all those interested in the production, chemistry, sanitation and control of foods. They will serve also as interesting and informative reading sources by those who are not food specialists.

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FATS AND OILS

Fats and Oils (An Outline of Their Chemistry & Technology). By H. G. KIRSCHENBAUER. 154 pp. New York: Reinhold Publishing Corporation. 1944. $2.75.

THIS book represents one of the first attempts to present briefly both the chemistry and technology of the vegetable fats and oils. Of the 140 pages of written material, about one third is given to an outline of the structure of fats and fatty acids and to analytical methods; about 35 pages are used for descriptive notes and general characteristics of the more important fats; and the remainder of the book deals with technological aspects such as methods of production, purification, hydrogenation, hydrolysis, distillation, spoilage, detergents and lubricants. Although such a condensed treatment offers very little new material and information not previously available in the accepted references and monographs, it does provide a satisfactory introduction to the extensive field of fats and oils. Its use will be of very limited value to those engaged in either chemical or technological work with fats and oils.

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SPECIAL ARTICLES

NEW STRAINS OF PENICILLIUM NOTATUM INDUCED BY BOMBARDMENT WITH NEUTRONS[1, 2]

MODERATELY heavy spore suspensions in normal saline in test-tubes of a stable variant isolated from a strain of *Penicillium notatum*[3] were bombarded with neutrons from the 42-inch cyclotron of the physics department. Tubes were removed after 1, 2, 3.5, 4.5, 5, 6 and 7 hours on the first day when the beryllium target (other targets were also used subsequently) was being bombarded by 10 mev deuterons. On succeeding days, after increasing the total time of operation of the machine, additional tubes were removed from time to time.

RESULTS

Approximately 100 new strains or mutations have been isolated from cultures of the bombarded spore suspensions. This was done by comparing colony characteristics such as color, size and texture with those of controls which received no neutron bombardment.

Some of the new strains isolated have been cultured simultaneously in large batches on the surface of medium in half-gallon milk bottles by the well-known methods. Under identical conditions such as medium, time and temperature there have been found marked differences with respect to rate of sporulation; yields of antibiotic activity when compared by the cup assay method; and color and texture of the mats among some of the strains isolated.

As a typical example the results of quadruplicate cup assays of composites of several gallons each of surface-culture metabolism liquor from two different strains isolated after neutron bombardment are given in Table 1.

TABLE 1

Green Mat	Buff Mat
86	153
90	128
60	143
86	143
Aver. 80.5	142 Oxford units

Although the eventual yield of antibiotic activity by the buff mat strain was superior to the green mat strain by 76 per cent., the rate of sporulation of the green mat was much faster than in the case of the buff mat strain during the early stages of culture.

Preliminary experiments indicate that the antibiotic activity produced by many of the new strains does not differ qualitatively from that produced by the parent strain with respect to inhibition of growth of various bacterial species. Work is being continued to rule in or out the possibility that new antibiotics are being produced by the mold as the result of neutron bombardment.

The number of new strains which appears is in some measure proportional to the amount of bombardment. Thus only a few new strains were found in cultures of spores removed during the first day of bombardment, whereas new strains were very numerous in cultures of spores bombarded by neutrons each time the cyclotron was in operation (approximately 5 days each week) over a period of 4 months.

At present we are exposing suspensions of spores

[1] This study is a contribution from the Departments of Chemistry and Bacteriology of the Ohio State University under fellowships sponsored by the Wm. S. Merrell Company and administered by the Ohio State University Research Foundation.

[2] Experimental method.

[3] Obtained from the Northern Regional Research Laboratory.

of *Actinomyces lavendulae*[4] and *Actinomyces griseus*[4] to neutron bombardment to see if new strains will similarly result which can advantageously be used to produce more streptothricin and streptomycin respectively and in less time or both or whether new strains will appear which will yield new and more desirable antibiotics. Preliminary results are promising in that new strains are appearing, but less frequently than in the case of *P. notatum*.

