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A second 'leaky' histidine mutant in linkage group IV

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Abstract

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The methionineless isolates from a cross of me-2 (P143) x tryp-4 (Y2198), pan-1 (5531) grew very slowly on medium supplmented with methionine, indole and pantothenic acid. Subsequently, it was shown that the methionine strain P143 (isolated by filtration enrichment technique following U.V. irradiation of Emerson a) required both methionine and histidine for normal growth. The histidine requirement resulted from a second mutation located a few units distal to the me-2 locus. It is proposed to designate the me-2 mutant isolation number P143m and the hist P143h.

Further information was sought for two reasons. First, a marker distal to me-2 was required to facilitate an analysis of recombination within the me-2 gene using marker genes which, like the me-2 alleles, had been induced in the Emerson wild type strain. Secondly, the new 'leaky' histidine mutant probably represents a class of mutants not readily recoverable by the filtration enrichment technique. Approximately 1,100 histidine mutants have been isolated (Catcheside, 1960. Proc. R. Soc. B 153:179; Webber and Case, 1960. Genetics 45:1605) by a filtration enrichment procedure, but no hist-4 allele was obtained. It was suggested that hist-4 mutants may all be 'leaky' and are therefore selected against by filtration. Both P143h and C141 (hist-4) grow appreciably on minimal medium and both are located in the right arm of linkage group IV, distal to me-2. None of the other six histidine genes is located in this region. No histidine independent isolate was found amongst 87 progeny from a cross of me-2, hist (P143) x hist-4 (C141), but preliminary chromatographic evidence of accumulation products detected by Pauly reagent (Ames and Mitchell, 1952. J. Amer. Chem. Soc. 74:252) indicates a difference between the two histi-

dine mutants. It is concluded that hist (P143h) is closely linked to hist-4 and that if P143h and C141 (hist-4) are alleles, they are physiologically dissimilar. A complementation test has not been made.

Random spores were isolated from crosses of me-2, hist (P143) x tryp-4 (Y2198), pan-1 (5531) and me-2, hist (P143) x cot (C102). The data are tabulated below. No double crossovers were observed.

Zygote genotype and recombination per cent	Parental combinations	Single exchanges in Region I	Region 2	Region 3	Total and per cent germination
4.1 3.1 0.2					
+ me hist +	198	12	9	0	455
tryp + + pan	223	7	5	1	91%
5.8 0.8					
me + hist	125	8	2	-	258
+ cot +	116	7	0	-	64%

On the basis of a single isolate hist (P143h) is proximal to pan-1, whereas hist-4 is distal to pan-1 (Perkins, Glassey and Bloom. Canad. J. Genet. Cytol., in press). However, the second cross indicates that P143h is distal to cot, and there is evidence (Mitchell and Mitchell, 1954. P.N.A.S. 40:436) that cot is distal to pan-1. The region adjacent to pan-1 comprises a cluster of very closely linked genes, making it difficult to demonstrate the linear order.