A new tool for the study of host-pathogen interactions is being developed for the educational laboratory setting. Educators of infection-related course laboratories (medical microbiology, general microbiology, immunology, pathobiology) can use this tool to enable students to study, through experimentation, host-pathogen interactions. Although the concept of a host-pathogen model for the laboratory is not new, an inexpensive, simple, flexible, and student-friendly model is not widely available. Thus, while host-pathogen interactions are commonly discussed in lectures as an important topic, few students have the chance to experience and learn for themselves in the lab setting. The use of Gambusia affinis, a readily available, inexpensive, invasive species of fish offers an appropriate host which can be easily maintained with little caretaking requirements and inoculated through a bath protocol, as opposed to a more difficult and time consuming injection or bleeding method. The Wissahickon Gambusia is prevalent across the entire Southern United States, and is easy to catch. To provide a safe (no human) and easy-to-use pathway as a positive control and a proof-of-concept, Edwardsiella (a Gram-negative Enterobacteriaceae) can be cultured on commercially available lab media, does not survive at 4°C, and therefore cannot cause systemic infection in humans. Pathogenicity of Edwardsiella is also readily裘并, as the major agent of enteritis septicaemia in catfish, one of the most significant causes of economic loss in the cultured catfish industry.

**INTRODUCTION**

While pathogenesis is virtually universally discussed in microbiology and related courses, few undergraduate laboratories include experiments, primarily because of logistical issues. Hypothesizing that active learning will give students a better understanding of concepts in pathogenesis, a novel virulence assay has been developed for use in labs which is simple, flexible, accessible, and safe for students. For this short model utilizes the Western Mosquitofish (Gambusia affinis), an invasive species broadly distributed across the U.S. These freshwater fish are rarely encountered in biology labs, and students are interested in learning more about them. This simple method can be adapted to any lab, with students inoculated (around 6% 14% of students on “enjoying the lab experience.” Interestingly, students answered a question how far 28% of them were concerned about suffering of the fish, but also a contradicting few and diverse 30% even could overlook the usage of animal experiments in microbial classes. Further, study will be performed on how this experience impacts student perceptions of animal research. The developed model protocol will be shared with instructors interested in adding virulence studies into their courses.

**DISCUSSION**

The ease, safety, flexibility, and inexpensive nature of the core infection protocol allows it to provide a set of practical lab modules which can be modulated to fit almost any lab where concepts in host-pathogen interactions are taught. Screening of enteric isolates for virulence has been performed in an undergraduate genetics microscopy lab for 3 semester successfully. Fish can be infected by single addition of pathogen strain, and mortality is proportional to infectious dose. Infection can be treated with two antibiotics (rif and tet), and partially protects against a future infection. Student attitude assessment indicates that students feel that the lab module is helpful to their learning (see attached results). This is the goal of this project to disseminate the information gathered in our preliminary studies to other microbiology educators to offer these modules as a flexible tool.

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