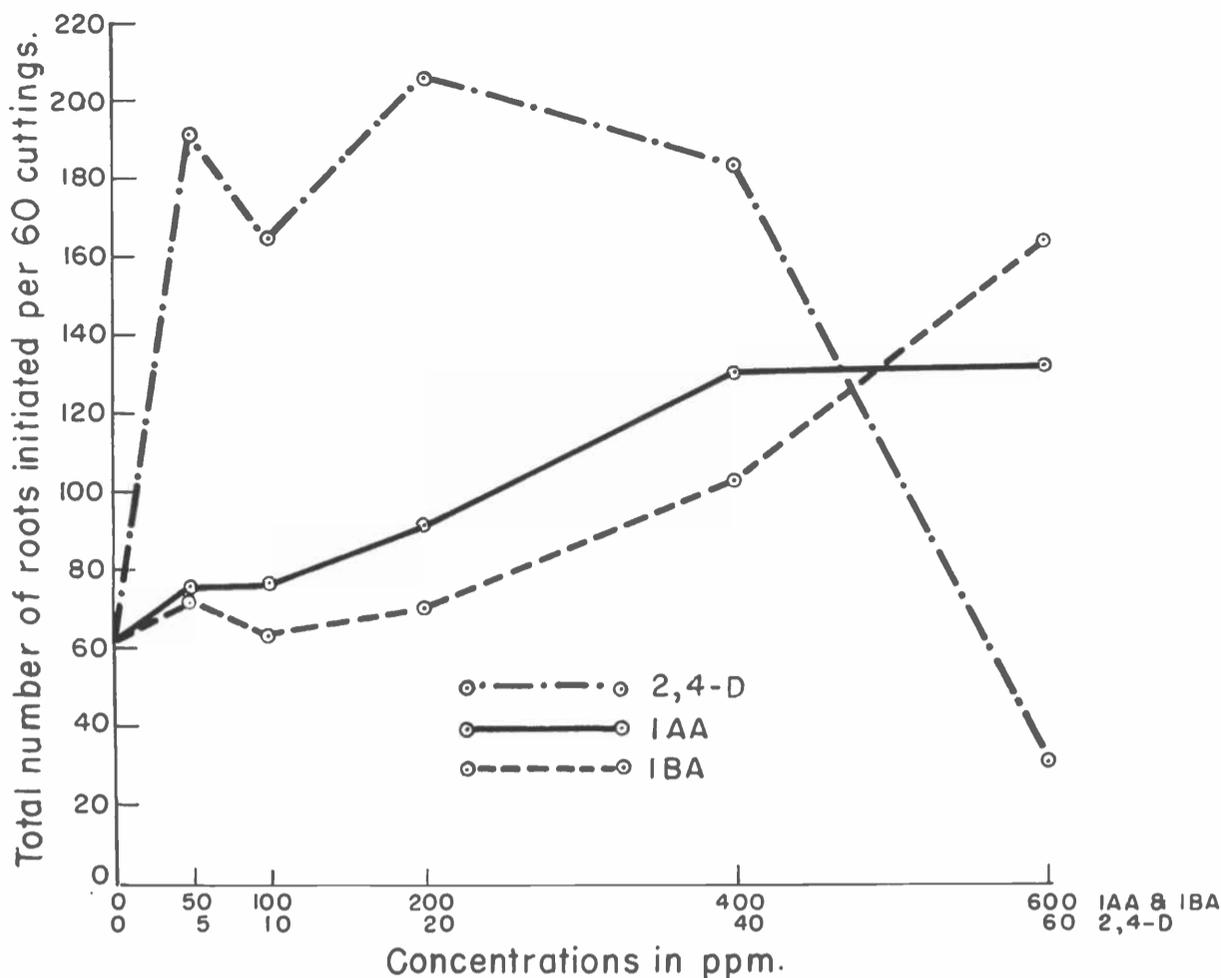


Food Poisoning Is Human Hazard

F. Eugene Nelson



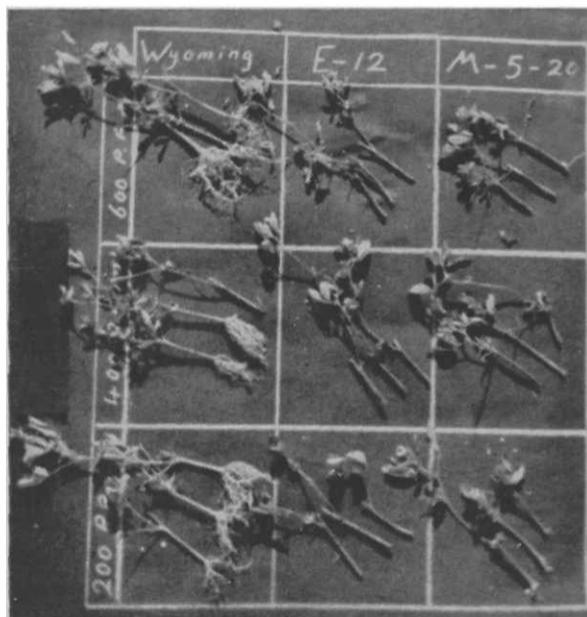
EFFECT OF DIFFERENT concentrations of three different treatments on number of roots started on 60 stem cuttings of alfalfa genotype P-14.

