

A Sheep of a Different Color

In Defense of the Faith

Wednesday, July 09, 2014

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Genesis 30 seems to describe Jacob mysteriously breeding spotted sheep by mating white sheep in front of peeled branches in a watering hole--which, as a geneticist, has been one of the most difficult passages of Scripture for me to defend. Until 2008 and the birth of epigenetics.

Epigenetics, meaning genetics “on top of” genetics, was officially defined in 2008 as “stably heritable phenotypes resulting from changes in a chromosome without alterations in DNA sequence”. What that means is that, until epigenetics was born, it was believed that your genome, the DNA sequence that you inherited from your parents at birth, was set in stone and that all genetic decisions were made by that sequence.

Now it is recognized that as those decisions are carried out, they are often modified by chemical reactions that change the way the DNA folds and unfolds or the way RNA messengers relay their orders. And some of these chemical changes are, in fact functionally permanent and therefore inheritable. Genetics on top of the genetic sequence, in other words, “epigenetics”.

The power of epigenetics came to light due to a specific event in 1944 called the Dutch Hunger Winter, a winter during which, due to Nazi occupation, food resources for the whole population of the Netherlands were nonexistent. Scientists in recent years recognized this as a valuable group in which to study the effects of maternal malnutrition on their offspring.

What they found was that babies who were in their mother’s womb during the starvation period were more likely to have a host of health problems like diabetes, heart disease, and obesity. What shocked the scientists is that the children of those children also carried increased risk. Whatever had happened to the children of starving mothers was inherited.

By 2008, molecular geneticists had figured out that these kinds of genetic changes dictate how genes are expressed by turning on or off sections in the DNA through chemical reactions, and these changes can be functionally permanent and therefore inherited, despite not being part of the genome (the foundational DNA sequence). And these heritable changes that do not change the fundamental genetic sequences are called epigenetics.

Epigenetics shed a whole new light on the Story of Jacob’s sheep.

Genesis 30:37-40 records an interchange between Jacob and Laban as Jacob prepares to leave his position as the manger of Laban’s herds to strike out on his own:

So *Jacob* said to him, “You know how I have served you and how your livestock has been with me. For what you had before I *came* was little, and it has increased to a great amount; the Lord has blessed you since my coming. And now, when shall I also provide for my own house?”

So he said, “What shall I give you?”

And Jacob said, “You shall not give me anything. If you will do this thing for me, I will again feed and keep your flocks: Let me pass through all your flock today, removing from there all the speckled and spotted sheep, and all the brown ones among the lambs, and the spotted and speckled among the goats; and *these* shall be my wages. So my righteousness will answer for me in time to come, when the subject of my wages comes before you: every one that *is* not speckled and spotted among the goats, and brown among the lambs, will be considered stolen, if *it is* with me.”

And Laban said, “Oh, that it were according to your word!” So he removed that day the male goats that were speckled and spotted, all the female goats that were speckled and spotted, every one that had *some* white in it, and all the brown ones among the lambs, and gave *them* into the hand of his sons. Then he put three days’ journey between himself and Jacob, and Jacob fed the rest of Laban’s flocks.

Now Jacob took for himself rods of green poplar and of the almond and chestnut trees, peeled white strips in them, and exposed the white which *was* in the rods. And the rods which he had peeled, he set before the flocks in the gutters, in the watering troughs where the flocks came to drink, so that they should conceive when they came to drink. So the flocks conceived before the rods, and the flocks brought forth streaked, speckled, and spotted. Then Jacob separated the lambs, and made the flocks face toward the streaked and all the brown in the flock of Laban; but he put his own flocks by themselves and did not put them with Laban’s flock. (Genesis 30: 29-40 NJKV)

To recap, Jacob tells Laban that he is quitting, and that, as his wages, he will take all the dark or spotted sheep. And since Jacob took the spotted or dark sheep, any white sheep (not dark or spotted sheep) in Jacob’s flock would be legitimately considered stolen.

As black and spotted sheep are recessive traits (requiring both parents to share the black/spotted, Jacob obviously (being a shepherd) understood genetics.

Interestingly, however, ancient Jewish commentators interpret the key element as Jacob’s placing of peeled sticks in the water, and the drinking of the water by the sheep that introduced the changes in the color of the fur that the Bible describes.

But does this really solve the problem? Could peeled sticks placed in water really create spotted coats.

Actually, yes.

Much of the research on epigenetic changes has been conducted in mice, specifically mice with a specific coat color called agouti. Agouti coats actually occur in lots of other animals as well, including gerbils, cats, dogs, and horses. The agouti gene determines where black hairs appear in an animal’s coat, and the appearance and the location of those black hairs can be influenced by nutrition.

Specifically nutritional elements like the free amino acids methionine and choline.

Interestingly the account in Genesis names the specific trees whose bark Jacob used: livney lach luz and armon, which have been identified by Jewish scholar Rabinowitz as poplar, almond, and plane. And it just so happens that according to Dr, Johua Klein, expert plant pathologist at the Israeli Ministry of Agriculture, these specific trees harbor fungi under their bark that are rich in specifically methionine and choline.

So Jacob, when he stripped the bark and put the twigs of poplar, almond and plane, in the water, would have released these amino acids into the water that the sheep drank. And methionine and choline, proven from experiments with mice, induce black hairs in an otherwise white coat. Changes that would be inherited, through epigenetic processes, to produce spotted and black coats in future generations.

Just like Genesis 30 says. Not hocus pocus, but heritable genetics. Epigenetics, only really understood in the last decade.

Look again at the Genesis passage: it describes the lambs produced by Jacob’s method as dark, spotted, spotted, or streaked. To me, spotted and streaked sound kind of contradictory. But the agouti gene, through nutritional influence, drives the appearance of dark hairs in the coat: lots make a dark coat; fewer create a speckled, spotted, or grizzled appearance. Interestingly, the hairs themselves are striped, with light and dark streaks on each hair, adding to the distinctive look of the agouti coat. Hairs give the coat a spotted appearance as a group, but are striped individually. Spotted and striped, just as the passage describes.

I’ve said it before, and I’ll say it again: Sir Francis Bacon once said, “A little science estranges a man from God, a lot of science brings him back”.

Every time.

[About Wendy Wippel](#)

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