Y E A S T S

A News Letter for Persons Interested in Yeast

May 1957 Volume VI, Number 1

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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 in Nov, 1957. 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.

The Editors

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

During the past summer an examination has been made of the yeast flora of the phyllosphere of pasture plants and its relationship with the yeast flora of the underlying soil. Most of the conclusions are still tentative but there is some corroborative evidence to support them. During a hot dry period in February the phyllosphere of mature pasture plants - mainly ryegrass and white clover - supported a population of red yeasts of more than 30 million per gram wet weight of leaves. The dominant species resembled Sporobolomyces odorus in some respects, although it may be an undescribed species, and Rhodotorula glutinis was also present in important numbers. The true yeast flora of the top 1 1/2" - 1/2" of soil seemed to have been killed by heat and drought and to have been replaced by red yeasts from the phyllosphere. At a depth of 4" the true soil flora persisted but some red yeasts were present.

Further soil and leaf samples were collected from the same area in March two days after a 2" fall of rain. The yeast count on the new growth of grass was 800,000 per gram wet weight of leaf and the dominant species was Cryptococcus laurentii. Red yeasts were present but in smaller proportions than before.

Cryptococcus laurentii was present in the 1 1/2" - 1/2" soil layer but the red yeasts were still commonest.

Work is continuing on this subject. There is evidence that the red yeasts disappear entirely from the phyllosphere in the winter and spring, being replaced by C. laurentii and Torulopsis aeria, but there is still not enough data on the infiltration of the soil layers by the Sporobolomyces-Rhodotorula group and their persistence or disappearance. Results from other pieces of work suggest that C. laurentii is a colonizer of soils in which the microflora has been depleted, but is unable to maintain itself in a soil with a normal population.

II. Robert A. Taft Sanitary Engineering Center, United States Department of Health, Education, and Welfare, Public Health Service, Cincinnati, Ohio. Fungus Studies, Microbiology, Water Supply and Water Pollution Research. Communicated by M. Bridge Cooke.

Since early in 1952 this laboratory has been engaged in surveying fungal populations of sewage and polluted water, and in studying the role of fungi in such habitats. By mold plating techniques and special yeast isolation techniques suggested by Wickerham, yeasts have been found in considerable numbers. Several strains of species of such genera as Torulopsis, Candida, Trichosporon and Rhodotorula as well as Geotrichum and Pullularia have been found.

In slide exposures on surfaces of trickling filters it has been observed that spring and autumn are peak seasons in numbers of colonies of both red and white yeasts, while summer is the poorest

season for yeast development. On a high-rate trickling filter, sampling shows a weekly average of more than a million colonies per 3 square inches of slide surface in peak seasons.

Throughout all sampling stations in a sewage treatment plant, and in most stations sampled in a polluted stream, yeasts could be obtained without difficulty even when samples were used at high dilutions.

Identification of cultures has been kindly undertaken by Dr. H. J. Phaff and his staff.

III. University of Kentucky, Lexington, Kentucky. Communicated by Dr. John M. Carpenter. (Received November 1956)

I received earlier in the year a $7100 grant from the National Science Foundation for a study of Drosophila species in relation to wild yeast species.

The grant is for a period of two years and will be concerned primarily with a study of seasonal fluctuations in Drosophila species in relation to wild yeast species. I have two graduate students working with me - - Mr. James K. Komatsu and Mr. James Ferrel Jones. Collection of Drosophila was begun in June and of yeast in September, and has continued twice weekly. Cold weather is now about to terminate collection of both, but we have isolated close to 75 yeast strains (many alike, of course) for which identification is scheduled soon.

We are following the method of collection and dissection as described in the series of papers by Dobzhansky, Phaff, Carson et al. in the July issue 1956 of Ecology, with the exception that we have used very fine jewelers forceps for dissection which we find are just as sharp and easier to handle than dissecting needles. We simply dissect and lift out the crop by its stalk.

Yeast identification will be done by following the methods as set forth in Lodder and Kreger-Van Rij.

IV. Instituto "Jaime Ferran" de Microbiologia, Madrid, Spain. Communicated by Dr. C. Ramirez.

The following are the Latin diagnoses of seven new species of yeast and one new genus. The yeasts were isolated from fleshy fungi. Details of the work will be published shortly in Microbiologia Espanola (Madrid).

