Dino Art Notes

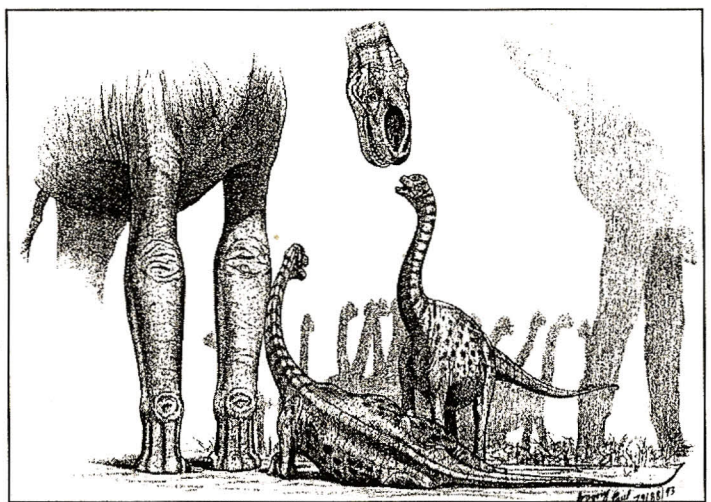
Brooding Over Dinosaur Nesting

by Gregory S. Paul

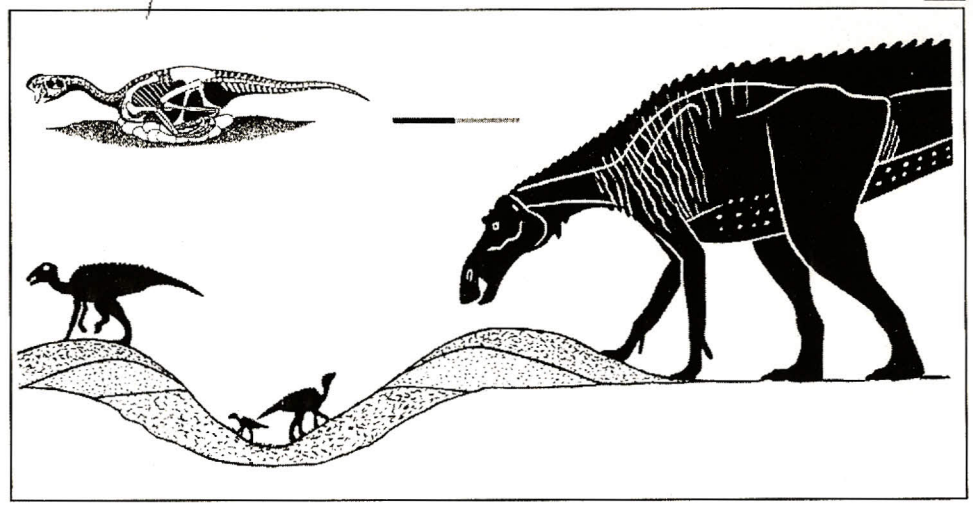
Back when I was a youngster, only a few dinosaur restorations showed their ancient eggs or offspring, and if they did the parents were assumed to abandon the poor things as soon the eggs were laid and buried. There were exceptions. Charles R. Knight once painted a *Triceratops* pair guarding their little one from a *Tyrannosaurus*. How things have changed. Illustrations showing dinosaurs caring for their young have become the standard. Recently new fossil finds have added to the evidence of parental care in dinosaurs. At the same time some researchers assert that the evidence for parental care in dinosaurs is not very good. What is the dinosaur artist to do?

As usual, life present and past is complicated. Parental care of young and/or eggs is not limited to birds and mammals. Some fish, amphibians and reptiles protect and take care of their nests and young. Pythons actually wrap their bodies around a pile of eggs, and warm them with heat generated by rhythmic contractions of their sinuous body muscles. Among birds, megapode fowl bury and incubate their eggs in big mounds of fermenting vegetation. Megapodes go to great pains to make sure the internal temperature is just right, but once the eggs hatch the chicks—which can fly within hours—are completely on their own. The young of giant ground birds leave the nest soon after hatching and feed themselves, but they remain under the careful guardianship of adults until they are big birds themselves. Only mammals have to care for their young, because if the babies are not fed mother's milk they die.

