Y E A S T

A News Letter for Persons Interested in Yeast

November 1965 Volume XIV, Number 2



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Many thanks to those who have contributed to this issue by sending in news items and accounts of research projects. The next issue will be published in May 1966. A contribution of $1.00 from those who have not contributed for some time would be appreciated to finance future editions of the News Letter. Many thanks to those who have contributed recently.

The Editors

The Editor extends to the readers of the Yeast News Letter his warmest wishes for a happy and productive new year ahead.

H. J. Phaff

I. Centraalbureau voor Schimmelcultures, Julianalaan 67a, Delft, Netherlands. Communicated by Miss W. Slooff.

The following new species, for which a description has been published, have been received and placed in the C.B.S. collection:

Candida ciferrii van Rij; N. J. W. Kreger-van Rij, Mycopath. et Mycol. Appl. 26, 49, 1965.

Candida krusei (Cast.) Berkhout var. transitoria Saëz; H. Saëz, Bulletin mensuel de la Société Linéenne de Lyon, 34, 265, 1965.

Hansenula bimundalis Wickerham et Santa Maria; L. J. Wickerham, Mycopath. et Mycol. Appl. 26, 87, 1965.

Hansenula bimundalis var. americana Wickerham et Santa Maria; L. J. Wickerham, Mycopath. et Mycol. Appl. 26, 87, 1965.

Hansenula fabiani Wickerham, L. J. Wickerham, Mycopath. et Mycol. Appl. 26, 79, 1965.

Pichia media Boidin, Pignal, Lehodey, Vey et Abadie. J. Boidin, M. C. Pignal, Y. Lehodey, A. Vey et F. Abadie; Bulletin de la Société Mycologique de France 40, 396, 1964.

Saccharomyces inusitatus van der Walt. J. P. van der Walt, Antonie van Leeuwenhoek 31, 277, 1965.

II. Illinois Institute of Technology, Department of Biology, Chicago, Illinois, 60616. Communicated by Dr. L. R. Hedrick.

Dr. L. R. Hedrick and Miss Marjorie Loyugenc have compiled a list of all new species of yeast published since 1951, the closing date of inclusion of new species in the monograph by J. Lodder and N. J. W. Kreger-van Rij. The list, dated September, 1965, gives an alphabetical arrangement of the new species by genus and furnishes the appropriate reference but does not give a complete description. Neither does it attempt to evaluate the validity of each organism described since 1951. The review is based on journal articles and the following publications: A Taxonomic Study of the Yeast Genera Endomycopsis, Pichia, and Debaryomyces by N. J. W. Kreger-van Rij, 1964 (see Yeast News Letter, Vol. XIII, No. 2) and on Sinossi dei lieviti descritti dae 1952 al 1958. O. Verona and A. Montemartini; Casale Mouf., Milano, 1959 (see Yeast News Letter, Vol. VIII, No. 1). Those interested in receiving a copy of this mimeographed list are invited to write to Dr. Hedrick at the above address.

III. Laboratory of Kodama Brewing Co., Ltd., Iitagawa, Akita Prefecture, Japan. Communicated by Dr. Kenkichi Kodama.

The following is an abstract of a paper which we are contributing to the Journal of Fermentation Technology:

Studies on Wild Yeasts which Thrive in Sake - moto (III)

Kenkichi Kodama, Tadashi Kyono and Shigeru Matsuyama

Following a previous paper, 9 cultures of wild yeasts isolated from rice koji were dealt with.

Judging from the spore morphology, these isolates should be classified in the genus Debaryomyces. Further, on the basis of pellicle formation (employing the chemically defined medium by Wickerham, besides Koji and malt extract) and the negative lactose assimilation in Wickerham's liquid medium, 5 strains (AK-10, CH-D21, D24, D45, D69) and 4 strains (AK-D8, D28, D52, CH-D56) were identified as Debaryomyces nicotianae Giovannozzi and Debaryomyces kloeckeri Guill. et Peju, respectively. This is because a dull creeping pellicle can be observed in the former, while no pellicle formed in the latter, even after long periods of cultivation. Lastly a key to the classification of wild yeasts isolated from "rice Koji" (except for a group of Saccharomyces species) is presented.

Table 4. Key to the classification of yeasts isolated from "rice Koji"

| | | |
|---|---|---|
| 1a | Nitrate assimilated | (2) |
| b | Nitrate not assimilated | (3) |
| 2a | Spores hat-shaped, cells variable<br>Hansenula anomala<br>H. anomala var. ciferii | |
| b | No spore formed, cells round<br>Candida fabianii | |
| 3a | Spores helmet-shaped or hemispherical, cells variable<br>Pichia membranaefaciens (syn. Zygopichia chevalieri) | |
| b | Spores spheroidal with warty wall, cells small, spheroidal | (4) |
| c | No spores formed | (5) |
| 4a | Pellicle formed<br>Debaryomyces nicotianae (syn. Debaryomyces membranaefaciens) | |
| b | No pellicle formed even after a long time of cultivation<br>Debaryomyces kloeckeri (syn. Debaryomyces sake) | |
| 5a | Cells variable, usually pseudomycelium formed<br>Candida guilliermondii | |
| b | Cells round to oval, no pseudomycelium<br>Torulopsis spec. | |

IV. The University of Texas, Department of Microbiology, Austin Texas, 78712. Communicated by Dr. R. Storck.

We have finished a preliminary survey on the base composition of RNA and DNA in fungi. This survey included several yeast species. A report on RNA will appear in the November issue of the Journal of Bacteriology. The results on DNA have been accepted by the same journal and will appear in the January issue.

