FERMENTATION OF SOME SIMPLE CARBOHYDRATES BY MEMBERS OF THE PSEUDOMonas GENUS. Leon Stein, R. H. Weaver and M. Scherago, Dept. of Bacteriology, University of Kentucky.

A comparative study of methods for the determination of carbohydrate utilization by members of the Pseudomonas genus has been made.

The results of these experiments make the following points evident:
1. The ordinary meat-extract sugar broth medium, with indicator, is not to be relied upon to show acid production by members of this genus.
2. A minimum buffered synthetic medium will reveal any acid production.
3. Since the results of the potentiometric determinations confirm those obtained in the synthetic medium, with indicator, such determinations do not seem to be necessary, at least in routine work.
4. Many strains of Pseudomonas utilize sugars without the production of any evident acid.
5. The use of a synthetic medium, without indicator, containing the carbohydrate as the only source of energy and of carbon, with growth as evidence of utilization, is the best routine method for the determination of carbohydrate utilization by members of the Pseudomonas genus.
6. Many species of Pseudomonas were found to produce carbon dioxide when Eldredge tubes were employed.
7. All of the 24 strains of Pseudomonas which were studied have been found to utilize glucose, the majority to utilize maltose and some to utilize sucrose and lactose.


The isolation of thermoduric organisms from milk and a consideration of their thermal resistance indicates that the thermoduric problem is not to be overcome by increasing the temperature or time of pasteurization, but rather by the elimination of the organisms from the raw supply by educating the producers to use the proper sanitary practices.

Line-run tests at hourly intervals for three consecutive days showed that the pasteurizer was causing an average reduction in bacterial count of 89.1 per cent. After the sanitary conditions on the farms of 48 shippers (out of 350) whose milk had been found to pasteurize out with high counts had been improved, a similar study showed that the pasteurizer caused an average reduction in bacterial count of 98.5 per cent.

ENTRANCE OF NON-MOTILE BACTERIA AND CHEMICALS INTO WATER-SOAKED TOBACCO LEAVES. Stephen Diachun, W. D. Vallee, and E. M. Johnson, Kentucky Agricultural Experiment Station.

It was previously reported that water-soaking of tobacco leaves enables leafspot bacteria to enter the leaves, presumably through water channels occurring in the stomata from the outside to the inside of the leaf. The object of the study reported here was to determine whether the bacteria enter the leaves by means of their own motility, or are carried in by action of some outside force.

Non-motile bacteria (Staphylococcus aureus) were placed on water-soaked tissue and non-water-soaked tissue of the same leaf. After the water-soaking disappeared (within 30 minutes) the leaf surface was sterilized with HgCl₂; representative portions of the leaf were cut out, crushed, and mixed with agar in petri plates. Within a few days thousands of colonies of S. aureus developed on each plate prepared from water-soaked tissue; no colonies were present on plates prepared from non-water-soaked similarly inoculated tissue. This
test shows that swimming is not necessary for bacterial invasion of leaves.

India ink entered water-soaked leaf tissue rapidly, producing a blackening that could not be washed off; ink did not enter non-water-soaked tissue.

Solutions of HgCl₂ and CuSO₄, and Bordeaux mixture entered water-soaked leaf tissue rapidly, producing necrosis. This suggests the possibility that naturally induced water-soaking may play a part in the occurrence of spray injury.

**EXPERIMENTS ON THE EXCRETION OF NITROGEN COMPOUNDS FROM LEGUME ROOTS.** Hugh G. Myers, Kentucky Agricultural Experiment Station.

Results of greenhouse and laboratory experiments at the Kentucky Station on the excretion of nitrogen compounds by legume roots as a means of N transfer from a legume to an associated nonlegume, were similar in general to the published results of other workers. Excretion occurred in less than three per cent of associated combinations of vetch and rye; and no excretion was obtained with mixtures of vetch and ryegrass, red clover and orchard grass, or alfalfa and bromegrass. Varying such factors as day length, light intensity, temperature, level of potassium in the substrate, and the strain of *Rhizobium* failed to bring about conditions consistently favorable to excretion. This mode of transfer of nitrogen from legume to nonlegume is of course different from that which occurs in disintegration and decomposition of legume roots.

