sessed heavily muscled arms with elbows that could not support knuckle walking. This arrangement suggests that they split their time between tree climbing and two-legged walking, White asserts.

An analysis of the ratio of two forms of argon in grains of volcanic ash found just below the fossils, as well as data on magnetic reversals in the ancient soil, produced the age estimate of 4.4 million years. Giday WoldeGabriel, a geologist at Los Alamos (N.M.) National Laboratory, directed this effort.

The researchers note that *A. ramidus* probably lived in a wooded environment. Later hominids resided on drier, more open savannas, where bones have a much greater chance of fossilizing. Extensive volcanic ash at Aramis helped preserve the bones, White says.

In addition to hominids, the scientific team recovered fossils of rhinos, elephants, birds, bats, rodents, the first large bear known to inhabit eastern Africa, and numerous bones of ancestors of monkeys and antelope that now live in forests and wooded areas. Fossilized plant and seed remains also come from varieties still common in African woodlands and forests.

A. ramidus probably ate whatever plants and other foods it could find on the forest and woodland floor, White holds. "Like all hominids, it was an omnivore," he says.

An estimate of the earliest known hominid's body size and the degree to which it relied on two-legged walking must await the discovery of foot, leg, and hip fossils. The scientists plan to return to Aramis in November to look for more hominid remains.

Further study of pollen, carbon isotopes, soil, and fossilized wood and small mammals at Aramis should clarify the nature of the habitat favored by *A. ramidus*.

White suspects that the common ancestor of humans and apes, as well as the early members of human and ape evolutionary families, all lived in wooded areas. Therefore, the chances of finding fossils for these animals are slim.

"We're in uncharted territory at Aramis for hominids and other mammals, as well as for Earth history," White maintains. *— B. Bower*

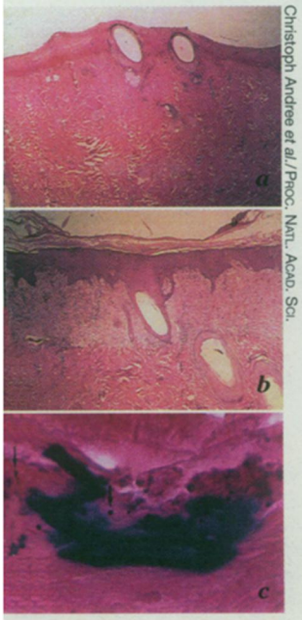
Gene gun, growth factors promote healing

Five years ago, researchers discovered that they could speed wound recovery by adding some of the body's own chemicals to an injury (SN: 7/15/89, p.39). But developing an efficient and economical way to administer those chemicals — called growth factors — in low, sustained doses proved difficult.

Now, a Boston-based team has come up with an innovative way around this obstacle: transferring the gene for the growth factor instead of trying to use the chemical itself. The scientists accomplish this transfer with a gene gun, a technique first developed for plants and recently applied to animals (SN: 1/1/94, p.6).

"We have proven the feasibility of inserting a gene directly into the wound, and we have seen a significant biological effect," says Elof Eriksson of Brigham and Women's Hospital in Boston.

For their experiments, Eriksson and his colleagues developed an incubation chamber that they place over a wound to isolate it from the rest of the body. They use this chamber on people and on pigs, whose skin closely resembles that of humans.



Christoph Andree *et al.*/Proc. Natl. Acad. Sci.

Wound at 1 day after receiving growth factor genes (a) has healed by 9 days (b). Close-up (c) shows gold particles (arrows) and extent of gene expression (blue).

Solutions of skin cells called keratinocytes, even genetically altered ones, survive and regenerate when added to a wound inside a chamber, they report in the Sept. 27 Proceedings of the National Academy of Sciences. For those studies, they used a modified retrovirus to add genes to the skin cells.

Working with Agracetus, a biotechnology company based in Middleton, Wis., the Boston group next tried a more direct gene transfer. They coated gold particles with rings of DNA containing either a piece of the gene for human epidermal growth factor or a marker gene. Electric pulses then drove the particles into wounds in anesthetized pigs.

This approach provides the wound with an adequate supply of growth factor and speeds healing by 2 days, the group will report in an upcoming Proceedings of the National Academy of Sciences.

"They were able to generate the biological response with what appears to be much lower doses [of growth factor] than when we give it exogenously," comments Gregory S. Schultz, a biochemist at the University of Florida in Gainesville. "That makes everybody feel much more warm and fuzzy about doing it."

Previously, researchers were concerned that adding growth factors in high amounts could lead to excessive scarring or possibly cancerous transformations. Moreover, a wound does best if these factors are available throughout the healing process rather than at the initial high doses typical of most drug delivery techniques.

Gene transfer avoids both of these problems, but the technology may have other drawbacks. "My understanding is that [gene transfer] is not inexpensive, and it is much more technically difficult to do than a cream or a slow-release polymer," Schultz says. Several companies are now testing creams and slow-release delivery systems in people. Both those companies and Eriksson's group are also evaluating different combinations of growth factors to find the best healing recipe. *— E. Pennisi*

Prediction averts volcanic disaster

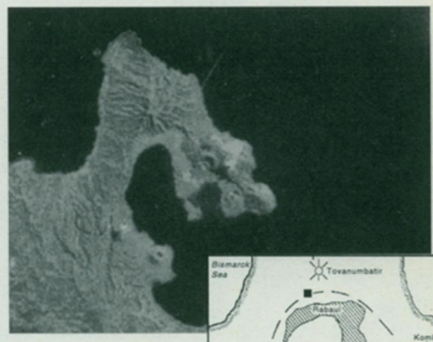
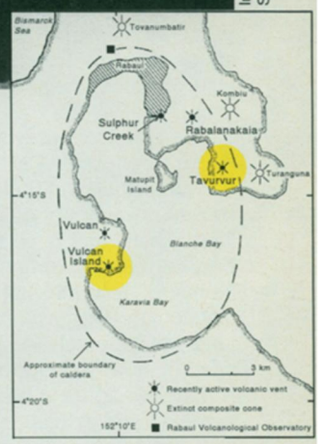


Image by: Earth Satellite Corp. Smithsonian Global Volcanism Network



Yellow dots show active volcanoes, which are visible in satellite image. Broken line indicates caldera rim.

Thanks to careful planning and geologic luck, volcanologists from Papua New Guinea successfully forecast a pair of eruptions last week, allowing 30,000 people to escape the endangered town of Rabaul.

Situated on a bay along the east coast of New Britain Island, Rabaul sits within a sunken crater, or caldera, formed during a huge eruption 1,400 years ago. The current blasts emanate from two volcanoes, Vulcan and Tavurvur, on opposite sides of the bay.

Scientists at the Rabaul Volcanological Observatory called for an evacuation on Sept. 18, hours after strong quakes rocked the area and seismometers detected a distinctive tremor that precedes eruptions. Early the next day, Vulcan and Tavurvur sent plumes of ash 70,000 to 100,000 feet into the air. In the days that followed, a thick layer of ash covered