

involved in recombinant experiments, and "no lab known to us now is planning type one or two experiments." The third type is more common, he says.

In addition to their specific warnings, the group requested that an NIH committee oversee studies on the potential hazards of the three types of experiments, develop ways to contain such recombinants if created and to set up guidelines for future recombinant experiments. They also requested the February conference.

Examination of this issue first started at the 1973 Gordon Research Conference on Nucleic Acids, where "a very large number of people brought the problem to the attention of the NAS through a letter," Berg says. The NAS asked Berg to establish a committee, and he and the 10 others met in April. They decided an international conference should be convened, but were unable to put the conference together before next February. They became alarmed at the progress in simplifying the techniques reported in the May PROCEEDINGS and decided to issue a joint statement which the NAS then agreed to endorse.

During the press conference, Roblin emphasized that the hazards are potential and not demonstrated at this point. "But with the rapid development of the technology, we suspect that research might be done by those more chemically oriented and not used to thinking about infectious organisms." About the possibility of the deferment setting back beneficial applications, Berg says: "First of all, we are talking about a six month deferral—that should not in itself set back any research efforts significantly. I don't know of any alternate methodologies for isolating specific genes, but a large number of beneficial experiments can still go forward. With some relatively small changes, we hope we can make the procedure safe."

Will the scientific community accept their appeal? Says Berg: "We feel the scientific community should be given a chance to regulate itself. If this attempt at auto-regulation is successful, it will be an extremely important precedent. If not, it could lead to restrictive legislation." Peer pressure is an important motivating force, he says, and "it is likely if a person tried to talk about or publish this type of work, he would have to answer" to critical peers. A funding and publication ban may be instituted after the February meeting.

Could this research lead to more effective biological warfare? Baltimore says yes. The Department of Defense may express an interest in this research but "this is a challenge we must meet. Many of us grew up with the question of the moral correctness of the atomic bomb," and moral feelings greatly influenced the group's decision, he says. □

Test-tube babies: Reaction sets in

The announcement last week by a physician in England that test-tube procreation in humans has now been achieved (SN: 7/20/74, p. 37) has, as might be expected, caused a worldwide flurry of comment and controversy. To review briefly, professor Douglas Bevis reported that one baby in England and two in Western Europe had been conceived in test tubes. Eggs had been removed from would-be mothers, fertilized in the laboratory, then placed back in the mothers' wombs to develop to birth.

What effect will the capability have on human reproduction and society?

First there is the question of whether the report was really true since Bevis initially would not say who did it, although he has since admitted that he was one of the participants. Scientists working in the field of human reproduction, though, think it probably was true. Efforts at test-tube reproduction had already been successful in animals (SN: 2/24/73, p. 124). So if test-tube reproduction is indeed now possible in people, what are the chances of it going awry and deforming offspring? As a National Academy of Sciences report being prepared on the subject puts it: "Although there have been no reports of gross deformities at birth following successful transfer in mice and rabbits, the number of animals so far produced in this way is too small to provide reassurance."

The academy report also points out that the chances of test-tube reproduction succeeding are as low as four percent—a far from acceptable rate if couples really hope to produce a baby.

There have been efforts to thwart human test-tube procreation, at least in the United States. The National Institutes of Health will fund animal test-tube research, but it will not fund human test-tube research. The American Medical Association asked for a moratorium on human test-tube research two years ago (SN: 5/6/72, p. 295). And when Landrum B. Shettles tried to carry out human test-tube research, Columbia University's College of Physicians and Surgeons "confiscated" his material. But as the achievement reported from England points out, efforts to stop human test-tube procreation were not successful, nor will they probably be in the future. All it takes is one scientist willing to defy conventions and clever enough to do it.

Some believe the event emphasizes that public discussion of what scientists should or shouldn't do too often has little impact on them. Daniel Callahan, a director of the Institute of Society, Ethics and Life Sciences at Hast-

ings-on-Hudson, N.Y. points out, "The fact that people talked about this—some for, some against—seems in the end not to have made any difference. This raises some basic problems for science and society."