The DNA values found for yeasts and expressed in mole % GC (values calculated from buoyant density measurements in CsCl gradients) are as follows:

| | |
|---|---|
| Candida pulcherrima | 46 |
| Cryptococcus albidus | 55 |
| Rhodotorula mucilaginosa | 61 |
| Torulopsis stellata | 50 |

| | |
|---|---|
| Endomyces reesii | 39 |
| Debaryomyces kloeckeri | 40 |
| Pichia membranaefaciens | 46 |
| Saccharomyces cerevisiae | 40 |
| Saccharomyces fragilis | 42 |
| Schizosaccharomyces octosporus | 40 |
| | |
| Sporobolomyces roseus | 50 |
| Sporobolomyces salmonicolor | 63 |

These results are in agreement with those available in the literature (very few!) and suggest, as one can see, that ascosporogenous yeasts as a group have significantly lower GC content than the others. This finding is of interest in view of the facts: that the Euascomycetidae have GC contents significantly higher than 50%, that the Zygomycetes analyzed (primarily Mucorales) have GC content averaging 40% and that Dipodascus uninucleatus has 42% GC. Note also that Rhodotorula mucilaginosa has a GC content similar to that of Sporobolomyces salmonicolor.

These observations, as a whole, suggest to me that DNA GC content could perhaps become a tool for systematic and phylogenetic studies.

With my colleague, C. J. Alexopoulos, we have obtained an NSF research grant. We will focus our efforts first on the possible link between Zygomycetes and Ascomycetes. But, as a side project, we would like to further investigate the possible relationships between Rhodotorula and Sporobolomyces.

Drs. Storck and Alexopoulos would appreciate receiving communications from other investigators working in this area. They also would be glad to make determinations on species or strains that any investigator would like to see analyzed.

V. Istituto di Genetica della Università, Via del Borghetto, 80, Pisa, Italy. Communicated by Dr. N. Loprieno.

Present researches on Schizosaccharomyces pombe are dealing with the induction of mutations in $ad_6$ and $ad_7$ loci (purple mutants) by different chemicals as EMS, MMS, HA, DES and nitroso-compounds.

The following articles have been published:

N. Loprieno. Cysteine protection against reversion to methionine independence induced by N-nitroso-N-methylurethane in Schizosaccharomyces pombe. Mutation Research 1 (1964) 469-472.

N. Loprieno and C. H. Clarke. Analisi di reversioni indotte in un ceppo metionina-dipendente di Schizosaccharomyces pombe. Atti Ass. Genet. It., Pavia, 10 (1965), 128-129.

R. Guglielminetti and S. Bonatti. Analisi dell'azione mutagena di N-nitroso-N-metiluretano e di N-nitroso-N-etiluretano in Schizosaccharomyces pombe. Atti Ass. Genet. It., Pavia, 10 (1965), 130-131.

N. Loprieno and C. H. Clarke. Investigations on reversions to methionine independence induced by mutagens in Schizosaccharomyces pombe. Mutation Research 2 (1965) 312-319.

R. Guglielminetti, S. Bonatti and N. Loprieno. The mutagenic activity of N-nitroso-N-methylurethane and N-nitroso-N-ethylurethane in Schizosaccharomyces pombe. Mutation Research (in press).

R. Guglielminetti and S. Bonatti. Analysis of hydroxylamine induced mosaicism in Schizosaccharomyces pombe. Atti Ass. Genet. It., Pavia (in press).

VI. University of California, Berkeley. Donner Laboratory and Donner Pavilion. Communicated by Professor C. A. Tobias.

Dr. John T. Lyman has completed his doctoral dissertation in biophysics on a problem using yeast cells. A copy of the abstract is reproduced below. The whole report is available from the Lawrence Radiation Laboratory under No. UCRL 16030.

Dark Recovery of Yeast Following Ionizing Radiations

John T. Lyman

Lawrence Radiation Laboratory
University of California
Berkeley, California

March 30, 1965

ABSTRACT

Following exposure of diploid yeast to either x rays, ultraviolet light, or nitrogen mustard, a great increase in viability is observed if the irradiated cells are stored in distilled water (30°C) for 1 to 4 days before plating. Possible mechanisms which have been proposed to account for these results are (a) replacement of the damaged regions by de novo synthesis of DNA; (b) genetic exchange or recombination between homologous DNA molecules either during DNA replication or during chromosomal pairing; (c) direct enzymatic repair of damaged molecules.