(Continued from Previous Page)

were made, the cuttings were removed from the perlite medium, thoroughly rinsed, and collected in a beaker containing distilled water. Data on the number of roots per cutting, length of the longest root, and dry weight of the roots were obtained.

Data from the first experiment showed that the number of roots from cuttings treated with 2,4-dichlorophenoxyacetic and indoleacetic acids was significantly higher than the number of roots from cuttings treated with other chemicals, or from the controls. Indolebutyric acid was not available for comparison in this test. Results of this experiment further showed that root growth expressed in length and/or weight was less affected by the plant-growth regulators studied than was the number of roots. There were large differences in dry weight of roots, number of roots and length of the longest root among the different genotypes of alfalfa, as seen in the photo above.

Other experiments sought to learn the best concentration of IAA, IBA and 2,4-D to use for start and growth of roots on alfalfa stem cuttings. Comparative effects of the three plant growth regulators on the number of roots are shown in the graph. These data show clearly that concentrations



ROOT FORMATION on alfalfa stem cuttings which had remained in perlite medium for 20 days. Note large number of roots on the Wyoming genotype as compared with genotypes E-12 and M-5-20.

up to 600 ppm for IAA and IBA did not reach the toxic level for root initiation and growth, but a concentration beyond 40 ppm of 2,4-D caused inhibition of root initiation and growth. Apparently, 2,4-D was toxic to the stem tissue at a level higher than 40 ppm.

In general, the best root start, growth and development on alfalfa stem cuttings came when they were

Each year a few thousand people in the United States suffer from the discomforts of what is known as "food poisoning." This combination of diarrhea, vomiting, nausea and weakness frequently is caused by eating food in which bacteria have grown extensively.

Staphylococcal food poisoning and salmonella "food poisoning" are the major examples of this type. A few people contract botulism each year, and about 65 percent of the cases are fatal.

Botulism usually starts out with fatigue, dizziness and headache, followed by double vision and difficulty in swallowing. The nervous system is involved, resulting in eventual paralysis of the respiratory system and the heart.

Staphylococcal food poisoning is caused by an organism known as *Staphylococcus aureus* (occasionally by *Staphylococcus albus*). Some strains of this organism are able to produce an enterotoxin, a substance which causes characteristic pronounced reactions when taken into the gastrointestinal tract. In a few instances symptoms may appear within an hour after the food containing the organisms and their growth products is eaten.

Recovery is Usual

More commonly, two to six hours elapse before illness, and periods as long as 12 hours have been known. While the discomfort is considerable at the time, the afflicted person usual-

(Continued on Next Page)

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treated with concentrations of 600 ppm of IAA and IBA and between 5 and 40 ppm of 2,4-D. We also gathered that different genotypes of alfalfa may require a different concentration of these growth-regulating chemicals for best rooting response.

(Continued from Previous Page)

ly recovers quite rapidly, and probably will have nothing more serious than a feeling of weakness 24 hours after onset of the symptoms. These staphylococci are the same ones responsible for pimples and boils, as well as many nasal and sinus infections, of humans, and for a type of mastitis and some other infections of animals.

These bacteria are found in the food-handling environment under many conditions. The staphylococci capable of causing food poisoning fortunately are rather easily killed by heat, such as the pasteurization used for milk. They are not abnormally resistant to the common chemical means used to kill infectious bacteria. These bacteria do not grow at 40° F., so good refrigeration is a satisfactory way to prevent their growth. At 50° F. some growth may occur and some strains can grow at 115° F. or a little higher.

When the population of staphylococci reaches 10 million or more per gram of suitable food, enough of the enterotoxin may have been formed to cause typical symptoms if that food is consumed by a susceptible individual. The toxic material is resistant to boiling, so subsequent heating of the food is ineffective.

Time Element Important

Most of the outbreaks of staphylococcal food poisoning occur when food is consumed one or more days after preparation. In many cases, an unusually large amount of food has been prepared and the refrigeration has been delayed, the refrigeration temperature has not been low enough, or so much food has been placed in one container that the center of the mass has cooled very slowly, so that staphylococci have been able to grow extensively.

