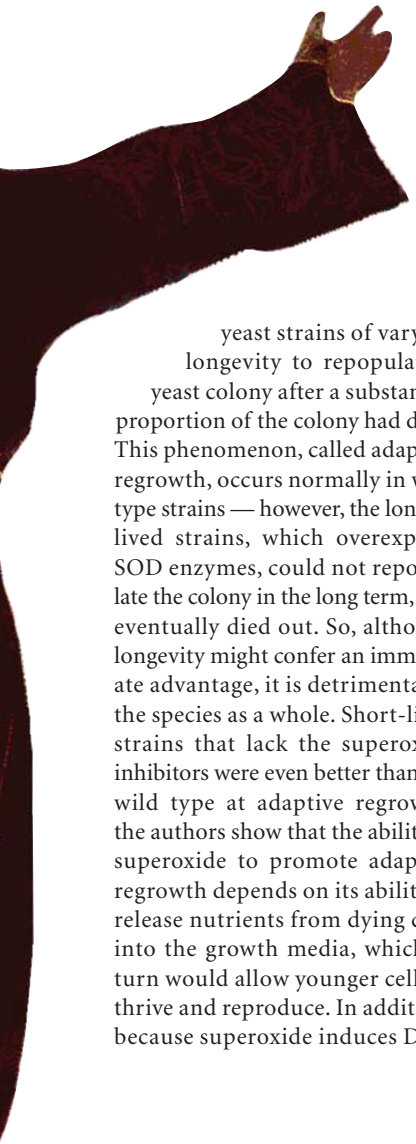

yeast strains of varying longevity to repopulate a yeast colony after a substantial proportion of the colony had died. This phenomenon, called adaptive regrowth, occurs normally in wild type strains — however, the longer-lived strains, which overexpress SOD enzymes, could not repopulate the colony in the long term, and eventually died out. So, although longevity might confer an immediate advantage, it is detrimental to the species as a whole. Short-lived strains that lack the superoxide inhibitors were even better than the wild type at adaptive regrowth; the authors show that the ability of superoxide to promote adaptive regrowth depends on its ability to release nutrients from dying cells into the growth media, which in turn would allow younger cells to thrive and reproduce. In addition, because superoxide induces DNA mutations, its presence favours the selection and growth of mutants that are better adapted to the environment.

The results were not peculiar to laboratory strains, as the same phenomena occurred in three strains newly collected from the wild. Computational simulations tell a similar story — that a population that undergoes premature death and has a high mutation frequency is more likely to adapt to a changing environment.

So in yeast, at least, apoptosis is an altruistic act, as not dying damages the chances of survival of the whole group. If the theory stands up to scrutiny then what consequences does it have for humans? Should we thwart any attempt to extend our lives for the sake of our species? Whatever the eventual answer, this is a debate that isn't being laid to rest.

Tanita Casci

References and links

ORIGINAL RESEARCH PAPER Fabrizio, P. *et al.* Superoxide is a mediator of an altruistic aging program in *Saccharomyces cerevisiae*. *J. Cell Biol.* **166**, 1055–1067 (2004)

WEB SITE

Longo's laboratory: http://www.usc.edu/programs/pibbs/site/faculty/longo_v.htm

suggesting that Ago1 functions as part of distinct complexes to mediate the two types of silencing.

The fact that both TGS and PTGS are mediated by Ago1 in *S. pombe* indicates that it is not simply the availability of specialized Ago proteins that determines which pathway is used to silence specific genes. Gene-specific characteristics are also likely to be important, such as the chromosomal context of the gene or its rate of transcription. The simple system provided by silencing in *S. pombe* should be a useful tool for dissecting these requirements.

Louisa Flintoft

References and links

ORIGINAL RESEARCH PAPER Sigova, A., Rhind, N. & Zamore, P. D. A single Argonaute protein mediates both transcriptional and post-transcriptional silencing in *Schizosaccharomyces pombe*. *Genes Dev.* **18**, 2359–2367 (2004)

WEB SITE

http://www.umassmed.edu/bmp/faculty/zamore.cfm?start=0&

IN BRIEF

PLANT DEVELOPMENT

The *PLETHORA* genes mediate patterning of the *Arabidopsis* root stem cell niche.

Aida, M. *et al. Cell* **119**, 109–120 (2004)

In *Arabidopsis thaliana*, root stem-cells are maintained by a small set of organizing cells, known as the quiescent centre (QC), the location of which depends on auxin accumulation. By using a promoter-trap screen, the authors identified two putative transcription factors, *PLETHORA 1* (*PLT1*) and *PLT2*, which are required for QC specification and for maintaining root stem-cells during embryonic pattern formation; in addition, evidence indicates that their expression in the QC responds to auxin.

DEVELOPMENTAL BIOLOGY

Foxa2 is required for transition to air breathing at birth.

Wan, H. *et al. Proc. Natl Acad. Sci. USA* **101**, 14449–14454 (2004)

A fundamental adaptation faced by a newborn mammal is the ability to breathe in air through its lungs. Now, by knocking out gene function in the epithelial cells of the developing mouse lung, Wan and colleagues show that *Foxa2*, which encodes a forkhead transcription factor, is a master gene required for lung maturation at birth. This finding could inform treatments for premature babies and for individuals with lung disease or injury.

DEVELOPMENTAL BIOLOGY

Hmx2 and *Hmx3* homeobox genes direct development of the murine inner ear and hypothalamus and can be functionally replaced by *Drosophila Hmx.*

Wang, W. *et al. Dev. Cell* **7**, 439–453 (2004)

The authors show that the roles of mouse homeobox genes *Hmx2* and *Hmx3* in the development of the vestibular system are overlapping and distinct, but that their roles in the central nervous system (CNS) are interchangeable. Moreover, the single fly *Hmx* can rescue the CNS and inner-ear phenotype in double-knockout mice, despite differences in morphology. The authors propose that evolution of complex organs such as the vertebrate inner ear might involve cooption of primitive genetic programmes to new locations, not just from acquisition and modification of protein domains.

GENE EXPRESSION

Genome-wide mRNA surveillance is coupled to mRNA export.

Hieronymus, H. *et al. Genes Dev.*, 1 November 2004 (doi:10.1101/gad.1241204)

The authors found evidence to suggest that there are links between DNA and RNA surveillance and mRNA export. A screen of annotated, non-essential *Saccharomyces cerevisiae* genes identified new factors required for mRNA export, including Rrp6, an mRNA surveillance factor, and Lrp1, a DNA-repair protein. The authors found that Lrp1 can mediate mRNA degradation and requires Rrp6 for nuclear localization to the genes that encode their target mRNAs.