Since there is a general idea that the biological effects of high-LET radiations are to a large extent irreversible, this paper is directed at determining the relationship between the recovery and the LET of the radiation, and will attempt to differentiate between the proposed recovery mechanisms.

The results of irradiation with x rays and heavy-ion beams have demonstrated that the recovery mechanism operates independently of the LET of the radiation, and also operates independently of the glycerol protection mechanism.

Experiments designed to elucidate the nature of the recovery mechanism have shown that besides the observed increase in viability, there is also a decrease in the induced allelic recombination frequency, a decrease in the time to form a visible colony, and a decrease in the dependence upon nutrient co-factors for the expression of the induced allelic recombination when the irradiated cells are stored in a medium lacking a nitrogen source before plating.

These results have been compared with the results expected on the basis of the different proposed recovery mechanisms. These comparisons suggest that the most likely recovery mechanism may be based upon the reunion of broken segments of DNA or upon enzymatic repair of damaged segments.

VII. University of Strathclyde, Department of Applied Microbiology and Biology, Royal College, George Street, Glasgow C1, Scotland. Communicated by Dr. J. R. Johnston.

Last year I moved to my present position from the Brewing Industry Research Foundation, Nutfield, Surrey. The following papers have recently been published or accepted for publication:

J. R. Johnston. Breeding Yeasts for Brewing. I. Isolation of Breeding Strains. J. Inst. Brewing 71, 130-135 (1965).

J. R. Johnston. Breeding Yeasts for Brewing. II. Production of Hybrid Strains. J. Inst. Brewing 71, 135-137 (1965).

J. R. Johnston. Reproductive Capacity of Yeast Cells. Antonie van Leeuwenhoek (in press) 1966.

A summary of the latter publication is given below:

Summary of "Reproductive Capacity of Yeast Cells"

The technique of micromanipulation was used to observe the number of daughter cells produced by individual cells of two yeasts, one a brewing strain and the other a hexaploid hybrid. The mode in which these cells died was also recorded. An average reproductive capacity of 34 daughter cells was found for the brewing yeast and of 17 daughter cells for the hexaploid strain. Two distinct modes of death were observed, one in which the final daughter cell appeared normal and the other where the last daughter cell could not be detached from its mother and both cells died. A correlation was obtained between the mode of death of a cell and its reproductive capacity. A number of final daughter cells (the 28th - 46th buds of their mother cell) was also observed through a considerable number of divisions and these cells were found apparently normal in their reproductive ability. These results appear consistent with the suggestion that cessation of budding is a consequence of reduction of the active surface to volume ratio because of the lower metabolic activity of scar tissue (Mortimer and Johnston, Nature, 1959).

VIII. McMaster University, Hamilton College, Department of Biology, Hamilton Ontario, Canada. Communicated by Professor J. J. Miller.

Mrs. M. Banerjee has recently completed an M.Sc. thesis entitled: "Some investigations on the sporulation physiology of Saccharomyces cerevisiae Hansen." The observation of Pazonyi and Markus (Agrokemia 4:225, 1955) that sporulated yeast cells contain more trehalose than the vegetative cells was confirmed. When the progressive changes in trehalose content during the sporogenic process were followed chromatographically, no consistent correlation was apparent between stage of sporogenesis and trehalose content, and this implies that the two processes are not closely linked.

IX. The Hebrew University of Jerusalem, Department of Biological Chemistry. Communicated by Dr. G. Avigad.

In our laboratory, work is continuing on aspects of reserve carbohydrate metabolism in yeast. The effect of various metabolic inhibitors on trehalose, glycogen, nucleotide pools and morphology of the cells is being studied. A study of the effect of 2-deoxyglucose on yeasts has shown that significant changes occur in the nucleotide pool--the adenine nucleotides being converted to inosine and hypoxanthine which are accumulated in the cells (Oppenheim, B., and Avigad, G., Biochem. Biophys. Res. Communication 20, 475 (1965). A paper on the properties of a trehalase which is found in extracts of a hybrid yeast

will shortly appear (Avigad, G., Ziv, O., and Neufeld, E., Biochem. J., 1965, in press).

X. University of Illinois, Department of Bacteriology, Urbana, Illinois. Communicated by Professor F. M. Clark.

Alice Helm and F. M. Clark. Studies on the capsular material produced by Lipomyces starkeyii.

The above paper was presented at a meeting of the Illinois Society of Microbiology held in Springfield, Illinois in October.

ABSTRACT

The culture of Lipomyces was grown on a synthetic medium containing ammonium salts and glucose. Growth was allowed to proceed until the 1% glucose added was entirely used. Cells were centrifuged out and capsular material from the supernatant precipitated with alcohol. After dialysis the capsular material was hydrolyzed with 1N $H_2SO_4$ for 12 hours at 100°C and neutralized with $BaCO_3$. Chromatograms permitted the identification of mannose and galactose in about equal amounts, and a small amount of free glucuronic acid. Two other compounds could be separated from the above on the chromatogram. One is probably an aldobiuronic acid, the other, an acidic compound that travels much slower than the other hydrolyzed products, has not been identified, but appears to contain glucuronic acid.

