willingness to provide technological assistance to developing countries, a recognition of the need for a "prudent" system of food reserves, hopes for better cooperation from the Soviet Union in providing crop estimates, and unspecified measures to help the immediate situation.

But neither the government representatives nor the swarm of special interest groups surrounding the conference showed any sign of yet coming to grips with the practical problems that must be faced before resolution of the present crisis can be achieved. The Rome Forum avoided making any recommendation on population control, lest the issue "polarize" the conference. Butz insisted that agricultural production could only be increased by having "reasonable" prices for crops, but failed to say how those who could then not buy food would be fed or why so many American farmers can't seem to make ends meet. And no one at all wanted to talk about how to divert some of the money now flowing toward the Middle East into channels for producing more food in developing countries of the world. □

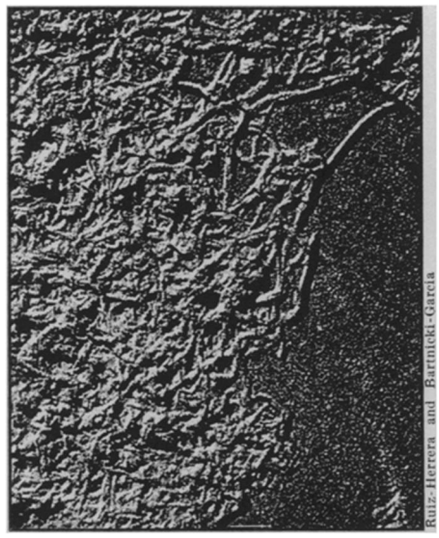
Plant cell wall material synthesized

The most abundant organic compound on earth—cellulose—literally supports most of the living things on earth, which happen to be plants. Cellulose is a major constituent of plant cell walls, the unique component missing in animal cells that allows plants to grow stiffly upright, away from the earth and toward the sun. All plants, from lacy ferns to towering redwoods, have this common unit of support. The fungi, including mushrooms and yeasts, are considered plants, and have cell walls, too, but in most species the walls are made of chitin, not cellulose.

Being abundant does not automatically make a substance abundantly understood, however, and plant physiologists still are unclear about how a plant manufactures its all-important cell walls. They now have come a big step closer though, with achievement of the first artificial synthesis of cell wall material.

University of California at Riverside plant physiologists Jose Ruiz-Herrera and Salomon Bartnicki-Garcia report the synthesis in the Oct. 25 SCIENCE. They were able to synthesize chitin microfibrils like those found in fungi cells. These microfibrils are tiny strands which enmesh in the living plant to form the cell wall. The team homogenized yeast cells and extracted an active fraction that contained a soluble chitin-forming enzyme. They combined this enzyme with the sugar building blocks of chitin, and microfibrils formed.

The artificial synthesis tells plant physiologists several new things about cell wall formation. Most important, says Bartnicki-Garcia, the findings demonstrate that chitin microfibrils can be formed in the absence of membranes. Many scientists had believed until now that chitin and cellulose microfibrils were formed in tiny membrane sacs in the cell's interior. These sacs, they believed, traveled to the cell wall and there deposited the newly formed strands which enmeshed with the existing cell wall structure. Because the team was able to synthesize microfibrils in a disrupted, cell-free fraction containing the chitin-forming enzyme and the sugar substrate, it is clear the enzymes need not be membrane-bound, Bartnicki-Garcia says.



Plant cell wall fibers (× 64,000).

A second important insight, he says, is the confirmation that the Leloir pathway is involved in microfibril formation. The Argentine Nobel laureate chemist Luis F. Leloir several years ago proposed a pathway for polysaccharide (long-chain sugar) synthesis, that included the transfer of a sugar unit from a nucleotide-sugar complex to the growing sugar chain. Many did not believe this to be a pathway involved in microfibril formation, Bartnicki-Garcia says. But, by successfully using as a substrate the nucleotide-sugar complex Leloir predicted, the team proved "unequivocally" that the Leloir pathway is involved in microfibril synthesis.

The next steps, Bartnicki-Garcia says, will be to learn more about the structure and function of the soluble chitin-forming enzyme (which is as yet unnamed) and to try to synthesize cellulose microfibrils using similar laboratory techniques. □

A safer road to engineering genes?

One of the goals of modern research is to eliminate the causes of disease at the genetic level. Researchers still are far from this goal, however, and already have hit some snags. The manipulation of genes in mammalian and bacterial cells may hold great dangers as well as great promise for medicine. The techniques now used could, some think, result in the spread of dangerous and resistant forms of disease.

Now a new technique is fostering some hope that "genetic engineering" efforts can proceed without some of the dangers associated with existing techniques. Scottish molecular biologists Moreen and Kenneth Murray from the University of Edinburgh report in the Oct. 11 NATURE the use of a bacterial virus called phage lambda instead of bacterial plasmid DNA as a vehicle for transferring genes from a donor cell to a bacterial recipient.

Plasmids are small circular strands of DNA that multiply alongside the much larger DNA ring in a bacterium like *Escherichia coli* (strains of which live in the human intestine). They have proven useful as vehicles in genetic recombination experiments, for transferring genes from mammalian, amphibian or bacterial donors into bacterial cells lacking the genes. But plasmids often can carry genes for resistance to antibiotic drugs and establish them in bacterial hosts, rendering them potentially impossible to destroy with some antibiotics such as penicillin or tetracycline.

The dangers involved in using plasmids for some types of recombinant experiments were outlined this summer when a group of molecular biologists, with the backing of the National Academy of Sciences, appealed to the scientific community to limit certain types of genetic research (SN: 7/27/74, p. 52). A recently discovered class of enzymes called "restriction enzymes" has made gene insertions possible, but, the group stated, has also created potential biohazards. Gene manipulations could result in the bacterial production of deadly toxins, dangerous amounts of cancer-causing agents or diseases which can't be controlled because of bacterial drug resistance. The group called for the voluntary deferment of several types of experiments until a committee can meet at a conference next February to study the risks. Their appeal has been met with attitudes ranging from complete sympathy and voluntary deferment to nose-thumbing disagreement (SN: 11/2/74, p. 277).

The Murrays were aware of the potential dangers of using plasmids when