

# Research Opportunities

## Providing Students with Valuable Experience

**Dr. Thomas Manning, professor of chemistry**

**F**rom researching anticancer drugs to developing an international periodic puzzle competition to teaching chemistry, Dr. Thomas Manning, significantly contributes to student research and scholarship activities at Valdosta State University.

The professor of chemistry arrived at Valdosta State in 1993 and embraced the research opportunities at the regional university.

As an undergraduate at the College of Charleston, Manning worked directly with faculty on various research projects. These opportunities made a huge impact on him and set the tone for his research philosophy, which emphasizes student involvement.

At VSU, Manning has found an institution that allows him to balance his teaching and research.

"I am a big fan of the expression 'the most important thing you can do is spend time with someone.' All the equipment, technology and buildings in the world are irrelevant — it's relationships that matter," he said.

Manning encourages his students to engage in research projects and sees it as a partnership. Not only does research provide students with the opportunity to develop special skills

needed for graduate or medical school, but it often gives them a different perspective on problems and issues.

"Sometimes the student will have ideas and suggestions that were not initially thought of," Manning said. "Students are not just sitting in a classroom copying information off a board; they are ready to do field work and look for the answers to the problem. The independence benefits them."

Manning works to engage his students at various levels of the research process. "For many students, there is a turning point when they go to a conference and present a paper or poster; they see that their work is just as good as or better than a student at a larger university. A light goes on, and they see themselves not just competing against fellow students at Valdosta State but against students across the country."

With more than 50 papers published in national and international peer-reviewed journals (many co-authored by his students), Manning encourages his students to find an interesting problem and try to solve it.

"Faculty at big universities do research a certain way because they have so many resources — people, space, and equipment — that is the model they use. You have to forget what you don't have and move past the idea that you need some type of special equipment or large space. The challenge is coming up with an innovative way to find the answer with the resources you have."

## Research Opportunities

Manning's research projects currently fall within one of three categories: researching anticancer drugs, exploring nanotechnology, and promoting chemistry education.

The anticancer drug research — popular with pre-medical students — focuses on the development of anticancer drugs from marine organisms. With students by his side, Manning makes frequent trips to the mucky waters off the Gulf Coast of Florida to harvest samples of sediment for research on three natural anticancer drugs: bryostatin, ET743 and Taxol. These drugs have been harvested from trees and marine organisms for several decades.

According to Manning, production costs, which include the high cost of extraction and the large quantities required, have resulted in rising drug prices for consumers. By harvesting bacteria from what Manning describes as “bacteria farms” in the ocean, the group is finding less expensive methods of producing these cancer-fighting drugs.

“From these ‘bacteria farms’ in the Gulf of Mexico, we are developing ways to harvest more bacteria at a fraction of the cost of what people are doing in the lab,” Manning said. “It’s a completely different approach, but a much simpler approach.”

The nanotechnology research includes work with quantum computers, environmental nanotechnology, and nanostructural development. Manning describes a nanostructure as something that might be 100,000 times thinner than a human hair but is able to perform mechanical or electrical functions.

“We have two papers coming out in this area. One deals with something called aza-fullerenes and the second deals with graphene or individual sheets of graphite,” Manning said. “Nanotechnology research is for students who are ‘hard core,’ wanting to get into graduate school.”

The third area of research centers on advancing chemistry education. For the past three years, Manning and Valdosta State chemistry students have collaborated with students from Instituto Superior de Tecnologías y Ciencias Aplicadas (InSTEC) in Havana, Cuba.

In 2010, the group launched its first international online periodic puzzle competition. The contest challenged students to solve Sudoku-style puzzles by answering chemistry-based riddles.

The competition attracted teams from Belize, Canada, China, Cuba, England, Russia and the United States. More than 20 teams completed the puzzles, which VSU chemistry students graded based on timeliness and accuracy.

“This contest is a great way for teachers to get science students involved in an international activity from their classrooms,” Manning said. “We hope to expand the competition in 2011, which is the International Year of Chemistry.”

## Research Protégées

Dr. Giso Abadi and doctoral student Caley Allen know firsthand the benefit of undergraduate research and its importance to students planning to attend graduate or medical school.

As an undergraduate, Abadi assisted Manning with his anticancer drug research. This experience benefited her during doctoral work at the University of Sunderland in the United Kingdom.

Through a collaboration between the University of Sunderland and VSU, Abadi continued her research with Manning. “I did most of my research here [at VSU] and most of my analysis in the United Kingdom. It has been the most rewarding and memorable experience of my life thus far. I





am very grateful to have had the opportunity to receive the graduate assistantship and very thankful to those university officials who made it possible.”

After receiving her Doctor of Philosophy in Chemistry from the University of Sunderland, the Belize native returned to VSU as a lecturer in the Chemistry Department.

With more than eight co-authored publications and numerous presentations at national conferences, Abadi appreciates the educational opportunities she received.

Her advice to undergraduate students is simple: develop close relationships with faculty members. “At a university such as VSU, when students familiarize themselves with their professors, they will benefit in many ways. Those with interest in the medical field will find the research at VSU rewarding and helpful.”

As part of a U.S. Air Force family, Allen moved around the country before her family settled in Valdosta. As a freshman at VSU, she had not planned to attend graduate school. “In the final semester of my undergraduate career, Dr. Manning organized a trip to Clemson University, University of Georgia and Auburn University. I decided to go on the trip and during the tours of the different graduate departments, I realized that pursuing and earning a higher degree was what I wanted to do.”

Now working on a doctorate in computational organic chemistry at Auburn University, Allen fully appreciates the opportunities and experiences afforded to her as a student at Valdosta State.

