



Gene Wong
[BIOLOGY]

Adding to the Body of Knowledge

From sea urchins and ultrasound waves to school finance reform, QU professors keep pace with their fields through research

BY KAREN BAAR • PHOTOGRAPHY BY ROBERT LISAK

The spiny sea urchin may be one of the marine world's prettiest creatures, but one professor prizes them instead for the clues they harbor to the mysteries of cell division.

Associate biology professor Gene Wong has spent the last 15 years studying cell division in sea urchin eggs. All living organisms begin life as a single cell, and all cells must divide to create new ones.

"Normally, a sea urchin egg will divide 2-1/2 hours after fertilization. If we disrupt the assembly of the cell's actin cytoskeleton, then the process

of division is delayed," Wong says.

He explains that the actin cytoskeleton in a cell works like the skeletal system in humans, helping in support and movement, with cell division actually a kind of movement within the cell. "This process is highly coordinated by 'checkpoints' found at key points in the cell cycle. When these checkpoints break down, cells may divide uncontrollably and lead to cancer," he says.

Wong is among some 40 professors currently conducting research at Quinnipiac on topics that span the disciplines. "We're primarily a teaching university, but scholarship is a key component of our faculty's professional responsibilities, and keeping up with emerging knowledge and how your field is evolving and changing helps faculty be the best possible teachers they can be," explains Kathleen McCourt, senior vice president for academic and student affairs.

McCourt thinks research is important for all universities. "Part of the mission of any university is creating new knowledge," she says.

Professorial scholarship enhances a university's reputation. Potential students may look for a school strong in research, especially in the sciences, where there is a long tradition of students collaborating with faculty on research projects. Graduate students are also likely to value research. Wong says more than 20 students are assisting biology professors with research this year.

Quinnipiac supports faculty research in several ways. A staff member works with deans and faculty members to identify funding opportunities and submit proposals for research. In addition, the university has a faculty research fund, through which professors may apply for grants to pay for summer research; faculty also may receive a temporary course load reduction to support their studies.

Three years ago, the university inaugurated its Faculty Scholars program. Two faculty members a year are selected by their colleagues from the different schools on a rotating basis. In addition to being recognized at an annual reception, they receive a modest research account, on which they can draw for lab, travel or other expenses. At that reception, all faculty who have published in the preceding year are invited to display their books and articles.

Wong has submitted his cell research for publication. This academic year, he will continue his studies by narrowing down where the

actin checkpoint occurs. "We then can focus attention on a smaller group of molecules in hopes of finding the critical ones involved in deciding when cells will divide. All of this work may contribute to a basic body of research that scientists can use to determine if they can regulate the process of cell division, and how this may be related to cancer cells," Wong says.

Since joining the faculty six years ago, Wong has received three faculty research grants to continue his work on this project and another looking at small flatworms called planaria on several levels, including how their memory can be enhanced using drugs. This may have implications in areas such as Alzheimer's research.

He and students have been working with planaria, training them to choose a direction to travel when confronted with a Y fork in their habitat. Sara Abbott '06, a departmental honors student last year, found that the worms could be trained to avoid an electric shock by choosing left over right, for example, over three days. However, immediately after the shocks stopped, the worms did not remember their trained directional preference.

This semester, he and students will expose the worms to a drug called Bryostatin-1 and repeat Abbott's experiments. It's used as a chemotherapy drug, but recent studies from the Marine Biological Laboratory at Woods Hole, Mass., have shown that it can enhance memory as well. Wong and his students will study whether the drug will help the worms remember their training to avoid an electrical shock by selecting a particular direction in a Y-maze.



Carrie Bulger
[PSYCHOLOGY]

New Meaning for "Home" Work

What began as neighborhood chats between Carrie Bulger and another professor in a nearby office has evolved into an ongoing interdisciplinary research project.

"There's a lot written in the popular press about the way that technology is blurring the boundary between work and home. We decided to see if this is really happening, and, if it is, to examine the impact," says Bulger, associate professor of psychology. She is collaborating with Mark Hoffman, associate professor of computer science. Hoffman is interested in the ways in which the Internet, e-mail, handheld digital assistants like BlackBerrys and other devices enable people to make the boundaries between home and work less distinct.

"When I worked in manufacturing, I could see that having a full-time Internet connection was blurring the lines. People were answering personal e-mails at work, and responding to work e-mails at home," he says. Bulger, an organizational and industrial psychologist, looks at this from a different angle. "If this is happening, is it good for people? Does it make them happier with their jobs and home lives or does it add to their stress?" she asks.

Partnering with the Milford Chamber of Commerce, the two professors surveyed employees at 24 member companies, eventually receiving more than 300 responses. They asked people what kind of technology they used, what they did online at home and at work, and the extent to which they kept home and work as separate domains. Respondents also were asked about job satisfaction and stress, and about work-family conflict.

