

## Non-Conforming TEK 7G in Holt Curriculum

### 7G Analyze and evaluate scientific explanations concerning the complexity of the cell.

- Holt-McDougal is using 20<sup>th</sup> Century science and speculative ideas to answer this question, even though research on cell complexity is probably the fastest-growing area of research in the biological sciences. **TEK 7G does not ask about the origin of cell complexity, it asks students to look at scientific explanations concerning cell complexity.** Students need to know what a [proteome](#) is, and what an [interactome](#) is.
  - Genome: The complete set of an organism's genetic material.
  - Proteome: The set of genetically expressed proteins in a given type of cell or an organism at a given time under defined conditions.
  - Interactome: The whole set of molecular interactions in a cell.
  - [www.ncdir.org](http://www.ncdir.org) would be a good place to get some examples of how to help students understand cell complexity.

Proteomes and interactomes are 21<sup>st</sup> Century science and are an essential part of understanding the unity and diversity of life as it relates to evolutionary theory. Students deserve to know about this. Holt-McDougal has a chance to take the lead on this, or be satisfied with 20<sup>th</sup> Century topics like endosymbiosis that merely speculate about origins of complexity. The choice is similar to what happened with Galileo in the early 17<sup>th</sup> Century, when he faced opposition to his conclusion that Earth was not at the center of our solar system. This contradicted the teaching of Aristotle, which was speculative and not based on actual observations. Galileo, one of the first to use a telescope, drew his conclusions from direct astronomical observations.

TEK 7G is new, and publishers do not know how to address it. However, it is wrong to teach this TEK using highly speculative ideas like endosymbiosis and exaptation, when we have overwhelming amounts of data and research on cell complexity that is testable, repeatable, and helps students understand the unity and diversity of life. Holt can take the lead on this and teach 21<sup>st</sup> century science, or be satisfied with teaching Texas students a dumbed-down version of cell complexity. I reject TEK 7G.

Early evolutionists described cells as a “bag of salts”, but as we progress into the 21<sup>st</sup> century, advancing research on the complexity of the cell is causing many scientists to reevaluate current evolutionary explanations. New models are no longer describing a “tree of life” with a common trunk, but instead show a complex web with multiple starting locations (include a figure). Lateral gene transfer is helping to explain bizarre relationships such as cows with pieces of snake DNA randomly inserted into their genome.

In the 1900’s genetics research advanced rapidly, and by the early 21<sup>st</sup> century scientists had mapped the human genome. To their surprise, they had only scratched the surface regarding cell complexity. Scientists thought that each gene coded for a single protein, but now we know that one gene may code for 1, 2, 4, or even more different proteins. In addition, even though all your cells have the same set of genes, it is self-evident that your liver cells are not expressing the same genes as your skin cells. Both cells have vastly different functions, requiring different genes to be expressed, or sometimes the same genes coding for different proteins in different cells. The set of genetically expressed proteins in a given type of cell is called a proteome. The proteome of a liver cell differs from the proteome of other cells in your body.

Even more complex than the proteome is the interactome. In each cell, thousands of chemical reactions are occurring constantly. Scientists study the molecules in a cell and create maps of the various molecular interactions (Show figure of yeast interactome). As cellular biology advances, new cures for diseases will be discovered. We have come a long way since the “bag of salts” idea regarding cells, and new research will lead to further discoveries that help us unlock the mysteries of life’s unity and diversity.