So what can the public do? If nothing more, it can try to get human test-tube reproduction in perspective. There is little doubt that test-tube procreation is a misnomer. Only six days of the fetus's life are spent outside the womb; the other 260 days are spent within. And as for dehumanizing procreation, the test-tube technique is no more disruptive than artificial insemination and probably even less so because the woman has the option of having her egg fertilized by her husband's sperm, not by sperm from an outside donor. People who endorse artificial insemination but condemn test-tube procreation are, in the opinion of Andre Hellegers, an obstetrician with the Georgetown University School of Medicine, exhibiting "male chauvinistic piggery." That is, they argue that one can exteriorize sperm from the male, as in artificial insemination, but one cannot exteriorize eggs from the female, as in test-tube procreation.

Will test-tube procreation threaten natural procreation? Most scientists don't think so. They think it will be used mostly when women cannot reproduce because of blocked oviducts. Says Hellegers: "I don't see that a woman would prefer to have her ovum taken out of her and fertilized *in vitro*, then see a doctor again and have it reinjected if she can reproduce by intercourse. I don't think that test-tube reproduction will endanger the family because I don't think there is going to be a big market for it." □

Famine fears rise, battle lines form

Again the rains are failing in the two most populous countries on earth. In China, lack of water now threatens crops at the height of their growing season, particularly in the northern central plains where irrigation is not available. Along the fertile river valleys of northern India, the monsoons began four weeks late and even now appear spotty. In pictures taken by weather satellite, the Himalayas stand barren of clouds, portending little runoff from melting snows to sustain agriculture in northern India during the dry season. Already conditions in the area are worse than in 1972 when crop failures brought India to her knees and when

most of the world's grain stocks were depleted. Should drought persist and the conditions of 1972 be repeated, Nobel laureate agronomist Norman Borlaug told a Senate hearing recently, without the grain reserves to fall back on 50 million persons around the world could die from famine.

This awesome prospect has lent new urgency to preparations for the November World Food Conference in Rome and a reassessment of America's Food for Peace program (SN: 5/11/74, p. 306 and 5/18/74, p. 322). The man in charge of U.S. preparations for the conference, Ambassador Edwin Martin, told the Senate Foreign Relations Committee July 11 that diplomatic efforts have begun to seek help from other nations in preparing to meet a possible emergency. But no firm U.S. position on the establishment of grain reserves or commitment to foreign aid could be made, he said, until after this year's domestic crops can be firmly determined, possibly as late as Sept. 1.

Martin's hesitancy immediately brought a reaction from the president of the Overseas Development Corporation (ODC), James Grant, who pointed out that other countries had already responded to a U.N. call for aid and that American foot-dragging was "jeopardizing the global situation." Behind the indecision appears to be another of those internal power struggles that continue to plague the Administration, with Secretary of Agriculture Earl L. Butz reportedly opposing internationally controlled stockpiles in favor of reserves held by private (American) interests, the State Department worried about the political instability that would surely accompany a major famine, and the Office of Management and Budget fussing over what the whole thing might cost. Martin and his staff—widely respected as thorough-going professionals—are caught in the middle.

One American contribution seems assured: Greater scientific and technological assistance to developing countries to help them increase their own agricultural productivity will begin shortly. In his Senate testimony, Martin outlined areas that could expect major funding in the near future: research on storage of perishable goods in tropical climates; establishment of regional research centers in developing countries to help adapt new crop strains to local conditions; several aspects of fertilizer research, including ways of cheaply recycling animal wastes, adapting commercial fertilizers from temperate zone countries to tropical conditions, and especially developing methods of "bio-fixation"—in which bacteria create natural fertilizer continually in the soil.

But such projects can only be considered long-range solutions. Since

North America now supplies 85 percent of the world's internationally traded grain, should famine develop anywhere, all eyes will turn toward the harvest in the United States and Canada. There the wheat crop has now been mostly harvested and is running a good 10 percent below expectations. Corn is in even worse shape, following late planting due to heavy rains and a failure to form ripe kernels due to drought during the crucial tasseling period. Current estimates by growers run 18 percent below original expectations. Fortunately, the Soviet Union should not suffer the crop failures it experienced in 1972, which led to the infamous "wheat deal" that depleted American reserves.

