

The Smell of Change in Our Understanding of Pseudogenes

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Pseudogenes are sections of DNA that are similar to protein coding genes but are considered non-functional. They have features, such as a stop signal that interrupts the reading of the gene, which is thought to prevent them from being expressed as proteins. Over 19,000 pseudogenes have been identified in humans, which is surprisingly close to the estimated number of protein coding genes, 21,000.¹ Scientists have speculated about how pseudogenes fit into the evolutionary model, and some have used information on pseudogenes to argue against creationists. Yet, as the results of more research come to light, the scent of change is in the air.

Do Pseudogenes Smell?

Our sense of smell is an awesomely designed gift from God. The process begins with the millions of olfactory receptors (ORs) found in the lining of the nose. While 855 different OR genes have been identified in humans,² we are capable of detecting more than 10,000 different smells. This is because each OR can detect a number of different odorant molecules, depending on the concentration. Also, each odorant molecule can stimulate a number of different receptors. The signals are sent to the brain, and, through this complex combinatorial code, we are able to recognize a huge array of odors and mixtures.³

Surprisingly, over half of human OR genes are classified as pseudogenes.⁴ This means that, by definition, they should not produce a functional protein receptor. A recent fascinating report in the scientific literature shows that this conclusion is premature. A specific human OR pseudogene containing premature stop signals was investigated. It was found that the gene was read in an unusual manner and produced an unusual functional receptor. It was shown to detect a narrow range of odorant molecules.⁵ Thus, this pseudogene does produce a receptor that “smells.”

Wrestling with the Oxymoron of Functional Pseudogenes

This is not the first pseudogene that was discovered to have function. The term functional pseudogene is obviously an oxymoron, leaving scientists grappling with how to best define them.⁶ Not all pseudogenes are used to form functional proteins; instead, some have been implicated in a wide variety of other important functions within the genome. If pseudogenes were really non-functional, they would be expected to accumulate mutations randomly and deteriorate. Yet, they are surprisingly conserved (similar in sequence among many species), suggesting that many more will be found to have function when they are investigated more fully.⁷

Origin of Pseudogenes

No human was around to witness DNA coming into existence. Thus, questions of origins are generally outside the realm of empirical science. However, people often take observations made today and use them as circumstantial evidence to try to reconstruct what may have happened in the past. It is important to recognize that a wide variety of different “histories” can be imagined using the same evidence. The differences are largely based on the different starting assumptions. In fact, the final story often reflects the person’s starting assumptions more than it reflects the actual evidence.

Evolutionists view the world as having originated by essentially chance, random processes. They view pseudogenes as genes that suffered mutation and no longer are able to produce a protein. Because most pseudogenes are very similar to actual protein coding genes, they believe many were originally extra copies of these genes. The patterns seen in pseudogenes have led them to conclude that the copies were formed in two major ways. First, many are believed to have been formed by gene duplication, which adds an extra copy of the gene near the original. The second method, retrotransposition, is a bit more complex. In this case the gene is copied into messenger RNA (mRNA); the mRNA is edited as if to make a protein, but, instead, it is copied back into DNA, often at a location distant from the original.^{8,9}

It is important to note that both gene duplication and retrotransposition are very complex rearrangements. These are not the types of complex processes that would be predicted to be a part of something that arose through chance, random events. Yet, there is strong evidence that they do occur at times. Evolutionists do not seem to mind this and imagine that it provides a mechanism by which all genes and pseudogenes can be explained as having arisen from an original gene by “natural processes.” Of course, they still have no satisfactory model for how DNA arose or how life can survive while it is waiting for all the necessary genes to form.

Biblical creationists, on the other hand, accept the history in Genesis as true: the account of an eyewitness, the Creator Himself. Therefore, living things were created as kinds with all the necessary genes in place. Changes have certainly occurred since creation. Both gene duplication and retrotransposition may have played important roles throughout history, as God provided for creatures to adapt to different environments throughout the earth. Yet these amazingly complex mechanisms do not really explain the origin of genes; they only explain how pre-existing genes can be modified. Furthermore, the recent findings that many pseudogenes have function fits well with the creation model, in which there is a Designer who has a purpose.

