STATEMENT
by the Food and Nutrition Board,
National Academy of Sciences-
National Research Council

Cancer and Food Additives

IN the development of our knowledge of nutrition, primary emphasis has been given to deficiencies that may occur in our diets and to ways of safeguarding against them. Along with the application of such knowledge a notable reduction in dietary deficiency diseases has occurred. With decreasing need in the United States for emphasis in this direction, more effort has been devoted to the investigation of positive factors in foodstuffs that might be detrimental to health.

A group of conditions broadly termed "degenerative diseases" has assumed major importance as causes of illness and death in recent decades. The causes of these conditions are under intensive investigation, and especial emphasis is being placed on the role of environmental factors.

Causal relationships between environmental factors and human disease have long interested scientists. Indeed, knowledge of such relationships underlies most advances in preventive medicine. It is not surprising, therefore, that investigators at present are trying to determine whether factors in the environment are causally related to the occurrence of cancer in man. As has been true in the study of all diseases whose causes are unknown, the elements of the environment to which man is constantly or repeatedly exposed, for example, the atmosphere, water, and foodstuffs, command the greatest share of attention.

Legitimate Conjecture

Conjecture concerning possible cause and effect relationships is a common and sometimes an effective device in the development of new knowledge concerning disease. Many discussions concerning the possible relation of chemicals which may occur in foods to the occurrence of cancer in man have been held at scientific meetings, and reports of these have recently appeared in scientific publications. Scientists involved in discussions of food additives and cancer recognize the conjectures as such, and ascribe importance to them only insofar as they may stimulate the kind of inquiries which will help advance knowledge. When the scientific discussions, either written or spoken, have been reported through the press and other news media for public information, however, the conjectural nature of the scientists' discussions has frequently been forgotten, misconstrued, or poorly stated. This has contributed to the present apprehension among consumers over the safety of the food supply, and to the concern among food manufacturers over the possible loss of consumer confidence.

In view of these circumstances, it is desirable that a statement be made clarifying for the public the present state of knowledge about the relation between food additives and occurrence of cancer in man.

Known Facts

What is known concerning a definite relationship between ingestion of a substance and the subsequent development of cancer in man? Accidental repeated ingestion of radium paint or the use of so-called radium water has been followed by the development of cancer of the bone. The ingestion of certain aromatic amines, such as b-naphthylamine or 4-aminodiphenyl, through industrial exposure has been associated with the occurrence of cancer of the bladder. Epidemiological evidence indicates that a prolonged intake of sufficient arsenic may result in development of cancer of the skin.

Do these materials occur in the food supply of the United States? Arsenic is the only one. It may occur in some foods in extremely small concentrations as a pesticide residue and is normally present in certain foodstuffs which have received no pesticide treatment. Insofar as is known, there is no danger from the amount of arsenic likely to be consumed from these sources under ordinary conditions.

If this were all of the story, probably no public apprehension would have arisen.

Experimental Animal vs. Human Cancer

Investigators studying cancer have induced the development of tumors in experimental animals by purposely exposing them to a number and variety of chemicals. Such experimental cancer may be produced in animals by giving the agent by injection, by skin application, or orally. From this evidence and knowledge of how man may be like or different from the experimental animal in the metabolism, excretion, or storage of a particular chemical, the scientist can form a hypothesis as to how man might react to the ingestion of the chemical. In this respect, the conservative position would demand that substances that produce cancer in experimental animals should be excluded from human foods as a precautionary measure, even though it is known that a substance carcinogenic in one species is not necessarily carcinogenic in others.

Knowledge about possible cancer-causing agents in foods is, in general, at the point that studies are being devised and undertaken to test such possible relationships. This research is, by its very nature, expensive and time consuming. Years of study will be required to build definitive knowledge concerning all causes of cancer. There is a need to continue and expand present efforts to identify any relationships which may exist between environmental factors and the occurrence of cancer in man. Measures taken to safeguard the food supply can be only as effective as our state of knowledge permits. Government agencies, the food industry, and bodies such as the National Research Council are working together to facilitate the development of this knowledge and its effective application as soon as the information becomes available.

Pearl McIver Retires From PHS

Pearl McIver, R.N., B.S., M.A., will retire from the Public Health Service in June 1957 to become the executive director of the American Journal of Nursing Company. At present she is chief of Public Health Nursing Services, Division of General Health Services.

