YEASTS

A News Letter for Persons Interested in Yeasts

March 1953 Volume II, Number 3

****

Cost of Operation

Funds on hand to cover the cost of mineographing and mailing are meager. Therefore, it would be most helpful if each of those sufficiently interested, would care to contribute a quarter to the kitty. Many thanks to those who have already contributed.

The Editors

I. Personal Notes

California State Poly Technical College, San Luis Obispo, California.

Dr. R. C. Hatfield has published a laboratory mannual entitled, Practical Experiments in General Bacteriology (105 pages) by William C. Brown Company.

Dr. Hatfield's new address is Facilities Operation Division, Braddock Heights, Maryland.

A note from Dr. W. H. Peterson, University of Wisconsin, Mason, Wisconsin.

"He spent the last summer in Europe visiting pennicillium and fermentation plants. He visited the Halcok Zuchering Company at Ems. Switzerland. Where they hydrolyzed wood and ferment the wood sugar to alcohol and the yeast Torulopsis utilis. He indicated that it is a fine plant and has operated since 1943. They also make synthetic urea, methanol, and a nylon like fiber called gretton." Dr. Peterson also visited the research laboratory of the Distillers Company, Ltd., at Epsam Faud and talked with them about yeast and pennicillin.

Dr. Wickerham in Accident

Dr. F. M. Clark of the University of Illinois, will take Dr. Wickerhams place as Associate Editor of the News letter. Because of the very unfortunate accident that Dr. Wickerham had last summer, he was for some time incapacitated. His daughter survived with certain injuries but we are extremely sad to report that Dr. Wickerham's wife did not come through the accident. Dr. Wickerham had hoped to be able to spend some time in the West this Fall, but in view of the accident and the situation at the laboratory, he has found it necessary to post-pone this trip.

Northern Regional Research Laboratory

Dr. Clifford J. Hesseltine has joined the N. R. R. L. at Peoria, to be in charge of the Fermentation Divisions Culture Collections Section. This laboratory is one of the units of the Bureau of the Agricultural Industry of the U. S. Department of Agriculture. For several years previously he was in charge of the microorganism Collection at Lederle Laboratories, Pearl River, New York. Dr. Hesseltine succeeds Dr. Kenneth B. Raper who is now Professor of Bacteriology at the University of Wisconsin.

Dr. Nora Nielson, who recently obtained her Ph. D. degree under Dr. Joslyn at Berkeley, is now Assistant Professor at the University of British Columbia. She reports that one of her students is working on the types of yeasts in cultivated and virgin soils. Another is working on yeast metabolism along the line that Dr. Nielson worked on for her Ph. D. Thesis. The title of this is given later in this publication.

Miss Betty Burkhardt, who graduated from I.I.T. in June, is a research worker in Dr. C. Lindgrens Group at the University of Southern Illinois.

Dr. L. R. Hedrick participated in the Food Nutrition Section of the Gordon Research Conference at Coby Junior College, London, New Hampshire, during the first week of August. Miss Elda Tsilenis became married to a graduate student from Germany. They returned to Europe last summer. Dr. Don Vosti, who recently obtained his degree under Dr. Joslyn, is now working with the American Can Company, in San Francisco.

II. Research Notes

Isolation of Certain Schizosaccharomyces

Dr. N. Nielson, of British Columbia.

The occurrence of Schizosaccharomyces on dried fruits has been reported only occasionally. We have observed that some strains of the genus grow slowly or not at all on the malt agar usually used for isolation of yeasts but do grow readily when the sugar concentration in the medium is increased. For example, a sample of raisins was washed for household use, then drained and left in a closed container at room temperature for a week or two. A considerable number of the colonies which developed on the raisins were found upon microscopic examination to be fission yeasts with the eight-spored asci typical of Schizosaccharomyces octosporus. When the yeasts were streaked on 5 percent malt agar, the first colonies to develop resembled Zygosaccharomyces. After a further week's incubation at 25°C., a few very small colonies of Schizosaccharomyces were observed. When the yeasts were streaked on 5 percent malt agar plus 35 percent glucose (cerelose), the colonies of Schizosaccharomyces developed much more rapidly.

