The morphogenetic gradient determining axis polarity in regenerating protoplasts of the moss, *Ceratadon purpureus*, involves phytochrome.

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Ceratodon protoplasts regenerate by polar outgrowth, forming cell filaments directly. In red light, outgrowth is polarised by the direction of the light source. We have shown, by the re-orientation of protoplasts regenerating in uni-directional red light, that development of the regeneration axis occurs in two steps (Cove D.J., Quatrano, R.S & Hartmann, E. 1996, Development 122, 371). There is a lag of about 9 hours following reorientation, before the regeneration axis becomes aligned to the new light direction. The orientation of the aligned axis, *i.e.* whether outgrowth occurs towards or away from the light source, is determined more slowly, so that the regeneration axes of protoplasts aligning to a new light direction following reorientation, show little or no tendency to orient their polar outgrowth positively.

To investigate a possible role for phytochrome in the response to light during polar axis formation, we studied the effect of treating protoplasts which had started to regenerate in red light, with far-red light before they were re-oriented and exposed to red light from a new direction. The far-red treatment results in the "memory" of the first light direction being lost more quickly, and a more rapid response to the new light direction, compared to the control (no far-red) treatment. However, if far-red light treated protoplasts are briefly returned to red light from the original direction before reorientation, the protoplasts' normal regeneration programme is restored, *i.e.* protoplasts treated in this way resemble control protoplasts.

We propose that the morphogen gradient that establishes the polarity of the protoplast regeneration axis, must be stabilised by phytochrome in its P_{FR} form, resulting in the response to a new light direction being slow, but that the gradient is less stable when phytochrome is in its P_R form, allowing a response to a new light direction to occur more rapidly.