

Dinosaur Blood: Warm or Cold?

The paleontological debate over ectothermy vs. endothermy among the dinosaurs continues to rage within the scientific arena, hotter than the hottest blood proposed by the most ardent endothermy advocates. For an entertaining recap of the battle thus far, see Richard Monastersky's piece in *Science News*, May 14, 1994, pp.312-313.

Monastersky outlines the history of the debate, quotes the scientists whose names recall the various twists and turns in the evidentiary arguments, and brings us up to date with the recent work by Anusuya Chinsamy of U/PA, who compared the bones of young and old animals from a single species. Her reconstruction of how dinosaurs grew has yielded "a confusing array of results," arising from analyses of the cross sections of femurs from the dinosaur type called *Syntarsus*. She found growth rings, usually indicating temporary stops in bone-building and seeming to link the animal with ectotherms (cold-blooded animals that tend to become dormant in difficult seasons such as winter-time).

But Chinsamy also found evidence that this small predatory dinosaur stopped growing when it reached adulthood—typical of endotherms and not of ectotherms. In addition, the *Syntarsus* bone showed rapid growth, another characteristic of endotherms.

Into this muddy picture has leapt John Ruben, Oregon State University professor of zoology. Ruben contends that the focus has been all wrong—that paleontologists, instead of examining slices of femur, should have been looking up a dinosaur's nose. Endothermic animals have a special set of nasal bones directly related to their metabolism, called maxilloturbinals—bones that form thin, folded sheets inside the nasal passages of birds and mammals and prevent warm-blooded, fast-moving animals from losing too much moisture.

The maxilloturbinals work as a humidifier-dehumidifier system. Willem J. Hillenius, a former student of Ruben's, has traced the evolution of endothermy in mammals by searching for maxilloturbinals or the internal ridges to which they attached. His findings support the idea that endothermy evolved because it enhanced an animal's ability to maintain strenuous activity, and he suggests that this is the most promising avenue to pursue in determining whether dinosaurs had a fast metabolism.

Ruben points out that some modern ectotherms can grow and move rapidly, but they lack the endurance of mammals and birds. "I think in the end," Ruben said, "we're going to find that dinosaurs were probably fairly typical ectotherms, metabolically, but that doesn't mean they were sluggish or uninteresting."