This advice applies especially to persons preparing large quantities of food for picnics, church suppers, family outings — occasions where large quantities of susceptible foods are prepared by persons who do not have the refrigeration facilities which restaurants and other commercial food-handling agencies do have. Potato salad is an example of foods which can be hazardous if prepared in bulk and not chilled throughout. Creamed chicken is another example of susceptible foods.

Food handlers should not have active staphylococcal infections, as such people are a potential source of large numbers of these very undesirable organisms. Creamed foods are a par-

Arizona Girl National 4-H Winner



Miss Jana Shields, 19, of Tempe receives congratulations from Dr. George E. Hull, director of the U of A Extension Service. Jana, a national winner in 4-H achievement, has been awarded a \$500 scholarship.

Daughter of Ivan J. Shields, Maricopa County Extension Agent, Jana

is a sophomore at The University of Arizona, Tucson. She has been a consistent winner in 12 different 4-H categories.

In the background are members of the Arizona delegation to the National 4-H Club Congress in Chicago.

ticular problem, because the physical character of the product makes them slow to cool, and a large amount of hand work is involved in their preparation, making them particularly susceptible to contamination. Many other foods have been involved. Cheese made from unpasteurized milk, and hams mildly cured and inadequately refrigerated, have been responsible for a number of outbreaks of staphylococcal food poisoning. Adequate sanitation of equipment, health of personnel, proper heat treatment of the product and refrigeration to 40° F. if the product is not sterile, are the major means of preventing staphylococcal food poisoning.

Is Bacterial Infection

What is commonly called salmonella "food poisoning" actually is a massive infection with any of several species of bacteria in the genus *Salmonella*. These organisms must grow to considerable numbers in the food if they are to cause typical symptoms. However, destruction of the organisms before the food is consumed will prevent the illness which would result if the untreated food were eaten.

Salmonella organisms are found in some lots of eggs, poultry, meat and other animal products. They may come also from humans and from rodents. They may be a portion of the bacterial contamination of the equipment. Fortunately, these bacteria are easily killed by heat. Pasteurization of milk and even moderately thorough cooking of meats will kill these organisms.

Best Bet is Sanitation

Since these bacteria are widely distributed, protection of the food from contamination at any stage of handling is of the greatest importance. Salmonella bacteria do not grow below 50° F., so adequate refrigeration is one of the best safeguards against this type of food-related illness. Not only must the refrigerator temperature be low enough, but also the food must be placed in appropriate containers in such amounts that it can cool rapidly to below 50° F. Five gallons of creamed chicken in one large container, such as a crock or pail, will require hours to cool to 50° F. in the center of the mass if the initial temperature was 90 to 100° F., even though the refrigerator may be at 35° F.

Botulism fortunately is a relatively rare illness. Until 1963, no case of botulism had been traceable to commercially canned food for many years. The evidence is that in the 1963 outbreak caused by canned tuna the problem was not inadequate processing but rather a poor seal on a few cans that permitted recontamination after proper heat processing.

Most cases of botulism have been due to home-canned non-acid foods, such as beans, peas and meats, that have not been adequately processed. For foods of this type and numerous others, a properly operated pressure cooker to insure reaching temperatures sufficiently high to kill the causative bacteria, and careful atten-

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tion to adequate sealing to prevent recontamination, are essential to prevent botulism.

Highly Dangerous Toxin

Botulism in humans is caused by an organism known as *Clostridium botulinum*, of types A, B, or E. This organism produces a toxin which is the most lethal agent known to man. One ounce of the toxin of Type A has been calculated as being enough to kill 600 billion mice. People have died from taking into the mouth and immediately spitting out just one piece of green bean from a container of a product in which this organism has grown.

Fortunately, the toxin is rather easily inactivated by heat, so boiling for 15 minutes any product under even the slightest suspicion will protect the consumer against botulism. *Some strains of the organism produce gas and a putrid odor, but some do not, so acid and odor cannot always be depended upon for detection of growth of these bacteria.*

Clostridium botulinum is found in some soils and in some samples of sea water. The bacteria produce spores, which are very resistant to heating. In non-acid foods, boiling for several hours may not kill the spores. In acid foods, such as tomatoes, peaches and most other fruits, boiling is adequate to kill the spores. Types A and B will not grow at 50° F., but Type E, which is associated with fish and other marine products, can grow slowly at 40° F.

A Problem of Processing

These bacteria are anaerobic, meaning that they grow only in the absence of the oxygen of the air, and thus they ordinarily are a problem only in food so packaged that air is excluded. Basically, protection against botulism involves adequate processing to destroy the causative organism under the particular conditions encountered, and adequate protection of the processed food against recontamination.

