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How to get hot

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Viruses can undergo convergent evolution at the level of single nucleotide changes when adapted to new environments. In the January 16 *Proceedings of the National Academy of Sciences*, Riehle *et al.* test whether the same is true for more complex organisms, in this case the bacterium *Escherichia coli*, at the level of large insertions and deletions of DNA (*Proc Natl Acad Sci USA* 2001, **98**:525-530). They track two lines of bacteria grown for 2,000 generations at 37°C; the two lines are then split into six and followed for a further 2,000 generations at 41.5°C. Relative fitness is tested at different timepoints, and the appearance of duplications and deletions detected using DNA arrays. No changes are seen at 37°C, but three of the lines show a total of five duplications and deletions after growth in the heat. Some of the events are temporally associated with increases in fitness at 41.5°C, and involve genes implicated in stress responses. Three of the five events are duplications that cover the same region of the chromosome. The reproducibility of this event, and its complex two-step mechanism, suggest that the pathway to heat adaptation is at least partially replicable.

References

1. Different trajectories of parallel evolution during viral adaptation.
2. *Proceedings of the National Academy of Sciences*, [<http://www.pnas.org/>]