The investigation reported in this paper is in connection with a project of the Kentucky Agricultural Experiment Station and is published by permission of the Director.

**MISSOURI VALLEY BRANCH**

**UNIVERSITY OF NEBRASKA, LINCOLN, MAY 2, 1942**

**COMPARATIVE STUDY OF MEDIA USED FOR THE ISOLATION OF ORAL STREPTOCOCCI.** K. D. Rose and C. E. Georgi, Department of Bacteriology, University of Nebraska, Lincoln, Neb.

A series of media designed for the selective isolation of oral streptococci have been tested in the laboratory on a comparative basis with micro-organisms likely to be found on eating utensils or in dishwater. The results indicate that media containing sodium azide, sodium azide and blood, or potassium tellurite are less inhibitory to organisms other than streptococci than a medium containing potassium tellurite and crystal violet, but the latter is also quite inhibitory to "typical" *Streptococcus salivarius*. A medium containing sodium azide and potassium tellurite inhibits all contaminants but *Staphylococcus aureus* and a *Proteus* species, the latter growing only in small discrete colonies. "Typical" *Streptococcus salivarius* grows without inhibition on this medium when the inoculum is sufficiently large to initiate growth. Experiments with serial dilutions of this organism indicate that the inoculum needed is greater than that normally occurring on restaurant glasses. A primary selective enrichment culture is probably necessary to assure 100% isolations in sanitary studies.

**THE INFLUENCE OF MICROORGANISMS AND BIOLOGICAL PRODUCTS ON THE PHYSICAL PROPERTIES OF A LOESSIAL SUBSOIL.** T. M. McCalla, Soil Conservation Service and Nebraska Experiment Station, Lincoln, Neb.

A loessial subsoil containing 0.2 percent organic matter and 16 percent inorganic colloid was used to determine the magnitude of the binding effect of microorganisms and biological products on the soil particles. Falling water drops were used to determine the energy required to destroy the structure formed in the presence of organic matter of microorganisms as compared with the original soil.

The incorporation of organic matter into the loessial subsoil and the use of plant residue cover resulted in a high intake of water. When the untreated soil was used with a cover, the water intake was much lower. Water intake into the soil in which the growth of microorganisms was stimulated by sucrose treatment was high, even without a cover to break the impact of the falling water drops. The thousands of...
fungus filaments bound the soil together into stable masses.

The Heat Resistance of Mixed Cultures of Streptococcus thermophilus and Certain Caseolytic Bacteria. H. J. Peppler, Department of Bacteriology, Kansas State College of Agriculture and Applied Science, Manhattan, Kansas.

The activity of Streptococcus liquefaciens, Pseudomonas aeruginosa, Proteus ammoniae, and other caseolytic bacteria, in a skim milk medium with Streptococcus thermophilus has been shown to stimulate the growth of S. thermophilus and to increase the activity of subcultures grown at 48°C. following heating at 65°C. for 30 minutes. The degree of stimulation and increase in heat resistance of S. thermophilus varied with the number of caseolytic bacteria added. The heat resistance of some mixed cultures was equivalent to that of pure cultures of S. thermophilus grown in milk media enriched with different commercial peptones. The activity of heat-treated subcultures of mixed cultures decreased sharply after the first culture generation as a result of the gradual suppression of the caseolytic associate.

Enrichment of skim milk with small amounts of heat-killed whey cultures of the caseolytic bacteria stimulated the acid production and increased the heat resistance of pure cultures of S. thermophilus to the same extent observed with corresponding mixed cultures.

The increased heat resistance of the lactic acid organisms is probably related to the availability of nitrogen in the culture medium before heat treatment. Alkali-treated peptones added to the skim milk medium for S. thermophilus possessed the same degree of stimulation exhibited by untreated preparations. Various accessory substances, such as calcium pantothenate, l-ascorbic acid, riboflavin, thiamin, and niacin added separately or in different combinations to the culture medium, did not influence the heat resistance of S. thermophilus.

