John Kopchick, Goll-Ohio Eminent Scholar and Professor of Molecular Biology

KEVIN RIDDELL

Teamwork, close collaboration, curiosity. These terms define the work of John Kopchick. He and his colleagues focus on the molecular biology of growth, obesity, insulin resistance, diabetes and aging — an ambitious set of problems by anyone's standards. Kopchick's creative work in the lab has led to the patent of Somavert, a drug that treats acromegaly, a rare disease characterized by abnormal growth of the hands, feet and face. What makes this scientist tick? To find out, we sat down with him in his office at Edison Biotechnology Institute.

ABOVE: At his office at the university's Edison Biotechnology Institute, John Kopchick looks at a ring-sizing tool used to examine the symptoms of acromegalic individuals. Following successful treatment of the disease, ring size should decrease.

What is your approach to research and problem solving?
As we define the problem, we start asking and answering questions. We do the initial experiment, then collaborate when necessary with expert clinical scientists around the world who can help us with specific areas. This approach is rewarding, but practical, too, because more expert minds on a problem increase the value of the work.

So a team effort is a key to scientific success?
Yes. And you have to love what you do. We have a very close team here, and we also like getting together socially each month. Liking what you do, interacting with good people, scientific interactions — that's what makes for rewarding work.

Did you always know you were going to be a scientist?
No! I started out as a history major. Then I took a biology course and was exposed to the fact that an egg and a sperm meet and go from one cell to 10 million and on and on. I found that to be an amazing thing! I don't know how anyone can't be in awe of that. It piqued my curiosity, so I switched to biology.

What do you think the future of medicine will be like?
We have 22,000 human genes, and scientists know the activity and function of only one-third of them. Discovering the function of the other two-thirds will lead to the ability to define the problem and understand the exact cause of genetic mutations. This is called functional genomics. This knowledge will create medicine tailored exactly to each individual person.

You have worked with several medical doctors. Ever wanted to be one?
No. I learned that when I interned with Dr. Ralph Arlington (at the University of Texas M.D. Anderson Cancer Center in Houston). He treated pediatric cancer patients, and I just don't have the heart for it. I would have been too sympathetic. I'll stick with working in the lab.

— Kelee Garrison Riesbeck

the consumer electronic industry and invented the first USB turntable to convert vinyl to CD or MP3 formats. • **BEST:** The university's

Marie Braasch
Senior, biological science/psychology

Ohio University senior Marie Braasch has yet to start a career in neurological research, but her potential to make an impact is already clear.

A biological science and psychology double major, Braasch has studied turtles in Maryland, stem cells in Singapore and genes in Oregon. In her free time, she has learned to belly dance, taken tae kwon do classes and written a historical fiction novel.

Did we mention she is only 18?

Braasch took classes at Ohio while a junior in high school and enrolled full-time as a freshman at 15. Her work on a variety of research projects inspired her to shift her field of study from stem cells to neuropsychology, a combination of psychology and neuroscience. "I have just always wanted to know how the world works," says Braasch, explaining why she explored before settling on her future career. Her senior thesis examines brain activity and memory in the elderly.

Associate Professor of Psychology Julie Suhr describes Braasch as one of the brightest and most educated students she has worked with, noting that her maturity sets her apart. "(Marie) knows where she wants to go and how she's going to go about getting there," Suhr says. "She goes above and beyond whatever you ask her to do."

After graduation, Braasch will pursue a doctoral degree in neuropsychology or cognitive neuroscience. However, the next step will take Braasch to the University of Newcastle in Australia, where she plans to enroll in liberal arts courses because, she says, she'll enjoy them. "To consider myself educated, I need to be a well-rounded person," she says.

— Samantha Pirc

DIEGO ROBLES

Global Leadership Center received the Andrew Heiskell Award for Innovation in International Education, which recognizes the top eight

Ariel Hollinshead, AB '51
Professor emerita of medicine, George Washington University

At age 12, Ariel Hollinshead taught piano to a young neighbor with leukemia. When he died, the loss inspired a lifelong interest in helping others through science. Her work on antiviral drugs and vaccines at George Washington University Medical Center from 1954 to 1990 paved the way for major cancer research and helped establish a vaccine to induce dormancy in lung cancer. Among other honors, she was named the Bicentennial Medical Woman of the Year by the Joint Board of American Medical Colleges in 1976.

Adam Jacoby
Doctoral candidate, biochemistry

When not climbing mountains or bicycling with his mentor, Adam Jacoby collaborates with the Nobel Prize-nominated Professor of Chemistry Tadeusz Malinski on a revolutionary treatment for Lou Gehrig's disease. Still in the test phase, the treatment extends the life of mice afflicted with the disease by 30 to 40 percent. After graduation in June, Jacoby will continue his work on neuro-degenerative diseases.

