Embryo Research Panel Ignites Debate

This week, a National Institutes of Health advisory panel released its proposed guidelines for federally funded research on very early human embryos. Panel members said the government should pay for such research as long as it meets certain criteria.

The group's most hotly contended recommendation would allow scientists to create a limited number of human embryos for research. In general, the panel would allow experiments on embryos up to the 14th day after fertilization, a time when the nervous system and various organs start to develop.

The National Right to Life Committee's Michele Arocha Allen called that recommendation "ghoulish." The Washington, D.C.-based group opposes research on human embryos because of its belief that life begins at conception.

That point of view has some support on Capitol Hill. Some conservative members of Congress are already trying to derail the panel's report. Rep. Robert K. Dornan (R-Calif.) and 27 other legislators sent NIH Director Harold E. Varmus a letter urging him to reject the panel's recommendations. Dornan said the panel's effort "shows a blatant disregard for the protection and preservation of human life."

Yet medical ethicists support the report's call for limited embryo research. "I applaud the panel for approving the categories [that] they have," says ethicist Harold Y. Vanderpool at the University of Texas Medical Branch at Galveston. Vanderpool believes that society has much to gain from research on human embryos, including insights into various genetic diseases and cancer.

The United States has had a de facto ban on federal funding of any research involving human embryos since 1980. However, last year Congress passed a law that paved the way for federal review and funding of such projects. Currently, embryo research in the United States is funded privately.

The 19-member panel also recommended federal support for research on "spare" embryos, those that go unused at in vitro fertilization clinics.

An experimental technique called preimplantation diagnosis also passed muster with the panel. The method involves drawing off one or two cells from a very young embryo in order to diagnose certain genetic diseases, such as cystic fibrosis.

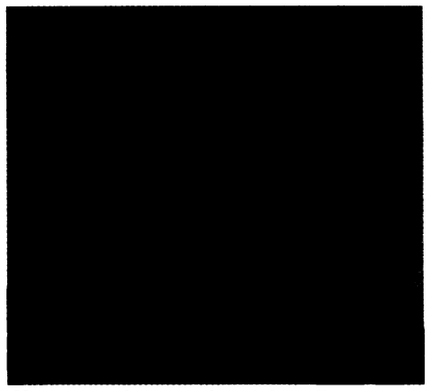
The panel okayed the practice of determining the gender of embryos in order to avoid a sex-linked genetic disease, such as hemophilia. The group advised against the sexing of embryos for any other purpose.

Another procedure that got the nod from the panel was the creation of "parthenotes," or human eggs that have been stimulated with chemicals or an electric shock to divide. These dividing eggs are not fertilized with a sperm and are grossly abnormal. However, researchers believe studies of such eggs may lead to a better understanding of the paternal role in fertilization.

A number of research practices require further review, says the group, including the harvesting of eggs from the ovaries of an aborted fetus.

The panel came out against the transfer of human embryos to the wombs of animals for further development and urged a prohibition on crossing human and animal sex cells.

The panel also recommended against providing federal money for twinning, or cloning human embryos, which could result in the birth of identical twins or triplets. Gary Hodgen of the Jones Institute for Reproductive Medicine in Norfolk, Va., believes that such a ban would be an unwarranted reaction to the uproar that resulted last year when a pair of U.S. researchers reported "cloning" human embryos (SN: 2/5/94, p.92).



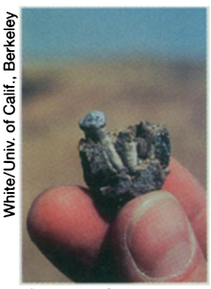
NIH

Human embryo at the eight-cell stage.

The panel's report does not represent the last word on federal funding policy. First, the report gets passed on to another NIH advisory committee, which will consider the initial panel's recommendations as well as public comments. It will then send its recommendations to Varmus, who will make the final decision.