When grown in skim milk for 24 hours at 32°C. and then heated at 55° or 58°C., all caseolytic bacteria, except P. aeruginosa and Achromobacter lipolyticum, survived after 60 minutes. At 58°C. P. aeruginosa and A. lipolyticum were killed in milk within 25 minutes; at 58°C. both organisms failed to grow in milk after heating for 10 minutes.

A Study of Certain Factors Which Influence the Apparent Heat Resistance of Bacteria. F. E. Nelson, Kansas Agricultural Experiment Station.

The effects of different plating media and of variations in temperature and time of incubation upon the quantitative enumeration of heat-treated bacteria were studied. Pseudomonas aeruginosa, Escherichia coli, Staphylococcus aureus, Bacillus subtilis, Streptococcus durans, Streptococcus liquefaciens and Streptococcus zymogenes were used.

Within fairly wide limits of variation the factors studied had little or no effect upon the counts of unheated control cultures. Beef-infusion agar usually gave higher counts of heated bacteria than were obtained from three other media. For some lactic streptococci the new standard milk agar was very superior to ordinary nutrient agar. Incubation at 32°C. usually resulted in counts higher than at 21°, 28°, 37°, or 42°C., and 96-hour counts were appreciably higher than 48-hour counts, especially at the lower temperatures of incubation. Heated bacteria were much more sensitive to the pH of the recovery medium than were the control organisms. Addition of thiglycollic acid in amounts as small as 0.00021 percent usually resulted in considerable increases in plate count of the heat-treated bacteria, while larger amounts had a still greater effect up to a limit which was a function of medium and organism. Cysteine had a similar effect.

By suitable plating procedures considerable differences can be caused in the apparent number of survivors among heated bacteria.

Growth of Non-sporulating Anaerobic Bacteria of Intestinal Origin in Synthetic Media. II. Essential Components and Additional Growth Stimulants. Don H. Larsen and Keith H. Lewis, Department of Bacteriology, University of Nebraska, Lincoln.

Elimination of unnecessary constituents from a previously developed synthetic
medium consisting of 10 mineral salts, glucose, sodium lactate, glycerol, 17 amino acids and 14 growth factors has been attempted. Duplicate cultures of 15 or more representative strains of non-spore forming anaerobic bacteria were employed in all experiments.

A combination of \( \text{K}_2\text{HPO}_4, \text{KH}_2\text{PO}_4, \text{NaCl} \) and \( \text{MgSO}_4 \) gave nearly as satisfactory growth alone as with the other six salts. Omission of sodium lactate and glycerol did not lessen growth in any instance and occasionally improved it. Elimination of amino acids either singly or in combination reduced the growth of the group as a whole. Individual strains could, however, develop in simplified mixtures of the amino acids. Of the 14 original growth factors all except pyruvic acid, pantothenic acid, nicotinic acid, pyridoxine and riboflavin were omitted without extensively changing the properties of the medium. Biotin, folie acid, adenylic acid, choline and p-amino benzoic acid, not included in the original 14 growth factors, were also tested. Only p-amino benzoic acid was active in the concentrations used. Addition of tryptone, liver extract or tomato juice to the synthetic medium improved growth, thus indicating that additional unknown factors are needed.

**Bacterium necrophorus Septicemia in Man.** Victor B. Buhler, Clark W. Seely, and Dorothy D. Dizon, General Hospital, Kansas City, Mo.

Two cases of *Bacterium necrophorus* infection with septicemia occurring in the human being are recorded in this paper. It is the opinion of the authors that *B. necrophorus* invasion in man is probably not such a rare occurrence as is commonly thought. They feel that more active investigation of common infections by anaerobic methods may reveal this organism in a larger number of cases.

*B. necrophorus* has long been fairly well known to veterinary medicine as the causative agent in gangrenous stomatitis, lip, and leg ulcerations, and abscesses of the liver in horses, cattle, sheep, and numerous other domestic and wild animals.

Human infections caused by *B. necrophorus* are reviewed describing involvement of many organs including skin, lungs, naso-pharynx, gastro intestinal tract, and genito-urinary system. Only one proved case of septicemia is previously recorded.

The two cases presented are reviewed in full giving case histories, hospital course, laboratory, and autopsy material.