Sporobolomyces albidus n. sp. IJFM n. 502

In musto maltato cellulae multae formae, ovoideae aut longovoideae (3-7)(5-15μ Sedimentum, anulus subtilis et pellicula subtilis formantur. Post unum mensem (17°C.) anulus crassus et pellicula mucosa formantur. Cultura in agaro maltato (post unum mensem 17°C.) satis

mucosa, flavifusca aut flavalbida valde crispulata. Pseudomycelium abundat. Cellulae pseudomycelii curvatae. Blastosporae verticillatae. Ballistosporae fusiformae formantur.

Fermentatio nulla. In medio minerali cum glucoso, galactoso, maltoso, saccharo crescit. Nitras kalicus non assimilatur. In medio minerali cum alcohole aethylico non crescit. Arbutinum finditur.

Sporobolomyces boleticola. n. sp. IJFM 533

In musto maltato cellulae cylindratae (3,5-6) (9-16)μ; anulus et sedimentum formantur. (Post unum mensem, 17° C.) pellicula formatur. Cultura in agaro maltato (post unum mensem, 17°C), miniata, mollis, satis mucosa aut surda, crispulata aut plana, margine undulato. Pseudomycelium abundat. Blastosporae ovoideae. Ballistosporae reniformae formantur.

Fermentatio nulla. In medio minerali cum glucoso, saccharo, maltoso crescit. Nitras kalicus non assimilatur. In medio minerali cum alcohole aethylico non crescit. Arbutinum finditur (exigua).

Genus Debaryolipomyces nov. gen.

Cellulae rotundae aut ovoideae. In propagatione vegetativa gemmae ab omni latere formantur. Pseudomycelium nullum.

Copulatio cellularum inaequarum, (cellulae maternae cum gemmae) conformationi asci praecedit. Ascoporae rotundae, spinulosae. 1 in asco.

Sporangium formatur hoc modo: Cellulae gemmantes, magnum tuberculum sacciformis, in sporangium vertens, formant. Sporae glabrae, ovoideae aut rotundae, plerumque 1 in sporangio. Sporae liberatae celeriter e sporangio.

Fermentatio nulla.

Debaryolipomyces lutetiensis n. sp. IJFM 535

In musto maltato cellulae rotundae, (3-6). (3-6) μ. Sedimentum anulusque formantur. In agaro maltato (post unum mensem, 17°C) cultura albida, glabra, mollis, cerea, margine undulato. Pseudomycelium nullum. Ascosporae et sporangium formantur in modo in diagnose generis indicato. Fermentatio nulla. In medio minerali cum glucoso, galactoso, saccharo, maltoso, lactoso crescit. Nitras kalicus non assimilatur. In medio minerali cum alcohole aethylico non crescit. Arbutinum finditur.

Debaryolipomyces hoimi n. sp.

In musto maltato cellulae rotundae aut subovoideae (2-5)(2,5-6)μ. In agaro maltato cultura (post unum mensem, 17°C.) albida aut flavalbida, mollis, plana, cerea, margine undulato. Pseudomycelium nullum. Ascosporae et sporangium formantur in modo in diagnose generis indicato. Fermentatio nulla. In medio milnerali cum glucoso, galactoso, saccharo, maltoso crescit. Nitras kalicus non assimilatur. In medio minerali cum alcohole aethylico non crescit. Arbutinum finditur aut non finditur.

Schizosaccharomyces zambettakesi n. sp.

In musto maltato cellulae ovoideae aut cylindratae (4-7)(11-50) u paucae cellulae mycelii. Pellicula formatur. Pellicula facile cadet ad iundum. (Post unum mensem 17°C.) materia pelliculosa flavida, valde mucosa, formata est. Cultura in agaro maltato (post unum mensem, 17° C.) flavalbida, nitida, nitida, glabra aut parum crispulata, margine interdum piloso atque undulato. Mycelium verum cum arthrosporis. Copulatio arthrosporarum conformationi asci plerumque praecedit. Ascosporae rotundae aut ovoidae. 1-8 in asco.

Fermentatio nulla. In medio minerali cum glucoso, galactoso, saccharo, maltoso, lactoso crescit. Nitras kalicus non assimilatur. In medio minerali cum alcohole aethylico non crescit. Arbutinum non finditur.

Candida anomala n. sp.

In musto cellulae ovoideae aut globosae (2, 5-4,5)(4-5)u, singulae aut binae. In propagatione vegetativa gemmae ab omni latere formantur. Sedimentum anulusque subtilis formantur. Cultura in agaro maltato (post unim mensem 17° C.) glabra, surda, albida, margine glabro aut undulato. Pseudomycelium abundat. Fermentatio glucosi, galactosi, sacchari (exigua), maltosi,(exigua), Lactosi (exigua), rafinosi (exigua). In medio minerali cum glucoso, galactoso, saccharo, maltoso, crescit. Nitras kalicus non assimilatur. In medio minerali cum alcohole aethylico non crescit. Arbutinum non finditur.