We have also been working on capsular material from Torulopsis melibiosum. This capsule is not removed as readily as that from Lipomyces. The work done so far indicates mannose as the main sugar component with smaller amounts of other materials not readily hydrolyzed by 1N $H_2SO_4$. A more complete analysis will be reported later.

XI. University of Tokyo, College of General Education, Department of Biology. Communicated by Dr. Akira Yuasa.

The following is an abstract of a paper which appeared in the "Japanese Journal of Botany, Vol. 19 (No. 1): 1-29".

Cytological Studies on Saccharomyces cerevisiae and its Allies

by

Akira Yuasa

1. As the experimental material, Saccharomyces cerevisiae and its allies were used. The nucleus contains a nucleolus, a karyosome and chromatin-threads, bound by the membrane. The appearance of the nucleus is different according to the strain, the condition in which the cell exists, the fixative and the staining.

2. In prophase of the nuclear division sometimes a crescent is formed or two rod-like chromatin-blocks are seen in the nucleus. At metaphase four chromosomes (n) appear in the spindle which is produced from the nucleus directly and is outside of the vacuole.

3. A centrosome is seen at the side of the nucleus. It divides into two during the nuclear division and exists at each pole of the spindle. The number of the centrioles seems to be correlated with ploidy of the cell.

4. Two kinds of mitochondria are discerned which are transformable into each other. They are vesicular and liporated mitochondria. Microsomes are also seen which seem to contribute to the formation of membranes.

5. By electron-microscopy the structure of nucleus and mitochondria were clarified and the process of nuclear division was pursued.

6. Endoplasmic reticula are seen protruding near the contacting portion between the nucleus and the vacuole by light and electron-microscopy.

7. A communicating pore is seen at the contacting portion between the nucleus and the vacuole. In some strains of Saccharomyces cerevisiae (Lindegren's tetraploid strain 11294 X 11296 and diploid strain 68 X 56) chromosomes appear in the vacuole and the contents of the nucleus change to the spindle directly in the vacuole.

8. Reduction-division and spore-formation were studied by light microscopy.

9. The number of chromosomes were studied on Wickerhamia fluorescens and Hansenula sp. to discuss the basic number of chromosomes of Saccharomyces cerevisiae. The basic number of chromosomes was supposed to be two in Saccharomyces cerevisiae and its allies.

XII. Muséum National d'Histoire Naturelle, Laboratoire d'Ethologie, Parc Zoologique, Paris XII, France. Communicated by Dr. Henri Saëz.

Below is presented a list of recent publications with brief commentaries. Besides the usual studies of fungi isolated from animals of the zoological garden, studies have been made of strains of Geotrichum obtained from various sources of yeasts.

a) Yeasts

Candida krusei (Castellani) Berkhout var. transitoria, a new variety of yeast isolated from various mammals and birds. Bulletin Mensuel de la Société Linnéenne de Lyon 34, No. 7, 265-270, 1965.

This variety utilizes xylose and has a maximum temperature of growth of 38-39°C, which is lower than that of the species (44-45°C).

A study of 29 strains of Cryptococcus isolated during the last five years from mammals and birds. Revue de Mycologie 30, No. 1-2, p. 57-73, 1965.

b) Geotrichum:

Etude d'une souche de Geotrichum linkii Vörös-Felkai 1961. Recueil de Médecine Vétérinaire, 141, pp. 357-362, 1965.

Etude comparée de Geotrichum linkii et Geotrichum vanriji. Bulletin trimestriel de la Société Mycologique de France 80, f. 4, pp. 439-444, 1964.

Les Geotrichum à l'origine de mycoses profondes. Pathologia et Microbiologia 28, 2, pp. 287-295, 1965.

Because of their maximum temperature of growth, we believe that one must consider Geotrichum candidum as a transient organism in warm-blooded animals. The rate of survival (resistance to above-maximal temperatures) has been studied (as for C. krusei var. transitoria).

XIII. National Research Council, Prairie Regional Laboratory, Saskatoon, Sask., Canada. Communicated by T. A. LaRue and J. F. T. Spencer.

Utilization of D-amino acids by yeasts

Approximately 60 species of yeast were tested for their ability to utilize eighteen D-amino acids as nitrogen source. Over 80% of the strains tested used at least one. Most grew on D-alanine and D-leucine, only a few on D-threonine and D-tyrosine. The extracellular products of D-histidine suggest that, at least for this substrate, the $\alpha$-keto acid is the first product formed. The rapid utilization by some yeasts of D-lysine, D-arginine, D-cysteine or D-threonine is especially interesting since animal D-amino acid metabolizing systems act on these substrates slowly or not at all.

