To: Faculty and Students of Tennessee Universities, Colleges, High Schools, and Middle Schools From: Applied Molecular Evolution, Inc.



Re: Request for Proposals: <u>The Green Human Project: Building a Photosynthetic Human</u> **Date:** November 16, 2011

Project Objectives: We require a list of design modifications to the human anatomy and physiology that would allow humans to carry out photosynthesis to convert solar energy into glucose or other energy-rich molecules.

Project Rationale: Given the current boom in the global human population, food shortages are occurring and will continue to worsen in severity as natural resources are depleted. Alternative sources of nutrition will need to be found that will be sustainable and non-polluting. Solar energy is abundant and nonpolluting, yet currently cannot be directly harvested by human cells to make food. A clear need therefore exists for investigation into the modifications that would allow humans to use solar energy via photosynthesis for basic cellular food production. Please examine and explain how cell structures, functions and activities will need to be altered for a human cell to preform photosynthesis.

Design Considerations: In order to create a photosynthetic human, we will need a list of cellular processes, components and organelles that should be engineered into the experimental green human organisms. We will also need to consider the impact that our photosynthetic humans will have upon human societies and the environment. Some of the issues that need to be addressed are as follows:

- 1. How will light energy be captured?
 - How do plants capture energy and what similar sorts of components would we have to build into our "green human?"
 - Would photosynthetic humans have to have green skin or could they be some other color?
 - Will additional appendages be required for additional energy-collecting surface area and if so what form should they take?
- 2. What sub-cellular structures (organelles) are required for photosynthesis and how does their structure promote the process of photosynthesis?
- How will the energy from the sun be used to create glucose?What types of reactions do plants carry out?
- How will our photosynthetic humans use the energy stores (glucose) that they produce?
 - How will the 'green human' disperse these energy stores (glucose) for cellular use throughout the body?
 - What are the steps in normal human cellular respiration that allow for release of energy from glucose?
- 5. What public safety and ethical issues will need to be addressed during the completion of this project?

Constraints on Budget, Schedule, and Design: Proposals need not be concerned with budgetary concerns or design limitations at this stage of the project. However, preliminary proposals that address the design considerations above will be due by December 2, 2011.