Torulopsis buffoni n. sp.

In musto maltato cellulae longovoideae (2,5-3)(8-15) u. Sedimentum anulusque subtilis formantur. (Post unum mensem 17°C.) pellicula mucosa, sedimentum et anulus crassus formantur. Cultura in agaro maltato (post unum mensem 17°C.) satis nitida, glabra, flavalbidobruna, plana et mollis. Pseudomycelium nullum Fermentatio nulla. In medio minerali cum glucoso crescit. Nitras kalicus assimilatur. In medio minerali cum alcohole aethylico non crescit. Arbutinum non finditur.

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

1. During the second half of May, the Departments of Enology and of Food Technology enjoyed a visit to our laboratories by Dr. J. P. van der Walt, representing the South African Council for Scientific and Industrial Research. Dr. van der Walt is returning to South Africa after a tour of various European enological institutes and the Carlsberg Laboratory at Copenhagen. Many stimulating discussions were held involving problems in the ecology and taxonomy

of yeasts. Dr. van der Walt will be moving his headquarters from Pretoria to Capetown and will devote a considerable part of his time to problems of the wine industry in South Africa.

2. Dr. E. M. Mrak, Chairman of our Department, has won the Nicholas Appert Award for 1957. The acceptance address was presented May 15 by Dr. Mrak at the Annual Meeting of the Institute of Food Technologists in Pittsburgh. The address dealt largely with his views and work on the distribution of yeasts in nature and the role of yeasts as food spoilage organisms.

3. Mr. Harry E. Snyder has begun a research problem for a Ph.D. thesis dealing with inulin fermentation by Saccharomyces fragilis, the same strain used previously for the production of a pectic enzyme. His work will deal primarily with the purification of inulase and its mechanism of action on inulin. Mr. R. T. Streutker has accepted a position with the Lucky Lager Brewing Company. He is completing his thesis for the M.S. degree. His work has shown that the assimilation of amino acids as single sources of nitrogen at various temperatures may be a promising approach to the differentiation of strains of brewers yeast. Other projects mentioned in the last issue of the News Letter are being continued.

4. Certain yeasts isolated from a variety of natural substrates in the Sierra Nevada (see page 6 of the Yeast News Letter of Nov. 1956) have been identified.

Sacch. kluyveri was isolated from the slime flux of a black cottonwood tree (Populus trichocarpa), altitude about 6000 feet. This yeast has also been isolated several times from willow exudate in Davis. Previously only one strain of this species had been isolated (from a Drosophila fly). One strain of Sacch. wickerhamii was obtained from the flux of an Abies tree (6000 ft.). Previous isolations (2 strains) only from Drosophila. Pichia xylosa was isolated from insect frass in Abies. Previously one strain isolated from Drosophila. (For a description of these yeasts, see Antonie van Leeuwenhoek 22, 145, 1956). In addition Pichia polymorpha was isolated from a slime flux in Quercus kellogii, one strain of Pichia silvestris was isolated from the flux of Q. kellogii and one from Abies flux. Six strains of the imperfect form of Hansenula mrakii were isolated from Q. kellogii, Abies and from the pitch of Libocedrus decurrens (cf. Antonie van Leeuwenhoek 22, 117 1956). Other yeasts isolated included Candida melinii (1), Torulopsis inconspicua (6), T. candida (3), Cryptococcus albidus (2), and Cr. diffluens (4) from a variety of substrates. Ascocybe grovesii (cf. Mycologia 46, 37, 1954) was isolated from a beetle underneath the bark of Q. kellogii. These results will be published in more detail in a future publication.

5. Since the last publication of the News Letter the following publication has appeared: "Delayed fermentation of sucrose by certain haploid species of Saccharomyces". D. Pappagianis and H. J. Phaff. Antonie van Leeuwenhoek 22, 353, 1956.

VI. Ministry of Agriculture, Fisheries and Food, Central Veterinary Laboratory, New Haw, Weybridge, Surrey, England. Communicated by Dr. P.K.C. Austwick.

"Candida tropicalis has been isolated from the stomach contents of an aborted bovine foetus in the absence of any other pathogenic organism and is reported by - Austwick, P.K.C. and Venn, J.A.J. (1957) "Routine Investigations into Mycotic Abortion." Vet. Rec. 69, 488-491."

