Vol 457 | Issue no. 7230 | 5 February 2009

Abstractions

LAST AUTHOR

Pathogens often hijack their hosts' cellular proteins in order to get into cells or hide from host immune systems. And at least one pathogen, researchers reveal, can commandeer a whole cellular organelle, taking advantage of it to provide essential building blocks for growth. Thomas Meyer, a molecular biologist at the Max Planck Institute for Infection Biology in Berlin, and his colleagues pursued the question of how pathogens acquire the lipids they need to survive and replicate. On page 731, the authors detail the takeover of a human organelle by the bacterium *Chlamydia trachomatis*. The bacterium's presence in host cells induces a particular protein to split in two, causing the Golgi apparatus — an organelle comprising membranous stacks that, among other things, generates and sorts lipids — to break down into smaller functional fragments, or 'ministacks'. The pathogen then recruits the ministacks and feeds on their lipids. Meyer tells *Nature* more.

Why not focus on the bacterium itself rather than its interactions with host cells?

Unlike some other bacteria, *Chlamydia* is not genetically amenable — we cannot manipulate it as we can *Escherichia coli*, by generating mutants. So instead of focusing on the bacterial side, we looked to the role of the host cell in the infection process.

How does *Chlamydia* recruit the ministacks?

That's a mechanism we don't yet understand. During observation, we saw the Golgi break down and the ministacks assemble around the *Chlamydia*. This recruitment seemed to lead to enhanced transfer of lipids through the membrane surrounding the *Chlamydia* and into the bacteria.

Does your discovery have implications for the treatment of *Chlamydia* in humans?

It might open up new avenues for therapeutic approaches, because we now know that the pathogen is not the only potential target for antibiotics. We could, for example, use the host-cell functions a pathogen relies on as drug targets.

How might that work?

When we knocked down expression of Golgi protein genes, we were surprised to find that, rather than being inhibited, *Chlamydia* replication was boosted. This made sense later when we found that the knockdown caused Golgi fragmentation. In treating this disease, you wouldn't block the genes that are identified in this paper because you would possibly increase replication. You would target other genes that would keep the Golgi intact. ■

MAKING THE PAPER

Jason Head & Jonathan Bloch

Giant snake fossils point to steamy ancient tropical climate.

Jason Head (left) and Jonathan Bloch.

Palaeontologists have long been searching for additional clues to the evolution of tropical vertebrates in the wake of the dinosaurs' demise roughly 65 million years ago. Sixty-million-year-old rock in the Cerrejón Coal Mine of northeastern Colombia yielded an exciting find — fossils of the largest snake species ever seen. These offered an opportunity to exploit reptile biology for palaeoclimatic clues.

A team of palaeontologists has been studying the mine's rocks for several years. Massive tractors are used deep below the surface to excavate long, thick coal seams that can spontaneously combust. "The mine itself resembles Dante's Inferno, but it is heaven for a fossil collector," says Jonathan Bloch, a vertebrate palaeontologist at the Florida Museum of Natural History in Gainesville and one of the team that discovered and identified the snakes' giant vertebrae.

Bloch contacted Jason Head, an expert on fossil snakes at the University of Toronto in Mississauga, Canada. Head jumped out of his seat when he saw the specimens. "When you look at fossil snake vertebrae bigger than your hand, you soon realize that their size alone is shedding new light on this past ecosystem," says Head. Even before they had an accurate estimate of the snake's size, he and his colleagues began to question what it said about past climate.

Plant fossils or ratios of oxygen and carbon isotopes are usually used as proxy data to interpret past climate. But cold-blooded vertebrates add a novel biological indicator because their metabolic rate controls their maximum size at a given temperature. "In this regard, the reptile fossil record is uniquely important and incredibly understudied," says Head.

However, interpreting climate wasn't as simple as plugging a number into an equation. Having single fossil vertebrae from a number of snakes, Head had to painstakingly quantify the shapes of individual vertebrae to identify their likely positions, basing his approximations on the 250-bone vertebral column of an extant snake of the same subfamily. Then, he and another colleague plugged their measurements into a mathematical model of vertebral column dimensions and positions in living snakes to estimate the fossil's original size.

Head estimates that the species was 13 metres long, between half a metre and a metre in diameter, and weighed more than a tonne, making it the world's largest snake. The authors named it *Titanoboa cerrejonesis* — the titanic boa from Cerrejón. From comparisons with the lengths of living species, they calculate that mean annual temperatures of at least 30–34 °C would have been required to support it (see page 715).

Head says that this work supports one of two hotly contested hypotheses about how heat was distributed across the planet when the poles were free of ice. Although some suggest that equatorial climates extended farther into higher latitudes, distributing the heat more widely, this work supports the alternative view that equatorial temperatures were much hotter than those on the rest of the planet.

However, the data also present a conundrum: the temperatures they suggest are above those that modern tropical forests can tolerate. "So, 60 million years ago either the snake or the forest was unlike those we know today," says Bloch. "This is a window to a time and place that we've never had access to before." ■

FROM THE BLOGOSPHERE

So you think you want to be a manuscript editor? *Nature Nanotechnology* associate editor Ai Lin Chun offers a glimpse into what makes a successful manuscript editor tick on the Asia Pacific and Beyond forum at Nature Network (http://network.nature.com/groups/nnano/forum/topics/3730).

Chun outlines what she has learned on the job for "those interested in editorial jobs to reflect if these are the things that really interest you and are the set of skills you really want to build". One of her first lessons was both "humiliating and humbling", she says — submitting her own writing to the journal's editorial mill.

Besides being comfortable with someone else correcting your writing, Chun writes, manuscript editors must also "shamelessly ask many questions and offer suggestions" to authors. She notes that, above all, editors must evolve into the ultimate speed-readers, able to 'sniff out' the main essence of a paper in short order, and keep up with manuscripts while on the road.

And finally, they must be prepared to answer the dreaded question: "Why did you reject my paper?" ■

Visit Nautilus for regular news relevant to *Nature* authors ▸ http://blogs.nature.com/nautilus and see Peer-to-Peer for news for peer reviewers and about peer review ▸ http://blogs.nature.com/peer-to-peer.