The winds of change usually come in the form of more precise methods of dating hominid fossils. In the Nov. 9 NATURE, T. C. Partridge of Braamfontein, South Africa, describes a complicated method of dating for the original opening of some fossil-bearing caves.

It goes like this: A river flows for millions of years across the African veld. With continual erosion, as the river cuts deeper, a valley is formed. Along the sides of the hills of the valley, cavities in the earth may be exposed as caves. Working with a detailed analysis of continental landform development, erosion cycles and valley spreading, Partridge has been able to estimate the earliest time at which these caves could have been inhabited.

In the same issue of NATURE, Philip V. Tobias of the University of Witwatersrand in Johannesburg, South Africa, discusses the implications of Partridge's work. The opening dates of several of the caves are much earlier than dates already given to fossils found in them. This apparent discrepancy, says Tobias, can be explained. It took our slow-witted ancestors a million years or more to find the caves and move in.

One cave, however, presents the opposite problem. In 1924, in a limestone quarry at a place called Taung, a small skull was discovered. It was one of the first specimens to be classified as *Australopithecus africanus* and was dated at more than 2 million years B.P. (before the present). But Partridge's estimation of the opening of the Taung cave is only about 800,000 years B.P. This makes the Taung skull 2 million years more recent than other specimens of *A. africanus*, and really shakes up the family tree. More investigation of the Taung skull is called for but Tobias suggests that Taung might have to be plucked from the *A. africanus* branch and hung on the *A. robustus* branch—as a late surviving member of that side of the family.

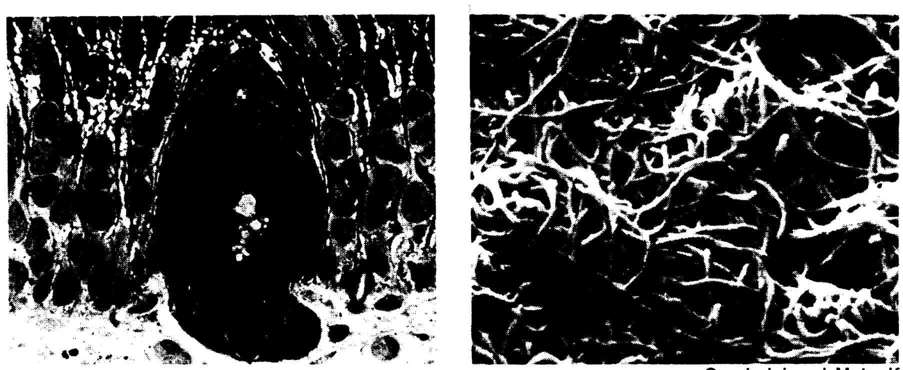


Tobias/Nature

Putting smell back in the whiffer

It is well known, in nerve research circles, that if the ends of mammalian nerves are cut, the nerves will grow new ends. But if the cell bodies of the nerves are destroyed, the nerves degenerate and die.

Over the past hundred years or so, there has been gradually building evidence that olfactory nerves in the mammalian nose differ from the other nerves in the mammalian body. If the cell bodies of these nerves are destroyed, the nerves die, but they are replaced by a fresh population of nerves. Evidence for this regeneration has been less than conclusive, though, primarily because techniques for studying olfactory nerves have been inadequate.


Graziadei and Metcalf

Olfactory nerve regeneration (l) is accompanied by growth of nose hairs (r).

During the past two years, P. P. C. Graziadei and J. F. Metcalf of Florida State University have been producing concrete, and ever more detailed, evidence for olfactory nerve regeneration in mammals. They have used sophisticated techniques such as electron microscopy and autoradiography to conduct their studies. Metcalf reported some of their latest results last week at the third annual meeting of the Society for Neuroscience in San Diego. Other recent results have just been published in TISSUE AND CELL.

To regenerate olfactory nerves in mice or other mammals, Graziadei and Metcalf first cut the nerves. The nerves die. Then, about three days after surgery and for the next two weeks, a new population of nerve cells in the skin of the nose bud and differentiate into new olfactory nerve cells. The new nerves send their axons (filaments) into the olfactory bulb in the brain where the ends of the axons establish normal synaptic connections in place of the old, experimentally degenerated ones (left photo).

"The plasticity of this neuronal system," says Graziadei, "allows a variety of experiments which may lead us to clarify phenomena such as neuronal specificity and patterns in the central nervous system. We are trying to find causal relationships between sensory nerves and the central nervous system."

While olfactory nerves in the nose undergo degeneration and regeneration, other changes in the skin of the nose also take place. The cilia (hairs) on the skin disappear when the nerves degenerate and reappear when a new