Yeasts metabolizing D-amino acids were found in the Endomycetoideae, Saccharomycetoideae, Lipomycetoideae, Sporobolomycetaceae, Cryptococcoideae, Trichosporoideae and Rhodotoruloideae. The ability to grow on these compounds is so wide-spread that it is not likely to be useful in identification and taxonomy.

XIV. Institute of Marine Science, University of Miami. Communicated by Dr. S. P. Meyers.

1. S. P. Meyers, Institute of Marine Science, University of Miami, Miami, Florida 33149.

"I have returned from a cruise (July-August, '65) into the Black Sea aboard the University of Miami, Institute of Marine Science oceanographic vessel R/V PILLSBURY. This cruise was a part of EXPEDITION ODYSSEUS 65 which entailed extensive geological, hydrographic and biological investigations of the Mediterranean and adjacent water masses. A large series of mycological collections were made with particular attention being given to the yeasts and molds. All samples were taken with the Niskin Biological Sampler which performed with nearly 100% accuracy during the over 200 individual operations. These various fungi (approximately 450 isolates) currently are being identified in cooperation with Drs. Ahearn and F. J. Roth, Jr., in our laboratories and will be compared taxonomically and numerically with other marine mycological investigations.

Following the cruise I had an opportunity to visit the Department of Microbiology of the National University of Athens, Greece, as a guest of Prof. J. Papavassiliou. Further visits were held with Prof. Renato Craveri of the University of Milan, Dr. Arpad Grein, Farmitalia Company, Milan, Dr. E. B. Gareth Jones, Portsmouth College of Technology, England, and finally with Dr. N. van Uden of the Department of Microbiology of the Institute of Botany at Lisbon, Portugal. Dr. van Uden showed me the extremely impressive facilities of the Gulbenkian Foundation, now under construction, particularly the area that will be devoted to microbiology. Dr. van Uden indicated he would report in full on this development in a subsequent Aquatic Microbiology Newsletter."

2. ANNALI DI MICROBIOLOGIA

During my recent trip to Europe, I visited the facilities of the Institute of Microbiology of the University of Milan, Italy, as a guest of Dr. Renato Craveri. Dr. Craveri discussed at length his plans to strengthen the journal of his Institute and to inject more of an international flavor into its format. Dr. Carveri writes "...we need more foreign collaboration, that is, original papers or up to date reviews on topics concerning soil, marine, industrial,

fermentation microbiology (in English). If you and your colleagues or friends in these fields would like to publish in our journal, they will be welcome. Since this journal is the only one in Italy concerning this scientific field, which is going to become more and more important, we would like to have it become really effective in a few years."

Dr. Craveri's address is: Dr. R. Craveri, Associate Professor
Instituto di Microbiologia Generale Agraria e Tecnica
Universita Degli Studi di Milano
Via Celoria 2, Milano, Italy

3. R. C. Dugdale, Institute of Marine Science, University of Alaska, College, Alaska.

"Our work on marine yeast has been channeled completely into the bioassay area and a student of mine, K. V. Natarajan, has just finished his doctorate with a thesis on thiamine in the sea. He made about 1500 thiamine determinations in all with some interesting results. Apparently it is produced in the euphotic zone by the phytoplankton where there also appears to be a fairly high rate of uptake of thiamine. He found good correlation between primary productivity and thiamine concentration.

We are planning to submit a series of papers resulting from Natarajan's thesis and will send you reprints as soon as they are available."

XV. Institute of Applied Microbiology, University of Tokyo, Tokyo, Japan. Communicated by Professor H. Iizuka.

The following is an abstract of a paper recently published in the Journal Gen. Appl. Microbiol. 11, 153-159, 1965.

Microbiological Studies on Petroleum and Natural Gas
VII. Monosaccharide Components of a Hydrocarbon-Assimilating Yeast

Hiroshi Iizuka, Mikio Suekane and Yoshikazu Nakajima

The ability of microorganisms to assimilate hydrocarbons has been recognized for many years. In order to collect new species for the purpose of microbiological taxonomy, Iizuka and Komagata have isolated many hydrocarbon-assimilating microorganisms from soil samples of oil fields and gas fields, and from aircraft fuel samples. Candida rugosa JF 114, a strain among the above hydrocarbon-assimilating microorganisms, was previously reported to be capable of assimilating either hydrocarbons or carbohydrates as the sole carbon source. The present investigation was undertaken to confirm differences between the monosaccharide components of hydrocarbon-assimilated cells and those of carbohydrate-assimilated cells using Candida rugosa JF 114.

XVI. Faculty of Agriculture, Mie University, tu, mie. Communicated by Dr. Morio Akaki.

The following is an abstract of a paper recently published in the Journal of Fermentation Technology 43 (6), 365-373, 1965.