While the author was working on the yeast flora of dried prunes with Dr. E. M. Mrak at Berkeley in 1949 similar observations were made. Direct plating of the prunes as outlined by Phaff, et.al. (1) yielded only a few yeasts, none of which were Schizosaccharomyces. When the prunes were placed in a yeast autolysate medium containing 50 percent sucrose, the first yeasts to develop resembled Zygosaccharomyces as might be expected. However, after 2 to 3 weeks at room temperature, cells typical of Schizosaccharomyces octosporus were present in large numbers. These cells failed to develop when they were streaked on 5% malt agar but grew readily when 20% sucrose was added to the medium.

The fact that the majority of the strains of Schizosaccharomyces encountered in these studies have retained their sugar requirement when grown in pure culture indicated that they are true osmophilic yeasts.

(1) H. J. Phaff, E. M. Mrak, Ruth Allemann and Rita Whelton "Microbiology of Prunes During Handling and Drying" Fruit Products Jour. and Am. Food Manuf. 25, 140-141 (1946).

Vitamin Requirements of Members of the Yeast Genus Candida

John J. Bona and Leslie R. Hedrick, Biology Department
Illinois Institute of Technology, Chicago 16, Illinois

Stock cultures of yeasts grown upon malt extract, yeast extract, peptone, glucose medium were depleted of their stored vitamins by two successive weekly transfers into Wickerham's synthetic vitamin free (VF) medium. This VF medium was used as the negative control in the experiments. The positive control was Wickerham's synthetic nitrogen base plus glucose (10 g/l). Parallel experiments were performed with additions of vitamins or the deletion of vitamins, Incubations were at 25 C for one week or two weeks. Growth response was measured as optical density in a Coleman spectrophotometer.

Only two species of Candida, namely C. crusei NRRL Y 1736 and C. sorbosa Y 1732 did not require vitamins for normal growth.

Most of the Candida's required biotin only as growth factors.

These yeasts are:

C. albicans Y-477
C. brumptii Y-311
C. catenulata-1508
C. chalmersi Y-1757
C. flareri Y-245
C. guilliermondi Y-488
C. intermedia Y-1741
C. monosa Y-1735
C. parapsilosis Y-316
C. reukaufii Y-1460
C. rugosa Y-1496
C. sorbosa Y-1732
C. tenusi Y-1498
C. zeylanoides Y-106
C. macedoniensis Y-87
C. tropicalis Y-85
C. pulcherima Y-412
C. stellatoidea Y-525
C. robusta Y-????
C. krusei Y-306
C. melinii Y-1514
C. mesentericus Y-1404
C. krusoides Y-305

If the growth of C. krusei Y-306 is measured within 48 hours, a need for biotin is indicated, however, if readings are taken at the end of 7 or 14 days, no need for biotin is suggested.

Two species, C. lipolytica Y-1094 and C. humicola Y-1266 need thiamin as a growth factor.

One species, C. hevanensis Y-1510 required both biotin and thiamin for normal growth.

C. pseudotropicalis Y-83 needed niacin, biotin, and pantothenic acid niacin is the essential vitamin, while biotin and PA are accessory growth factors.

Cytologyical Observations of Saccharomyces with the Electron Microscope

R. DeLong and C. F. Edwards, Bacteriology Department,
University of Kentucky

The recent success of clearing yeast cells for electron microscopy by subjecting the cells to ultra-violet radiation has led us into an investigation involving the process of budding in Saccharomyces cerevisiae as observed with the electron microscope.

An attempt is being made, utilizing this same technique, to reveal the internal structure of the yeast nucleus. Some progress along these lines is already being realized. It is observed that small dense bodies of fairly constant number are present within the nuclear vacuole when this vacuolar membrane is disintegrated by intense ultra-violet radiation.

Many other details of the yeast cell's structure are easily observed with the electron microscope when this techinque is applied. Bud scars and birth scars in particular are clearly outlined.

The writers have had considerable success in shortening the clearing time required to obtain results, comparable to those of Bartholomew and Mittwer. In fact, the clearing time has already been reduced forty-eight hours in our hands.

These experiments are, of course, merely in the preliminary stages and it is hoped that the future will bring to light many new and interesting facts concerning yeast cytology.

Literature cited

Bartholomew, J. H. and T. Mittwer, J. Bact., 64: 1-8, (1952).

Department of Food Technology, University of Illinois.

Professors Z. John Ordal and Marvin Stienberg are investigating some of the factors which affect the production of fat by two yeasts, Rhodotorula gracilis, and Torula utilis. This investigation is now in progress. They hope in a later report to be able to summarize their findings.

Department of Bacteriology, University of Illinois.