— K.A. Fackelmann

Team unearths oldest known human ancestor



White/Univ. of Calif., Berkeley

A. ramidus *child's jaw, still containing two teeth.*

Fieldwork at an Ethiopian site in 1992 and 1993 has yielded the remains of the oldest members of the human evolutionary family yet discovered. These chimpanzeelike creatures, who lived 4.4 million years ago, apparently served as a common ancestral stock for all later hominid species. Their existence supports the theory that a common ancestor of apes and humans lived in Africa no more than 6 million years ago.

The scientific team that found the new fossils, led by Tim D. White, an anthropologist at the University of California, Berkeley, assigns them to a new species, *Australopithecus ramidus.* For nearly 20 years, the earliest hominid remains were those of "Lucy" and other members of *A. afarensis,* a species that lived from 4 million to 3 million years ago (SN: 4/2/94, p.212).

A description of *A. ramidus,* a dating analysis of associated volcanic ash, and evidence that this hominid inhabited forests rather than savannas appear in the Sept. 22 NATURE. The fossils may display enough anatomical differences to qualify as a new genus distinct from *Australopithecus,* argues Bernard Wood, an anthropologist at the University of Liverpool in England, in an accompanying comment.

"Whatever you call this creature, it was Lucy's ancestor, and it was considerably more primitive [anatomically] than Lucy," White contends.

Investigators discovered the fossils near the village of Aramis, about 45 miles south of Hadar, where Lucy and her kin were found. White and his coworkers uncovered the remains of 17 individual hominids. These specimens consist of skull fragments, teeth, arm bones, and part of a child's lower jaw. Carnivores apparently broke apart most of the bones before fossilization.

A. ramidus displays several differences from all other hominids: smaller cheek teeth, relatively larger canine teeth, thinner tooth enamel, and a cranial base and deciduous first molar tooth more like those of chimpanzees.

Yet three nearly complete bones from an *A. ramidus* individual's left arm look much like those of *A. afarensis* (SN: 11/20/93, p.324). Both hominids pos-

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*

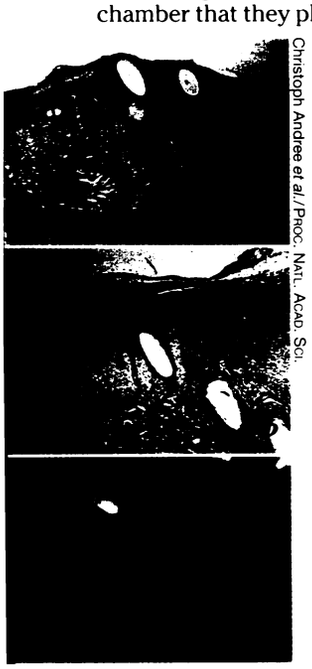
Gene gun, growth factors promote healing

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

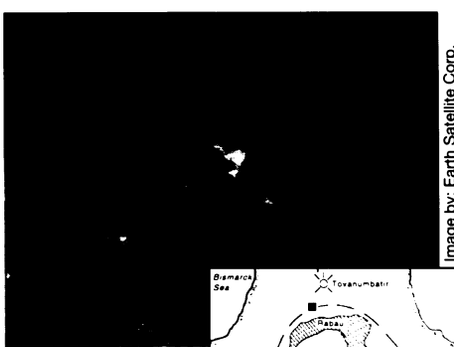
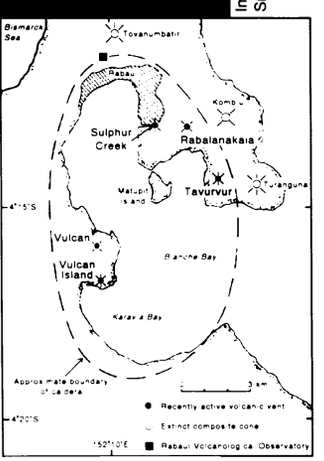


Image by: Earth Satellite Corp. Smithsonian Global Volcanism Network



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