instance, FPC would simply lie on the top.

The scope of FPC's future role also hangs on the world's fish supply. J. W. Devanney, who headed the M.I.T. study, is among the most pessimistic about FPC's future. He believes the world's fish resources are already reaching the state of maximum annual exploitation without being depleted. But estimates vary widely. A 1968 government report speculated that the annual world fish harvest of 64 million metric tons could safely be expanded to 180 million, and other scientists, basing their estimates on improved fishing techniques, believe the potential harvest is far higher.

Because of the present uncertainties, it is perhaps understandable that American food processors, many of whom displayed avid interest in the new product during the early 1960's, are waiting for someone else to show them it's worthwhile. H. M. Burgess, director of technical applications for General Foods, says interest in the food industry is "rather minimal at the moment." It was "one of those things that look awfully attractive on the surface," but "limitations have emerged" which were not previously apparent—as Alpine's rocky experiment amply demonstrates. Burgess believes that a change in FDA regulations might give companies an incentive for exploring the field and that an American market for FPC would begin in "so-called poor man's food," finding its public through the same channels—Indian reservations, urban ghettos, and school lunch programs—that General Foods has been using to try out a low-cost pasta rich in vegetable protein.

Devanney of M.I.T. believes, to the contrary, that FPC may only be able to find acceptance as a specialty item, incorporated into cocktail snacks, medical diets, and pet food (item: the M.I.T. report says fish protein in pet food should be top quality, since an estimated 25 percent of American pet food is consumed by people).

Other ideas are cherished by the National Biscuit Company, which is, at present, the only American firm actively interested in FPC. Nabisco has formed a development corporation with a Swedish company, Astra Nutrition, that is presently manufacturing a high quality product, EFP-90 (with over 90 percent protein), from cleaned and eviscerated fish. Nabisco-Astra is approaching the market as a whole—that is, it is working on a product which, from the standpoint of cost, palatability, and versatility, would find a market both in underdeveloped and in highly industrialized countries. Being "clean," the product would not be snagged by FDA restrictions in the United States. Nabisco-Astra is now test-marketing Astra products here, and Harry Watson, the corporation's vice president, says Nabisco may eventually develop a separate line of high-protein bread and cereal products.

Otherwise, prospects for a domestic market for FPC seem to be at an impasse—the FDA is waiting for business to beat its doors down asking for looser restrictions, and business is waiting for the government to show that it's worth the trouble.

Despite limited efforts to exploit the world's fish in this form (Cardinal Proteins, Inc., in Nova Scotia is the only other commercial firm working on it), Knobl believes that "the day will come" when the needs of the exploding population will force a heavy reliance on FPC. He argues that present production is too experimental to be damned on the basis of not being cheap enough to compete with other protein supplements.

On the regulatory front, Knobl says, overcautiousness by the government has been "very, very frustrating," but adds that there are signs that the FDA is coming around. Last year, the agency allowed sardines and menhaden (an oily fish used almost exclusively for animal feed meal) to be added to the list of acceptable fish, and West Coast anchovy may soon join this select company. As the number of acceptable species increases, the advantages to the fishing industry may become greater, and the resulting political pressures may help things along. More important, the FDA has finally taken under consideration a petition submitted 2 years ago by Alpine, which asks, among other things, that the 1-pound packaging limitation be removed. Wodicka, who believes FPC should be allowed to stand or fall on its own merits, says "the petition is likely to be favorably considered."

Making FPC functional remains the chief goal of American researchers. Knobl's team has already demonstrated in its test kitchens that the stuff can be palatably cooked into breads, pastas, cereals, and cookies, in ratios ranging from 5 to 25 percent FPC (*Science* sampled an FPC pretzel and found it tastier and crunchier than normal pretzels. The bread was unexciting but breadlike). The NMFS is experimenting with numerous forms of FPC, such as pastes and wettable powders, and Knobl believes that other properties could be built into FPC. These properties might, for example, give an FPC product a longer shelf life or decrease brittleness, thus enabling cracker-type products to maintain their integrity during shipping.

The immediate future of FPC in overfed countries like the United States—which already produces 4 times as much protein as the population needs—is chancy; but FPC seems bound for a significant place in the world food picture. Nabisco's Watson points out that it will not be long before we are all eating things whose protein sources—seaweed, grass, molds, petroleum and sewage—are "far less pleasing" than dead fish.

—CONSTANCE HOLDEN

APPOINTMENTS

Robert Zeppa, cochairman, surgery department, School of Medicine, University of Miami, to chairman of the department. . . . **Paul P. Giffin**, professor of orthopedics, Medical School, George Washington University, to chairman, orthopedic surgery department, School of Medicine, Vanderbilt University. . . . **Billy R. Wilson**, research professor, entomology and economic zoology department, Rutgers University, to chairman of the department. . . . **Donald G. Schmalberger**, associate professor of astronomy, State University of New York, Albany, to chairman, astronomy and space science department at the university. . . . **William D. Romey**, executive director, earth science education program, American Geological Institute, to chairman, geology department, St. Lawrence University. . . . **Anthony Kales**, professor of psychiatry, University of California, Los Angeles, to chairman, psychiatry department, College of Medicine, Milton S. Hershey Medical Center, Pennsylvania State University. . . . **William B. Schwartz**, professor of medicine, School of Medicine, Tufts University, to chairman, medicine department at the medical school. . . . **Joseph Daniel**, associate professor of molecular, cellular, and developmental biology, University of Colorado, to chairman, zoology and entomology department, University of Tennessee, Knoxville.