Y E A S T S

A News Letter For Persons Interested In Yeast

November, 1955 Volume IV, Number 2

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The Editor takes pleasure in thanking all those who have contributed to this issue. Without this gratifying support the News Letter cannot fulfill its purpose. The Editors would like to invite others to send in contributions for future issues. It is planned to publish the next issue of the News Letter during the spring of 1956. It would be appreciated if anyone would notify the Editor of additional people in our field who would like to receive the Yeast News Letter.

Cost of operation: Contributions to help finance the News Letter are voluntary. Despite the gratifying support of some of our readers, the expenses of mimeographing and mailing the News Letter during the last year have been greater than the funds on hand. It would be helpful if those who have not already contributed this year would mail $.50 to the Editor. Foreign readers, who have difficulties in transfering money, are of course, exempt.

The Editors.

I. Northern Utilization Research Branch (U.S.D.A.) Peoria, Illinois. Communicated by Dr. L. J. Wickerham.

Dr. J. Lodder of Delft, Holland, will study various phases of Yeast taxonomy with Dr. L. J. Wickerham at the Northern Utilization Research Branch at Peoria, Illinois, from January through March, 1956. She will then study for three months at the University of Washington at Seattle. An informal meeting lasting one day is planned for March so that persons interested in meeting Dr. Lodder may do so. It is anticipated that the morning will be spent in reports of yeast programs being pursued at various laboratories, and the afternoon in a general discussion of yeast taxonomy. Those persons wishing to attend this meeting should write to L. J. Wickerham.

Two papers dealing with hybridization of Saccharomyces lactis, Saccharomyces fragilis, Zygosaccharomyces ashbyi, Zygosaccharomyces dobzhanskii, and other related species are awaiting publication in the Journal of Bacteriology.

II. Illinois Institute of Technology. Technology Center, Chicago 16, Illinois.

The following abstract covers work done by Miss Louise Mojonnier under the supervision of Dr. Thelma Porter, Chairman, Committee on Home Economics of the University of Chicago. Facilities of Dr. L. R. Hedrick's laboratory were used. The material will be published in an early issue of the Journal of Nutrition.

Abstract

AMINO ACID COMPOSITION OF YEASTS

The complete amino acid composition of the proteins of four species of yeasts not previously reported were determined by the microbiological assay method. The yeasts studied, Candida krusei, Pichia membranaefaciens, Saccharomyces carlsbergensis, and Hansenula anomala, were grown

under standardized conditions in synthetic Wickerham's medium containing glucose and ammonium sulphate. Hansenula anomala was also grown on identical medium containing potassium nitrate. Brewers' yeast was assayed for comparison, and several of the so-called non-essential amino acids are reported for the first time.

The total nitrogen of the yeasts varied from 5.57% in Pichia membranaefaciens to 7.4% in Candida krusei, somewhat lower than the brewers' yeast value of 8.76%. Amino acids accounted for 73-79% of the total nitrogen in the various yeasts. All yeasts studied contain the eight so-called nutritionally essential amino acids making them potential supplements of poor quality proteins. All are relatively good sources of lysine; all are relatively poor sources of cystine and methionine. Hansenula anomala grown in the ammonium sulphate medium contained the same amount of protein as that grown in the potassium nitrate medium but the former contained more glutamic acid, glycine, isoleucine, leucine, phenylalanine, tyrosine, and valine and less alanine and arginine than the latter, although the growing conditions and other components of the media were identical.

III. Southern Illinois University, Carbondale, Illinois. Communicated by Dr. Carl C. Lindegren.

Since the last publication of the YEAST NEWS LETTER, the following articles have been accepted for publication:

Lindegren, Carl C., Williams, Marion A. and McClary, Dan O. The distribution of chromatin in budding yeast cells. Antonie Van Leeuwenhoek. In press.

Brenes-Pomales, Arturo, Lindegren, Gertrude and Lindegren, Carl C. Gene control of copper sensitivity in Saccharomyces. Nature In press.

Lindegren, Carl C. Methods for the diagnosis of gene-controlled fermentative ability in Saccharomyces. Wallerstein Laboratory Communications. In press.