The source of *B. necrophorus* was thought to be from a peri-appendicitis in one case and from a perforating wound of the perineum in the other.

From the bacteriological aspect the organism is described morphologically and culturally. The media and methods used for isolation and identification are given in detail, with an accompanying comparative chart of *Bacterium necrophorus* and closely related organisms. The bibliography contains 31 references.

**Galacturonic Acid, A Constituent of a Bacterial Gum.** C. E. Georgi, W. E. Militzer, K. B. McCall, and D. A. Bizler, Departments of Bacteriology and Chemistry, University of Nebraska, Lincoln, Nebraska.

An unidentified bacterium produces large quantities of a polysaccharide gum when grown on an agar medium containing sucrose as the carbon source, \( \text{KNO}_3 \) as the nitrogen source and in addition, \( \text{K}_2\text{HPO}_4 \). Mass cultures were grown in Kotte flasks. Cells were removed by centrifuging at 45,000 r.p.m. after the gum had been greatly diluted in a weak aqueous solution of \( \text{Na}_2\text{OO} \), designed to reduce the viscosity so as to facilitate precipitation of the cells. Water was removed by heating to 50°C. at 15 mm. and the gum then precipitated with absolute Et\( \text{OH} \). After filtering and drying, the gum was hydrolyzed with 2.5% \( \text{H}_2\text{SO}_4 \) and precipitated as the barium salt. Analysis of the latter indicated \( \text{Ba} = 26-27\% \) which is the theoretical value for a hexose. Oxidation of the barium salt with bromine water yielded mucic acid. The orcinol test applied to the gum itself resulted in the detection of furfural. These qualitative tests point to the presence of galacturonic acid as one of the constituents of the polysaccharide gum.

**Bacteriological Study of Machine and Handwashed Dishes at Haskell Institute.** Harold G. Nelson, Dept. of
Bacteriology, Univ. of Kansas, Lawrence.

This study consisted of three examinations of the dishes from the dining halls, the cafe, and hospital at Haskell Institute, which is an Indian school located at Lawrence, Kansas.

The enrollment at the school is approximately 725 students. The hospital is a forty-bed institution. The dishes are washed by hand at the cafe and hospital while they are washed by machines at the dining halls.

The first samples were obtained February 16, 1942. The swab technic of Fellers, Levine and Harvey was employed. This technic was modified by swabbing onto blood agar and proteose peptone III agar and inoculating lactose broth. The results were as follows: Machine washed, 8 organisms per article; Hand washed, 27 organisms per article.

Loeffler's tubes and lactose tubes were negative.

Samples were again obtained on the 24th of February and run out as above. The results were as follows: Machine washed, 13 organisms per article; Hand washed, 14 organisms per article.

Loeffler's tubes and lactose tubes were again negative.

The Kansas State Board of Health Method was employed on the third samples obtained February 27, 1942. This method is similar to the above method except that ten articles are swabbed rather than one. Blood agar and lactose broth are also included. The results were as follows: Machine washed, 31 organisms per article; Hand washed, 52 organisms per article.

Since alpha streptococci were found on the hospital and cafe samples, it was recommended that the cups and glasses in these places be rinsed in a chlorine solution.

The counts in all cases were quite low; however, the machine washed dishes yielded a lower count than did the hand washed dishes.

**Preliminary Report on a Survey to Determine the Bacteriological Condition of Utensils in the Service of Food. Evan Wright, Flora Acton and Charles A. Hunter, Kansas State Board of Health, Topeka.**

**Utilization of Twenty-one Proprietary Peptones by Representative Aerobic and Facultative Bacteria. Margaret McMaster and Carl E. Georgi, Dept. of Bacteriology, Lincoln, Nebraska.**

The growth of representative aerobic and facultative bacteria was followed qualitatively and quantitatively on twenty-one commercial peptones.

From the quantitative studies, it was observed that peptones vary a great deal in their ability to support the growth of the test organisms. Using peptones in concentrations of 0.1%, 0.01%, and 0.001% in semi-solid glucose peptone agar, it was found that four peptones supported growth vigorously in these low concentrations.

The peptones were compared qualitatively as to their effectiveness in the detection of acetyl-methyl-carbinol, the production of indole and of hydrogen sulfide.

