

Can Scales Be Converted into Feathers?

By Jerry Bergman, PhD

In a debate I had with Rutgers University professor Dr. Daniel Stern Cardinale on January 19, 2025, he claimed that evidence exists that scales can be caused to become feathers on crocodiles. His claim specifically, correcting for grammar, is that

“Changes in the expression pattern of two regulatory genes in crocodiles has allowed crocodiles to grow feathers instead of scales. This is a new morphological trait that is only seen in avian reptiles which we were able, based on some very minor gene changes, to cause crocodiles to grow feathers as well.” (At 1:44 of the recorded debate)

The current theory of the origin of the more than 10,000 living bird species living today is that birds evolved from the largest known terrestrial animal, the dinosaur, into some of the smallest vertebrates today, birds, including the tiniest living bird, the hummingbird. Specifically, evolutionists claim that birds evolved from maniraptoran dinosaurs that included the Velociraptor and the Oviraptor.¹ In other words 50-pound dinosaurs evolved into 0.07 oz. birds. This dinosaur was 11,429 times greater in weight than the hummingbird.

Since dinosaur bones are massive, they preserve comparatively well in the fossil record. So far, over 11,000 fossil dinosaurs have been found, but not one has been uncovered that provides evidence of dinosaurs evolving into birds. Evolutionists hypothesize that birds evolved from dinosaurs only because they have no better theory. They know that other possibilities, such as the proposal that birds have evolved from flying insects, such as dragonflies, proposed by some evolutionists, are even less likely. One common but debatable piece of evidence often mentioned in textbooks is the idea that some dinosaurs might have had “feather-like structures”

¹ Andrus, Aubrey (ed) 2022. *Dinosaur Atlas. When they Roamed, How they Lived, and Where We Find Their Fossils*, Washington, DC: National Geographic. p. 112.

on their scales. However, scientists have shown that these supposed ‘proto-feathers’ are actually frayed keratin fibers.

The importance of the Wu et al., research was described by the lead researcher as follows:

The origin of feathers is an important question in Evo-Devo [evolutionary developmental biology] studies, with the eventual evolution of veined feathers which are aerodynamic, allowing feathered dinosaurs and early birds to fly and venture into new ecological niches. Studying how feathers and scales are developmentally specified provides insight into how a new organ may evolve.”²

The Wu et al., experiment involved identifying *feather-associated genes* which, by using genetic recombination techniques, were transplanted in the chicken and alligator scale forming regions. What the research found was a useless blend between scales and feathers. Some morphotypes resemble filamentous appendages that were similar to that found on dinosaur fossils. Others structures Wu et al. noted exhibit some characteristics found on modern avian feathers. The authors concluded that “Our analyses led to identification of five morpho-regulatory modules that are essential for modern feather formation. We propose that the evolution of feathers requires the integrative combination of five morpho-regulatory modules. The work here provides molecular clues of these modules.”

The researchers used genomic research techniques to identify feather-associated genes. The function of the genes was then evaluated by a careful analysis of their expression in the chicken and alligator scale-forming regions. Some morphotypes resemble filamentous appendages found in feathered dinosaur fossils, whereas others exhibit some characteristics of

² Wu, Ping, et al. 2018. Multiple regulatory modules are required for scale-to-feather conversion. *Molecular Biology and Evolution* 35(2):417-430, February. DOI: 10.1093/molbev/msx295.

modern avian feathers. Ectopic expression of these genes produced intermediate morphotypes between scales and feathers which produced useless feathers and useless scales, but did provide insight into several major morphogenetic events. In addition to molecules known to induce feathers (retinoic acid, b-catenin), novel scale-feather converters were noted (Sox2, Zic1, Grem1, Spry2, Sox18) that induce one or more regulatory modules that guided these morphogenetic events.

Conclusions

There exists a large gap between what highly educated genetics researchers, in this case ten, are able to do in the scientific laboratory and what is possible by mutations and natural selection. Judging by the illustrations that the authors provided with their article, the results would not produce the protection that scales confer on animals, nor the flight abilities, or even the insulation, that feathers provide to enable better heat retention than would occur with developed bird feathers. What the research actually found was that evolution from scales to feathers was *far more complex than once believed*, a fact which was noted in their article title. Not just a few changes were required, but rather “Multiple Regulatory Modules Are Required for Scale-to-Feather Conversion.” In fact, the researchers emphasized that five such sophisticated modules were required in “integrative combination.”

The genes involved in converting scales to feathers, called “scale-feather converters, include 218 feather region-independent genes, 102 feather-associated genes, and 552 feather-development genes.³ And these 872 are only those genes that are currently known to exist. No doubt others also exist. The Wu et al., research also illustrates the problem in changing the scale

³ Ping Wu et al., 2018.

genes into the feather and as the over 1,000 changes occur the system must allow the scale to feather organism to survive each change. In the Wu et al., experiment the designed genetic alterations produces a creature that would rapidly be eliminated in the survival-of-the-fittest competition. It is logical to conclude that, likewise, attempts to evolve from a scaled creature to a feathered creature would soon lead to the poor animals' extinction .

Several evolutionists have totally misrepresented the Wu et al., research. As one evolutionist asked, "How do creationists deal with the fact that scientists have managed to turn alligator scales into bird-like feathers using genomics?"⁴ Of course, as we have seen, this claim is false. One response to this claim is as follows:

The postulates scale-to-feather transformations naturally over time) assumed to be true can never be confirmed via observation. The overall claim is extraordinary having more to do with wishful thinking than actual science. What top-trained scientists did in the lab does not show it all happened naturally. True science is not an echo chamber or a one sided conversation in matters which are highly ambiguous and not conclusive. It is laughable.⁵

Furthermore, much evidence exists against the dinosaur-to-bird evolution as presented in the one master's degree⁶ noted in the footnote below.

⁴ How do creationists deal with the fact that scientists have managed to turn alligator scales into bird-like feathers using genomics? <https://www.quora.com/How-do-creationists-deal-with-the-fact-that-scientists-have-managed-to-turn-alligator-scales-into-bird-like-feathers-using-genomics>.

⁵ <https://www.quora.com/How-do-creationists-deal-with-the-fact-that-scientists-have-managed-to-turn-alligator-scales-into-bird-like-feathers-using-genomics>.

⁶ Bledsoe, Donald Raymond. 2018. *The Refutation of Bird Evolution by a Study of Feathered Dromaeosaurs*. Southern Baptist Theological Seminary, Louisville, KY.