

Study shows scales evolving into feathers—really?

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EVOLUTIONISTS HAVE long claimed that bird feathers evolved from reptile scales. They have even been trying to show for decades that scales could turn into feathers today (see box). And in 2023, it continues with Michel Milinkovitch, Full Professor in the Department of Genetics & Evolution at the University of Geneva (Switzerland).

He claims that “an evolutionary leap—from scales to feathers” requires only a temporary change in the expression of a single gene, called sonic hedgehog (*SHH*).^{1,2}

Milinkovitch even tried to support this claim by an experiment he led using a chicken embryo. However, does this experiment truly show that the scales of dinosaurs—the supposed evolutionary ancestors of birds—could have easily evolved into feathers?

What the study really showed

The goal of the study was to better understand the signalling pathways involved in the development of chicken embryos. These pathways are incredibly complex and function like computer programs controlling the development of the embryo. One of these pathways—called the sonic hedgehog pathway (*Shh*)³—controls where different types of skin appendages (scales, flight

feathers, down feathers, nails, etc.) form. This pathway is also important in other aspects of embryonic development, such as the formation of the neural tube (which later becomes the brain and spinal cord). The researchers specifically wanted to explore what would happen if they disrupted the normal expression levels of the *Shh* pathway.

The study injected a substance called SAG,⁴ which activates the *Shh* pathway, into an 11-day-old chicken embryo. This disrupted the normally-precisely-controlled expression levels of the *Shh* pathway. As a result, feathers formed on the chicken embryo’s feet, which normally only have scales.⁵

So, what did the study show? Disrupting the programs that control where scales and feathers form in a chicken embryo results in feathers forming in the wrong place. The study also found that injecting a higher dose of SAG, or injecting the same dose at an earlier stage of development, always resulted in embryo mortality. This shows how important it is to have the correct expression level of the *Shh* pathway.

The feather-making program is already there

It is important to note that chickens already have the genetic instructions on how to form both scales and feathers. In the chicken embryo of the study, cells in the feet that would normally follow

the instructions on how to make scales followed instead the instructions on how to make feathers.

If the chicken embryo did not have the feather-making instructions, disrupting the *Shh* pathways would not result in the formation of feathers. The same is true for dinosaurs. Dinosaurs would only be able to form feathers if they already had the genetic instructions on how to do so.

Rather than supporting evolution, the results of this study show the brilliance of the Creator who designed the sophisticated programs that control chicken embryonic development. ■

References and notes

1. Agius, A., Reptilian ancestors, sonic the hedgehog and genetic alchemy combine to manipulate genes, cosmosmagazine.com, 18 May 2023.
2. Cooper, R.L., & Milinkovitch, M.C., Transient agonism of the sonic hedgehog pathway triggers a permanent transition of skin appendage fate in the chicken embryo, *Science Advances*, 17 May 2023.
3. The sonic hedgehog gene codes for the sonic hedgehog signalling protein, named after the Japanese video game character Sonic the Hedgehog. The acronym for the name of both the gene and its protein is all capitalized (SHH), in contrast to the pathway, which is *Shh*.
4. SAG = Smoothened Agonist, a chemical that activates the ‘Smoothened’ protein receptor, part of the hedgehog signalling pathway.
5. Most chickens only have scales on their legs, but some ‘show’ breeds (e.g. the Silkie and the Brahma) have feathers there as well. If anything, this further highlights the lack of evolutionary significance in getting feathers to grow there.

Nothing new under the skeptical sun?

Some decades ago, the claim was made in anticreationist literature that the supposed evolutionary change from reptile scales to bird feathers was not only possible, but a rather simple matter. The hands-down proof? Embryo experiments had shown that a simple chemical (vitamin A) was enough to ‘transform scales into feathers’! However, as here, the experiment was in *chicken* embryos, which obviously already have the information for producing *chicken* feathers! The Australian Skeptics’ (recurring) use of this misleading claim is documented in: CMI editors, The strange recurring case of the feathered reptile, *Creation* 12(4):47, 1990; creation.com/feathered-reptile.

