# nutrition

## Gathered from the Third International Congress of Food Science and Technology in Washington, D.C.

PROTEIN SOURCES

### From blood, grass and yeast

Of the 19 sources of protein discussed at the congress, one of the newest is a process to convert waste animal blood from packing houses into edible protein.

Dr. Alan Michaels, president of Amicon Corp. in Lexington, Mass., says that his company is filtering blood through an ultrafine membrane to concentrate the plasma protein. The process was developed by Drs. Charles Dill and Wendell Landman of Texas A. & M. Univ.

Dr. Michaels says the membrane could also be used to concentrate fish protein and to harvest bacterial cells at a cost below that of present methods.

**Successful commercial production** of protein from green leaves was reported by Department of Agriculture scientists who designed a pilot plant at Albany, Calif. A commercial plant is under construction, culminating a 30-year research effort.

The program is intended to produce food for humans. Recent shipments of food for poultry and cattle mark successful completion of the first phase.

Alfalfa and grasses are pressed to extract green juice. The protein component is coagulated by heat or acid. This curd is separated, leaving a brown whey, and dried or extracted by solvent. This concentrate is 55 to 70 percent protein.

Next steps in preparing the protein concentrate for human food, says Dr. George O. Kohler, who with Dr. E. M. Bickoff developed the plant, are to remove the bitter taste and the green color and to inhibit oxidation of the fat content, which reduces digestibility.

**The French Petroleum Institute** this year will build a $5.6 million plant for commercial production of a protein-vitamin concentrate extracted from yeast cultured on petroleum. In discussing the plant, Dr. C. R. Gatellier said the institute hopes ultimately to produce several million tons of animal food a year as a necessary preliminary to improving the product for human use.

Because of their larger size, yeasts are easier to process than bacteria, whose culture on petroleum has been studied for some time. Yeast has a higher content of lysine (an amino acid in which flour and other cereal foods are short) and is more easily grown than bacteria. It is not subject to attack by bacteriophages, the viruses that infect bacteria.

Gatellier says that a Russian pilot plant is producing two tons per day of yeast protein, and Shell Oil Co. is developing a process to produce one ton of protein from four tons of methane.

DESALINIZATION

### Farming an arid shore

On the Gulf of California at Puerto Penasco, Mexico, a plant is distilling seawater by tapping the waste heat from electrical power generators using internal-combustion engines. The waste heat is tapped by heat exchangers around exhaust pipes. The system is operated by the Universities of Arizona and Sonoma, with Rockefeller Foundation financing.

Because the fresh water so obtained is too expensive for ordinary irrigation, Dr. Carle O. Hodge of the University of Arizona's environmental research laboratory says, it is used in large closed-environment greenhouses. Here crops are planted directly in the beach sand from which excess salts have been leached.

The university laboratory is building a similar installation with five acres of greenhouses for the Sheikdom of Abu Dhabi on the Arabian peninsula, Dr. Hodge says.

FISH PROCESSING

### Improving shark and herring

Two Russian projects to improve fish products were reported to the conference. One advance concerned shark-meat. Shark is a good nutrient because its proteins contain all the essential amino acids, but urea and other nitrogenous substances give the meat an unpleasant odor and flavor. C. E. Tishin reports that washing minced shark-meat in five changes of water removes these substances as well as enzyme treatment and is more feasible for mass production. The water is removed by centrifuging.

In the other project, enzymes extracted from *Aspergilli* fungi (*A. oryzae* and *A. terricola*) are being used to improve both herring and salted and spiced mackerel products. The enzymes break down proteins and add tenderness. They also improve taste by breaking down extractable nitrogenous substances. The same enzyme preparations are used to increase water content and so produce juicy sausages from large marine fish such as squid and whales.

FUNGICULTURE

### Mushrooms made to order

Five years of research at Britain's Lord Rank Research Center has produced a high-protein mushroom-like fungus that can be added to human diet without any change in form.

"Our main aim was to develop a food with structural qualities, needing no texturization to present it to the public as a recognizable and acceptable food item," the center's director of research, Dr. Arnold Spicer, reports.

Fungi have a long food history as mushrooms, truffles and as components of cheese delicacies but are low in protein. By selecting mutants, the British researchers raised the protein content of a fungus from 25 to 50 percent and raised quality, as measured by the amino acids present, to a level equal to that of milk protein, Dr. Spicer says.

The researchers successfully translated batch culture into a continuous one. After thousands of hours in this economically feasible continuous culture, the fungus has not mutated to an unstable or undesirable form.

The fungus grows on a broth of carbohydrate derived from petroleum. It is harvested as an off-white product "with practically no flavor."