Studies are being continued on the nutrition of the genus Rhodotorula and attempts are being made now to correlate the results obtained with the new classification of this group, suggested by J. Lodder and N. J. W. Creger Van Rij.

Dr. F. H. Clark and Henry Yarbrough are working on a problem concerned with the fate of inosital as an essential metabolite for Schizosaccharomyces pombe. Work on the inosital compounds formed by S. pombe have indicated about 50% of the inosital can be removed from the cells by the extraction of fat solids. The remainder of the inosital appears to be obtained in the wall and is not removed by exhausted extraction with fat solids.

There are, at present, two independent investigators working in Dr. Spiegelman's laboratory. They are Dr. Boris Rotman, who is concerned with the problem of precursors in enzyme synthesis as well as continuing his investigations on the heritable conversion of "slow to fast" synthesizers of galactozymase. The second investigator is Dr. Ruth Ban-Ishai from the Weizmann Institute of Rehovoth, Israel who is working on enzymes syntheses

in biochemically deficient mutients. Starting last January, Dr. Otto Landmann of the California Institute of Technology joined Dr. Spiegelman's group.

III. An Interesting Observation

Dr. Hedrick said in one of his Microbiology classes last semester a student applied a fat stain (sedan black) to a preparation of Saccharomyces containing ascospores. Among other items, which stain black with a sedan black, was the fluid surrounding the ascospores within the ascus. Thus, the ascus wall and the asci were colorless while the field immediately around the asci was blue and black. Experiments are in progress to determine if other yeast asci and ascospores react in a similar manner.

IV. Recent Publications

1. L. R. Hedrick and G. C. Burke, "Two New Yeasts From Hawaiian Fruit Flies". Mycopathologia et Mycologia Applicata 6, 92-95. Dec. (1951).

Elda Tsilensia and L. R. Hedrick, "Growth of Food Yeasts in Olive Residue Hydrolysate". Food Technology, 6, 107-109 (1952).

2. Halvorson, H. O. and Spiegelman, S., Inhibition of enzyme formation by amino acid analogues, J. Bact., 64:207-221, (1952).

Spiegelman, S. and De. Lorenzo, W. F. Substrate stabilization of enzyme-forming capacity during the segregation of a heterozygote. Proc. Nat. Acad. Sci., 38:583-592.

Spiegelman, S., Mapping function in tetrade and recombinant analysis. Science, 116:510-512. (1952).

3. Maurice Ogur, Sherwood Minckler, Gertrude Lindegren and C. C. Lindegren. "The Nucleic Acids in a Rdyploid Series of Saccharomyces," Archives of Bio-chemistry and Biophysics Vol. 40: 175-184. September, 1952.

A. L. Sheffner and C. C. Lindegren. "Adaptation to the Pre-fermentative Oxidation of Galactose." Journal of Bacteriology, Vol. 64: 523-530. September (1952).

N. J. Palleroni, A. L. Sheffner, and C. C. Lindegren, "The absence of Preadaptive Oxidation of Galactose by Strains of Saccharomyces". Archives of Biochemistry and Biophysics. Vol. 40: 22-27, September (1952).

V. Baird, S. Hestrin and C. C. Lindegren. "The Syringe Gasometer". Wallerstein Communications. Vol. 15: 213-217. Sept. (1952)

Dan O. McClary, N. J. Palleroni and C. C. Lindegren. "An Inexpensive Fermentometer". Wallerstein Communication Vol. 15, 219-224. September (1952).

Balaji D. Mundkur. "The Phenomenon of Long Term Adaptation to Galactose by Yeast." Genetics 37: 484-499. Sept. (1952).

J. Bona and L. R. Hedrick, "The Vitamin requirements of Members of the genus Candida."

Moving Picture of the Life Cycle of the Yeast Cell.

Dr. Lindegren has produced a very interesting movie entitled "The Life Cycle of the Yeast Cell." It is a 16 ml. sound picture. The picture takes 17 minutes and shows a disection of a four-spored acus, budding sequence, and fusion of yeast sex cells and production of a hybrid by time lasp photomicrographic sequence. Also, commercial production of yeast. This film is available for rental booking at $2.65 by writing to the Audio-Visual Aids, Southern Illinois University, Carbonale, Illinois.

Conclusion

The editor regrets that this issue has been so long in coming out. However, if there isn't much news forthcoming, it is difficult to get out an issue. We would like very much to get out the next issue sometime in June. Therefore, if you would be kind enough to submit any information you may have, I'll see to it that it gets out. Thanks for all your help.