ScienceWatch – From Dinosaurs to Birds

In recent years the idea that birds evolved from a group of dinosaurs has become immensely popular. Fueled partly by evidence that dinosaurs were warm-blooded and fast-running rather than sluggish creatures mired in swamps, this hypothesis has become known as the "dinosaur-origin orthodoxy" among evolution scientists. Certainly the reptilian origin of birds cannot be questioned since the discovery over 100 years ago of *Archaeopteryx*, a reptilian skeleton covered in feathers,. Thomas Huxley, the famous proponent of Darwin's theory of evolution, thought this fossil showed a dinosaur-bird link and used it as evidence that members of one vertebrate group can be transformed into another. Until the 1970's most scientists believed that *Archaeopteryx* (and modern birds) descended from a relatively unspecialized, primitive group of dinosaurs (thecodonts) from which the dinosaurs probably radiated. Evidence for this came from the fact that the thecodonts had a clavicle (wishbone in birds) lacking in later dinosaurs. Then some dinosaur fossils with clavicles were discovered and scientists began noting other similarities among *Archaeopteryx*, theropods (the more advanced running dinosaurs) like *Deinonychus* and modern birds. The most compelling piece of evidence came from the similarity in wing/forelimb structure among the three. All have three digits, but which of the original five from the basic vertebrate plan are they? Comparisons of fossils show that the theropod plan is *1-2-3* (the thumb is *1*) and supporters of the dinosaur-origin orthodoxy have argued that the three digits comprising the wing of modern birds is also *1-2-3*.

Now a report in the October 27th issue of *Science* clearly demonstrates that in modern birds the plan is *2-3-4*, a fact that negates the possibility that birds diverged from the fast-running dinosaurs. The report by Ann C. Buek and Alan Feduccia compares the embryological development of the limb buds in a modern alligator, turtle and bird (chicken). Photographs of stained cartilage at various developmental stages clearly show the early appearance of one digit followed by two others. By comparing this with the patterns for alligator and turtle forelimbs, where all five digits are visible, it can easily be seen that in the chicken, as in the alligator and turtle, the first embryonic digit to form is *4*, followed by *3* and *2*. Digit *5* does appear temporarily, but *1* is never observed. This developmental evidence goes against the homologies adopted by paleontologists for the dinosaur origin, and adds weight to other facts that detract from the hypothesis. For example, how did those tiny theropod forelimbs (think of *Tyrannosaurus)* become the large (in relation to body size) *Archaeopteryx* wing? Moreover, most theropods, especially the "bird-like" forms appear in the fossil record 75 million years later than *Archaeopteryx*.

Thus, it is possible that the similarities between these dinosaurs and birds, rather than being evidence for a common origin, really results from convergent evolution, whereby unrelated forms assume similar traits from different structures to achieve the same purpose (compare butterfly and bird wings). Based upon this reasoning, dinosaurs and birds developed similar body plans because they both started walking on two legs and not

because two-legged dinosaurs became birds. The jury is still out on this one, what do you think?