Dr. Akira Yuasa, Professor of Biology from the University of Tokyo, Japan, is working in the Biological Research Laboratory under a Fullbright fellowship for one year.

Dr. B. Ranganathan from the Indian Institute of Science, Bangalore, India, is studying in the Biological Research Laboratory for one year.

IV. Dr. Caroline Raut reports the publication of the following recent paper:

Raut, Caroline and Simpson, W.L. The Effect of X-rays and of ultraviolet Light of Different Wavelengths on the Production of Cytochrome Deficient Yeasts. Arch. Biochem. Biophys. 57, 218 (1955).

V. Mycology Laboratory, National Institutes of Health, Bethesda, Maryland. Communicated by Dr. Chester W. Emmons

Studies of the saprophytic occurrence of Histoplasma and other fungi causing disease in man have been continued. Attention has been focused recently upon possible environmental sources of Cryptococcus neoformans, the most frequent cause of mycotic meningitis in man. This fungus was first isolated in 1895 from fruit by Sanfelice, who experimentally demonstrated its virulence for animals. Many fatal cases of human cryptococcosis have been observed and reported during the past 60 years.

C. neoformans was again isolated from a saprophytic source unrelated to a human or animal host in 1951 in this laboratory and in 1954 its isolation from 20 samples of soil or organic debris was reported. Some of these specimens were old weathered pigeon nests and a subsequent search has yielded isolations of typical virulent strains of C. neoformans from 63 of 111 specimens of old pigeon nests and pigeon droppings taken from 16 farm premises and 3 city premises. These findings were reported and the public health aspects discussed by Chester W. Emmons at a Symposium on Fungus Infections sponsored by and held on the campus of the University of California at Los Angeles, June 23-25, 1955. A report has been accepted

for publication in the American Journal of Hygiene.

VI. University of Southern California, Department of Bacteriology, Los Angeles 7, California.

Dr. M. D. Appleman reports that he recently gave a talk in London dealing with a new method of evaluating the flora of the tooth. He and his coworkers demonstrated that yeasts are solely surface contaminants of the plaque on the tooth. This paper is in press now in the British Dental Journal.

VII. University of Tennessee, Department of Bacteriology, Knoxville, Tennessee. Reported by Dr. J. Orvin Mundt.

Under my direction Mr. Jay Cameron has been attempting to characterize and elucidate the nature of the "peroxidase" reaction in yeast. He finds that only a few of the many substrates oxidized by vegetable peroxidase are also oxidized by fractions of the yeast cell. It is probable that the substance responsible for the reaction is either iron or a simple moiety containing iron, rather than an enzyme or an enzyme system. The substance is active at pH 2.5, and it survives autolysis, digestion with pepsin, autoclaving, and precipitation with ammonium sulfate. It is relatively inactive at neutrality.

The authors of an article in the July, 1955 issue of Applied Microbiology (v. 3, p. 250) give me credit for the isolation of a number of cultures of yellow yeasts. The term "yellow" is erroneous. These are unidentified, hyaline cultures isolated from curing meats several years ago.

VIII. University of Cambridge, Department of Scientific and Industrial Research, Low Temperature Research Station, Cambridge, England. Communicated by Dr. M. Ingram.

Arising out of interest in the taxonomy of osmophilic species, previously called Zygosaccharomyces, the splitting of the β-glucosides,

aesculin, arbutin, cellobiose, and salicin, by many different yeasts, has been studied. The results obtained suggest the following.

(1) The ability to split aesculin is far more widespread among yeasts than has been suspected hitherto.

(2) A medium, sufficient for good growth, is in many cases not sufficiemt to develop β-glucosidase activity.

(3) For this reason the arbutin plate technique (e.g. Lodder & Kreger-van Rij, 1952) does not always reveal the potential ability of a yeast to split arbutin.

(4) If a yeast can split one β-glucoside, it is not necessarily capable of splitting another.

An important factor in making these observations has been the use of spectrophotometric technique for measuring the phenolic aglycones liberated from aesculin, arbutin and salicin.

A note announcing the work described has been offered to "Nature" and a full length publication is in preparation.

The following paper has been published recently:

Barnett, J.A. and Ingram, M. Technique in the study of yeast assimilation reactions. Jour. Appl. Bact. 18, 131-148 (1955).

