DIFFERENTIAL BEHAVIOUR OF *Saccharomyces chevalieri* AND ITS PETITE VARIANT IN ADAPTATION TO GALACTOSE

Classification of colonies	Respiratory activity of cells	Adaptation to galactose in fermentation tubes (*defined medium*)	Fermenter papillæ on colonies grown on *EMB* complete galactose agar	Characteristics of rapid fermenters of galactose
Normal (large)	Respiratory-sufficient; utilize lactate; consume oxygen	Fermentation completed in all tubes in 5–7 days	100 per cent of colonies contain one or more papillæ by 3rd or 4th day; overgrown by 5th and 6th days	Normal (large colonies) respiratory-sufficient, rapid (two-day) fermenters of galactose; may become de-adapted
Petite (small)	Respiratory-deficient; cannot utilize lactate; do not consume oxygen	Fermentation irregular; completed in 9–18 days	Less than 1 per cent of the colonies contain papillæ by 3rd or 4th day; 64 per cent of colonies contain one or more papillæ on 7th day	Small colonies, respiratory-deficient, rapid (two-day) fermenters of galactose; do not become de-adapted

experiments were not devised which would exclude the possibility that mechanisms involving cytoplasmic particles or slow genes may co-exist. Most of the normal rapid fermenters of galactose yield de-adapted populations after growth on a galactose-free substrate. Some of the petite rapid fermenters derived from the de-adaptable respiratory-sufficient fermenters also become de-adapted. These data are consistent with the views that an extra chromosomal apparatus may be involved[3,9]; the possibility that two mechanisms may operate simultaneously in adapting populations warrants serious consideration in formulating a concept of microbial adaptation.

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Identification of the Genes for Maltose Fermentation in *Saccharomyces diastaticus*

Winge and Roberts[1] have established that *Saccharomyces cerevisiae* contains three polymeric genes for maltose fermentation, M_1, M_2 and M_3, and they have obtained by mutation a fourth maltase gene (M_4).

It has been found[2] that *Saccharomyces diastaticus* contains two maltase genes, one governing normal fast fermentation (M_F) and one governing slow or delayed fermentation of maltose (M_S).

Prof. Ø. Winge has very kindly made available four hybrid yeasts each of which is homozygous for one of the genes M_1, M_2, M_3 or M_4. These yeasts were crossed, by Winge's spore-to-spore method, with cultures which were homozygous for M_F or M_S alone. Four-spored asci of the hybrids thus obtained were analysed for the segregation of maltose fermentation with the results shown in the accompanying table.

Crossing	Number of 4-spored asci of the hybrid giving segregation of maltose fermentation 4+ : 0−	3+ : 1−	2+ : 2−	Probability of this distribution if the two genes are non-allelic	allelic
$M_F \times M_1$	6	0	0	0·00002	1
$M_F \times M_2$	2	3	1	0·08	0
$M_F \times M_3$	0	5	1	0·13	0
$M_F \times M_4$	1	4	1	0·16	0
$M_S \times M_1$	0	5	1	0·13	0
$M_S \times M_2$	0	6	0	0·09	0
$M_S \times M_3$	2	3	1	0·08	0
$M_S \times M_4$	1	3	2	0·08	0
Theoretical 2-gene segregation	1	4	1		

It is thus established that the M_F gene of *S. diastaticus* is M_1. It is also established that the M_S gene of *S. diastaticus* does not correspond with any of the four genes M_1, M_2, M_3 or M_4, and it may be called M_5.

The maltase gene in *Saccharomyces italicus* was also identified[3] as M_1, so that this gene is common to all the naturally occurring maltose-fermenting yeasts so far examined.

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Environmental Influences and the Maxillary Index in *Anopheles gambiae*

APPARENTLY contradictory reports of the behaviour of *Anopheles gambiae* in different parts of Africa have led to suggestions that more than one biological race of this species exists. In French West Africa, Holstein[1] has attempted to correlate these differences with variation in the maxillary index—the number of teeth on both maxillæ, divided by two. He has recognized a paucidentate population with a maxillary index of 13·5 and a multidentate population with an index of 15. The former is said to be anthropophilic, mainly exophilic and to breed for preference in temporary pools in which the organic content of the water is low; the latter to be zoophilic, endophilic and to breed in permanent types of water of high organic content. Holstein has stated unequivocally that these two populations represent distinct biological races, and in this he has been supported by