Studies on Mixed Yeast Cultures in Sulfite Waste Liquor Medium

Using seven strains of yeasts, i.e., Pichia sake form. $\alpha$ and Pichia farinosa (selected by the author in the preceding paper), Candida pelliculosa

(isolated by the author), Mycotorula sp., Candida utilis and Rasse XII as test organisms, pure culture and mixed culture agitation tests in sulfite waste liquor media containing $(NH_4)2SO_4$ and $KH_2PO_4$ were carried out. The yeast yields and the rate of sugar consumption of these yeasts in both cultures were investigated comparatively. The rate of sugar consumption by the culture of Candida utilis, which has lower ability to consume sugar in sulfite waste liquor medium than the other yeast strains employed in these experiments excepting Rasse XII in pure culture, in combination with one strain each of the following yeasts, i.e., Pichia farinosa, Pichia sake form. α, Hansenula anomala, Mycotorula sp. and Candida pelliculosa, which have higher ability to consume sugar in the sulfite waste liquor medium than Candida utilis in pure culture, exceeded the rate attained by the pure culture of Candida utilis. The yield of yeast cells in a mixed culture of Candida utilis and Mycotorula sp. exceeded the yield attained by either of the strains in pure culture. These results obtained from the mixed cultures are interesting from the standpoint of the biological treatment of sulfite waste liquor and the increase in cell yield from the liquor.

Candida utilis and Mycotorula sp. were cultured separately with agitation for 45 hours at 30°C in the sulfite waste liquor media containing about 2% sugar. Adding their culture filtrates to the sulfite waste liquor media, the effects of both culture filtrates on yeast growth were tested. The addition of the culture filtrate of Candida utilis was effective for the growth of Mycotorula sp., but addition of the culture filtrate of Mycotorula sp. had little effect on the growth of Candida utilis.

Using the culture apparatus with semipermiable membrane developed by McVeigh and Brown, the mixed culture of two strains of yeasts, Candida utilis and Mycotorula sp. in the sulfite waste liquor media were carried out without agitation. It was found that the growth of Mycotorula sp. was promoted by culturing it in combination with Candida utilis, while the growth of Candida utilis was little promoted by culturing it in combination with Mycotorula sp.

XVII. The Nancy Sayles Day Mycology Laboratory; Grace-New Haven Community Hospital and Yale-New Haven Medical Center. Communicated by Dr. L. D. Haley.

The Laboratory Staff consists of:

Leanor D. Haley, Ph.D., Director; Associate Professor, Department of Microbiology, Yale University School of Medicine.

Ruth Burke, Ph.D., Consultant in Mycology.

Yash Myer, Ph.D., Consultant in Biochemistry.

Lorraine Francis, Consultant in Animal Technics.

Betsey Wynne, A.B. Chief Technologist, Diagnostic Service.

Ruth Myer, Chief Technologist, Research Section

George Curry, Chief Animal Technician.

Among other projects, the research staff has been actively engaged in the study of hypersensitivity and pyrogenicity induced by several species of cryptococci and their significance in the pathogenesis of cryptococcosis.

The role of yeasts as potential pathogens for man is one of the prime interests in this laboratory. Because this is one of the few medical mycology laboratories containing a division of medical zymology, the number of consultations in this area is steadily increasing. Several mycologists from other

institutions have visited the laboratory to learn some of our technics. The Director has received much of her training in zymology in the laboratories of Dr. Lynferd J. Wickerham in Peoria, Illinois and Dr. N. J. W. Kreger-van Rij in Delft, Netherlands.

Publications:

This year saw the fruition of several years of work: the publication of a book, "Diagnostic Medical Mycology", Appleton-Century-Crofts, 1964. This book has been written primarily for the bacteriologist and physician who have had little experience in medical mycology.

Two papers are in press....

1. Barnett, R., Bradley, E. T., and Haley, L. D. Chronic mycotic granuloma due to a demateaceous fungus. Conn. Med., 1965.

2. Haley, L. D. Yeast infections of the lower urinary tract. I. In vitro studies of the tissue phase of Candida albicans. Sabouraudia, 1965.

XVIII. Reports of recent and future meetings on yeast.

1. The second International Symposium on Yeast will take place in Slowakia in 1966 one week before the International Congress of Microbiology in Moscow. The Symposium will emphasize especially the area of yeast taxonomy from a number of different points of view: cytological, genetical, serological, biochemical, etc. Present indications are that most internationally-known specialists on yeast will be participants. The organizing committee is attempting to assemble as many workers on yeast and yeast-like organisms as possible. Your inquiries and communications are invited and should be sent to the following address:

> Organizing Committee (Chairman: Dr. A. Kocková-Kratochvílová), Csl. spolocnost chemická pri CSAV, Bratislava, Palachého 32, Czechoslovakia.

2. Your Editor participated with approximately 120 other scientists from 21 different countries in a highly interesting International Symposium on Yeast Protoplasts, which was held from September 21-24 in Jena, D.D.R. The success of the conference was due in no small measure to the excellent organization by Dr. R. Müller and his staff. For the benefit of those who could not be there an abbreviated listing of the various papers is given below. It is planned to publish the symposium and details of publication will be announced in the next issue of the Yeast News Letter.

