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Green is go, red is stop

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In the 24 November Science Terskikh *et al*. describe a mutant fluorescent protein that changes from green to red over time, and can therefore indicate when transcription is turned on and off (*Science* 2000, **290:**1585-1588). The starting point is the red fluorescent protein drFP583, which was originally isolated from a non-bioluminescent reef coral. Terskikh *et al*. mutate drFP583 using an error-prone polymerase chain reaction, then screen for mutants exhibiting a green intermediate fluorescence. The resulting E5 mutant has a threonine substituted for serine 197. This residue probably contacts the fluorophore directly, and the mutant shows initial bright green fluorescence that decays to yellow, orange and finally red over time. (The yellow and orange reflect the presence of two protein species - those with green and red fluorophores.) The mutant protein can indicate when transcription has recently been activated (green areas), is steadily active (orange areas) or has recently been switched off (red areas) in either mammalian cells, worms or frogs. For example, heat shock of worms injected with an E5 gene under heat-shock control results in green fluorescence 2 hours after heat shock, with red fluorescence increasing from 5 hours after heat shock. Using E5, promoter activity can be analyzed over a wide time range by looking at a single developmental stage.

References

1. *Science*, [http://www.sciencemag.org/]

2. Fluorescent proteins from nonbioluminescent Anthozoa species.