

Men may contribute to infertility through newly discovered part of sperm

By Christine Billau

Life doesn't begin the way we thought it did.

A new study at The University of Toledo shows that a father donates not one, but two centrioles through the sperm during fertilization, and the newly discovered sperm structure may contribute to infertility, miscarriages and birth defects.

The newly discovered centriole functions similarly and along with the known centriole. However, it is structured differently.

"This research is significant because abnormalities in the formation and function of the atypical centriole may be the root of infertility of unknown cause in couples who have no treatment options available to them," said Dr. Tomer Avidor-Reiss, professor in the UT Department of Biological Sciences. "It

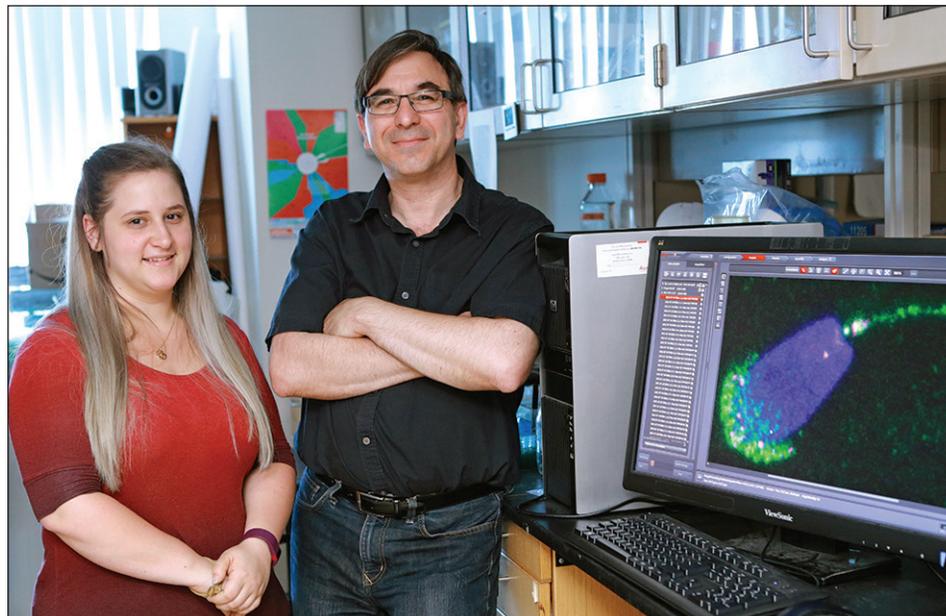


Photo by Daniel Miller

IN THE LAB: Dr. Tomer Avidor-Reiss and Lilli Fishman worked on the study titled "A Novel Atypical Sperm Centriole is Functional During Human Fertilization," which was published in Nature Communications.

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13-year-old UT student creates faster, cheaper way to make pharmaceutical drugs, agricultural pesticides

By Christine Billau

Like many 13-year-olds, Daniel Liu enjoys reading books and wears T-shirts covered in cartoon characters.

Unlike most boys and girls his age, Liu has been honored at the White House for his science achievements and is now a published scientific researcher at The University of Toledo.

The Ottawa Hills High School student has been taking classes at UT for more than a year through Ohio's College Credit Plus program.

Liu is one of three members of a UT green chemistry lab team that created a chemical reaction that results in a faster, cheaper, more environmentally friendly way to make pharmaceutical drugs and agrochemicals, such as pesticides and herbicides.

The team's research, which was recently published in the Journal of the American Chemical Society, shows how carbon dioxide in the form of dry ice is used

to break up carbon-hydrogen bonds, reactions known as C-H activation.

"We showed that we could run this reaction with many different starting materials and produce very diverse products," said Liu, a co-author on the paper.

"When you take an unreactive carbon-hydrogen bond, which is found in most organic compounds, and break it to convert it into a new type of bond, you make new molecules more quickly and more sustainably, especially in pharmaceutical and agrochemical



Liu

Photo by Daniel Miller

molecules," said Dr. Michael Young, assistant professor in the UT Department of Chemistry and Biochemistry.

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Bee proactive: UT students to compete in Biodesign Challenge in NYC

By Vicki L. Kroll

A team of University of Toledo students is buzzing with excitement, preparing to compete against 29 schools in the Biodesign Challenge Summit in New York this month.

The four students will present "Apigene Hive: Rethinking Bee Hygiene" at the international contest Thursday and Friday, June 21-22, at the Museum of Modern Art.

"We decided to focus on bees because of the recent problems with colony collapse disorder," said Madeline Tomczak, who graduated with a bachelor of science degree in environmental science in May.

"And we simply found those tiny yellow-and-black insects adorable," added Domenic Pennetta, a sophomore majoring in art. "By focusing on bees and their problems, we could help both bees and apiarists here in Ohio, and also have solutions that could potentially be used to benefit others around the globe."

Solving problems creatively is what the Biodesign Challenge is all about. The Genspace NYC program offers college students the chance to envision future applications of biotechnology by working together interdisciplinarily.

At UT, the Biodesign Challenge class in spring semester brought together students majoring in art, bioengineering and environmental science, as well as peers from the Jesup Scott Honors College.

"The really wonderful part about participating in this challenge is it started with the students — they approached us about having the class," Eric Zeigler, associate lecturer in the UT Department of Art, said.

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Look for the next
issue of UT News
June 25

Toledo earns Jacoby Trophy as MAC's top women's athletic program

By Paul Helgren

The University of Toledo was awarded with the Jacoby Trophy as the top women's athletic program in the Mid-American Conference at the recent MAC Honors Dinner in Cleveland.