This appears to be the first case of mycotic abortion associated with a yeast.

VII. Tierhygienisches Institut Der Universität München, Munich, Germany. Communicated by Dr. Brigitte Mehnert.

The following publications have been published or prepared by our Institute: MEHNERT, B.: Über das Vorkommen und die Bedeutung von Hefen im Kot von Menschen und Tieren. Zentralblatt f. Bakteriologie, II. Abt. 110, 50, 1956; ROLLE, M. und B. MEHNERT: Hefen als Symbionten bei Säugetieren. Zentralblatt f. Bakteriologie, I. Abt., Orginale. In press. (Based on a paper given at a meeting of the Austrian Society for Microbiology and Hygiene at Gmunden, Sept. 3-5, 1956 by B. Mehnert).

In September 1957 I intend to come to Boston (Massachusetts) and I would be very pleased to visit some yeast friends there or in the neighbourhood of Boston, in the state of Massachusetts.

VIII. Haskins Laboratories, 305 East 43rd Street, New York 17, N. Y. Communicated by Dr. S. H. Hutner.

A Cury and S. H. Hutner of the Haskins Laboratories, 305 East 43 Street, New York 17, New York would greatly appreciate having cultures of nonpathogenic intestinal yeasts that, like Saccharomycopsis guttulata, do not grow on ordinary yeast media; they have been working with the Parle strain of S. guttulata and would like to see whether their results on its nutritional requirements are applicable to ecologically similar yeasts isolated either from different hosts or belonging to different species. A preliminary paper on these results was given by Dr. Cury at the Jan. 1957 meeting of the New York Branch of the Society of American Bacteriologists.

On his return to Brazil in the fall of 1957, Dr. Cury expects to continue these studies in the new Institute of Microbiology of the University of Brazil for which plans are now being completed.

IX. Mycological Laboratory - Inst. of Hygiene, Montevideo, Uruguay. Communicated by Dr. Ricardo C. Artagaveytia-Allende.

1. R. C. Artagaveytia-Allende and N. Garcia - Zorron: "Yeasts encountered in man and in some animals".

In the study of various materials results have been obtained which we consider as being of interest in the understanding of the habitat of the yeasts.

Candida Albicans was isolated 3 times from scrapings of the tongues of 3 small dogs which still drank mother's milk. These animals had no human contact.

Candida tropicalis was isolated repeatedly from epithelial scrapings from the tongue of bovines.

Candida parapsilosis We have studied a strain isolated by Sanchez-Marroquin of Mexico, which had been isolated from the Mexican drink "Pulque".

Candida guilliermondii. We have isolated it from chicken manure, bovine tongue and from green feed for cattle.

Candida pseudotropicalis We have isolated it 7 times from autopsied rats which had been inoculated with diverse materials.

Torulopsis pintolopsei was isolated 13 times from the peritoneum of rats inoculated with most diverse materials such as samples of soil, bird manure, cephalo spinal fluid, etc.

2. A study on the importance of direct examination in diagnosis of "moniliasis" has been started.

X. Carlsberg Laboratorium, Physiological Dept: Copenhagen, Valby, Denmark. Communicated by Dr. C. Roberts.

Dr. J. P. van der Walt from Pretoria arrived in Copenhagen in March and was a guest at the Physiological Department of the Carlsberg Laboratorium for a period of six weeks, during which time he acquainted himself with the techniques employed here in yeast genetics. In addition, Dr. van der Walt carried on investigations on the life cycles of the two species belonging to the recently created genus Kluyveromyces.

Recent Publications:

Roberts, C.: The inheritance of enzymatic characters in yeasts. Friesia 5: 161-179, 1956.

Roberts, C.: Observations on the yeast Lipomyces (in press)

O. Winge and C. Roberts. A genetic analysis of melibiose and raffinoise fermentation. Compt. Rend. Lab. Carlsb. 25, 420, 1957.

M. Losada. The hydrolysis of raffinoise by yeast melibiase and the fermentation of raffinoise by complementary gene action. Compt. Rend. Lab. Carlsb. 25, 460, 1957.

XI. Low Temperature Research Station, Downing Street, Cambridge, England. Communicated by Dr. M. Ingram.

Dr. M. Ingram has given some consideration to the osmotic behavior of osmophilic yeasts in a paper on "Micro-organisms resisting high concentrations of sugars or salts" in the VIIth symposium of the Society for General Microbiology, edited by R.E.O. Williams and C. C. Spicer. "Microbial Ecology".