All the peptones tested, but one, contained sufficient compounds possessing a guanidine nucleus to give good tests for acetyl-methyl-carbinol when the latter was produced by the bacteria.

Several peptones, five in number, were found to yield superior tests for the production of indole. Three did not contain enough tryptophane to give any positive tests with the organisms studied.

Of the three indicator ions (iron, lead, and bismuth) used for the detection of hydrogen-sulfide production, bismuth proved to be the most satisfactory, when used with the various peptones. Four peptones were found which yielded very good results with bismuth as the indicator. It was also found that the indicator used for the detection of hydrogen sulfide must be taken into account when a suitable peptone is being chosen. Three were not suitable for the demonstration of hydrogen-sulfide production with any of the indicator ions.

**The Composition of Culture Media as It Affects the Fermentation Characteristics of Corynebacterium. Harle Barrett, Flora Acton and Charles A. Hunter, Kansas State Board of Health, Topeka, Kansas.**

A considerable number of nose and throat cultures from a selected group of individuals revealed the presence of Corynebacterium.
These were isolated by using tellurite blood agar and studied.

Fermentation media were prepared by combining various fermentation bases and indicators. The fermentation of sucrose, glucose, and dextrin seemed to depend upon the composition of the culture media and the indicator used.

The Effect of Gramicidin and Tyrocidine on Various Bacteria. Cora M. Downs, University of Kansas, Lawrence.

In a series of articles Dubos and Hotchkiss and Dubos have described the isolation and identification of two bactericidal agents: gramicidin and tyrocidine, the first active chiefly against gram-positive organisms, the second active against both gram-positive and gram-negative but more active against the latter. Downs has studied the effect of these substances on gonococci and meningococci. In the present study a comparison was made of the bactericidal substances in regard to their activity on various organisms. The substances were diluted in 5 per cent glucose to the desired concentration mixed with an equal volume of the organism suspended in glucose, incubated at 37°C. for three hours and cultured in suitable media. The following amounts of gramicidin and tyrocidine were found to be lethal for the organisms named: Pneumococci G* 0.01 g, T † 1 g; Hemolytic streptococci G 2 g, T 5 g, Staphylococcus aureus G 10 g, T 50 g, Meningococci G 5 g, T 1 g; Gonococci G 1 g, T .01 g; Pasteurella avicida T 500 g; Pasteurella tularensis virulent G 250 g, T 100 g; avirulent G 25 g, T 25 g; Shigella dysenteriae T 50 g; Escherichia coli T 500 g; Salmonella schottmulleri T 250 g; Eberethella typhosa 500 g.

Where no figures are given for gramicidin, 500 gs did not kill the organisms. Smaller amounts of the substances were bacteriostatic but not bactericidal. When the substances are used in amounts which are bactericidal the action is evident within the first hour as determined by plate counts.

*When bacteriostatic amounts are used there is a progressive decrease in numbers until after the fifth or sixth hours after which there is a gradual increase.

Studies on the Reagin Content of Normal and Syphilitic Rabbits. Noble P. Sherwood and Carolyn Collins, Department of Bacteriology, University of Kansas, Lawrence, Kansas.

The Kahn Verification test as well as other serological tests was used in the study of the blood serum of eighty-nine normal, adult, male rabbits. Fifteen of these were used as uninoculated normal controls and seventy-four of the rabbits were inoculated intratesticularly with Treponema pallidum. Darkfield examinations were made at various intervals of time to determine the presence or absence of spirochetes. The shortest interval of time elapsing between infection and darkfield examination was five days. The results of these examinations were positive.

The maximum titer of reagin in uninoculated animals or in animals before inoculation was three Kahn units. The minimum was no Kahn units. Fluctuations between completely negative and detectable amounts of reagin were observed in all normal controls. Following inoculation with T. pallidum there would develop, usually within two or three weeks, a marked increase in reagin. This might or might not be, in the beginning, of the syphilitic type according to Kahn’s Verification test, but as infection progressed, this syphilitic type of reaction predominated although fluctuations occurred; for some weeks the general biological type of reaction would replace the syphilitic type.