Starting in 1978, John Horner and co-workers found colonies of nests containing hadrosaur eggs and juveniles. They concluded that hadrosaur babies remained in the nest for a month or two and were fed by their parents. One reason was that nestling hadrosaurs leg joints are made largely of cartilage, but the same is true of adult dinosaurs and active but immature birds. Nicholas Geist and Terry Jones have shown that baby hadrosaur hips bones were well formed like those of bird chicks that live outside the nest. In this view baby hadrosaurs quickly left the nest, which were open pits exposed to chilling rain and baking sun. On the other hand, hadrosaur chicks had the very short snouts that elicit parental care. Smashed egg shells imply the nestlings used the nest, and the remains of fast growing hadrosaurs as big as dogs have been found in or near their nests. Reptiles take years to grow to dog size,



In this speculative scene a pair of adult sauropods *Pleurocoelus* care for a large creche of juveniles. Bones of both sizes have been found in the Cretaceous of Maryland (source: G. S. Paul)



Two examples of fossil dinosaur nests from the Cretaceous, shown at the same scale. A rhino-sized hadrosaur *Maiasaura* tends to its pit nest. At the bottom of the nest are two possible sizes of hatchlings, which numbered as high as two dozen. Walking out of the nest is an older juvenile. Lying on a nest of eggs is a brooding *Oviraptor*, figure courtesy of Mark Norell (artwork, Mick Ellison, AMNH).

so they must leave the nesting area at a smaller size. It seems that young hadrosaurs remained in the nest where they could be protected by their parents but not be trampled. Well developed thermoregulation allowed the nestlings to cope with the weather. Growth was so rapid because the lazy babies were fed large quantities of food by their hard working parents. However, if the parents died or left, the hungry but strong hipped chicks could leave and fend for themselves.

Also controversial are the brooding *Oviraptor* skeletons and nests recently found in Mongolia by paleontologists from the American Museum of Natural History. Increasing numbers of *Oviraptors* have been found atop complete nests, so it is unlikely that they all died while laying eggs. Were these small, bird-like dinosaurs incubating their eggs like birds? Or, did *Oviraptor* brooding not differ significantly from that practiced by reptiles, as Geist and Jones have asserted? Only *Oviraptors* and large birds lay eggs in flat rings in open nests, then sit directly on top of them, and carefully drape their arms over the eggs. It is unlikely that the *Oviraptors* were just shading their eggs from the heat of the desert they lived in, because there is no point to leaving eggs exposed unless they are going to be incubated with body heat—and deserts become bitter cold at night. That predatory dinosaurs were protecting and incubating their eggs in the manner of birds is not surprising considering the close relationships of the two groups. What is not yet known is whether *Oviraptors* had feathers to better cover the eggs with (if they did, then they would have needed a naked brooding batch to warm the eggs with). Also unknown is whether *Oviraptors* cared for the babies once out of the eggs.

It is probable that parental care was highly varied among the dinosaurs. For example, the very long snouts and big teeth of young tyrannosaurs suggest they hunted on their own from the start. The artist has some general rules to follow. Do not draw giant dinosaurs moving in big herds with babies fresh from the eggs, the wee little ones would have quickly become the Mesozoic equivalent of road kill. Trackways and skeletal associations suggest that some juveniles moved in independent groups, and only joined adult herds when they were big enough to do so safely. Juvenile ceratopsids and hadrosaurs, for instance, did not merge with the big herds until they were one fifth to one half of adult dimensions respectively. The famous Davenport sauropod trackway from Texas shows two adults of under 20 tonnes, accompanied by twenty-one juveniles of 1 to 10 tonnes. A typical elephant herd consists of a few adult cows accompanied by twice as many subadults and juveniles, including a couple of babies. This points

to a flaw of many dinosaur scenes (including my own), which is to show one or two large juveniles under the care of adults, like big slow breeding mammals. But big dinosaurs were more similar to big birds because they laid many eggs. As per the latter, a few adults may have had large numbers of charges under their care, at least until attrition cut down their numbers. Nature is harsh, and it is harshest to the young and the weak.

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