A pioneer and recognized leader in her field, Miss McIver was the first public health nurse to enter the Public Health Service. After serving 10 years as director of public health nursing with the Missouri State Board of Health, she was appointed in 1933 as a public health nursing analyst in the Division of Scientific Research. In 1935 she became chief of the Service's Division of Public Health Nursing, a position she held for 22 years.

A special consultant to the World Health Organization for technical discussions on nursing at the 1956 World Health Assembly, Miss McIver was named during the same year "Public Health Nurse of the Year" by the American Nurses Association. She was one of the recipients of the Lasker Group Award of 1955, and in 1951 received the Outstanding Achievement Award of the University of Minnesota.

Among the posts Miss McIver has held in a number of organizations were those of vice president of the American Public Health Association, president of the American Nurses Association, and chairman of the International Council of Nurses Committee on Constitution and Bylaws.

On Miss McIver's retirement, Margaret G. Arnstein, R.N., M.P.H., chief of the Division of Nursing Resources, will become chief of Public Health Nursing Services. Scheduled to assume the duties of Miss Arnstein is Apollonia O. Adams, M.A., now deputy chief of nursing resources.

Ethiopian Assignment

IN August 1954 the Ethiopian-American Public Health Joint Fund assumed responsibility for operating the Haile Selassie I Hospital in Gondar, Ethiopia. The fund's mission was the transformation of this institution of some 100 beds into a demonstration hospital and medical center where technical personnel would be trained. My main responsibility was to set up the laboratory. Primarily, it was to be used for training laboratory technicians, but it would also be available for use as a hospital service. My assignment also included teaching all the biological sciences and laboratory methods in the Public Health College and Training Center in Gondar.

I arrived in Gondar with my family on June 4, after 2 months at headquarters in Addis Ababa. Gondar is a town with a population of about 22,000 in northwestern Ethiopia. The great and pardonable curiosity of its populace was entirely reciprocated by my family. Because of our official status, a detail of rifle-carrying police was assigned to guard our house day and night, but at our request it was withdrawn.

Before the formal transfer of the hospital to the fund, we visited the grounds to become familiar with conditions and personnel.

Laboratory personnel consisted of 1 technician and 1 apprentice on detail for training from the nearby provincial army post. The laboratory equipment was a microscope, a table, some stains, and miscellaneous broken pieces of glassware. There was no laboratory budget; infrequent doles of alcohol were wheedled from the pharmacy, and Giemsa stain was purchased from time to time from personal funds of clinical staff members. Conferences with the laboratory technician, through an interpreter, revealed that he was performing a surprising range of simple laboratory procedures with practically no equipment, and that he was discouraged.

This technician, Ato Araya Guhley, had been presumably well trained at the Pasteur Institute in Addis Ababa, but owing to lack of working facilities his knowledge had deteriorated during the 8 years spent at the Gondar Hospital. He was at this time performing, more or less creditably, fecal examinations, blood counts, examinations for malarial parasites and relapsing fever, a simple urinalysis, and stains for tuberculosis, gonorrhea, and leprosy. He appeared to be sincerely interested in laboratory analysis and was enthusiastic about relearning things he had forgotten and in acquiring new skills.

Therefore, the first project was to stimulate Ato Araya with descriptions of projected development and to "sharpen" his performance. His response was satisfactory, and it was then possible to move on to a second phase of laboratory development.

Although the laboratory building was not completed, and the equipment not yet delivered, we decided to conduct a training experiment. A particularly alert youngster, a lad of 17 with 7 years schooling devoid of science instruction, was selected from a group of day laborers and put into the laboratory as a trainee. We wished to see if unusual pedagogical techniques were necessary.

The lad, Asfau Makonnen, turned out to be

Dr. Arthur H. Webb writes an account of his assignment in Ethiopia from April 9, 1954, to April 28, 1956. His duties involved setting up a laboratory in Gondar and teaching biological sciences and laboratory methods in a college in that town. During his tour of duty Dr. Webb was on leave from the post of assistant professor of bacteriology at the Howard University Medical School, Washington, D. C., to which he returned after completion of his assignment.

an unusually fortunate selection. After a mere 20 months in the laboratory, he carried most inventory details in his head, prepared solutions and reagents, performed all the technical operations, and helped train new personnel. He organized projects and prepared data for reports; it was only necessary to explain carefully what was wanted, answer a few questions, and then leave it to Asfau. This was a prime example of an individual who needed only a chance. There is no reason to assume that he is remarkably different from other bright boys; he merely points up the unexplored and undeveloped potential of his fellows. Rapport was facilitated not only by his high degree of innate ability, but also by his unusual proficiency in the English language.