Reagin titers of as much as thirty Kahn units were commonly reached during infection. After a variable number of weeks the reagin titer would drop, gradually, to within normal limits in most of the infected rabbits that we were able to study for a long period of time.

During infection there was not only variation in the kind of reaction but there was variation in amount of reagin from week to week. Some rabbits were studied as long as fifty-one weeks. In others the period of observation has been limited to ten weeks.

Health Laboratories, Kansas State Board of Health.

Two-hundred-and-twenty-five blood specimens, of which 117 were from syphilis and 108 were from presumably non-syphilis, were sent to 31 laboratories that voluntarily entered the evaluation study. The U. S. Venereal Disease Research Laboratory also received a set of the specimens.

The State Laboratory served as the control laboratory.

The results were as follows:

Kahn Standard
Number of Laboratories entered........ 25
Number of laboratories low in sensitivity 10
Number of laboratories low in specificity 7
Number of laboratories low in both....... 1
Total number of laboratories failing to meet standards.......................... 17

Complement Fixation
Number laboratories entered............... 20
Number laboratories low in sensitivity... 3
Number laboratories low in specificity... 6
Total number laboratories failed.......... 9

Kline Diagnostic
Number of laboratories entered........... 6
Number of laboratories low in sensitivity 0
Number of laboratories low in specificity 6
Total number laboratories failed.......... 6

An Attempt to Demonstrate a Virus as the Cause of Mastitis in Cattle. L. D. Bushnell, Kansas State College, Manhattan.

In 1939, Broadhurst, Cameron and McLean reported on a filterable virus as the probable cause of mastitis in cows.

In our investigations, milk was obtained from cows with typical clinical mastitis and an attempt made to demonstrate a virus on the chorioallantois of the developing embryo of the hen's egg.

The cellular sediment was stained by several methods and various bodies which may have been inclusion bodies were demonstrated.

The milk was filtered and eggs of 10 to 12 days incubation were inoculated with from 0.1 ml. to 0.5 ml. In no instance could virus lesions be demonstrated.

Samples of milk treated with 50% glycerol, 1:1000 merthiolate, 1:1000 phenol, 1:1000 crystal violet finally became free of bacteria and were inoculated on the egg membranes. In a few instances there was a thickening or clouding of the membrane. Sections of these membranes were transferred to other eggs but we were unable to cultivate a virus by this means.

The conclusion reached was that we were unable to demonstrate a virus for mastitis by this means.

Bacterial Invasion of the Chorio-alantoic Membrane. Cornelia M. Downs and Seymour S. Kaller, Department of Bacteriology, University of Kansas, Lawrence, Kansas.

This paper represents a preliminary report involving certain immunological aspects of bacterial infection of the chorio-alantoic membrane of chick embryos. The technic employed is essentially that of Goodpasture, et al., and in all cases so far described the pathology of the infection of these membranes corresponds to that described by Goodpasture.

Studies thus far have been made with Staphylococcus aureus and Neisseria meningitidis.

Immunological studies so far have been limited to the use of immune sera placed directly upon the membrane immediately before adding the infecting dose. Immune rabbit serum against staphylococcus with an agglutinative titer of 1:840 was used. A commercial polyvalent horse antiserum was used for protection against the meningococci, with an agglutinative titer of 1:320. Our controls consisted of normal rabbit serum, in the case of the staphylococci, and normal horse serum for the meningococci, corresponding to the immune serum used.

There was no significant protection obtained by immune serum against staphylococci. The staphylococcus was recovered from the membrane after twelve hours. An exudate appeared at this time, followed by ulceration of the membrane. The exudate involved the mesoderm also. The organism grew extracellularly and there was no intracellular invasion.

When meningococci were used, the anti-
serum protected the embryo which survived what was a lethal dose of cocci in untreated chicks. In the untreated embryos only one lived 96 hours, with the majority dying before 72 hours. On both the protected and unprotected membranes, no exudate was noticed until 18 hours at which time the organism was recoverable from small pieces of the membrane. Grossly there is a thickening of the membrane and slight hemorrhagic areas were noted on the untreated membranes.

