Abstractions

LAST AUTHOR

Genomic imprinting is a controversial mechanism because it contradicts the idea of mendelian inheritance. In this process, only one of the two alleles is expressed, so only one parent influences expression of the gene. To investigate the necessity of imprinting in seed development, Arp Schnittger at the University of Cologne in Germany and his colleagues crossed paternal mutants that could not contribute genes to endosperm development with maternal mutants that decode genetic imprinting patterns (see page 312). The seeds that resulted were viable, lending credence to botanist Eduard Strasburger's hypothesis, first raised in 1900, that the endosperm is of maternal origin.

What was it like studying a hypothesis first put forward in 1900?

I am awestruck by the insights of Eduard Strasburger — especially as his understanding was based on comparative morphology. We used elaborate genetics and advanced tools and techniques, and came to the same conclusion.

How did your research in this area begin?

The major interest of my group is the crosstalk between cell-cycle control and development. We developed an *Arabidopsis* mutant in which only one male gamete is generated, rather than the two typically produced in flowering plants. This single gamete can still fertilize female gametes, but only the egg cell, and not the other female gamete, the central cell. With this single fertilization we can now compare the input from the mother with that of the father.

Do your findings challenge the biological necessity of genomic imprinting?

We think that our data will help to refine the issue of how necessary biological imprinting is. We have shown that imprinting is not required for seed development, but as it is an essential mechanism in wild-type plants it is tempting to speculate that a 'naïve' genome, which does not have imprinting marks, might not be stable in evolution.

What are the possible applications for plant breeding?

The most exciting potential application is for the generation of apomictic plants — those that produce seeds without fertilization.

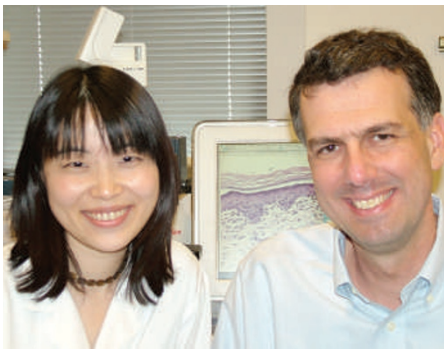
What's your next step?

We now want to analyse which genes from the mother and father are imprinted in the developing seed. The combination of the mutant with genome-wide transcriptional profiling will hopefully provide us with a new way to unravel differentially expressed genes. ■

MAKING THE PAPER

George Cotsarelis and Mayumi Ito

Hairs in wounds offer hope for organ regeneration.



Mayumi Ito (left) and George Cotsarelis.

About three years ago George Cotsarelis, a dermatologist at the University of Pennsylvania School of Medicine, was studying whether stem cells in the hair follicle — the part of the skin that hair grows from — could help heal wounds. Working with mice, his team found that when the skin is cut, stem cells move quickly from the lowest portion of the follicle, or 'bulge', where they usually reside, to the surface of the skin to form new skin cells (M. Ito *et al. Nature Med.* **11,** 1351–1354; 2005). But during these experiments, postdoc Mayumi Ito noticed something unusual. New hairs also seemed to be growing inside the wound. "We really thought we were seeing things," says Cotsarelis.

The dogma in the field has long been that new hair follicles cannot form in adult mammals, even after damage or loss. But Cotsarelis quickly found hints in the literature that this long-held belief might be mistaken. In 1956, pathologist Robert Billingham at the University of Pennsylvania noticed new hair forming in skin that had been wounded in rabbits. And the same year, Albert Kligman, also a dermatologist from the University of Pennsylvania, found that people who had had the top layer of their skin scraped away showed signs of forming new hair follicles. "Those studies were in the 1950s and no one has paid much attention to them since," says Cotsarelis.

Ito and Cotsarelis and their colleagues decided to follow up on their intriguing observation and determine whether the hairs in the wound grow from new hair follicles and, if so, whether the hair follicles develop from the stem cells of neighbouring follicles. Over the past 15 years, Cotsarelis' group has developed several strains of transgenic mice, which has allowed the researchers to visualize the hair-follicle stem cells as they migrate from deep within the skin to the surface of the wound site. The group has also developed several antibodies that can distinguish between various types of skin cell.

Armed with these tools, the team showed (page 316) that mice indeed grow new hair follicles at the wound site. But the investigators had another surprise. The new hair follicles did not arise from the stem cells in nearby hair follicles, but rather from cells in the top layer of the skin. They somehow acquire a more embryonic character, which allows them to develop into different cell types. "One of the lessons is that wounding generates a window of opportunity for manipulating hair-follicle formation," says Cotsarelis. Because the mammalian hair follicle is considered to be a tiny organ, this finding could have implications for organ regeneration in mammals, in addition to providing a way to ameliorate baldness.

One of the main questions that Cotsarelis and his team are now pursuing is whether the same process takes place in human skin. On the basis of Kligman's work of 50 years ago, the answer would seem to be yes. Cotsarelis also hopes to determine the 'molecular signature' of the skin straight after wounding. Knowing which genes become turned on might suggest ways to induce the same pathway in skin cells, and thus coax them into becoming follicles without having to resort to making wounds. ■

FROM THE BLOGOSPHERE

Authors are often curious about what goes on at the journal after their paper is submitted. What happens to their work? Why is a press release issued and how is it created? What happens when a paper is featured in News and Views? What are the editors like? We hope that *Nurture*, the magazine for *Nature* journal authors, helps to lift the veil on some of these processes.

The latest edition of *Nurture* features articles on authors and editors of the *Nature* journals, including our latest addition *Nature Photonics*. It also describes the new Question & Answer format in *Nature*'s News and Views section, offers highlights from *Nature*'s history, looks at the new online publications *Nature Reports Avian Flu* and *Nature Network Boston*, provides instructions on how to write a best-selling science book and describes a new tool for visualizing the structure of proteins.

The print edition of *Nurture* is sent to authors who have published a paper in the past year. It is also available free of charge as a digital edition, which you can access on the author and reviewers' website at http://www.nature.com/authors/author_benefits/nurture.html. ■

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