Mr. J. A. Barnett has published a paper "Some Unsolved Problems of Yeast Taxonomy" in Antonie van Leeuwenhoek 23, 1, 1957, this being virtually the paper read at the Yeast symposium of the British Mycol. Society a year ago. It deals especially with ambiguities in the interpretation of classical biochemical tests. He is now spending a few weeks at the C.B.S. in Delft to become familiar at first hand with the system used there.

XII. Southern Illinois University, Carbondale, Illinois. Communicated by Dr. C. C. Lindegren.

Since the last publication of the Yeast News Letter, the following articles have been published or have been accepted for publication:

Pittman, David D. Induction of respiratory deficiency in tetraploid Saccharomyces by ultraviolet radiation. Exp. Cell Research 11, 654-656 (1956).

Shult, E. E. and Lindegren, C. C. The direct effect of preferential segregation on the origin of polysomy. Nature 179, 683 (1957).

Lindegren, C. C. The role of the gene in evolution. N. Y. Academy of Science, December 1956.

Lindegren, C. C. Cytoplasmic inheritance. Proceedings New York Academy of Science, November 1956.

Lindegren, C. C. The integrated cell. Naturwissenschaften. Accepted for publication.

Lindegren, C. C. and Braun, W. The "Living" Molecule. Science. Accepted for publication.

Lindegren, C. C., Ogur, M. and Pittman, D.D. Respiratory competence in the diagnosis of gene-controlled phenotypes in Saccharomyces. Science. Accepted for publication.

XIII. U. S. Food Fermentation Laboratory (USDA, ARS) and North Carolina Agricultural Experiment Station, Raleigh, North Carolina. Communicated by Dr. John L. Etchells:

Two yeast papers were presented at the recent meeting of the Society of American Bacteriologists in Detroit, Michigan, April 28 - May 2, 1957; (1) "Influence of Sorbic Acid on Populations and Species of Yeasts in Commercial Cucumber Fermentations," by A. F. Borg, J. L. Etchells and T. A. Bell, (2) "Quantitative Determinations of Carotenoid Pigments in Yeasts of the Genus Rhodotorula", by W. J. Peterson, W. R. Evans, Eileen, Lecce, T. A. Bell and J. L. Etchells. (Abstracts of the above articles appear in Bacteriological Proceedings 1957, page 27 (for No. 1 above); page 29 (for No. 2)

XIV. University of Illinois, Urbana, Illinois. Communicated by Dr. F. M. Clark.

1. Professor Fred Wilbur Tanner died Sunday, February 24, 1957 at his home in Winter Park, Florida, after a prolonged illness. He obtained his A.B. degree from Wesleyan University, Middletown, Connecticutt 1912. Working as a Bacteriologist in the Illinois State Water Survey, he enrolled as a part time graduate student in the University of Illinois and was awarded an M. S. in 1914 followed by the Ph.D. degree. He was the first head of the department of Bacteriology, assuming this position in 1921. He served in this capacity until 1948 when illness forced him to retire.

Prof. Tanner's principle interests were the yeasts and the general field of food Bacteriology. The Tanner Collection of yeasts was known world wide, and at one time was a part of the American Type Culture Collection. His translation of Guilliermond's text "The Yeasts", was a noteworthy contribution to this field and a tremendous aid to American scholars working with yeasts. He was the author of several texts and reference books notably the "Microbiology of Food" and "Food Illness and Food Intoxication".

In 1943 his Alma Mater, Wesleyan University conferred upon him the honorary degree of Doctor of Science. In 1952 he was awarded the Stephen A. Babcock Award by the Institute of Food Technologists. He was an active worker in the Society of American Bacteriologists, Institute of Food Technology and American Public Health Association. It is with deep feelings of regret that we recognize this occasion.

The department is sponsoring a F. W. Tanner Memorial fund to be used for a portrait of Dr. Tanner to be hung in the New Biological Science Building. Friends of Dr. Tanner wishing to contribute can send their contribution to F. M. Clark, Tanner Memorial Fund, 726 So. Foley Street, Campaign, Illinois.

2. An article entitled, "The Utilization of Inositol, an essential metabolite for Schizosaccharomyces pombe", by H . F. Yarbrough, Jr. and F. M. Clark will appear in the Journal of Bacteriology soon. Proof of the article has been returned to the printers. Reprints will

be available to anyone who wishes them after the article is printed.

