

Energy limits crop improvement

The breeding of more nutritious cereal crops, a project of considerable emphasis around the world, has had only limited success. New plant stocks with increased or improved protein content repeatedly have decreased yields. Two scientists from the Food and Agriculture Organization and the International Atomic Energy Agency report that part of the reason for this disappointing correlation is the crops' energy and nitrogen requirements. Plants that invest energy, derived from photosynthesis, in high-protein grain have less energy available for synthesizing more grain.

In plants, protein synthesis requires about twice as much energy as synthesis of carbohydrate, the major grain component. Producing grain with a 1 percent increase in protein content requires about 1 percent increase in energy. The grain would then have a higher caloric content, so the extra energy is not lost.

If higher protein is not to result in a lower yield, the additional energy requirement would have to be met with a higher rate of photosynthesis, more leaf area, a longer period of photosynthetic

activity or mobilization of energy reserves in the plant. Increasing the protein content in grain may thus require more far-reaching changes in plant metabolism.

C. R. Bhatia and Robert Rabson, in the Dec. 24 *SCIENCE*, also describe energy requirements of alterations in the protein composition of grains. If the concentration of the amino acid lysine is increased, for example, animals can better utilize the cereal protein, so the grain is more nutritious. Bhatia and Rabson point out that the energy requirements of protein synthesis in both maize and barley are slightly higher in the high-lysine stocks that have been developed than in normal stocks.

Demand for nitrogen, as well as for energy, limits yields in protein-enriched crops, according to Bhatia and Rabson. They suggest that breeding experiments be performed at high soil nitrogen levels.

The energy limitations calculated apply best to experimental, crops grown under optimal conditions. In developing countries deficiencies in fertilizer or water limit crop yields, Rabson points out.

"I'm not pessimistic. People have only worked on the problem of high-protein crops for a relatively short time," Rabson says. "There are prospects for inching up on both yields and protein levels, although progress may be slower than originally expected." □

teracts with a student named Richard or Roderick." The teacher's role in this has also been demonstrated. In his educational psychology class Garwood puts several names on the board as an exercise and asks his students to assign grades arbitrarily. Davids and Karens almost always get high marks while Huberts and Mabels get low ones from students who deny that they are prejudiced by names at all. "Everyone in training to be a teacher should have exposure to this kind of unintentional psychological effect," concludes Garwood. □

Fire retardant may pose cancer hazard

The benefit of flame retardants in children's pajamas is clear. It reduces the number of burns and deaths due to night-wear catching fire. But recent laboratory tests indicate that the main flame retardant currently used in sleepwear may cause cancer. Biochemists Arlene Blum and Bruce N. Ames of the University of California at Berkeley say that risk outweighs the benefits.

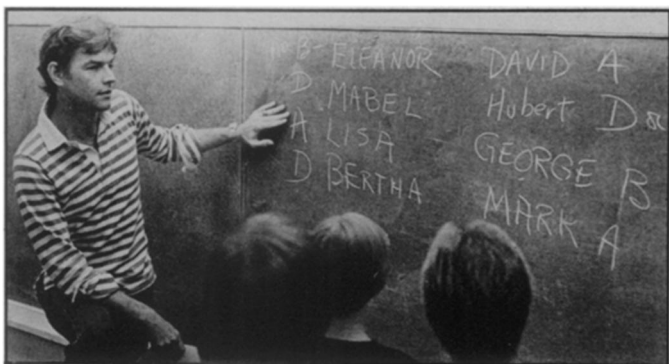
The fire retardant most often added to man-made fabric is tris-BP (tris [2, 3-dibromopropyl] phosphate). That chemical causes mutations in bacteria, according to experiments by Michael J. Prival of the Environmental Protection Agency and Elena C. McCoy, Bezalel Gutter and Herbert S. Rosenkranz of New York Medical College. They report in the Jan. 7 *SCIENCE* that both commercial samples of tris-BP and extracts from treated fabrics demonstrate mutagenic activity. The National Cancer Institute is currently running animal studies for more conclusive evidence on whether tris-BP is carcinogenic since some mutagens are not.

Even if tris-BP is not cancer causing, it may induce genetic defects in people. Blum and Ames write in the same issue of *SCIENCE* that various researchers have observed mutations caused by that chemical in fruit flies and damage to DNA in human cells grown in the laboratory.

Tris-BP can probably be absorbed through skin, according to research in several laboratories. Metabolites of the chemical have been measured in rabbits and rats and tris-BP in fabric can cause hypersensitization in humans, indicating some absorption into the body.

"Few cancer tests in animals have been carried out with the large number of chlorinated and brominated chemicals that make up a good part of the 100 million pounds of organic flame retardants used annually in the United States," Blum and Ames say. They warn that the flame retardant chemicals now being added to many fabrics, plastics and carpets may provide as disturbing a situation as the pesticides that have been proven carcinogenic. □

The name game: Handle or handicap?



Garwood and future teachers: Lower grades are assigned to hypothetical students whose names are perceived as undesirable.

S. Gray Garwood does not like his name. (The S stands for Samuel.) "I've never liked either of my names," he says. "I've spent half my life correcting people who call me Gary or Greg instead of Gray."

With this as background, it's not surprising that Garwood, an educational psychologist at Tulane University in New Orleans, has decided to do some research on names. And, as he expected, a child's name can prove to be a handicap. A boy named Roderick, for instance, is more likely to have low aspirations and be less well adjusted than if he had been named Richard. To study this situation, Garwood picked 24 sixth-grade boys whose names were listed as "desirable" by a sample of teachers and 23 more whose names were rated as "undesirable" by the same

group. Tests of achievement level and self-concept showed that the Rodericks, Maurices and others in the "undesirable" group had lower levels of adjustment, lower aspirations, lower expectations of success, lower self-concepts and lower achievement in school than the Richards, Jonathans and others with more desirable names. Garwood chose males because boys' names tend to stay the same through several generations, picking up good or bad connotations along the way. Girls' names tend to change in popularity from year to year.

How does an "undesirable" name affect self-concept? "Often the kind of behavior we expect from other people is the kind of behavior we get," says Garwood. "Name expectations are bound to have some influence on the way a teacher in-