IX. University of Birmingham, England, Department of Applied Biochemistry. Communicated by Dr. C. Rainbow

A culture of Saccharomycodes ludwigii (Yeast 27) in my possession has, for a yeast, unusual requirements for nicotinate and pyridoxin. The organism appeared to be suitable for use in microbiological assays of the Vitamin B_6 complex over the range 0 - 1.0 mμg. pyridoxin/ml. and responds approximately equally to pyridoxin, pyridoxal or pyridoxamine.

Rainbow and his coworkers (J. Gen. Microbiol., 1952, 7, 54; 1954, 11, 180) reported the formation of a diazotizable amine by Saccharomyces cerevisiae (Yeast 47) in a defined medium which was fortified with added methionine but partially deficient in biotin. An amine, probably slightly transformed during purification, has now been isolated by Lones & Rainbow in crystalline form. This amine may be structurally related to the purine ribosides: it lacks the pyrimidine ring structure of the purines and contains a pentose moiety, but no acid-hydrolysable phosphate.

X. The University, St. Andrews, Scotland, Department of Botany. Communicated by Professor John H. Burnett.

Work on the nucleic acid metabolism and cytology of yeast will continue in St. Andrews and, in addition, an investigation of the nature of the mating-type locus of Saccharomyces cerevisiae is in progress.

(Dr. Burnett was previously connected with the University of Liverpool, England. --- Editor)

XI. South African Council for Scientific and Industrial Research. P.O. Box 395, Pretoria, South Africa. Communicated by Dr. J. P. van der Walt.

A new species of yeast has been obtained from the sugary efflorescence of dried figs from the Western Cape Province. The yeast has been named Saccharomyces delphensis and is characterized by the formation of kidney-shaped ascospores. It ferments and assimilates only glucose. A description will be published in a forthcoming issue of the journal "Antonie van Leeuwenhoek".

XII. Soil Bureau Experimental Station, Department of Scientific and Industrial Research. Eastern Hutt Road, Lower Hutt, New Zealand. Communicated by Dr. Margaret di Menna.

Dr. di Menna has moved from the University of Otago and is now attached to the Soil Bureau. She is now working on soil yeasts and the

present project was set up to find whether there is any relationship between the species found, the soil type and the vegetational cover. Although it will be some time before sufficient surveys will have been made to advance any hypotheses, the present findings indicate that the pasture soils tested have a typical yeast flora of a rather restricted number of non-fermenting species.

XIII. Universidade de São Paulo, Departamento de fisiologia geral e Animal, Faculdade de Filosofia, Ciencias e Letras, Caixa Postal 8105, São Paulo Brasil. Communicated by Dr. Elisa Knapp.

The University is now operating a Marine Biological Station, located in São Sebastião, North coast of the State of São Paulo. The laboratory is starting research in marine microbiology. Beginning next year, graduate students will be trained in this field. The Rockefeller Foundation is greatly helping the new research center.

During October-November, 1955, the laboratory organized a course in Marine Biology, sponsored by UNESCO, Conselho Nacional de Pesquizas do Brasil and Rockefeller Foundation. This course attracted researchers from all Latin America. Dr. Knapp gave a seminar on "Factors affecting post mortem spoilage of marine products, with special reference to yeasts as contaminants". A practical course on the above subject was also given.

Elisa Pereira Knapp is continuing her work dealing with problems on ecology of Drosophila as related to yeasts and bacteria which she started in the Department of Food Technology, University of California, Davis in 1954. During the first phase of this work, 120 yeast strains were isolated from the breeding sites and food sources of different species of Drosophila found in different plant biotypes.

XIV. Department of Food Technology, Alexandria University, Egypt. Communicated by Dr. A. M. El Tabey Shehata.

Dr. Shehata has returned to Egypt after spending a year and a half in Brazil under a Rockefeller Foundation Fellowship at the University of São Paulo. His work was also supported by the Brazilian National Research Council. During his stay in Brazil a study was made on the association between yeasts and Drosophila. 281 flies (representing 13 species) were dissected and 394 yeasts were isolated (representing 9 genera and 43 species). In addition 46 yeasts were isolated from wild fruits present in the areas of fly collection. In attraction experiments, it was shown that certain species of Drosophila show strong preferences for certain yeasts. This last phase of the work will be published jointly by A. B. da Cunha, A. M. El Tabey Shehata and W. de Oliveira under the title, "A study of the diets and nutritional preferences of tropical species of Drosophila". Another paper dealing with the taxonomy of the yeasts will be published later by Dr. Shehata.

