The dermal skull bones of temnospondyl amphibians are textured with patterns of raised, honeycomb-like and/or ridge-and-groove patterns. The function of this texture has been the subject of inquiry in several previous studies. Competing hypotheses propose that the texture: (1) increases the surface area of the skin in support of cutaneous respiration and/or thermal regulation, (2) strengthens the bone against stresses incurred during feeding, and/or (3) protects blood vessels supplying the skin and results from the growth of nutrient channels through the bone.

We studied skulls of the Middle Triassic cyclotosaurid amphibian, *Eocyclotosaurus*, from the Moenkopi Formation near Anton Chico, NM, to perform our own investigation. The skull surface texture was recorded by applying latex rubber to the skulls and then peeling it away after drying. The latex peels were cut to reveal the texture in cross section, and the surface area increase attributable to the texture was calculated. Allometric analysis of the surface area increase showed strong negative allometry (allometric constant $\sim 0.14$). We calculate that surface area must increase with a positive allometric constant of 1.5 to maintain support of skin breathing or thermal regulation throughout growth. Thus, while some skin breathing is possible in these animals, the surface area increase due to dermal bone texture cannot be a significant contributing factor.

Studies of stress in the skulls of predators during prey capture show that stress typically concentrates above and in front of the jaw joint and on the snout in front of the orbits. We note that these are the areas in the *Eocyclotosaurus* skulls where ridge-and-groove texture is present, whereas the honeycomb texture is present around the orbits and over the braincase. We calculated the strength and stiffness increase due to the dermal bone texture in these critical areas. The preliminary results showed that strength was increased by 77% and stiffness increased by 160%, while the bone mass increase due to the texture was only 29%. This represents a purchase of considerable strength and stiffness with a relatively small increase in mass. Thus, our results reinforce the argument for structural significance of the dermal bone texture, while not rejecting some possible contribution of the other hypothesized processes.

**Keywords:**

vertebrate paleontology, amphibians, fossils, skulls

**pp. 37**

2012 New Mexico Geological Society Annual Spring Meeting
April 27, 2012, Macey Center, New Mexico Tech campus, Socorro, NM