3. The production of β carotene by species of Rhodotorula is being studied by Mr. Robert Deufel in our laboratory. To date we have found that there appear to be complexes in yeasts with β carotene that render its extraction rather difficult. There appears to be considerable variation in the amount of this material produced by the different species of Rhodotorula. Nutritional studies are under way at the present time to determine the relationship between carbon and nitrogen sources and the production of β carotene. Selected for this work were both high and low producing species of Rhodotorula.

4. A paper was presented at the Annual Meeting of the Society of American Bacteriologists (May 1957) in Detroit on the "Relationship between p-amino-benzoic acid and folic acid in the nutrition of Rhodotorula aurantiaca and Rhodotorula rubra." Both these strains seem to have a definite requirement for PABA. Folic acid does not readily seem to replace the PABA requirement even though it is assumed to be formed from this vitamin. From the work done it appears that folic acid serves only as a poor source of PABA for these two strains of Rhodotorula.

5. Prof. Z. John Ordal, Dept. of Food Technology, University of Illinois, Urbana, Illinois, is in search of a special yeast for use in his research. He is interested in obtaining an oxidative yeast that will destroy lactose in solutions he is using. This yeast must not be a lactose fermenting yeast. H e would like to remove the lactose by oxidative means and not by fermentation. He would appreciate a culture of such a yeast if you have one available in your laboratory.

XV. Institute for Research in Canning, Meat Packing and Refrigeration, Section of Microbiology, Budapest, II., Herman O. -ut 15. Communicated by Dr. K. Vas.

The Effect of Removal of Available Water on Cell Form and Kinetics of Growth of a Strain of Sacch. cerevisiae var. ellipsoideus.

By. K. VAS & G. PROSZT

As a preliminary, the frequency distribution of the volumes of cells derived from a single-cell culture was studied (the volume was calculated from the values of the long and short axes of the cells using the formula for rotational ellipsoids). It has been shown that this distribution is not normal. Nearly all distribution curves examined were asymmetrical, showing strong positive skewness owing to the presence of a number of cells much larger than the average. Studying the nature of this frequency distribution by probit transformation and by fitting to

the normal curve by the χ^2 test led to the conclusion that, in most of the cases, it is of the log-normal type. It is believed that this finding provides a tool for a more critical survey of the taxonomy of yeasts based on cell size and for the statistical evaluation of the cytorrhytic, shrinking effect of various osmotic agents.

Suspending the cells in NaCl and glycerol solutions of various strengths, the mean of cell volumes decreased rather abruptly up to concentrations corresponding (osmotically) to about 1 per cent NaCl. At higher concentrations slower decrease followed. On the contrary, growth rate and total growth showed a continuous decrease from the smallest concentration onwards.

Thus, increasing the concentration brings about a relatively strong initial change in the degree of swelling of the cell plasm without apparent harm to its building-up and multiplication processes. Beyond a certain degree of de-swelling, corresponding to a decrease in volume of about 15 per cent, further removal of water causes relatively severe reduction in the intensity of life processes. This critical shrinkage of cell volume may be accompanied by a stronger decrease in the hydrature slowing-down of growth.

The two plasmolytic agents, NaCl and glycerol, so widely differing in chemical nature and material characteristics, exerted similar action on the cell: both acted as substances simply enhancing osmotic pressure and not possessing specific effects (salt effect).

Osmophilic Yeasts in Tomato Concentrates

By K. VAS & G.PROSZT.

It was found that spoilage occurring in warm weather of barrelled tomato concentrates containing 38-40% soluble tomato solids and 8-10% added sodium chloride is caused by osmophilic yeasts . Non-osmophilic organisms, e.g. Sacch. cerevisiae and Hansenula species may also be present in the microflora of spoiled purees but their role is only secondary. Applying the scheme of identification of LODDER and KREGER-VAN RIJ (The Yeasts, 1952), spoilage was traced back to Sacch. rouxii (VAS & PROSZT: Elelmezesi Ipar, 9, 41, 1955). This yeast is capable of deteriorating purees containing 38% soluble tomato solids and 10% added salt (equilibrium relative humidity at 23°C., ca. 86%) as well as concentrates containing 65% soluble tomato solids without added salt; ERH ca. 83%. Spoilage is accompanied by losses in weight of 1 - 3%, blowing and fermentation odour. Fermentation by these yeasts is far from complete and only a portion (8-32%) of the sugar present is consumed. Nevertheless, even in the case of minute losses in sugar the puree may become unpalatable. Fermentation is impossible in concentrates with an ERH of 73 - 75% or below. Fermentation cannot occur, even at an inoculation level of 10^8 Sacch. rouxii cells per g. of product, if - in the range of 40-70% total soluble solids - the composition of the puree satisfies one of the equations: $S \geq 25.82-0.273 \cdot T$ or $T \geq 94.6-3.67 \cdot S$,

where S = the concentration of added salt in per cent and T = soluble tomato solids (%).