**Demonstration of the Titration of Various Viruses on Chorio-allantoic Membranes.** Jean Rubbra, Carolyn Collins and Seymour Kalter, University of Kansas, Lawrence.

**JOINT MEETING, NEW JERSEY AND NEW YORK BRANCHES**

**Princeton, N. J., May 16, 1942**

**The Effect of Certain Carcinogenic Hydrocarbons on the Growth Rates of E. coli and S. aureus.** G. David Novelli, Department of Bacteriology, Rutgers University.

The effect of methylcholanthrene; 1,2,5,6, dibenzanthracene; 3,4-benzyrene and 1,2-benzanthracene on the growth rate of *Escherichia coli* and *Staphylococcus aureus* was studied by making growth curves of the organisms in the presence of the hydrocarbons as compared with a standard control.

Both methylcholanthrene and 1,2,5,6-dibenzanthracene stimulated the growth rate of *E. coli* and *S. aureus* in the concentrations employed. Both of these compounds were more effective on *S. aureus* than on *E. coli*. Methylcholanthrene caused an increase in maximum numbers of 36% with *S. aureus* as compared to a 25% increase with *E. coli*. Dibenzanthracene caused an increase of 17% with *E. coli* as compared to a 19% increase with *S. aureus*. 1,2-Benzanthracene had no effect on *S. aureus*. It proved, however, to be slightly inhibitory to the *E. coli* culture. This inhibition did not occur until after the maximum numbers had been attained.

The effect of 3,4-benzyrene was found to vary both with the concentration of the compound and with the size of the inoculum. The greatest effect on *E. coli* was found to occur when a small inoculum was used. In high concentrations and using a large inoculum the effect of this compound was seemingly inhibitory. At a concentration of 30 milligrams %, a concentration at which this compound was slightly inhibitory to *E. coli*, it caused a 52% inhibition of the *S. aureus* culture, suggesting that these compounds behave differently with different organisms.

**Remarks Concerning Some Recent Developments in Bacterial Metabolism.** Dr. J. H. Quastel, Rothamsted Experimental Station, England.

**The Effects of Detergents on Proteins, Viruses, and Bacteria.** Dr. M. L. Arson, The Rockefeller Institute, Princeton.

**Observations on the Anti-Bacterial Action of Surface Active Cations.** E. I. Valko and A. S. DuBois, Onyx Oil and Chemical Company, Jersey City, New Jersey.

The bactericidal effect of a surface active cation, e.g., N-n-dodecyl-N'-ethyl-benzotriazolium ion is greatly diminished when other surface active cations which are less toxic to the bacteria, e.g., N-n-hexadecyl- or N-n-octadecyl-N'-ethyl-benzotriazolium ion, are present. The phenomenon indicates that, either on the surface of, or in the bacteria there are certain spaces available for the surface active cations. If these spaces are occupied by harmless cations the bacteria are protected against the toxic cations, provided the harmless cations are more firmly attached to the bacteria than the toxic ones.

The concentration of surface active cation which is determined by the F.D.A. method as killing, is not always lethal to bacteria. By detoxication with surface active anions the bacteria which were treated with the “killing” concentration can recover their
ability to growth. E.g., *Staphylococcus aureus* treated for 5 min. with alkyl-di-methyl-benzylammonium chloride of a concentration corresponding to five hundred per cent of the “killing” concentration can be revived by a 5 min. treatment with an equivalent amount of sodium loral sulfate.


Calculations of the particle weights of purified acid, alkali and heat denatured egg albumins from sedimentation and diffusion measurements show that these substances are aggregates. The size of the aggregates depends on the type of product and on the extent to which it has been exposed to the aggregating influences of salt or long standing in the flocked state.

The viscosities of these products decrease from several months after preparation, and evidence from viscosity and diffusion data has been given to show that the shape of the aggregate resembles that of a disk.

The mobilities of acid and heat denatured egg albumin are the same as that of the native protein. The mobility of alkali denatured egg albumin is lower.

The different types of products have been found to exhibit small quantitative immunological differences.

Epidemic Kerato- Conjunctivitis. Dr. Murray Sanders, Department of Ophthalmology, College of Physicians and Surgeons, New York.