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The structure of the *A* mating type factor in *Coprinus lagopus*: Wild alleles

P. R. Day

*John Innes Institute, Bayfordbury, Hertford, Herts.**

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The *A* mating type factor of *Coprinus lagopus* is made up of two sub-units $A\alpha$ and $A\beta$ which recombine by crossing-over (Day, 1960). The initial study of the *A* factor of *Coprinus* was carried out with the two alleles *A*5 and *A*6 isolated by the author in 1957 and was followed by an investigation of mutant forms of these alleles (Day, 1963). This note reports the results of an examination of the sub-unit structure of a further eight wild alleles. Culture media and methods were the same as in Day (1963).

The basic collection of wild-type haploid stocks was enlarged to thirty-three made up of twenty-seven from Bayfordbury, England, and six, collected by Dr K. M. Swiezynski, from Gelasna, near Warsaw, Poland. Two compatible single basidiospore cultures were isolated from each fruit body or spore print. These stocks included thirty-one different *A* and twenty-seven different *B* mating type factors. Two *A* and four *B* factors were each recovered twice and one *B* factor was recovered three times.

By appropriate crosses the marker *ad*-8, 1·2 map units to the right of *A*, was combined with eight of the new *A* factors. Similar crosses with nine other new stocks failed to yield *A* factor—*ad*-8 recombinants in progeny tests of at least 235 auxotrophs in each cross. The *ad*-8 recombinants were crossed with *A*5 and *A*6 stocks carrying the marker *paba*-1, 0·5 map units to the left of *A*, and the progenies were screened for prototrophs carrying non-parental *A* factors. Approximately 4% of the prototrophs from such crosses are made up by one of the $A\alpha$-β recombinant classes. The recombinants were tested both among themselves and with all the wild alleles. The results for seven of the new factors are given in Table 1. The *A* factor sub-units are now numbered so that *A*5 is *A*5 α1β1, *A*6 is *A*6 α2β2 and so on in order of identification.

The *ad*-8 recombinant from a cross between the eighth stock, *A*34 *B*34 from Poland, and *A*6 α2β2 *ad*-8 *B*6 was itself an *A* α-β recombinant incompatible with *A*y α1β2. Since this recombinant carried in addition the mating type factor *B*34 it is most unlikely to have been a contaminant. The sub-unit constitution of *A*34 was thus *A*34 α1β5.

The comparison between *A*13 from England and Poland provided a test of the suggestion by Day & Holliday (1959) that identical factors might sometimes be reciprocally constituted; e.g. *A*13 α1β4 and *A*13 β4α1. They were, however, both *A*13 α1β4.

Among the ten wild *A* factors investigated there were four *A* α's; *A* α1 was recovered five times, *A* α3 three times, and *A* α2 and *A* α4 once each. There was also a minimum of five or a maximum of seven *A* β's, three of which, *A* β1, *A* β2 and *A* β4, were each recovered twice. The sub-units A α1 and *A* β2 and the combination *A* α1β4 (*A*13) were all common to the English and Polish material.

The pattern of inter-sub-unit recombination that occurs between the factors *A*5 and *A*6 is repeated when other wild *A* factors are crossed with them. The crosses were designed to

* Present address: Department of Botany and Plant Pathology, Ohio State University, Columbus 10, Ohio.

Table 1. *Results of crossing seven* A *factors, each in coupling with* ad-8, *with* A5 α1β1 and A6 α2β2 *both in coupling with* paba-1

		A- *ad*-8 × *paba*-1 *A*5 α1β1			*A*- *ad*-8 × *paba*-1 *A*6 α2β2			
A factor	% recomb. with *ad*-8	Proto-trophs	% recomb.† between markers	Recombs.	Proto-trophs	% recomb.† between markers	Recombs.	Factor constitutions
*A*7	0·16	248	0·64	0	139	0·54	4 (*A*y α1β2)	*A*7 α1β3
*A*9	0·53	316	0·61	0	148	0·68	1 (*A*32 α3β2)	*A*9 α3β1
*A*13 England (Bayfordbury)	0·18	86	0·52	0	152	0·73	7 (*A*y α1β2)	*A*13 α1β4
*A*13 Poland (Zelasna)	0·58	67	0·49	0	75	0·51	3 (*A*y α1β2)	*A*13 α1β4
*A*14	1·03	155	0·80	3 (*A*? α4β1)	140	0·65	0	*A*14 α4β?
*A*16	1·36	80	0·52	8 (*A*9 α3β1)	111	0·61	5 (*A*32 α3β2)	*A*16 α3β?
*A*32 Poland (Zelasna)	0·37	163	0·42	4 (*A*9 α3β1)	244	0·59	0	*A*32 α3β2

† The percentage recombination between the markers *ad*-8 and *paba*-1 was calculated by doubling the prototroph frequency in each cross.

recover only one of the two reciprocal *A* factor recombinant classes and no more than one class was recovered from each cross. While the scale of these tests was not large enough to recover intra-sub-unit recombinants they would have been expected to reveal any further sub-units, comparable to *A* α and *A* β, which may have been homozygous in the earlier crosses involving *A*5, *A*6 and their derived mutants. It is possible, however, that the enforced selection of wild *A* factors which could be recovered as *ad*-8 recombinants, when crossed with *A*6 *ad*-8 (8 out of 17), may have excluded the analysis of crosses between factors which were, for example, structurally heterozygous at *A* α or *A* β or other sub-units.

In a study of the sub-unit constitutions of thirty-two different *A* factors of *Schizophyllum commune*, chosen at random, Raper *et al.* (1960) found only nine *A* α specificities and twenty-five *A* β specificities. While the *Coprinus* sample is smaller, a similar tendency is evident with only four *A* α and possibly seven *A* β specificities among nine different *A* factors. It may be noted that the spontaneous *A* mutants of *Coprinus* appear to be most frequently altered in the *A* β sub-unit (Day, 1963), which may therefore be more mutable than *A* α.

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