State and Local

A&M prof experimenting with light producing bacteria

By BILL HUGHES
Reporter

The room is dark, except for a liter of fluid glowing an eerie aqua in a flask sitting atop a magnetic stirring motor.

The fluid contains bioluminescent bacteria known as photobacterium phosphorium, the marine microorganisms responsible for the light show.

"If we can learn what the parameters are on the surface of the enzyme, we have the beginnings of an ability to design a reactor with high efficiency for home lighting," says Dr. Tom Baldwin, associate professor of biochemistry and biophysics at Texas A&M.

After 14 years of working with these light-emitting creatures, Baldwin says he is still fascinated by them.

"I'm far from becoming bored with it," he says of his work in bacterial bioluminescence.

Baldwin's interest in luminescent bacteria began in 1971 when he was a graduate student working in protein chemistry at the University of Texas.

He attended a seminar on bacterial bioluminescence given by visiting professor Woody Hastings, got hooked on the subject and began reading about it at the library, he says.

"I decided there was a lot of fertile ground there for further research," Baldwin says.

When he began working, little was being done in basic or applied research with bioluminescent bacteria.

Since then, researchers have made new discoveries about the chemical structure of the enzymes, known as luciferases, which catalyze the light-emitting reaction.

The reaction is highly efficient, with most of the energy going to light production and little energy being wasted as heat.

The result is cold light, a light bright enough to read by in a dark room, but not hot to the touch the way an ordinary tungsten bulb would be.

"As a result of the protein chemistry that we've done with the bacterial luciferase, we know a lot about the structure of the enzyme," he says. "We know what we can do to it and what we can't do to it."

Baldwin primarily is interested in how the enzyme folds to give an active 3-D structure.

"All proteins, when they're synthesized in the cell, are synthesized starting from one end . . . it's like a chain that's being made one link at a time," he says. "When the protein is fully synthesized . . . it's properly folded and ready to go to work."

Doing the same thing in a test tube isn't quite as efficient. The subunits of the protein can be separated chemically, but when they're recombined it takes about three days to get full activity.

"There must be something about how folding occurs in a cell that is very different from the way it occurs in a test tube," Baldwin says. "My feeling is that it must have something to do with the order with which the subunits are available to fold."

Monitoring the results of the reaction within the cell is made easier because the product of the enzyme-catalyzed reaction leaves the cell as light. Checking for enzyme activity is as easy as looking for light emission from a colony of cells.

"The hope is . . . that since the assay is so sensitive with respect to the luciferase system, we might be able to get an experimental handle on the process of protein folding inside the cell," he says.

Baldwin says he believes that whoever finds the key to protein folding surely will be awarded the Nobel Prize.

"Right now, it's pie in the sky, but I think we might be able to get a handle on it," Baldwin says.

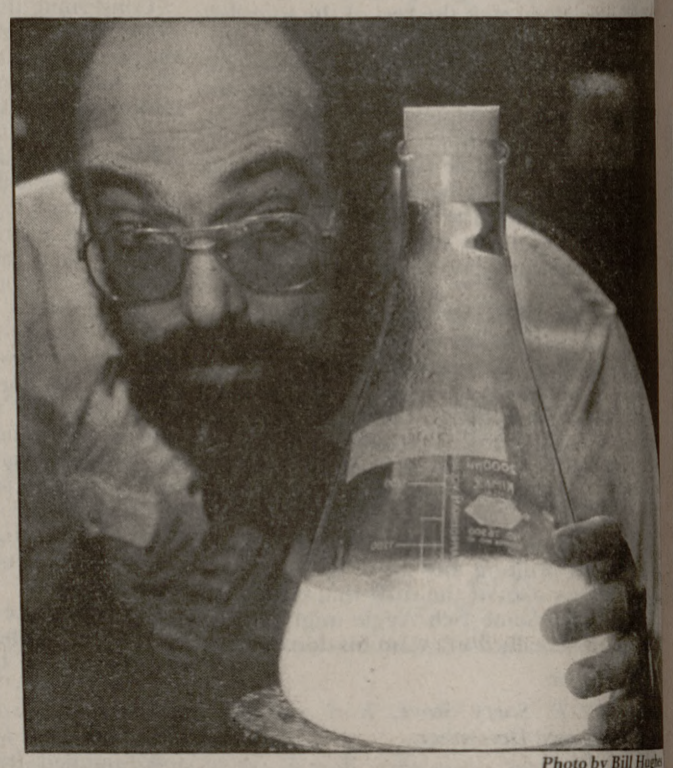

Photo by Bill Hughes

Dr. Tom Baldwin examines the enzymes known as "luciferases"

He says protein folding research is creative, but chancy. Baldwin says he's trying to get enough information on the process to write a grant proposal.

"At this moment, the research isn't even sufficiently well-formulated enough to convince a granting agency to give me the money to do the work," he says. "You have to show you know how to do the things you want to accomplish."

A new microprocessor-controlled 250-liter fermentation unit has helped Baldwin speed up the research process because the unit lets him grow the large quantities of bacteria needed for some of his experiments.

In one day, the 250-liter unit can process the same amount of bacteria that it used to take 18 days to do with a 10-liter unit.

Baldwin's research is basic, meaning it's research designed to expand the boundaries of knowledge without any specific applications in mind.

Baldwin says that using luciferases as molecular tags in place of radioactive isotopes is safer and more efficient because the luciferases don't present the hazards of radioactive material, aren't as expensive to manufacture, and are easier and cheaper to assay than isotopes.

Regents to discuss emergency loan eligibility changes

By MARYBETH ROHSNER
Staff Writer

A rules revision of Texas A&M's emergency tuition and fees loan program is one of the items on the Board of Regents' agenda for today's meeting at 3 p.m.

The Regents will discuss the recent change in the eligibility requirement for the emergency loan program to allow students on conduct probation to be eligible for the federally sponsored loans.

Currently students on conduct probation are not considered eligible for the program, but the U.S. Department of Education has ruled that such students should be eligible.

The Regents also will vote on:

- Choice of a contractor for the A. P. Beutel Health Center addition.
- Choice of a contractor for the Veterinary Medicine Complex renovation.
- Acceptance of nearly $10 million in contributions to the University for September 1984 to August 1985.
- Appropriations for the Excellence in the Humanities and Social Sciences program.
- Appropriations for the Excellence in Engineering program.
- Proposing to establish a center for mathematics and science education within the College of Education.

Photography: Bill Hughes/Hair D'Lynn of Ferguson and Company.