Making a Stink over Pseudogenes

It is very common for those who attack creation to use “evidence” from areas that are not well understood. Often, the “evidence” includes conclusions that may not be well informed. This certainly appears to be the case with arguments based on pseudogenes. Some evolutionists had pointed to the large numbers of pseudogenes and claimed it was inconsistent with creation because it would mean God wasted large sections of DNA on junk. While degeneration is a part of the creation model, the amount of “junk” was much higher than would be predicted. Some creationists have pointed out that just because we do not know of a function, this does not mean there is no function. Yet, given our previous knowledge, it appeared the pseudogenes could not be used to make proteins, and other functions had not been discovered yet.¹⁰ The results of further scientific research have shown just how presumptuous the evolutionary claim that “junk” argues against a Creator really was. As several scientists concluded:

Rather, pseudogenes that have been suitably investigated often exhibit functional roles, such as gene expression, gene regulation, generation of genetic (antibody, antigenic, and other) diversity. Pseudogenes are involved in gene conversion or recombination with functional genes. Pseudogenes exhibit evolutionary conservation of gene sequence, reduced nucleotide variability, excess synonymous over nonsynonymous nucleotide polymorphism, and other features that are expected in genes or DNA sequences that have functional roles.¹¹

Inspiring Awe for the Creator

We now know that a number of pseudogenes that were thought to have no function do, in fact, have important functions. We now know that a pseudogene that certainly could not make a protein because of the premature stop signals actually does form a functional protein receptor. The more we learn in genetics, the more we find layers upon layers of complexity and design. We are also reminded how limited our understanding really is and how awesome the God who made us must be. May this information inspire us to thank and glorify God who has created us in such an astounding and wonderful way.¹² What had appeared impossible to us was not impossible with God.¹³

Footnotes

1. Gerstein, M., and D. Zheng, 2006. The real life of pseudogenes. *Scientific American* **295**(2):48–55.
2. The Human Olfactory Receptor Data Explorer (HORDE) Retrieved from, <http://bip.weizmann.ac.il/HORDE/aboutHORDE.html>.
3. Recent research focused on one OR gene family in the dog shows this combinatory code is astoundingly complex. See Benbernou, B., S. Tacher, S. Robin, M. Rakotomanga, F. Senger, and F. Galibert, 2007. Functional analysis of a subset of canine olfactory receptor genes. *Journal of Heredity* **98**(5):500–505.
4. HORDE, Ref. 2, lists 391 of the 855 OR genes as having an open reading frame. This leaves 464, or 54%, as pseudogenes.
5. Lai, P.C., G. Bahl, M. Gremigni, V. Matarazzo, O. Clot-Faybesse, C. Ronin, and C.J. Crasto, 2008. An olfactory receptor pseudogene whose function emerged in humans: A case study in the evolution of structure-function in GPCRs. *Journal of Structural and Functional Genomics* **9**(1–4):29–40.
6. Zheng, D., and M.B. Gerstein, 2007. The ambiguous boundary between genes and pseudogenes: The dead rise up, or do they? *Trends in Genetics* **23**(5):219–224.
7. Balakirev, E.S., and F.J. Ayala, 2003. Pseudogenes: Are they ‘junk’ or functional DNA? *Annual Review of Genetics*, **37**: 123–151. Back
8. Gerstein and Zheng, Ref. 1.
9. Max, E.E., 2008. Plagiarized errors and molecular genetics. Retrieved October 2, 2008, from <http://www.talkorigins.org/faqs/molgen/>.

10. Max, Ref.9.

This article also argues that shared pseudogenes between humans and chimps must be from a common ancestor, since a designer would not put the same mistakes in both, and they would be unlikely to occur twice by chance. The fact that pseudogenes cannot be assumed to have no function is a major problem for this argument. It assumes that pseudogenes contain “random errors.” If these types of arguments were valid, evolutionists would be able to show a consistent pattern in a number of genes across many different taxa. The problem is that the actual patterns often conflict with this. That is why evolutionists coined the term “convergent evolution.” It is supposed to explain patterns of similarity that are not from common descent; the same changes supposedly occurred more than once.

11. Balakirev and Ayala, Ref. 7, p. 123.

12. Psalm 139:14; Romans 1:20–22.

13. Luke 1:37.