Creating transgenic animals through spermatogonial stem cells

Creating transgenic animals through spermatogonial stem cells makes it possible to produce laboratory animal models in the shortest possible time and at the lowest cost. Genetically altered animals currently used in many downstream scientific and production applications such as fundamental biological research, preclinical study, production of proteins etc. The proposed technology allows one to create models of those species for which the traditional methods of introducing foreign DNA into the animal's genome are not possible, do not work, or are expensive.

Blinn students in the biology department will be able to take part in the process of optimizing the technology and creating models of genetically modified animals that address a specific problem in the biomedical field by studying such disorders as cancer, stroke, Alzheimer, Parkinson, etc. The students involved in the project, under the guidance of Dr. A. Syvyk will consolidate, expand, and apply their knowledge and hand on experience gained in biology and biotechnology courses. The collective work of students will jointly create the final product – a useful transgenic animal model that will serve for the solution of general or specific problems in the process of drug discovery. Such participation will encourage each project member to perform high-quality scientific work and prepare them for the further professional development.

Depending on the size of funding, one or several research projects can be carried out for a specific task of creating a model animal that could be utilized by scientists locally (TAMU), nationwide, or globally.

When carrying out the project under the guidance of A. Syvyk, the students will:

- develop a transgenic strategy ***in silico*** for creating a DNA modifying construct for introduction into male germ line the male-rat genome for a given gene or gene product;
- isolate and manipulate mammalian DNA ***in vitro*** using enzymatic reactions;
- isolate and manipulate mammalian cell lines ***in vitro*** utilizing cell culture methods;
- generate required animal models ***in vivo*** using alterations of mammalian genome in spermatogenic stem cells;
- collaborate with leading Principal Investigators at TAMU.

The outcome of the proposed activity: knowledge dissemination; more applicable and competitive training at the 2-year college level; creation of a final product (animal model) with patentable and profitable value.