Abstractions

FIRST AUTHOR

Cattle, sheep and goats were domesticated more than 10,000 years ago, but when and where secondary animal products — such as milk or wool — were first used remains a subject of debate. Richard Evershed, a biogeochemist at the University of Bristol, UK, invented a stable-isotope technique to detect milk residues and has now used it to analyse an unprecedented collection of more than 2,200 pottery fragments in a search for direct evidence of milk usage. On page 528, he and an international group of collaborators trace the earliest known use of milk to residues on pottery from southeast Europe and the Near East. Evershed tells *Nature* that milk may have trumped meat as a Stone Age food source.

What inspired this project?

One of our archaeologist co-authors, the late Andrew Sherratt, developed a theory that secondary animal products were first used some 7,000 years ago. Ten years ago, I developed a compound-specific carbon isotope method to identify the fats produced by domesticated animals. This allowed us to test the dairying aspect of Sherratt's hypothesis on a macro-regional scale. Our findings show that milk use occurred 2,000 years earlier than he had suggested.

Why is milk such an important archaeological topic?

Animals were probably domesticated first for meat. These data provide the first hints of humans using cows for large-scale milk production. Slaughtering an animal, especially a cow, is a dramatic final act. The alternative — a sustainable, daily supply of milk as a nutritious source of carbohydrate and protein — helped people to meet their dietary needs more efficiently.

Where did the use of milk emerge?

Our data show that milking was particularly important in what is now northwest Turkey, in part because the environment was suitable for cattle grazing and herding. It seems that milk was produced there at a surplus level, and its widespread use by humans followed. These data are from some of the earliest pottery in Europe and the Near East, raising the interesting possibility that containers were needed to hold milk.

Did you gain unexpected insight from your data?

Yes. We set out to determine where and when milk use emerged. We then wondered how people at the time, believed to be mainly lactose intolerant, could consume milk. But the residues in pottery suggest milk was processed — for example, into butter or yogurt, which contain less lactose — getting around the lactose-intolerance problem. ■

MAKING THE PAPER

John Brigande

Tuning in to how genes control hearing development.

The hair cells of the inner ear translate sounds into nerve signals. They are a key part of the apparatus that converts thuds, hums, swishes and voices into data that can be interpreted by the mammalian brain. But the delicate tufts of stereocilia — microscopic hairs that jut out from the surfaces of hair cells, giving them their fuzzy appearance and name — are vulnerable to loud noises, infections, drugs and ageing. Once damaged or destroyed, they are unable to regenerate spontaneously, and their loss leads to impaired hearing.

Although earlier experiments showed that a transcription factor called ATOH1 (also known as MATH1) controlled the expression of developmental genes to generate cells with the shape and characteristics of hair cells, no one knew if they were functional. But a team led by John Brigande, a developmental neurobiologist at the Oregon Health and Science University in Portland, has shown that in mouse embryos *in utero*, transferring the *Atoh1* gene into cells that will become the cochlea creates additional working hair cells that form connections with nerve cells (see page 537). "A lot of people had done work on this gene, but no one had ever interrogated the behaviour of the cells, or done a direct recording of their properties," says Brigande.

The biggest challenge, he says, was convincing Anthony Ricci, a hair-cell biophysicist at Stanford University School of Medicine in California, to join him on the project. "It's not that easy to find a person with the skill set, drive and passion to pursue such a difficult question," Brigande says.

Their first meeting might have been disastrous. Ricci entered Brigande's office wearing a New York Yankees baseball cap. "How could he come into the office of a Boston Red Sox fan wearing that?" Brigande jests. After chatting about this most bitter of baseball-team rivalries, Ricci agreed that the hair-cell study would be a unique opportunity to understand the functionality of the cells induced by ATOH1. Brigande says that he and Ricci are kindred spirits in the way they approach science. "We're both in the experimental trenches."

Brigande has a progressive form of hearing loss in both ears that was detected at age ten. He became interested in studying hearing when he joined Donna Fekete's lab at Purdue University in Indiana for his postdoctoral training. At that point, he realized that his hearing loss had progressed to a point where he needed a supportive environment in which to continue his academic career. Fekete's hair-cell development lab and the field of hearing research offered just that.

Brigande, who describes himself as profoundly hard of hearing, admits that he has personal motivations for his work. But he says it is his deep fascination with mouse embryonic development that drives him. "Living with profound hearing loss does add some inspiration, but I didn't need the extra kick. Even as a student, I would wake up far too early in the morning and drift into the lab," he says.

Now that Brigande and his colleagues have shown that *Atoh1* gene transfer produces working hair cells, they plan to use mouse models of human deafness to answer the question of whether a gene-replacement strategy can restore hearing. "The questions that remain now rely on creativity, passion and hard work," he says. "Such questions are not intractable any more, and that's exciting." ■

FROM THE BLOGOSPHERE

It's time for conference 2.0. "Scientific conferences are essential both for the exchange of ideas and for networking, but they don't have to be organized the same way as they were ten years ago," writes clinical fellow Martin Fenner in his Gobbledygook blog on Nature Network (http://tinyurl.com/5vrfr8). The user-generated phenomenon of Web 2.0 and its interactive nature translates easily into 'conference 2.0' in various ways, as described in more detail in the blog post.

Fenner, of Hanover Medical School in Germany, suggests that active participation works best in gatherings of fewer than 150 people and that attendees should have input into the programme; for example, helping to select session topics in an online network created in advance. If organizers allow open reporting and provide free wireless Internet access, the conference experience can be enhanced by 'microblogging', in which audience members make notes online simultaneously with a talk. This is especially valuable for those unable to attend, as they can ask questions or provide relevant information in real time. ■

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