industries and governmental agencies. Requests for consultation and specialized technical assistance related to the research activities are estimated to exceed 700 per year. The senior staff also receives invitations at least once a week to talk about the public health aspects of food protection, and by selective acceptance reaches an audience of 3,000 to 5,000 persons per year. Individual staff members are frequently asked to serve on national or international committees concerned with the control of food hazards and currently hold about 30 such appointments.

In recent years, requests from other Federal agencies for research by this group have resulted in the negotiation of direct reimbursement or interagency agreements within the National Aeronautics and Space Administration, Department of the Army, National Cancer Institute, and National Center for Radiological Health.

A limited number of research contracts have also been negotiated to obtain the help of selected State, municipal, and private laboratories. These studies have been mainly related to the detection and prevention of food contamination with *Clostridium botulinum*, because funds were allocated specifically for this purpose. A much broader contract program would be desirable to foster the application of laboratory and pilot-plant studies to actual field problems.

For convenience, the remainder of this discussion is presented in three sections that correspond to the organizational pattern of food protection research; that is milk sanitation, food chemistry, and food microbiology. In addition to conducting the types of studies illustrated, the food protection research staff devotes much effort to the technical assistance and training functions already mentioned.

CONTRIBUTIONS OF MILK SANITATION RESEARCH

Research is being conducted in several areas, with major emphasis on pathogenic micro-organisms in dairy products and on engineering problems of public health significance associated with the processing of these products. In addition to research, the group conducts a nationwide program on the evaluation of milk laboratories, and this effort is supported by a program on the development of improved methods for the examination of dairy products. To illustrate the scope of this research, three examples follow together with a brief description of the laboratory evaluation program.

The first example relates to studies on the most common group of food poisoning toxins, staphylococcal enterotoxins. At the inception of this program, enterotoxins could be assayed only in cats, monkeys, or human volunteers. In concert with other laboratories, however, reliable, inexpensive, and rapid in vitro techniques were developed to assay these toxins by means of gel-diffusion procedures. These techniques have been used to demonstrate that some strains of the coagulase-positive staphylococci, which occurred in 20 percent of the market samples of cheddar and colby cheese, are capable of producing enterotoxins (1, 2). These strains will grow rapidly in raw milk that meets the standards of grade "A" milk, and detectable levels of enterotoxin can be produced in as little as 6 hours at 35° C. (3). Enterotoxin has been demonstrated in milk and cheese by extraction and concentration procedures followed by assay using gel-diffusion procedures (4, 5). Although prophage is necessary for the production of toxin by some bacteria, demonstrable prophage is not essential for enterotoxin production by S. aurens (6). Once enterotoxin is formed in milk, the heat resistance of this toxin is such that it will not be completely inactivated by either pasteurization or sterilization processes (7). Similarly, enterotoxin will withstand the processes used for the sterilization of foods by gamma irradiation (8).

The second example relates to recent reports that milk may contain C-type particles similar in morphology to known leukemic viruses. This observation reopened the question of the efficacy for virus detection of processes recommended by the Public Health Service for the pasteurization of dairy products. With financial support from the National Cancer Institute, tissue culture procedures have been developed for the isolation and enumeration of viruses from both raw and pasturized milk and milk products. These procedures are being used to establish the times and temperatures required for the thermal inactivation of viruses. Fortunately, the results to date indicate that the present processes used for pasteurization of dairy products are adequate to inactivate the several types of viruses under study (9). On the other hand, the radiation resistance of viruses has been found to exceed that of bacterial spores.