> J. R. Villanueva (Madrid). Protoplast release and its structure in Candida utilis.
>
> R. A. Zvjagilskaja (Moscow). Die Isolierung und Fraktionierung der Protoplasten aus Hefezellen von Endomyces magnusii.
>
> G. Svihla und F. Schlenk (Argonne/Illinois). The influence of culture conditions on the formation of spheroplasts from Candida utilis.
>
> A. Svoboda (Brünn). Regeneration ability of protoplasts of different yeast species.
>
> R. Müller (Jena). Mikroskopische Analyse der Protoplastenentstehung und reversion (mit film).

C. Robinow (London/Ontario). Fresh light on the structure of the yeast nucleus.

B. Mundkur (Storrs/Connecticut). Submicroscopic cytochemical methods and the structure of yeast cell.

Ph. Matile (Zürich). Production and elimination of secretory granules in Neurospora crassa.

N. Yanagishima (Osaka). Biological action of auxins on yeast.

G. Kraepelin (Braunschweig). Induktion und Permanenz des Atmungsdefektes bei Hefen.

M. Meissel, G. Medwedjewa, V. Birjusowa, N. Pomoshnikowa und R. Zvjagilskaja (Moscow). Struktur und Ultrastruktur der normalen und bestrahlten Hefeprotoplasten.

O. Necas und M. Havelkova (Brünn). Elektronenmikroskopie der wachsenden und regenerierenden Hefeprotoplasten.

R. Davies (Cambridge). Mercaptoethanol and protoplast formation and invertase release from yeasts.

O. Necas und A. Svoboda (Brünn). Beziehungen zwischen der Biosynthese der Zellwand und Regeneration bei Hefeprotoplasten.

A. A. Eddy (Manchester). Cell wall formation in yeast protoplasts.

F. B. Anderson (Nutfield). Yeast protoplasts and cell wall structure.

E. Streiblova (Prag). Der Einfluss der Zellteilung auf die Struktur der Zellwand von Schizosaccharomyces pombe.

M. Kopecka, O. Ctvrtnicek und O. Necas (Brünn). Die Bildung und Eigenschaften des fibrillären Gerüstes, das sich als erste Stufe der de novo-Entstehung der Zellwand bei den Hefeprotoplasten bildet.

H. J. Phaff and H. Tanaka (Davis/Calif.). Action of bacterial β-glucanases on isolated cell walls and ascus walls of various yeasts.

Ch. A. Masschelein (Brüssel-Anderlecht). Variations of cell wall structure during growth.

D. R. Kreger (Groningen-Haren). Roentgenographical aspects of yeast cell-walls.

R. Müller (Jena). Über die optischen Eigenschaften der Hefezellwand.

E. Streiblová, A. Svoboda und O. Necas (Prag, Brünn). Fluoreszenzmikroskopie der Hefeprotoplasten.

H. Klaushofer (Wien). Immunoelektrophoretische Untersuchungen an Hefezellwandfraktionen.

J. Sandula (Bratislava). Immunologische Eigenschaften der aus den Zellwänden verschiedener Arten der Gattung Candida isolierten Polysaccharide.

J. F. T. Spencer (Saskatoon/Sask.). Extracellular polysaccharides of yeast and their relationship to cell wall composition.

L. Silhankova (Prag). Effect of surface active agents on electrophoretic mobility of S- and R-mutants of yeast.

H. A. Koch (Erfurt). Untersuchungen über Ektofermente von Cryptococcus neoformans.

A. Kocková-Kratochvilová (Bratislava). Bedeutung des Zelldisintegrationsverlaufs bei der Bereitung des komplexen Candidins.

H. Wetzstein (Jena). Aspekte der lyophilen Konservierung von Hefezellen und ihrer Protoplasten.

S. Bernander (Uppsala). Phase transition of Candida albicans.

Y. Svobodová (Bratislava). Zur Mikromorphologie von Chmelia fusca, nov. gen. nov. spec.

P. Ottolenghi and E. B. Lillehoj (Copenhagen). Osmotic effects on yeast cells and protoplasts.

V. P. Cirillo (Stony Brook/N. Y.). The characteristics of sugar transport in yeast protoplasts.

A. Kotyk (Prag). The sugar space in yeast cells and protoplasts.

J. Zsolt und E. K. Novak (Szeged, Budapest). Über die Rolle der Zellgrenze während der Aufnahme von Oligosacchariden bei Hefen.

T. Ohnishi (Osaka). Properties of mitochondria prepared from yeast protoplasts.

Ph. Matile (Zürich). Morphological and biochemical properties of yeast mitochondria as influenced by oxygen.

J. A. Barnett (Cambridge). Biochemical aspects of yeast taxonomy.

H. M. C. Heick, F. A. McElroy and H. B. Stewart (London/Ontario). Biochemical activities of morphologically defined fractions from protoplasts of Lipomyces lipofer.

J. Hauge (Bergen/Norway). The involvement of membrane structures in protein synthesis in Bacterium anitratum and in the yeast hybrid Saccharomyces fragilis x Saccharomyces dobzanskii.

