Abstractions

FIRST AUTHOR

Studies of human evolution have rarely paid attention to the selective forces associated with pregnancy. Past consideration of the skeleton has focused solely on the size and shape of the pelvic opening and its importance in birthing. On page 1075, Katherine Whitcome of Harvard University and her colleagues detail the surprising adaptations found in the human spine — past and present — that allow females to better endure the expanding and shifting pregnancy weight.

What led you to study the role of pregnancy in evolution?

Pregnancy is an obvious selective pressure in evolution. Now that we have a better understanding of how pelvis size and shape affects reproductive success, we've broadened our remit to look at other anatomical features. Women must be able to deliver a baby, but also to carry one as it grows.

How did you seize on the importance of the vertebral column?

In thinking about the upper-body load generated on the vertebral column, I realized that historically most females would have had an additional load — having spent much of their adult lives either pregnant or nursing. So we looked at vertebrae, and found previously unidentified female-specific traits — for example, three wedge-shaped vertebrae in women (compared with only two in men) form a longer curve that better reinforces the lower back. In addition, we found that the joint that buttresses the lower vertebrae is larger, relative to vertebrae size, in women.

Had nobody noticed these male–female vertebrae differences before?

No. The differences are very subtle. If I showed you vertebrae from a woman and a man, it would be hard to distinguish between them, in part because the effect is cumulative over a number of vertebrae. Unless you are using calipers to measure the slight wedging, it is not obvious, but it is significant and biomechanically relevant.

Was this extra lumbar support in women important to the evolution of *Homo sapiens*?

The big surprise is that these adaptations seem to be fundamental to our bipedal existence. The changes make sense: the challenges faced by modern women during pregnancy, such as balance and stability, were as important, or possibly more so, in early humans and their predecessors, because many — *Australopithecines* for instance — spent hours foraging, travelling and avoiding predators. Their ability to stay mobile was necessary for survival. ■

MAKING THE PAPER

Aviv Regev

Malaria can have one of three distinct genetic profiles in humans.

A patient-profiling study that may explain why symptoms of malaria vary widely between individuals began as a simple chat on board an aeroplane. Computational biologists Aviv Regev and Jill Mesirov, now colleagues at the Broad Institute, of the Massachusetts Institute of Technology and Harvard University in Cambridge, happened to be returning from a meeting together, before Regev formally joined the institute. The two struck up a conversation that turned into the beginnings of a fruitful collaboration before the aeroplane even touched down.

The malaria parasite *Plasmodium falciparum* has a notoriously complex life cycle. Patient reactions to infection range from asymptomatic to mild flu-like symptoms to severe fever, inflammation, coma and death, but so far nobody has managed to explain the biological basis of this variation.

Regev's interest lies with complex molecular networks, which she has generally studied in yeast, and Mesirov specializes in molecular pattern recognition, working mostly in cancer. But the two came together over the work of a colleague, Harvard University infectious-disease specialist Johanna Daily, who was working with patients with malaria in Senegal.

Lab-based studies of the gene expression of isolated malaria parasites had found no significant changes under different conditions. But Daily suspected that plasmodia growing in patients' blood cells might show more variation, which, in turn, could help to account for the different disease states. Two years ago, she approached Mesirov with the problem and some preliminary transcription data, collected from parasites infecting her Senegalese patients.

Using techniques she had developed to study the profiles of cancer cells, Mesirov set about trying to extract patterns from Daily's data, and found that the *P. falciparum* samples fell into three distinct groups. But it wasn't until her airborne chat with Regev that a possible means to understand the clusters' biological basis became clear.

From the literature, Regev had already collected gene-expression patterns for yeast growing under different environmental conditions — normal, starvation and environmental stress. "I wondered whether we could try to project those signature expression patterns from yeast to *Plasmodium*," she says, "as Jill had already done from mouse to human cancer."

Because Mesirov had already developed the relevant computational tools, Regev adds, "It took about a day to go from 'oh, we have an idea' to 'oh, we have a result.'" They established that the three groups that Daily's *P. falciparum* samples fitted into corresponded to the physiological states that Regev had deduced from yeast (see page 1091). Now, the team is pushing to connect the various physiological states to disease outcomes — and, they hope, to reveal new treatment targets.

Regev and Mesirov hope to join Daily in Senegal next year for a taste of the field-work. In the meantime, says Regev, they don't mind working from a distance. "This work is very gratifying for people like us, who are usually quite isolated in front of our computers here," she says. "Malaria is a major killer, especially of children, and this is a challenging scientific problem. It's very satisfying to think that we might have an impact on understanding the biology of the disease, and on how it's treated." ■

FROM THE BLOGOSPHERE

The Neuroscience Peer-Review Consortium is an imaginative alliance of neuroscience journals. From 1 January 2008, if a manuscript is not accepted by one journal in the consortium, the authors can submit it to a second consortium journal and have the reviews from the first journal forwarded to the second. This is similar to the NPG journals' manuscript-transfer system (see http://tinyurl.com/3c2ybo), but is subject-specific rather than publisher-specific.

In a related post on Action Potential, the *Nature Neuroscience* blog, Noah Gray points out that consortium journals must drop the review practice of 'confidential comments' to the editor. Noah asks his author and reviewer readers for their views on this aspect of the proposal; so far more than 30 have contributed to a thoughtful discussion. Most readers liked the proposed system, but were divided about the confidential comments question — some feel that there is no place for such comments, others put forward various reasons for their value, and yet others are not sure why they need be excluded from consortium journals. See Action Potential for all opinions in full at http://tinyurl.com/3c9b2g. ■

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