

"We're searching for a needle in a haystack"

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Students on a team conducting a three-year research project on a parasitic organism are expecting some "aha" moments during what will admittedly be hard, often tedious work in the lab.

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More than 40 undergraduate students will participate in a research project that, someday, could have positive consequences for one of every five people in the United States.

Over the next three years, SCSU Assistant Professor Christopher Kvaal, Department of Biological Sciences, and his students will be studying *Toxoplasma gondii*, a single-celled parasitic organism that lives in human beings and animals. The organism, which infects one of every five people in the United States, remains inside the body permanently. Although fairly benign in healthy humans, it poses significant threats to the unborn as well as individuals with suppressed immune systems.

Kvaal and his students are hoping to identify weaknesses or "vulnerabilities" in *Toxoplasma*. Rather than culture the parasite in human cell lines, which creates significant time, money, and safety considerations they'll use yeast as a surrogate host for *Toxoplasma* DNA.

The research team will run the experiment millions of times; Kvaal expects a discovery about 1 out of every 1,000 times. He believes what the researchers learn will help lead to development of a drug that kills the *Toxoplasma* infection, though that could be as far off as ten years.

"We're searching for a needle in a haystack," said Kvaal. "If we put a *Toxoplasma* gene in the yeast and the yeast does not change, the experiment is a failure. But, if something happens — if a change occurs — that's our needle in a haystack."

Among the students working on the project is aspiring agricultural genetic engineer Anna Sandoval. Said the third-year biotechnology major and track team member: "When we first started this research, Dr. Kvaal told me that it was going to be really hard, that a lot of things would seem really tedious. Then he asked me if I had ever seen *Karate Kid*. He said, 'Do you remember how the teacher had him painting the fence and washing the car? Do you remember how all of sudden that all came together? You're going to have a *Karate Kid* moment just like that'."



The two most common ways of becoming infected by the parasitic organism are by eating undercooked meat or touching cat feces, even trace amounts like dust from a litter box. According to Kvaal, most people don't realize they've been infected because healthy individuals experience few if any symptoms. "Cysts form in your brain, eyes, and muscle tissue, but you won't even know that's happening."

Toxoplasma presents serious health issues, however, for pregnant women, individuals with AIDS, and patients undergoing chemotherapy or organ transplant. Acquiring the infection during pregnancy can cause serious birth defects. And individuals with suppressed immune systems who are already infected or become infected can die as a result of toxoplasma-related complications, such as encephalitis.

The project is supported by a \$162,500 Academic Research Enhancement Award from the National Institutes of Health.

Students at SCSU often work side-by-side with professors on research projects. As a result, they develop better analytical, writing, and speaking skills, and they're exposed to role models, methods, and the language of their fields in preparation for further study or the workplace.

- Marge Proell