We propose similarly to bombard other micro-organisms with neutrons, especially bacteria, molds and yeasts of industrial and medical importance to see if new strains can be isolated which will find advantageous application in industrial and medical microbiologic processes.

A more detailed presentation of the substance of this communication will be submitted for publication elsewhere.

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THE DIFFERENTIAL DIAGNOSIS OF BOVINE BRUCELLOSIS FROM THE BACTERICIDAL ACTION OF BLOOD PLASMA

IN herds of cattle in which several animals are infected with *Brucella abortus*, it has been a common observation that many develop only low serum agglutination titers. According to the standards in vogue to-day, such animals are placed in a border-line category as regards active infection. A long time-interval must intervene and several tests be made before the actual status of such animals can be determined. Very often such a practice is not economical and, too, such animals are considered unsafe when valuable dairy cattle are involved.

It has been observed that most of the animals in the suspicious category, in herds in which infected ones have been present for many years, will in time become negative to the agglutination test. In the herd in which infection is of recent date, it has not been possible by procedures now in use to predict the future of those that show low agglutination titers.

In a comprehensive *in vitro* study of the bactericidal and growth-inhibiting action of bovine blood plasma for *Br. abortus*, sufficient differences were found in the action of plasma from infected and non-infected cows to differentiate one from the other regardless of the agglutination titer. The latter group contained normal animals and animals showing different agglutination titers from a previous natural exposure, or following the injection of a killed *Br. sius* vaccine.

[4] Obtained from Dr. S. A. Waksman, Rutgers University.

[1] Part of a cooperative project between Michigan State College and the Bureau of Animal Industry of the U. S. Department of Agriculture.

PROCEDURE EMPLOYED AND RESULTS

Blood was collected from the jugular vein by means of a sterile needle into sterile bottles containing 0.1 ml of saturated sodium citrate for each 10 ml of blood. Plasma was separated from the cells by centrifugation and tested immediately. If necessary, the sample may be stored at 4° C. for as long as 10 days without impairing its bactericidal action.

A single, smooth strain of *Br. abortus* was used in all experiments. The differential value of the growth inhibition test depends upon the employment of a smooth culture. If a dissociated culture is used, plasma from both infected and non-infected animals will inhibit its growth to an equal degree.

The organisms were grown on beef liver agar slants for 24 hours at 37° C., then removed by means of a wire-loop and suspended in distilled water containing 0.05 per cent. Tryptose peptone and 0.5 per cent. NaCl. The bacterial suspension was then diluted to a scale reading of 28 on the Libby Photronreflectometer. The standard suspension contained approximately 1.5×10^9 live *Brucella* organisms per ml. This was diluted 1:1,000 in the same diluting liquid for final use.

The outline of the method which has proved to be the most practical and the least involved, and at the same time reveals more distinct differences between the action of plasma of normal, immune and infected animals follows: Each plasma sample was diluted two-fold in tubes of Tryptose broth from a 1:10 dilution to 1:1,280; the final volume in each tube was 5 ml plus 0.1 ml of diluting fluid containing 1.5×10^5 live organisms. The tubes were incubated for 48 hours at 37° C. The results were recorded at the 24th and 48th hour. The action of the plasma was measured by the absence or degree of growth (turbidity) in the tubes as compared with that in a control tube inoculated at the same time. The organisms multiplied sufficiently during the first 24 hours to produce considerable turbidity in the control tube of medium. The medium remained clear in those tubes in which growth was completely inhibited.

In Table 1 are set forth results representative of those that have been obtained on plasma samples from a large number of cattle of different statuses toward *Brucella* infection. Not in a single instance has a plasma sample from infected animals inhibited the growth of *Br. abortus* in any of the dilutions employed routinely. That this is not an exhibition of "zone-inhibition phenomenon" has been repeatedly demonstrated by the failure to obtain inhibition of growth in further two-fold dilutions of the plasma up to 1:200 million even after adding bovine or guinea pig plasma to each dilution to provide complement.

The *Brucella* organisms always grow in aggregates