Larry Witmer
Professor of anatomy

When looking at a dinosaur fossil, College of Osteopathic Medicine Professor Lawrence Witmer sees more than just bones: He sees a living, breathing creature whose inner workings remain a mystery. Take a tour of "WitmerLab" — a place where prehistoric forms meet pioneering technologies.

1. **Tyrannosaurus rex** is a common research subject in WitmerLab and a favorite with visitors, who range from kids to documentary crews from the BBC, Discovery Channel and National Geographic, which visited four times just last year alone.

2. The lab has emerged as a well-integrated machine of undergraduate and graduate students, technicians and postdoctoral fellows, all churning out **new scientific findings** and making their mark as the next generation of scholars.

3. Medical imaging techniques, including CT scanning, are combined with **innovative 3-D computer modeling** to visualize dinosaurs in new ways.

4. **Dinosaur and animal skulls** are shipped to WitmerLab from all corners of the globe — every continent except Antarctica — for scanning and analysis.

5. **Exact replicas of fossil skulls**, scattered around the lab, provide important reference for rare fossils that have been studied in the lab and returned to their museums.

6. Modern-day dinosaur relatives, such as birds and this large alligator (a road-kill victim), are **dissected to better understand the soft tissues** that clothed and animated dinosaur skeletons.

7. Modern-day animals preserved in jars of alcohol (or stored in the walk-in freezer) provide a **dissection "library"** for research on muscles, brains and blood vessels.

8. Dinosaurs aren't the only stars here. **Saber-tooth cats**, "terror pigs" and other predatory mammals are also studied.

9. When scientific inspiration needs to be supplemented with **musical inspiration**, Witmer and his guitars are never far away.

JOHN SAILER AND NEIL EVER OSBORNE/OU-COM

U.S. international education programs. • **ONLY:** The **College of Osteopathic Medicine** is the only U.S. institution to offer a postdoctoral fellowship focusing on the study of diabetes. • **ONLY:** The only facility of its kind in the United States, the **Avionics Engineering Center**

Q: What's smelly but can fuel a car?

Driving home from a seminar on fuel cell technology, Gerardine Botte was struck with a notion.

Her idea was based on water electrolysis, a process used to produce hydrogen energy from water. Botte, an associate professor of chemical and biomolecular engineering in the Russ College of Engineering and Technology, took the concept to the next level: Instead of clean water, what if it were possible to use wastewater? "You could remove the ammonia from wastewater, convert it to hydrogen energy, and it would be better, because you'd be remediating and producing clean energy," says Botte.

What resulted was a first-of-its-kind fuel cell technology, known as the "ammonia electrolytic cell," that allows hydrogen to be produced on demand. It's an efficient and environmentally sound process; compared to water electrolysis, ammonia electrolysis consumes 95 percent less energy and produces more hydrogen.

The ammonia itself comes from a renewable supply. Botte estimates more than 5 million tons of ammonia enter the waste stream as human and animal urine each year in the United States.

If it seems like an unlikely fuel source, Botte will do her best to convince you otherwise. "I think ammonia is our future fuel," she says. "It's green, renewable, and we know how to transport it and work with it."

Rick Fatica

Since its inception, Botte's idea of ammonia electrolysis has blossomed into several projects. At Ohio University, she enlists the help of five graduate students who each cover specific branches of ammonia electrolysis research, including potential automobile and residential applications.

In November, Botte's Electrochemical Engineering Research Laboratory received a $2.23 million federal grant to adapt the concept for military use. Under the "Silent Camp Initiative," she'll work with the U.S. Army Engineer Research and Development Center's Construction, Engineering Research Laboratory to provide backup power for training facilities and soldier camps at night. The system could cut long-term costs for fuel and decrease susceptibility to attacks against fuel supply lines.

If successful, there could be promising potential for the commercialization of the ammonia electrolytic cell.

Botte takes pride in the fact that the cell had its beginnings at Ohio University. "It was born here and is unique to this university," she says.

— Samantha Kinhan

Q: HOW DO YOU STOP A BULLY?

Bullies who taunt not on the playground but through the use of technology are the research focus of Christine Suniti Bhat, assistant professor of counselor education. Few studies have targeted these "cyber-bullies," who might use text messaging, instant messaging or e-mail to harass peers. Bhat has presented internationally on the topic and specializes in education efforts for counselors and parents who can prevent bullying or aid a victim.

Q: CAN WE TARGET CANCER MORE EFFECTIVELY?

A new class of compounds called phosphaplatins can effectively kill ovarian, testicular, head and neck, and other cancer cells with potentially less toxicity than conventional drugs, according to a study by lead author Rathindra Bose, vice president for research and a professor of biomedical sciences and chemistry at Ohio University. The findings, says Bose, suggest a "paradigm shift" in the development of cancer treatments. The compounds could have fewer side effects than current drugs on the market, such as cisplatin, because they activate specific cancer-killing genes and don't penetrate the cell nucleus. Patents are pending on the work. Currently, Bose and his co-workers are testing the compounds in mice models.

