

Care, M. E., H. E. Brockman and F. J. de Serres.
Further information on the origin of the Yale and Oak
Ridge wild-type strains of *Neurospora crassa*.

Studied on series of alleles in *N. crassa* before 1953 were usually
made on mutants induced in many different wild-type strains.
The development of the filtration-concentration technique (Fries
1947 Nature 159: 199; Woodward, de Zeeuw and Srb 1954 Proc.

Natl. Acad. Sci. U. S. 40: 192; Cotcheside 1954 J. Gen. Microbial. 11: 34) made it possible to avoid the complication of
differences in genetic background and to obtain series of allelic mutants induced in the same genetic background for genetic
analysis. The cytological studies of St. Lawrence (1953 Ph. D. Thesis, Columbia University) and Singleton (1948 Ph. D.
Thesis, California Institute of Technology) reported various meiotic abnormalities in crosses of the standard Yale wild-type strains
(SY 7A x SY 4a) and the Abbott wild-type strains (Abbott 4A x Abbott 12a), respectively. McClintock's studies on the Cal.
Tech. wild-type strain 2292-2A (McClintock 1955 Carnegie Inst. Washington Yearbook 53: 254) showed that it carried a struc-
turally altered chromosome 5, resulting from the addition or insertion of a segment of uncertain origin into one of the arms so that
it was much larger than its normal homologue and comparable in total length to chromosome 3.

These studies demonstrated a need for a new wild-type strain as a starting point in filtration-concentration experiments to
avoid the complications in genetic analysis brought about by the presence of undetected structural modifications of chromosomes
presumed to be normal in their chromosome constitution. The development of new wild-type strains was undertaken by St. Law-
rence (op. cit.) and at Yale University two new wild-type strains ST 74A (St. Lawrence A standard) and ST 73a (St. Lawrence
a standard) (that she derived by morphological and cytological selection of progeny from intercrosses of Emerson's wild-type
strains E 5256A and E 5297a (see Barratt 1962 NN#2: 24)) were obtained for use in the mutant screening programs that were
started early in 1953. In these experiments mutants were induced in ST 74A and f_1 progeny were obtained from a cross to ST 73a.

In the heterocaryon tests made to distinguish mutants with identical biochemical requirements, however, problems developed
with the use of the f_1 progeny from crosses to ST 73a because of the segregation of heterocaryon-incompatibility genes. Many
 f_1 progeny would not form heterocaryons with standard tester strains of mating type A that originated in ST 74A. To avoid this
difficulty, an inbreeding program was initiated to replace ST 73a with a mating type a wild-type strain which was as nearly like
ST 74A as possible with respect to genes controlling heterocaryon formation and growth. A spontaneous *pan-2* mutant
(74A-Y153-M96) from ST 74A was crossed to ST 73a. The inbreeding program consisted of two successive backcrosses of a mating
type a, *pan-2* isolate with ST 74A (Fig. 1). A *pan-2* mutant of spontaneous origin, rather than one induced, in ST 74A was chosen
for the backcrossing program on the assumption that such a mutant was less likely to possess changes at other loci in the genome.
The heterocaryon reactions of *pan-2* isolates were checked in each generation with different biochemical mutants induced in
ST 74A until no further segregation of heterocaryon-incompatibility genes was indicated.

In the f_1 generation *pan-2* isolates were tested with an *ad-8* mutant of mating type A that originated in ST 74A
(74A-Y152-M47) and one isolate (74-YU371-11.7a) which responded to give a slow-growing bisexual heterocaryon was chosen
for further backcrossing to ST 74A. The segregation of heterocaryon-incompatibility genes in this generation was clearly indicat-
ed since some of the *pan-2* isolates did not respond in heterocaryon tests with two other testers: (1) a *pan-1* mutant of mating
type A that originated in ST 74A (74A-Y164-M65) and (2) an *ad-4* mutant of mating type a (74-YU390-9a) that resulted from a
cross of a mating type A mutant that originated in ST 74A with ST 73a. All f_2 progeny from the backcross of 74-YU371-11.7a to
ST 74A formed heterocaryons with the *pan-1* and *ad-4* testers, but differences in the linear growth rates of the heterocaryons were
found. The response of bisexual heterocaryons, however, was more uniform between the a isolates and the mating type a *pan-1*
tester than between the A isolates and the mating type a *ad-4* tester (perhaps indicating that 74-YU390-9a was not completely
isogenic with ST 74A). One *pan-2* isolate (74-YU387-11.7a) which gave wild-type growth rate with the *ad-4* tester and a slow-
growing bisexual heterocaryon with the *pan-1* tester was backcrossed to ST 74A. In the f_3 generation, all heterocaryon tests of
the progeny with the *pan-1* and *ad-4* testers were uniform showing that there was no further segregation of heterocaryon-
incompatibility genes in this generation. To verify this conclusion progeny from the f_3 generation were crossed to other
biochemical mutants of spontaneous origin recovered in filtration-concentration experiments on ST 74A. In all cases the hetero-
caryon responses of the progeny from the f_4 generation were like the responses of the f_3 generation. Since there was no evidence
of further segregation of heterocaryon-incompatibility genes in either generation, two wild-type strains (*pan-2*⁺) were selected
from those asci in the f_3 generation where the *pan-2* segregants had been tested. For convenience, these strains, 74-YU392-3.1a
and 74-YU392-5.5a have been referred to as 3.1a and 5.5a, respectively.