A few remarks about the growth of microorganisms in dried and frozen foods may be in order. Bacteria, yeasts and molds must have moisture to grow. Both drying and freezing stop microorganism growth because water no longer is available to support growth. Neither food-poisoning organisms nor spoilage organisms are killed by drying or freezing, although their numbers may be reduced somewhat. When water becomes available (by addition to dried foods and by thaw-

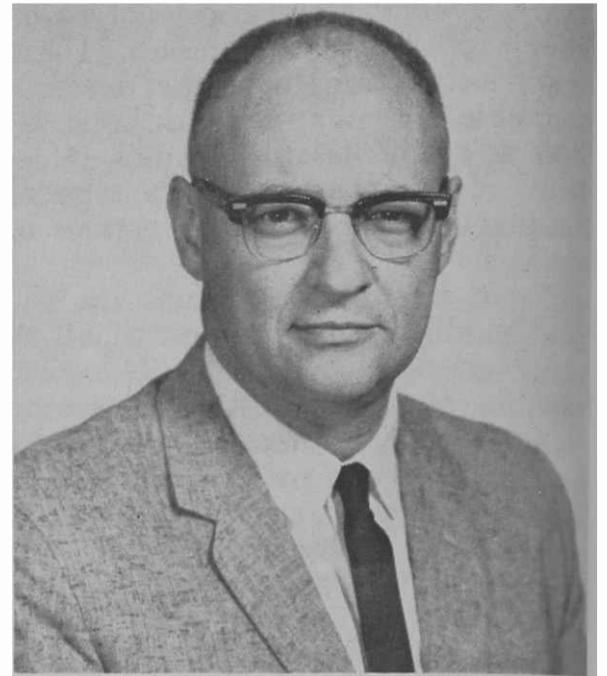
Dr. Levin Heads USDA Bee Lab

Dr. Marshall D. Levin, staff member of the U. S. Department of Agriculture's Honey Bee Research Laboratory at Tucson the past two and one-half years, has been named head of this federal facility.

He succeeds Samuel E. McGregor who was transferred to the Plant Industry Station at Beltsville, Md., last September 1. McGregor now is assistant branch chief under Frank Todd, who earlier had been transferred from the Tucson facility to head the Agriculture Research Branch of the Entomology Research Division at Beltsville.

As head of honey bee pollination investigations, Dr. Levin supervises the work of three other entomologists. These other professional workers are studying the composition of pollen and the nutrition of the honey bee, the water needs of bees in our desert climate, and the effects of attractants and repellents on the behavior of bees.

Dr. Levin spent 12 years at the federal honey bee laboratories at Logan, Utah, studying the pollinating



DR. MARSHALL LEVIN

activity of bees on alfalfa, carrots, and onions.

Brought to Tucson, he has devoted his attention to honey bee pollination of alfalfa, as before, and has widened his studies to include such additional crops as safflower, cantaloup, and cotton as well as the effect of pesticide on bees and their activities.

ing of frozen foods) the same precautions to combat food poisoning and spoilage must be taken as would be taken with the undried or unfrozen food.

3 Points to Observe

In summary, control of food poisoning depends upon: (1) Sanitation and protection against recontamination to keep the causative organisms out of the food. (2) Adequate treatment (usually heat) to destroy food-poisoning bacteria which may get into the product. (3) Holding non-sterile foods under proper refrigeration (at least 50° F. and preferably 40° F.) to prevent growth of any food-poisoning bacteria which may be present.

Jeff's Good Neighbor Policy

Hordes of visitors proved Thomas Jefferson's undoing. The steward at Monticello, his estate near Charlottesville, Virginia, groaned: "I have often sent a wagon-load of hay up to the stable and the next morning there would not be enough to make a bird's nest. I have killed a fine beef and it would all be eaten in a day or two." After Jefferson's death, his daughter had to sell Monticello to pay his debts, the National Geographic says.

Sir Winston Churchill

... on the American heritage:

"The Americans took little when they emigrated from Europe except what they stood up in and what they had in their souls. They came through, they tamed the wilderness, they became what old John Bright called 'a refuge for the oppressed from every land and clime.'

"They have become today the greatest state and power in the world ...

"What are dollars? Dollars are the result of toil and the skill of the American workingman, and he is willing to give them on a very large scale to the cause of rebuilding our broken world. In many cases, he gives them without much prospect of repayment."

Italy Gets U. S. Veal

Veal is in such demand in Italy, according to a Department of Agriculture bulletin, that in recent weeks more than 6,500 United States veal calves have been shipped there by air transport to supply the market.

March-April