Findings supported the idea that the lines between work and home are becoming hazier, but not for everyone. "We speculate that some people prefer to keep the two areas separate," Bulger says. This choice



Steve Straub
Lenn Johns
[PHYSICAL THERAPY]



Susan Norkus
[PHYSICAL THERAPY]

has mixed effects: those who blurred their home-work boundaries had higher job satisfaction, but they also tended to be higher on work-family stressors, such as work-family conflict.

Hoffman says that overall, “The way people manage their boundaries is reflected in the online activities they take part in at home and at work. While some people blur their home boundary by answering work-related e-mail at home, others are more protective of their home domain and less likely to do so.”

The researchers plan to take their next survey nationwide. And, says Bulger: “Since we’re studying technology, the survey will be online.”

Therapeutic ultrasound is administered to soft tissue at a variety of energy and time dosages to enhance healing and reduce chronic inflammation for muscle or tendon injuries, or it can be used to improve the range of motion of a joint. The clinical effects of the ultrasound are dosage dependent, however, with too low a dosage having no clear effects and too large a dosage resulting in tissue injury.

“The bottom line is that we found variability that we believe is clinically relevant, meaning that a clinician may need to consider each transducer as a unique device or that two ultrasound transducers may lead to different clinical outcomes when set to the same parameters,” Johns says.

“The bottom line is...two ultrasound transducers may lead to different clinical outcomes when set to the same parameters.” —PROFESSOR LENN JOHNS

Dosing Differences Discovered

Lenn Johns and Steve Straub, professor and associate professor of physical therapy respectively, are evaluating the accuracy of ultrasound equipment and consistency of therapeutic dosing using a *Consumer Reports* magazine-style approach.

“Ultrasound has three primary clinical uses: diagnostic, surgical and the kind our project focuses on—therapeutic ultrasound, which is used in physical therapy and athletic training clinics,” says Johns, director of Quinnipiac’s athletic training/sports medicine program.

Over the past few years, conflicting reports have raised questions regarding ultrasound’s clinical efficacy. “What we are studying,” says Johns, “is the uniformity of the ultrasound field and the consistency of the clinical dose delivered to the patient.”

He said a critical review of FDA guidelines shows that 150 percent variability can exist between two ultrasound transducers that are within FDA guidelines. They are completing a study that was funded by the National Athletic Trainers’ Association Research and Education Foundation aimed at measuring the variability in dosing that exists between 11 new transducers from six different manufacturers.

The first in a series of manuscripts describing this variability recently was accepted for publication in *The Archives of Physical Medicine and Rehabilitation*, a highly regarded journal within the field. Three additional manuscripts describing variability within the ultrasound fields and between transducers are under review.

Johns and Straub have shifted their investigation from the physics perspective—evaluating the ultrasound field—to the clinical world. Johns says the next step is to show that the variability they measured makes a difference clinically. They have two additional manuscripts under review linking variability in the ultrasound field to clinical variability.

“If drug manufacturers reported this much variability in their products, they’d never get through the FDA. We’ve talked with people at the FDA and other agencies. They know this is a problem, and they’re trying to figure out how best to tighten the regulations,” Johns says.

“There has been a longstanding debate between clinicians as to whether therapeutic ultrasound is effective or not. Our data may reframe that question as, ‘Is the ultrasound transducer you are using effective or not?’”

Masking—a Larger Problem

Athletic trainers sometimes face a thorny problem when caring for injured athletes wearing helmets. Removing the helmet's face mask can be necessary to allow access to an athlete's airway if he stops breathing. However, if the athlete has neck pain or is knocked unconscious, the athletic trainer must assume the worst—that there is a spinal cord injury—until proven otherwise. In that case, removing the helmet is a dangerous risk because it could put the injured athlete's neck and spine out of alignment.

Susan Norkus, associate professor of physical therapy and clinical coordinator of the athletic training program, along with colleagues at the University of New Hampshire, has been investigating the most efficient way to remove a face mask from a helmet.

"Removing it is not as easy as it sounds. The face mask is held on by four plastic clips. You want to cut off the clips quickly without producing movement," she explains.

Using Quinnipiac's biomechanics lab for 3-D motion analysis, the researchers watched certified athletic trainers remove face masks from models wearing the equipment. "We measured how much movement was occurring and which type of tool is best," she says. Although current practice is to cut the clips using a tool similar to a gardener's anvil pruner, they found a better method.

"The clips are attached to the helmet with screws; we've found that a cordless screwdriver is best; it's the fastest, produces the least amount of head movement, and is easiest to use," she says.