In another study carried out in Brazil, 138 yeasts were obtained from sugar cane juice after pressing and during the subsequent fermentation for "Pinga" manufacture. Nine genera and 26 species were identified. The most common isolates were Sacch. cerevisiae, S. carlsbergensis, Pichia membranaefaciens, Candida krusei and Torulopsis stellata. This work, including certain chemical and technological studies, will be published in a bulletin of the "Instituto Zymotecnico" by A. M. El Tabey Shehata, R. di Camargo and O. Valsecchi.

In Alexandria Dr. Shehata is now studying certain yeasts found in the rumen of sheep.

XV. Department of Food Technology, University of California, Davis, California. Communicated by Dr. H. J. Phaff.

1. Dr. R. di Camargo from the Instituto Zymotecnico, University of São Paulo, Brazil, has arrived in Davis, where he will spend a year at the Department of Food Technology under a Rockefeller Foundation Fellowship to study yeasts.

2. Three papers have been accepted for publication in Antonie van Leeuwenhoek.

(a) "The taxonomy of yeasts isolated from Drosophila in the Yosemite region of California". H. J. Phaff, M. W. Miller and M. Shifrine. This paper covers the taxonomy of the yeasts mentioned in the papers to be published in Ecology (see Yeast News Letter, May, 1955). Two new species of Saccharomyces were described, S. wickerhamii and S. kluyveri. The first yeast has kidney-shaped ascospores, the seond one spherical spores. Zygosaccharomyces fermentati Naganishi was shown to be a distinct species and is not a synonym of S. cerevisiae as was proposed by Lodder and van Rij. In order to avoid confusion with another yeast of the same name, it was suggested to change the name Z. fermentati to S. montanus Naganishi. Other new species are Pichia xylosa and Trichosporon aculeatum. The last species forms characteristic needle-like cells.

(b) "The taxonomy of yeasts found in exudates of certain trees and other natural breeding sites of some species of Drosophila." H. J. Phaff and Elisa P. Knapp. The yeasts, which were obtained from exudates of Quercus kellogii, Abies concolor and from some mushrooms and dead logs, were placed in the following genera: Pichia (34), Debaryomyces (35), imperfect forms of Hansenula (39), Endomyces (3), Saccharomyces (2), Candida (11), Trichosporon (7), Torulopsis (1), Cryptococcus (1), Sporobolomyces (1).

Four new species have been described, Pichia silvestris, Pichia quercibus, Pichia carsonii and Debaryomyces fluxorum.

(c) "A proposal for amendment of the diagnosis of the genus Pichia Hansen." by H. J. Phaff.

Since a number of species of Pichia have been found in the surveys listed under (a) and (b) which have a very primitive pseudo mycelium or none at all and, in addition, may lack pellicle forming ability, it was suggested to modify the present diagnosis of Pichia (see Lodder and van Rij) to allow inclusion of these species. The author feels that they belong to Pichia because hatshaped spores are formed and they lack the ability to ferment sugars. The amended genus would also include Saccharomyces pastori and S. pini, both of which are atypical representatives of Saccharomyces.

XVI. Department of Food Technology, University of California, Berkeley, California. Communicated by Dr. M. A. Joslyn.

Because of the practical and scientific interest in the field the data on yeast autolysis based upon Donald Vosti's Ph.D. thesis has been published in part in Applied Microbiology (Autolysis of Baker's Yeast and Autolysis of Several Pure Culture Yeasts; Vol. 2, No. 2, March, 1954). In addition, two extensive reviews of the entire field were prepared for Wallerstein Laboratories Communications, Part I appearing in the June, 1955 issue and Part II in the September, 1955 issue.

The possible applications of our present knowledge of yeast autolysis to changes in flavor and stability of beer was presented in a report to the American Master Brewers Association in San Francisco on September 27. This elicited considerable discussion and aroused great interest and will appear in the forthcoming proceedings of the Association.