Fermentation by Sacch. rouxii may be prevented by 0.15% sodium benzoate or by storage at temperatures below 8°C.

Complete inhibition of fermtation may also be achieved by treating the tomato juice with a cation exchanger (Dowex 50) before concentration (VAS: Food Manufacture, 32; 71, 1957). In this case, tomato purees of 25% soluble solids prove to be stable without heat treatment (sterilization).

XVI. Sulphite Pulp Manufacturer's Research League. Pulp & Paper Information Service, 1101 East South River Street, Appleton, Wisconsin. Communicated by Dr. Averill J. Wiley (March 20, 1957).

1. Appleton - Western Europe is currently buying high-vitamin stockfeed supplements of Wisconsin pulp-mill origin, the Pulp and Paper Information Service announced today. These exports are torula yeast that Wisconsin sulphite mills produce as a by-product from spent liquor they formerly discarded into the Fox and Wisconsin Rivers. There are no other torula yeast manufacturers in the U.S.

Small overseas orders began reaching the Wisconsin mills about 18 months ago from Germany and Sweden, where poultrymen and animal husbandmen have long been familiar with torula-enriched feeds. Because Western Europe has tremendous quantities of spent sulphite liquor available as raw material for making torula yeast, Wisconsin manufacturers consider their present overseas business welcome but only temporary. European rivers have their own sulphite pollution problems, and Europe can make torula yeast at lower cost than the same product can be shipped there from this country. The shortage of U.S. dollar exchange in Europe is another factor working against continuation of this demand. According to the Information Service, recent reports indicate that new torula yeast plants are being constructed in Germany and Spain, and there are as yet unconfirmed rumors of similar projects in other countries. Eventually European sources will be adequate to supply all European requirements.

The Wisconsin producers are counting rather on expanding their overseas markets for food-grade torula yeast that goes for human nutrition. They have developed this product to extremely high standards. As yet the export volume is relatively small, but it is growing steadily to Oriental and Southern Hemisphere areas where protein and vitamin supplies of local origin are scanty.

2. The new torula yeast plant in Formosa is now in production. The February 1957 issue of "Taiwan Sugar," Vol. 14, No.2, Page 22 through the first column on page 26, describes the dedication ceremonies of this large, new plant, and we understand that the March or April issues soon to be available in the U.S. will contain a description of the plant.

XVII. Miscellaneous News.

1. Dr. R. C. Hatfield of the California State Polytechnical College at San Luis Obispo writes: Two of my students are working with yeasts this year, one on the effects of ultrasonic vibrations at various levels. The other student is concerned with a survey of recent industrial disinfectants upon yeasts.

2. Dr. Caroline Raut Hebb of the Detroit Institute of Cancer Research writes that Dr. Tatsuo Yamamoto, Professor of the Kochi University, Kacho-mura, Kochi, Japan, had written to her asking whether any Institute or University might have a grant or fellowship available to work for a year on yeast problems in the U.S.A. Travel to the U.S. has been provided for. Dr. Yamamoto is interested primarily in improving the quality of nutritional and feed yeast. He has also worked on cell wall constituents of yeast. Since the Detroit Institute has no opening, the Editor is glad to bring this request before the readers of the News Letter, who might have funds for this purpose.

3. Positions wanted:

Dr. John G. Kleyn, 3605 Summit View Ave., Yakima, Washington, presently with the Washington State Department of Agriculture is seeking a new position. Ph.D. Cornell University 1951, thesis subject on factors affecting sporulation in yeast. Major subject - Bacteriology; minor in Biochemistry and Genetics.

Mr. Moshe Shifrine, Department of Food Technology, University of California at Davis expects to complete his Ph.D. degree about mid-fall of 1957. Field of study - Microbiology. Major Professor, H. J. Phaff. Thesis subject "A study of the genus Saccharomycopsis". Principal interest: taxonomy, ecology and biochemical activities of yeasts.