Using a screwdriver has not generally been recommended because of fears that screws could rust and then strip. Norkus and her colleagues looked at that issue, too. "On new equipment, the screwdriver was hands-down superior. But we also went into reconditioning facilities, where equipment is sent to be cleaned and upgraded. We looked at equipment that had been used for at least a season of play, so it had been exposed to the elements and gotten dirty and sweaty, and we still found that a high percentage of clips came off with the screwdriver."

The research has had significant payoffs. It's a tremendous investment for manufacturers to change the way face masks are attached to helmets. However, says Norkus: "They're starting to recommend and use stainless steel screws, which have a much higher success rate than screws more prone to corrosion."

Norkus is on the writing team crafting a position statement for management of the spine-injured athlete for the National Athletic Trainers' Association. "Based on the research, we are making recommendations on how to deal with the athletes and their equipment out on the field, before they get to the hospital," she says.

Eric Brunner
[ECONOMICS]



Does the Medium Send a Message?

Nancy Worthington, an associate professor of communications, studies gender representation in the media. Her last study, "Progress and Persistent Problems: Local TV News Framing of Acquaintance Rape on Campus," was an analysis of news reports about a campus rape scandal at a private Catholic college in the West. She now is involved in a comparative study of two rape cases in collaboration with Ian Glenn, a colleague at the University of Capetown, in South Africa.

The South African case revolved around Jacob Zuma, former executive deputy president, who was accused of rape by a woman who is an AIDS activist and is HIV-positive.

Worthington explains: "This case brings up a lot of social issues. South Africa's response to AIDS has been controversial. Their president has taken the stand that HIV does not cause AIDS. With respect to [his exposure to] HIV, Mr. Zuma explained that 'he took a shower afterward.' Also, he argued that this was consensual sex, in part because of a particular kanga or sarong-like garment that the woman was wearing. One interesting question, then, is whether this is the South African version of 'she was asking for it because of what she had on.'"

The two professors will compare the Zuma case to one currently under investigation in North Carolina, where a woman has accused several lacrosse players at Duke University. The alleged victim is an exotic dancer.

The research focus for the study will be how the accusers are represented in the media. "The women are anonymous, but we know that in



local tax revenue or reduce state education budgets. Such cuts can threaten not only extracurricular activities, but academic programs as well. In response to these measures, some schools and school districts appeal to parents for voluntary contributions.

Brunner studied the size and distribution of voluntary contributions to California's K-12 public schools in 2001 and whether these donations created inequities in school funding across communities. He also has explored the characteristics that lead some schools to be more successful at raising voluntary contributions than others.

Brunner also studies the political economy of school spending and school choice.

"Essentially, this is research on why individuals support or don't support education spending and programs such as school vouchers, which are designed to offer parents and students greater choice."

Common wisdom has it that senior citizens are less inclined to support school spending...Eric Brunner found otherwise.

both cases, they have less power and social status than the person they're accusing. In the Duke case, the race issue is definitely a part of the picture. In the Zuma case, his mention of a particular robe may be a reference to a specific ethnic culture."

In South Africa, Zuma has been tried and acquitted. The Duke trial is scheduled for March. In the meantime, Worthington is doing an international literature review to evaluate how the media cover rape.

The researchers plan to collaborate on a class they'll teach at their respective universities. "Students will be able to comment on the different media representations. It's exciting, because we don't generally get to learn much about the media in other countries," she says. They also plan to publish their findings and present them at a conference.

Community Support for Schools

Eric Brunner's research focuses on education spending. The associate professor of economics looks at the intended and unintended consequences of school finance reform. For example, such reform usually is intended to equalize spending across districts in a state. "Sometimes, though, it leads to things you might not have expected—a decline in overall spending or an increase in private school enrollment," he explains.

Brunner also is interested in school finance reform plans that limit

Some of his research has probed the relationship between the elderly and support for education funding. Common wisdom has it that senior citizens are less inclined to support school spending because they don't have a direct need for public schools. Brunner found otherwise.

"Their support tends to depend on the level and kind of spending. If the state wants to increase funding, their support tends to decline. However, the elderly are more likely to support school spending in their local communities. Why? Because there's an incentive—the money stays in the community, so it affects the value of their homes."

Brunner's work has been published in peer-reviewed journals, such as the *Journal of Public Economics*, the *National Tax Journal* and the *Journal of Urban Economics*. Until now, his research has focused on California; however, he has begun a project that will use national data to look at the impact of tenure on teacher wages, educational quality and student outcomes.

As Quinnipiac strives to attract and retain the best faculty, research is becoming more significant. "Faculty wouldn't come to Quinnipiac unless they felt their primary vocation was to teach, but the faculty we're recruiting out of the best universities have been doing research. In most cases, they want to continue. And we want them to keep on doing that work," McCourt says.

Magazine editor Janet Waldman contributed to this story.