

T2: Genetic analysis of mutants of *Ceratodon purpureus* with abnormal responses to gravity.

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Wild-type strains of *Ceratodon* grow upwards in darkness. The response to gravity is switched off in the light. Mutants blocked in the synthesis of the phytochrome chromophore, continue to respond to gravity in the light (Lamparter *et al.*, 1996), indicating that the inhibition of gravitropism by light is phytochrome-mediated. We have recently isolated mutants that not only fail to respond to gravity, but also continue to synthesize chlorophyll in darkness. We conclude these mutants are constitutively switched to a program of light development.

Mutants with altered responses to gravity in darkness occur at high frequency in WT4, a wild-type strain that grows vigorously in darkness. Both alignment to the gravity vector and/or the orientation of the response may be affected. Phenotypes include an almost complete lack of alignment and reversal of orientation while retaining normal alignment (“wrong way response”, - Wagner *et al.*, 1997). Mutant phenotypes also include partial impairment in alignment, with or without reversal of orientation.

We have isolated further mutants showing abnormal responses to gravity in two other wild-type strains (WT3, GG1), using UV or EMS mutagenesis. These strains do not show the high mutability of WT4 and grow less vigorously in darkness. Nevertheless mutants with a similar range of phenotypes have been isolated. To determine the genetic basis of the gravity response, we are undertaking a program of complementation testing, selecting somatic hybrids using different transgenic antibiotic resistance markers. No complementation has yet been detected between orientation-reversed mutants isolated in the three different wild-type strains. We propose to call the gene concerned *gtrC* (*Physcomitrella gtrC* mutants are also orientation reversed). A single mutant isolated in GG1 has an almost complete loss of gravitropic alignment and complements all orientation-reversed mutants so far tested. We propose to call this gene *gtrA* (*Physcomitrella gtrA* mutants have a similar phenotype). However, a similar mutant isolated in WT4, when hybridized with an orientation-reversed mutant, gave an orientation-reversed phenotype, suggesting that this may be an allele of *gtrC*.

Clearly more mutants and more complementation test must be carried out before the genetic status of gravitropism is clarified!

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