4. As in previous years, a round table discussion group again met during the National Meeting of the Society of American Bacteriologists in Detroit, May 1957. A group of about 12 persons met for several hours to discuss problems on yeast ecology, taxonomy, nutrition, biochemistry and spoilage of yeast. H. J. Phaff presided.

LETTERS TO THE EDITOR

Dear Sir:

We have a project of many years duration which is now nearing completion. It is the organization of all of our data on the many strains of yeasts that we have studied into a key for classification and a ready means of indicating which sporogenous species are most likely related to certain nonsporogenous species.

Over 3,800 strains of yeasts, both named strains and isolates from nature, have been studied morphologically, sexually, and biochemically in 38 carbon compounds for assimilation patterns and in 6 sugars for fermentation reactions. The reactions of all strains of a species are recorded on sheets 16 x 10 1/2 inches, 10 strains per sheet of biochemical data, and 6 to 12 strains per sheet of morphological and sexual data. These sheets immediately give the rangeof variation for all known species in which many strains have been studied. Non-sporogenous isolates which may or may not correspond to known species are recorded on sheets each of which has data on strains having identical assimilation reactions. Almost no variation is allowed here, for the strains will be used in mating experiments when an adequate number have been obtained. It is difficult enough to get sexually active mating types without reducing the chances for success by including unknowingly two species in the tests. Once mating types have been obtained in strains having one set of reactions, attempts can be made to mate them with mating types having slightly different reactions to learn howmuch variation exists in the species.

Another set of data sheets contain at the very top of the sheets the fermentation reactions and the carbon assimilation reactions of one species or group of isolates. In the space below those two lines are recorded the characteristics which separate species which may have the same fermentation and carbon assimilation reactions. The sheets are arranged in the order of increasing fermentation capacities. In species having the same fermentation reactions, they are arranged in order of increasing numbers of carbon compounds assimilated. The third set of sheets, which probably be in the form of a continuous roll some feet long, will have all species, both sporogenous and non-sporogenous, and arranged according to increasing fermentation reactions on the side and increasing number of assimilated carbon compounds on the top. As soon as the fermentation and carbon assimilation reactions have been determined and the position noted on the roll, the names of all species identical or extremely closely related to it should be found in a small circle around the point where the isolate falls on the table.

The key is purposely based on physiology and not on sex, for many species may occur in nature rarely as the sporogenous form and frequently as the asexual form. For instance, Endomycopsis chodati Wickerham et Burton is a very common heterothallic haploid, but a strain obtained from the Orient is diploid and sporulated abundantly. Similarly, a new species, Hansenula

matritensis Santa Maria, is an exceptionally interesting heterothallic diploid. It has identical fermentation and carbon assimilation patterns with Torulopsis globosa (Olson et Hammer) Lodder et Kreger-van Rij. One of the mating types of H. matritensis conjugates and forms ascospores with T. globosa. Thus another name of an imperfect species may drop from active use.

It would seem that this system would be of use to other institutions engaged in studies of yeast taxonomy. Only a broad description of the key has been presented here, but anyone interested is welcome to visit our laboratory and study the system in more detail.

Sincerely yours,

(signed)

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Kermit A. Burton, Biological Aid
Culture Collection Unit
Fermentation Section
Agricultural Research Service, U.S.D.A.
Peoria, Illinois

Dear Sir:

I am preparing a review to cover papers on Candida and Brettanomyces which have been published since the appearance of the review on the same subject in 1947, Bact. Rev, 11, 227-294. After I had collected more than 500 references, and the end was not in sight, I decided to eliminate from consideration medical aspects of the subject, although this is admittedly the most important practical field. It was felt that it would be better to cover all other aspects reasonably well, than to give a partial covering of the whole field that space limitation in Bact. Rev. quite properly necessitates.

It would be appreciated if persons having published on either of these two genera (even if only incidental to the main purpose of the article) would send in reprints as soon as possible. It is just those papers, the titles of which do not carry the names of the genera in question, that are most likely to be overlooked. Also it would be appreciated if persons coming in contact with papers on the subject would send in references, especially from "unusual" or foreign periodicals. It is my opinion that citations of articles in remote journals are of more value than citations of equally good papers in well known and readily available journals. I expect to include both and I do not anticipate that space limitation will be of importance since I have eliminated the field in which the most voluminous literature has been published. Naturally full references with authors, title, journal, page and year are easier to locate than incomplete references.

I have been working on this for three years, and I hope to have the manuscript ready late in 1957. I have most of the tedious work done and have read most of the papers, but I know that I must have missed some papers.

Yours sincerely,

(signed)

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