Should famine and millions of deaths come, however, weather will not be the determining factor. Enough food will

be harvested that the world *could* be fed; the problem remains how to distribute that food. Even in India itself the government has been unable to obtain half of the legally required portion of the domestic harvest needed to feed the urban poor. Fertilizer shortages would already have accounted for a major crop failure in developing countries, and ODC's Grant says that the extra fertilizer Americans spread on their lawns, cemeteries and golf courses more than equals the missing quantities needed for crops abroad. Dressed in her simple white robes, a nun working in the slums of Calcutta, Mother Teresa, expressed the dilemma in deeply human terms to the Foreign Relations Committee: "In the name of the poor of the whole world, don't miss the *chance* of giving until it hurts." □

Final piece in the Gondwana Game

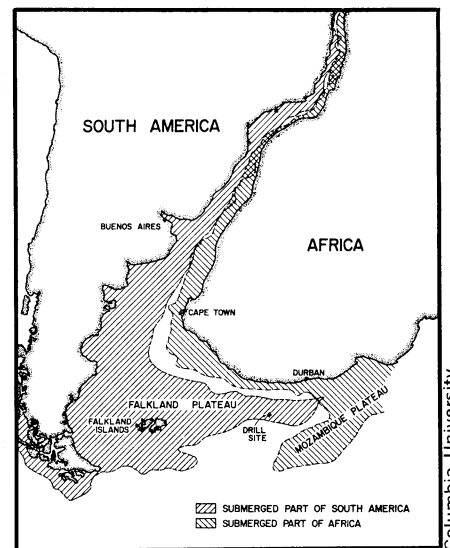
The Gondwanaland Game is a little like that geometrical brain-teaser in which a T-shaped figure can be taken apart and reassembled into a square. Nature has played it for the past 200 million years, breaking up the ancient supercontinent of Gondwanaland and shifting around the pieces atop plates of the earth's crust until they reached their present arrangement.

Ever since they realized the game was going on, earth scientists have been trying to play it backwards, reuniting the pieces in their original configuration to see how the game began. A major sub-plot in the Reverse Gondwanaland Game has been to rejoin Africa and South America, by hunting up the missing continental bits that would make their facing coastlines fit exactly instead of just approximately.

Last week, researchers from Columbia University and the University of Birmingham, England, announced that they had dropped in the sub-plot's final piece—a 750-mile tongue of submerged land thrusting eastward from the Falkland Islands off the Argentine coast that used to border what is now the southeastern coast of South Africa.

"It completes the puzzle," says geologist Ian W. D. Dalziel of Columbia. "All the other points along the Atlantic contours of the two continents had been proved by various scientific means to have been joined long ago. Now, with deep sea drilling, we've identified a large area of foundered continent, and the last piece is in place."

The past piece was discovered during Leg 36 of the remarkable journey of the research ship *Glomar Challenger* (SN: 6/15/74, p. 382), as part of the Deep Sea Drilling Project. With Dalziel and Peter Barker of the University of Birmingham as co-chief scientists for the leg, the drill team had to send their



Africa and South America: A comfy fit.

drill string down through more than a mile and a half of water and 1,835 feet of bottom sediment before they struck the hard base of continental granite that would later prove to be the missing fragment.

For the first 50 million years or so of the Gondwanaland Game, starting about 200 million years ago, the African-South American rift-to-be remained locked together and dry, in fact with a rather balmy, Mediterranean-type climate. When it finally began to separate, the land along the facing edges, no longer supported at the junction, started sinking, reaching its present depth about 80 million years ago.

The missing piece was discovered when Dalziel and Barker realized that they had struck continental granite in an extension of the Falkland Plateau that reached so far to the east that it must formerly have filled in a vast, canyon-shaped space northwest of the tongue of the Mozambique Plateau. □