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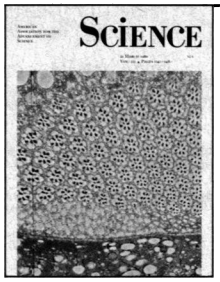

COVER Radial section through a compound eye of *Drosophila* illustrating its highly ordered and repetitive structure. Approximately 70 repeat units, or ommatidia, are shown. Each ommatidium contains eight photoreceptor neurons, seven of which are visible in any given plane of section. The determination of the various cell types during development depends on cellular interactions. See page 55. [Slide courtesy of Hermann Steller, Howard Hughes Medical Institute, Berkeley, CA 94720]

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World Food

Due to advances in agriculture in many countries, there is now a substantial world surplus of food. Twenty-five countries, including some of the European Economic Community, Canada, Australia, Argentina, China, India, and even Saudi Arabia, are net exporters of grains. Prospects are that for the next decade at least, world capability to produce food will increase faster than population. These developments have had and will have profound effects on American agriculture. Symposiums on global agriculture were part of the recent AAAS meeting in Chicago. In what follows, I will provide some highlights from the sessions.

Improvement in food supplies is the result of many factors. Among them are new and better crop varieties, more irrigation, fertilization, pest control, and the bringing of more land into production. The most important is the new crop varieties. Plant genetics has been the foremost factor in the rise of world farm productivity in recent years. Asian rice yields have increased from 1.2 tons per hectare (t/ha) in 1960 to 3.2 t/ha and are still rising. European wheat yields have about tripled and since 1960 have risen to 4.4 t/ha. Comparable improvements have occurred in a number of other countries, and yields today in many instances are comparable to those in the United States.

China provides the most dramatic example of improvements in agriculture. Since 1978 productivity there has increased 50 to 60 percent. The change is in part due to organizational reforms that encourage private initiative. However, seed-breeding institutions have provided high-yielding varieties that have replaced traditional ones. Improved wheat, rice, and maize seeds are available. In addition, better water control, more irrigation, extension services, and increased use of manufactured fertilizer have been factors. China is now the third largest user of manufactured fertilizer, but night soil and other organic matter still provide half of the added nutrients.

Changes in agriculture in India have also been noteworthy. Since 1968 the country has moved from a grain-importing status to being a grain exporter. Moreover, as in China, the Indians have established excellent capability for genetic improvement of seeds. Substantial developments have occurred elsewhere, for example, in Bangladesh and Indonesia. The slowest rate of progress has been in Africa, but improvements there seem likely. A new sorghum hybrid produced by the International Center for Research in the Semiarid Tropics is drought-resistant. In a bad year, it yields more than local cultivars do in a good year. In a good year, it doubles and triples yields.

The growing food surplus has been exacerbated by national policies of subsidizing farm outputs. World agricultural subsidies, which totaled about $20 billion in 1970, have risen to about $150 billion. In the United States, aid to farmers is expected to reach $27 billion this year. The 12 countries of the European Economic Community spent $23 billion in 1986; Japan spent $15 billion. The subsidies have led to excessive production and low prices for grains sold on the world market. The people who are taxed to provide the subsidies usually do not enjoy the benefits of the low world prices.

In 1960 Japan paid its rice growers twice the world market price. Internal politics have raised the price of Japan's rice to ten times that for Thai rice. Japanese shoppers pay $25 for a melon and $30 per pound for good beef.

U.S. farmers are up against trade barriers or they are competing with low-cost producers in a global marketplace. Exports of food, which totaled $44 billion in 1981, shrank to about $27.5 billion in 1986. Given surpluses, there are many people in the United States who advocate decreasing our agricultural research and extension services. This is, of course, wrongheaded. We are in a global competitive market in which others are improving their capabilities. If we are to compete, we cannot rest on past achievements. We must find ways of being more creative and more effective in rapidly harvesting the many potentials of research and development.—PHILIP H. ABELSON