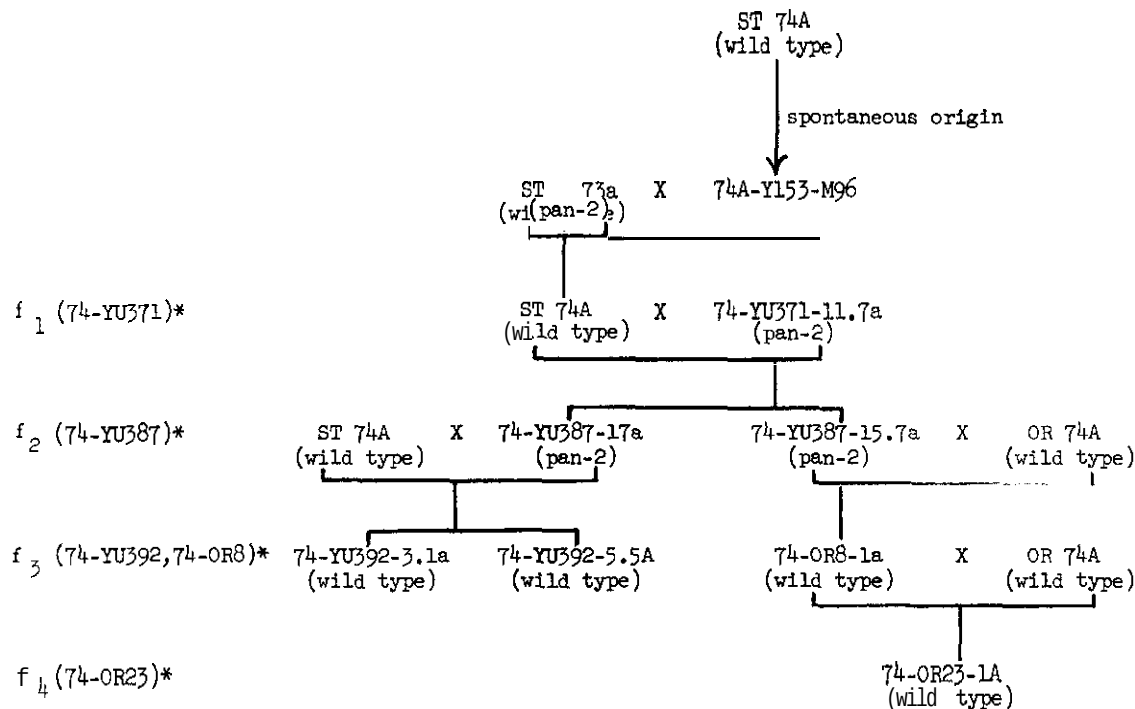
A parallel analysis of f_3 progeny from a backcross of a *pan-2* strain (74-YU387-15.7a) with the Oak Ridge conidial isolate
of ST 74A (OR 74A) gave similar results. In this case no segregation of heterocaryon-incompatibility genes was found among the
pan-2 progeny in heterocaryon tests with mutants induced in OR 74A or other inbred mating type a testers. A wild-type strain
was selected from the f_3 progeny of this cross to provide a new mating type a wild-type standard at C. R. Ridge (74-OR8-1a).

Early in 1960 we noticed that there was an unusually high percentage of tan and white ascospores (ca. 11%) and lower
ascospore germination (ca. 60%) in backcrosses of mutants induced in OR 74A, or in wild-type OR 74A, with 74-OR8-1a.
These and other data clearly implicated the Oak Ridge isolate of ST 74A which had somehow changed during the course of vege-
tative transfer sometime prior to 1959. To obtain a replacement for OR 74A a backcross was made to 74-OR8-1a to obtain a
mating type A wild-type strain that would give high fertility and a high percentage of black ascospores. f_4 progeny (Fig. 1)
were backcrossed to 74-OR8-1a, and the percentages of white, tan and black ascospores in each cross were determined by making
counts on suspensions in a hemocytometer with transmitted light at 90x magnification. Several mating type A isolates were ob-
tained from this cross that gave very low percentages of tan or white ascospores, and one was chosen (74-OR23-1A) that gave
398 black, 2 tan and 0 white ascospores in a total of 400 counted.

The following pedigree of the Yale and Oak Ridge derivatives of the original St. Lawrence wild-type strains corrects and
extends that given by Barratt in *Neurospora Newsletter* #2.

Figure 1

Pedigree of Yale (YU) and Oak Ridge (OR) wild-type strains
of N. crassa. (* = cross numbers in each generation.)



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