Real laboratory work began in December 1954 with delivery of the laboratory supplies and equipment. These were packed in 34 boxes on two huge trucks which came approximately 400 miles over rough, wornout mountain roads from the port of Massawa, Eritrea, to Gondar, at an altitude of 6,700 feet. The road rises to 12,000 feet at points. The crew assembled to unload the boxes had had apparently little experience with packages of that size and weight. They were willing workers, but the fact that one box exceeded one man's strength was something new; this is an area where the standard load is a donkey load or head load. With much confusion, shouting, and effort, boxes started to move. The scene remains vivid: 500-pound boxes of glassware dropped 6 feet from truck bed to hard-packed earth . . . 12 men maneuvering a 600-pound case to place it carefully on the back of one man . . . watching that one man literally sink into the earth beneath his load . . . trying to live through the conference that ensued before the box was finally lifted off the man . . . wondering whether lives would be lost . . . then, unpacking . . . the gay and vigorous hacking with axes and sledge-hammers at cases that contained precision instruments . . . one man inside a large box pitching out small packages.

Miraculously, out of approximately a quarter million separate pieces not a single item broke. Inventorying was smooth but slow because the new laboratory trainees, previously selected and called to duty at this time, were unfamiliar with most items.

Two weeks after delivery of the equipment, training proceeded in earnest. Ato Araya, the senior technician, continued to be responsible for hospital work, while Asfau, the first trainee, assisted with new men. The first project was urinalysis; this was done on a somewhat mechanical basis without reference to theory. After about a month of this, when hands and eyes became familiar with colors and manipulations, the student health officers attending the Public Health College and Training Center entered laboratory training. Through the lectures for college students, the laboratory trainees learned the significance and theory of the manipulations they had already learned mechanically. Then too, with their new mechanical skills, they were able to give individual instruction to the professional students. Laboratory trainees and health officer students took the same examinations. As expected, trainees did better in practical work, and students excelled in theory.

In a relatively short time it was possible to build up a staff with fair proficiency in hematology, examination of feces, urinalysis, detection of blood parasites commonly found here, simple microscopic bacteriology, and syphilis serology.

The selection of personnel, ordinarily a major program, was simplified by the large number of applicants. Men chosen sometimes "on hunch" have on the whole worked remarkably well. Alazar was developing proficiency as a bacteriologist; Mammo's Kahn test was to be depended upon; and Mellise would some day be a competent hematologist. Gebre Sellassie and Asfau worked well in all fields. There were as yet no specialists; all had to serve where the work was heaviest. But each was allowed a measure of responsibility in one field; for example, all Kahn testing had to be done under Mammo's supervision.

While technical divisions of the laboratory were developing, the service branches were working, also. Since the trainees who spoke English were schoolboys without dependents, we staffed the washroom with mature men with families. These three were beginning to speak

a little English and were enthusiastic and faithful. Alemu, an amputee who had been dependent on the hospital social service department, was able to marry and establish his own home. Tashoma was like a proud housewife in his zeal to keep the building clean. Beyenne had learned to make bacteriological culture media and was now training as a laboratory technician. But the washroom had not always been so harmonious. The men had had no experience with laboratory glassware, and breakage was exuberant. Gradually, it came to be no more than one would expect in an operation of this size.

In October 1954 the teaching program of the health center started. Twenty-four young men of a broad variety of educational backgrounds were received. Some were proficient in English; some barely understood it. The course in biology cum physiology that I taught 4 hours a week for 15 weeks was about the hardest work I have ever done. Not only did I teach biology, I taught English as well, defining every word and writing it on the board.

Next were two trimesters of formal instruction and laboratory practice in the usual clinical diagnostic procedures, with emphasis on simple techniques considered most useful and reliable under field conditions.

When the second school year opened in October 1955, a second class of 34 health officer students and a first class of 20 community nurse students were admitted. The staff had decided to give the students short basic survey courses in biology, mathematics, physics, chemistry, and other sciences so that all students could be presumed to have had certain standard basic information.

I conducted a basic biology course of 16 lectures and demonstrations, designed as a background for understanding the functioning of the living organism. At the same time, second-year health officer students were assigned to the laboratory on rotation and, working under supervision of laboratory personnel, helped perform the laboratory routine.

During the second trimester of this school year, this laboratory practice was continued, and courses in microbiology were given to first-year male students and to community nurses.