“Working with Dr. Manning greatly prepared me for graduate school. The work environment was independent, and he was updated from week-to-week on the progress. His approach to undergraduate research taught me how to be dedicated and problem solve on my own without someone over my shoulder,” Allen said. “Dr. Manning also greatly encouraged public speaking. Either in the form of a poster presentation or PowerPoint presentation, being able to present scientific data in a comfortable, professional and confident manner in front of your peers and academic research advisors is an invaluable skill to develop within the scientific community.”

Allen had the opportunity to work with Manning on two research projects. Both won top honors at a professional competition and were published in national publications. “Chemistry in a Nanodrop” was presented at the Southeastern Regional Meeting of the American Chemical Society (Oct. 2007), where it placed second out of more than 200 entries. Allen received first place for overall graduate and undergraduate oral presentations at the joint meeting of the Georgia and Florida Academies of Sciences (March 2008).

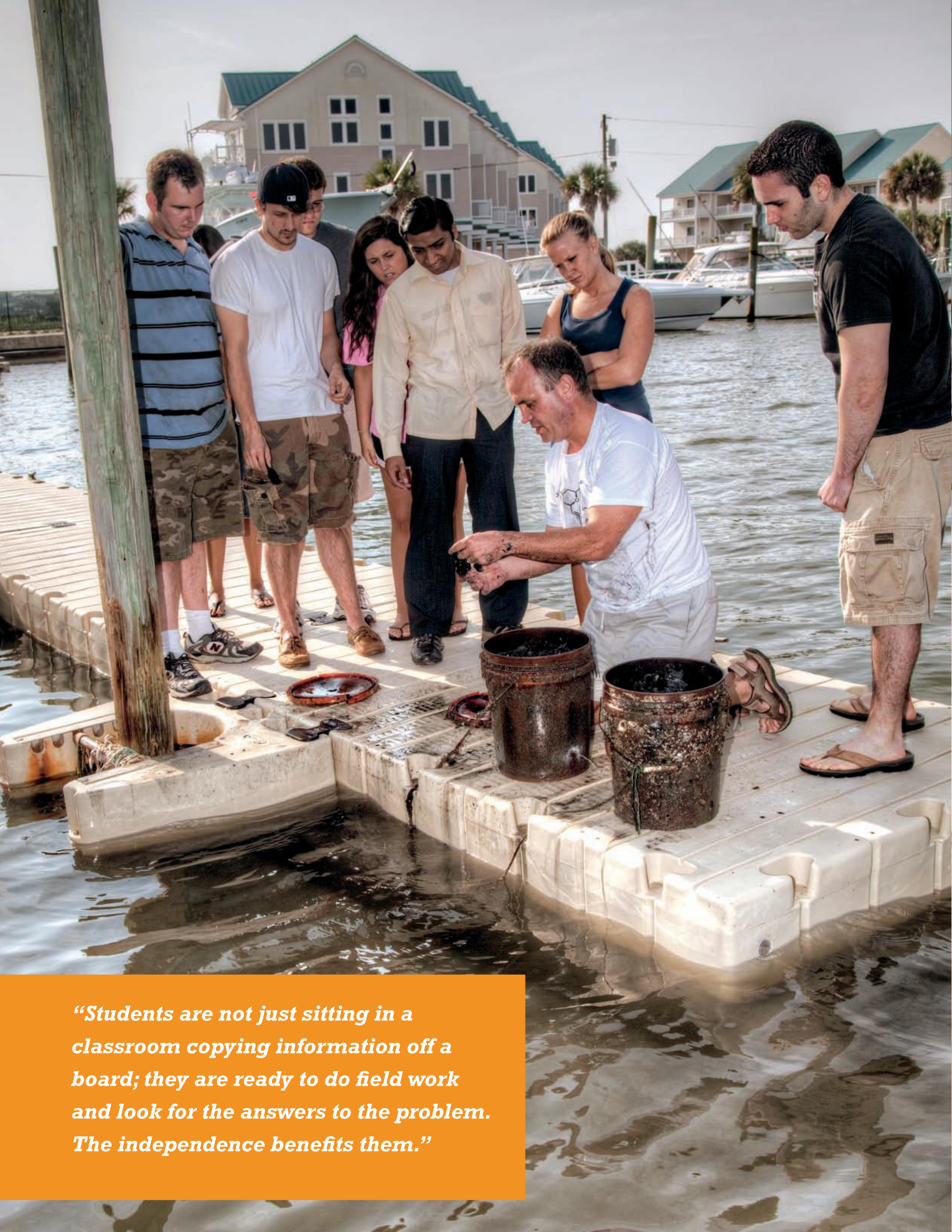
The second project, “Carbon Nanotube and Co<sub>2</sub> Supercritical Fluids” was cited in the book *Computer Based Projects for Chemistry Curriculum*, co-authored by Manning and Auror Perex Gamatges, professor of chemistry at Instituto Superior de Tecnologías y Ciencias Aplicadas.

Allen plans to complete her doctorate at Auburn University and then examine her career options. “I enjoy teaching chemistry classes and labs. I enjoy the experience of when a student grasps a concept and I get to watch the ‘light bulb go on’ -- it is very rewarding. But also, I believe that I would benefit a pharmaceutical company utilizing my degree in computational chemistry.”

Manning enjoys staying connected with former students. He realizes that his research and teaching not only help the medical and scientific community but directly affect the lives of students who pass through his classes and engage in research partnerships.

“Research keeps me excited about science, and I think, in general, that enthusiasm boils back over into the classroom,” Manning said. “There is that mentality of having a legacy — you don’t dwell on it, and you don’t record it, but you know it’s out there somewhere.” ■





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