Q: What if carbohydrates weren't so bad?

The experts always say it: Avoid carbohydrates. But what if the quality of carbohydrates in food could be altered to achieve a more desirable effect?

Ohio University researcher Michael Kushnick is working to uncover this effect.

Kushnick, assistant professor of exercise physiology in the School of Recreation and Sports Sciences, has teamed with food scientists from Purdue University to study the glycemic response, or amount of sugar released into the blood, for specific foods. This response has been widely publicized as the glycemic index.

Certain foods release sugars into the bloodstream more slowly and are reported to be beneficial to health, helping to treat or even prevent chronic diseases such as diabetes. Unfortunately, the mode of cooking some foods that are considered to be healthy, such as potatoes, may negatively alter the glycemic index, causing sugars to be released more quickly and creating an unhealthy response.

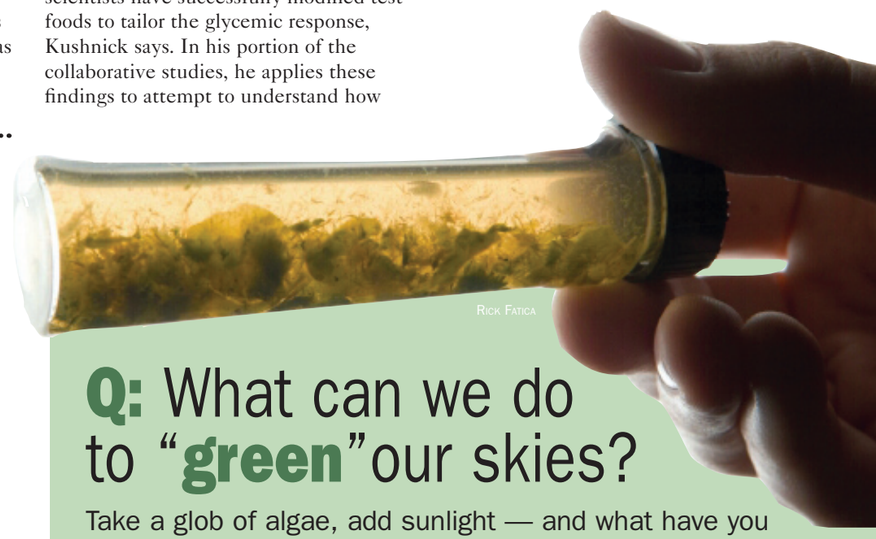
Through their research, the food scientists have successfully modified test foods to tailor the glycemic response, Kushnick says. In his portion of the collaborative studies, he applies these findings to attempt to understand how the body handles the carbohydrate, so that these processes can be used in the future to promote health and reduce the burden of chronic diseases.

With help from a USDA grant, the team is investigating how the body digests and responds to sugars in a series of ongoing projects — even how breakfast affects the body's response to meals later in the day.

— Jennifer Krisch

Q: IS FREEZER BURN AVOIDABLE?

Ice. It freezes crops, damages organs intended for transplants and alters food as it preserves it. But science has a solution: Assistant Professor of Physics and Astronomy Ido Braslavsky studies a naturally occurring antifreeze protein that prevents ice growth and could combat freezer burn. A member of Ohio University's Nanoscale and Quantum Phenomena Institute, Braslavsky is one of 27 professors studying engineering at the nano scale. Nanotechnology — as this cutting-edge field is known — has applications in areas as diverse as medicine and electronics. Braslavsky's research team, including three graduate students, uses a unique fluorescent protein to illuminate the inner workings of the antifreezing protein as it attaches to an ice crystal. Jack Frost may never look the same.



Rick Fatica

Q: What can we do to "green" our skies?

Take a glob of algae, add sunlight — and what have you got? A lean, green, cleanup machine. Ohio University Professor of Mechanical Engineering Dave Bayless and a team of faculty and researchers at the Ohio Coal Research Center have developed one of the most efficient fiber optic-based algae bioreactors on the market. A bioreactor provides algae with light, nutrients, water and carbon dioxide — the basic elements for plant growth — with an end goal in mind. For example, algae can process carbon dioxide from a polluting coal power plant to produce more algae to be used as fuel or feedstock. Bayless' unique model harnesses sunlight more effectively via collectors and optical fibers, allowing engineers to grow algae in the massive quantities needed to make an impact.

has been the aviation industry leader in research, development and evaluation of electronic navigation, communication and surveillance systems. • **BEST**: **Howard Nolan**, **BSAE '57**, co-founded one of the largest African American-owned architectural firms in the U.S.