The laboratory teaching of relatively inexperienced students is a process calculated to turn hair gray. The burden of individual instruction was partially solved by drafting three laboratory workers into the teaching laboratory as "graduate assistants." Seeing that students followed directions d e m a n d e d constant vigilance.

Despite these difficulties, as well as chronic shortages of materials and lack of sufficient microscopes, instruction was given in microscopic fecal examination for parasites, hematology, the Kahn test for syphilis, and microscopic bacteriology. The second-year health officers made some small start in clinical chemistry as well.

There had always been at the Gondar hospital an informal training program for Imperial Army personnel. The army post commander, who is highly popular with the international personnel readily agreed to establish a laboratory to utilize the experience of soldier trainees, and a laboratory was set up with supplies and materials "loaned" from our stock on a returnable "if" and "when" basis. This installation served an army community of about 3,000 persons, did 10 to 15 tests a day, and sent us material for those procedures which it could not carry out. We continued to supply the installation.

Early in 1956 we were approached by the director of medical training, Ethiopian Ministry of Public Health, who asked us to share a training program with the Pasteur Institute of Addis Ababa. The arrangement provided for 6 months of didactic instruction at Pasteur Institute and then for 6 months of practical training in our laboratories.

In 1956 the laboratory employed 10 persons and had 5 army and Pasteur Institute trainees. For the first 25 days of that month, we registered 953 people for whom we performed 980 tests.

A fairly trustworthy service in hematology was offered, and our urinalysis and fecal examinations were good. We did only the Kahn test for syphilis, but the serologist was enthusiastic and ready to learn other tests. His performance could be depended upon. Bacteriology and chemistry were slow in development, I suspect because they require more judgment

than the other procedures. Bacteriology was especially delayed because of the fluctuation in incubator temperature; nights were quite cool, and current was off entirely from about midnight to 9:30 a. m.

Therefore, although some of the projected services of the laboratory were not yet fully developed, some phases of the work were far enough along so that some crude figures could be analyzed. Some 4,000 stool examinations gave a positive figure of 74.4 percent. However, these were not general survey figures; they represent only persons who presented themselves for examination. Parasites found most often were *Ascaris* (30.2 percent), *Trichuris* (13.6 percent), and *Endamoeba histolytica* (34.8 percent).

A very low finding of 1.2 percent for ova of *Taenia saginata* is reported, although a high incidence of *Taenia* infection in humans was presumed. Beef is eaten raw on ceremonial and other occasions, and *Taenia saginata* is considered somewhat of a national pest. It is to be expected that beef animals are rather heavily infected. Indeed, purgation in the hospital sometimes produced a yard or two of tapeworm, but *Taenia* eggs were rarely found in stool examinations conducted by fairly competent people. There is, however, a universal practice of taking periodically a local vermifuge, Kosso, which must move out the mature egg-producing sections of the worm, leaving the upper portions intact. There is also the possibility, since gravid proglottids detach themselves and actively pass the anal sphincter to expel their ova on the outside, that the feces were not the place to look for them. If Kosso is actually effective against the large flat tapeworm, it must have practically no effect on the large round *Ascaris lumbricoides*, which showed up in almost every positive stool.

These laboratories were staffed entirely by Ethiopian nationals. One may feel competent to predict that perhaps after some are sent away for further training Bagemder Province will have a clinical and public health laboratory that will compare favorably with any similar institution in that part of the world.

Abstracts of Soviet Medical Literature

The National Institutes of Health of the Public Health Service has completed arrangements with the Excerpta Medica Foundation of New York City for the translation and publication of abstracts representing Soviet contributions to medical research. The plan calls for broad coverage of the Soviet medical sciences. The collected papers of the institutes located in various cities throughout the U.S.S.R. as well as the professional journal literature will be covered.

Soviet specialists will contribute abstracts to Excerpta Medica, Amsterdam. The abstracts will be edited by a permanent editorial committee of 30 Soviet scientists appointed by the Excerpta Medica Foundation in cooperation with the presidium of the Academy of Medical Sciences, U.S.S.R., and will be supplemented by verbatim translations of published abstracts of Soviet literature. The whole work will be under the editorial supervision of Excerpta Medica's own specialists. The resulting abstracts, published under the title of "Abstracts of Soviet Medicine," will appear throughout 1957 in two separate series: Part A, Basic Medical Sciences, and Part B, Clinical Medicine.