K. Rost (Jena). Über das Verhalten der Nukleinsäuren in Hefeprotoplasten.

I. Pashev (Sofia). Subzelluläre Strukturen in normalen und γ-bestrahlten Rhodotorula.

3. MARINE MICROBIOLOGY SEMINAR. An invitational seminar on marine microbiology will be held in Japan in August 1966 under the auspices of the National Science Foundation U.S.-Japan seminar program. Topics to be discussed will include (1) Marine microbial ecology and taxonomy; (2) Physiology and biochemistry of marine microbes, including yeasts and molds; (3) Primary production in the sea; phytoplankton physiology, biochemistry, and nutrition. Dr. Meyers (University of Miami) will be one of the participants discussing marine fungi and current research in marine mycology.

## XIX. Brief News Items.

1. I have settled down here again after an interval of two years. I was mainly engaged in studies on the cytoplasmic streaming and histochemistry of mitochondrial nucleoid in a slime mold, and on the differentiation of stomatal complex in Dr. Porter's laboratory, Harvard University.

I would like to study again subjects on yeasts and other lower fungi.

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2. The first three contributions on "Le genre Pichia sensu lato" have appeared in the Bulletin de la Société mycologique de France. The third contribution by M. C. Pignal and J. Boidin was published October 30, 1965 in Volume 81, No. 2, pg. 196-226. The last one, which has been with the editor since July, will contain, besides the description of the species with spherical spores, some general discussions and a key. "Les Candida sans pouvoir fermentaire" by S. Poncet and M. Arpin will soon appear in Antonie van Leeuwenhoek.

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3. Dr. Alberta Herman has joined our staff and is working in the field of microbial genetics.

The following papers have been published:

Stodola, F. H., R. F. Vesonder, and L. J. Wickerham. 1965. 8,9,13-triacetoxydocosanoic acid, an extracellular lipid produced by a yeast. Biochemistry 4: 1390-1394.

Wickerham, L. J. 1965. New heterothallic species of Hansenula. I. Hansenula fabianii. Mycologia et Mycologia Applicata 26 (1): 79-86.

Wickerham, L. J. 1965. New heterothallic species of Hansenula. II. Hansenula bimundalis and variety americana. Mycopathologia et Mycologia Applicata 26 (1): 87-103.

Wickerham, L. J. 1965. Opposite sexes as type specimen for heterothallic haploid yeasts. Taxon 14: 187-188.

Dr. L. J. Wickerham
United States Department of Agriculture
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4. Below are some references to recent publications from our laboratory:

Brock, T. D. 1965. β-Glucanase of yeast. Biochem. Biophys. Res. Commun. 19: 623-629.

Conti, S. F., and T. D. Brock. 1965. Electron microscopy of cell fusion in conjugating Hansenula wingei. J. Bacteriol. 90: 524-533.

Brock, T. D. 1965. The purification and characterization of an intracellular sex-specific mannan protein from yeast. Proc. Nat. Acad. Sci. 54: 1104-1112.

Brock, T. D. 1965. Biochemical and cellular changes occurring during conjugation in Hansenula wingei. J. Bacteriol. 90: 1019-1025.

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5. The following articles have been published since the last issue of the Yeast News Letter:

Lindegren, C. C. The circulation of the cell. Nature 208, 304-305 (1965).

Lindegren, G., Hwang, Y. L., Oshima, Y. and Lindegren, C. C. Genetical mutants induced by ethyl methanesulfonate in Saccharomyces. Canadian Journal of Genetics and Cytology 7, 491-499 (1965).

Carl C. Lindegren, Professor
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Southern Illinois University
Carbondale, Illinois

6. Dr. M. Shifrine, formerly with the Department of Avian Medicine, University of California, Davis, has spent the last year as a staff member at the East African Veterinary Research Organization, Box 32, Kikuyu, Kenya. He recently visited Davis but has returned to the above-mentioned institute for an additional two years to work on bovine pleuropneumonia. He is also planning to initiate a limited project on yeasts associated with various African wild life.

7. Dr. John Kleyn, who spent many years with various brewing companies in research (last with Anheuser-Busch in St. Louis) has accepted an academic position at the University of Puget Sound, Tacoma 6, Washington. Dr. Kleyn writes that he is enjoying his new teaching career.

8. The Mycoses Newsletter - for those interested in medical and veterinary pathology - has a new Editor. Following the appearance of the 8th issue (October 1965) of the Mycoses Newsletter the editorial responsibilities will be taken over by Dr. J. G. O'Sullivan, Department of Veterinary Pathology, University of Glasgow, 85, Buccleuch Street, Glasgow, C.3, Scotland, to whom all future correspondence should be addressed. Your previous editor has become increasingly involved with editorial duties of a different kind and this has made it increasingly difficult to devote the time necessary for expanding further the scope and circulation of the Mycoses Newsletter (Donald W. R. Mackenzie).