XVII. Red Star Yeast & Products Co. (Oakland, Milwaukee, New Orleans). Communicated by Dr. H. J. Peppler.

Operations under the Red Star label began July 1 in the recently acquired plant of Consumer's Yeast Co. in Oakland.

Factors affecting the determination of yeast solids are discussed in a paper from our Research Department: "A Study of Factors Affecting the Determination of Solids in Yeast Press Cake" by Dale, Amsz, Keipper, Cooper and Peppler, Food Technol. 9: 458 (1955).

At the North Central Branch meeting of the Society of American Bacteriologists, held in Madison October 14 & 15, Joe Amsz discussed the details of "A Submersible Electrode for the Estimation of Dissolved Oxygen in Fermentation Systems".

Dr. Herman J. Phaff, Department of Food Technology, University of California, Davis, served as visiting Professor to the Research Department staff during the summer of 1955. Dr. Phaff's activities in lecturing, counselling and research greatly stimulated our endeavours.

XVIII. University of Wisconsin, Department of Biochemistry, Madison, Wisconsin. Communicated by Dr. W. H. Peterson.

I attended and gave papers at the International Congress of Pure and Applied Chemistry, Zürich, Switzerland, July 20-28, 1955, and the Third International Congress of Biochemistry, Brussels, Belgium, August 1-6, 1955.

I visited yeast plants at:

(1) Weingarten, Germany. This is a very modern plant and uses the Vogelbusch method of aeration and agitation for the production of baker's yeast. This method is not yet in use in the United States.

(2) Zellstofffabrik, Waldhof, Mannheim, Germany. This is the original plant where the Waldhof method of aeration was developed. It is a huge plant and makes torula yeast from sulfite waste liquor. There are

two such plants in operation in the United States, at Rhinelander and Green Bay, Wisconsin (see item XIX). From torula yeast Waldhof makes ergosterol, ATP, nucleic acids and many derivatives thereof, e.g. adenylic acid. Much torula yeast was used in Germany for human food after the last World War ended, but its use has gone out as meat has became available. This experience repeats the many previous failures to get yeast into the human diet. Will it succeed in Formosa, India and other far eastern countries?

(3) Two baker's yeast plants of the Distillers Co. Ltd. at Liverpool, England and Glenochil, Scotland. The Research Laboratories of the Distillers Co. Ltd. are located at Great Burgh, Surrey in the London area. Distillers makes most of the baker's yeast in Great Britain. They make Active Dry Yeast and ship frozen yeast to Malaya and other countries in the Far East. They operate under very carefully controlled conditions.

New Yeasts. Dr. J. F. T. Spencer, Prairie Regional Research Laboratory, Saskatoon, Canada, has obtained some extraordinarily interesting products from Zygosaccharomyces in highly aerated media -- high yields of glycerol and a hitherto unknown yeast product, D-arabitol. On the face of it, high yields of reduced products under aerobic conditions seems a contradiction and anomaly. The Biochemistry group in Wisconsin is joining Dr. Spencer in investigating the metabolism of osmophilic yeasts.

XIX. Sulphite Pulp Manufacturers Research League, Inc., 1101 East South River Street, Appleton, Wisconsin.

Dr. Averill J. Wiley, Technical Director of this organization, writes that his group is interested in research and development on processes and products connected with food and feed yeasts. They have been working

on the torula yeast process since 1943 and now have two member mills producing yeast at Rhinelander, Wisconsin and at Green Bay, Wisconsin. Persons interested in the research program should write to the above address and request copies of a list of League reports and reprints available for distribution (dealing with torula yeast nutrition, yeast process and product analysis and research on spent sulphite liquor).

XX. Annual Meeting Society of American Bacteriologists, Houston, Texas, April 29 - May 3, 1956.

Last year at the New York meeting, an informal Round Table discussion group met to discuss mutual problems on yeast. Although it appears unlikely that I will be able to attend this meeting, I shall be glad to arrange for a meeting room and try to find a person to act as discussion leader, so that a similar gathering can be held of persons interested in yeast. Time and place of these meetings are announced on the bulletin boards in the hotel.

Herman J. Phaff - Editor.