The Rockets earned the trophy for just the second time in the 36-year history of this prestigious award. Toledo also won the award in 2012.

Eastern Michigan won the Reese Trophy in the men's competition.

For the 2017-18 academic year, the Rockets won the MAC women's soccer title for the first time since 2011 and finished second in the MAC in women's cross country and women's golf. In softball, Toledo (33-20, 16-7 MAC) was MAC West Co-Champion and earned a berth in the National Invitational Softball Championship, the Rockets' first postseason appearance in 26 years.

In women's basketball, the Rockets finished the regular season with an 18-15 overall record, 8-10 in the MAC, for a No. 7 seed. Toledo participated in the postseason in the WNIT with a win over Wright State before a second-round loss by two points at Michigan State.

In track and field, the Rockets finished the outdoor season with a third-place finish in the MAC Championship after posting a fifth-place finish during the indoor meet. In women's tennis, the Rockets finished with a 15-6 overall record, 5-3 in the MAC, for a No. 3 seed in the MAC Championship. Toledo ended the volleyball season with a 12-16 overall mark, including 7-9 in the

MAC. In swimming and diving, Toledo posted a sixth-place finish with 254 team points in the conference meet.

"This is a tremendous recognition for our program," said UT Vice President and Athletic Director Mike O'Brien. "The student-athletes and coaches in our women's programs have truly earned their recognition as the best in the Mid-American Conference. We are extremely proud of everything they have accomplished and congratulate them for this outstanding achievement."

For the Reese and Jacoby trophies, points are awarded based on each school's finish, with the overall total divided by the number of sports sponsored by each school. Toledo participated in 10 sports and earned 89.25 points for a league-best 8.925 average. Miami came in second, averaging 8.05 points per sport.

The women's trophy is named for former MAC Commissioner Fred Jacoby. Jacoby was the MAC commissioner from 1971 to 1982 and is credited with incorporating women's athletics into the conference structure.



BEST IN THE MAC: Posing for a photo with the Jacoby Trophy were, from left, Kelly Andrews, senior associate athletic director; Dr. Mary Powers, professor of pharmacy practice and faculty athletics representative; President Sharon L. Gaber; MAC Commissioner Jon Steinbrecher; Stephanie Sherman and Jordan Doore, members of the track and field team; and Jay-Ann Bravo-Harriott, UT alumna who finished her career on the basketball court this year.

2017-18 FINAL JACOBY (WOMEN'S) STANDINGS SCHOOL — POINTS AVG.

TOLEDO — 8.925	Western Michigan — 6.800
Miami — 8.050	Bowling Green — 6.545
Kent State — 7.900	Northern Illinois — 6.350
Buffalo — 7.900	Akron — 6.000
Eastern Michigan — 7.363	Ball State — 5.895
Central Michigan — 7.000	Ohio — 5.600



At bat

The hits keep coming for UT outfielder John Servello. He was named to Collegiate Baseball's Freshman All-American team last week, and he was named Mid-American Conference Freshman of the Year in May. Servello hit .343 in 46 games this season, the highest batting average by a Rocket freshman since Mitch Maier in 2001 (.444). He ranked sixth in the conference in hitting and was highest among all freshman in the league. The native of Hollidaysburg, Pa., hit two home runs and tallied 29 RBIs and was tied for second on the team with 16 extra-base hits. Earlier this season, Servello registered a 23-game on-base streak and a 19-game hitting streak, both of which are season-highs for Toledo and the longest by a Rocket since 2010. He hit .325 in conference games, highest on the team.

Associate vice provost named

By Vicki L. Kroll

Dr. Denise Bartell, director of student success and engagement at the University of Wisconsin in Green Bay, has been named UT's associate vice provost for student success.



Bartell

She was among more than 30 applicants who applied for the position during a national search. Bartell will start her new job Aug. 1. “We are excited to have

Dr. Bartell join the University,” Dr. Andrew Hsu, provost and executive president for academic affairs, said. “With her extensive experience helping students succeed, she will help propel UT's student success programs to new heights.”

“I am very excited to join The University of Toledo as the new associate vice provost for student success. During my interview, I was incredibly impressed with the institution's efforts to support the success of all students and the clear dedication to those efforts of the faculty, staff and administrators I had the pleasure to meet,” Bartell said. “I look forward to working with these stakeholders from across campus to advance together the University's student success goals.”

The associate vice provost for student success is responsible for providing leadership in the implementation of strategic

initiatives related to retention and the undergraduate experience from pre-college through degree completion.

Bartell will oversee the offices of Success Coaching and Academic Support Services, and lead efforts to support undergraduates in several areas, including advising, orientation, first-year experience, academic enrichment, and blending curricular and co-curricular learning.

At the University of Wisconsin in Green Bay, Bartell founded and led several student initiatives: Gateways to Phoenix Success Program, Phoenix Emergency Grant Program, Center for Students in Transition, Peer Mentor Program for First-Year Seminars and First-Year Seminar Program.

She joined the University of Wisconsin in Green Bay in 2002 as an assistant professor of human development and

psychology, and was promoted to associate professor in 2008. For two years, she was co-director of the First-Year Seminar Program and then started and served as director of the Center for Students in Transition from 2011 to 2016. During that time, Bartell also founded the Gateways to Phoenix Success Program in 2013 and still serves as its director.

In 2016, she was named director of student success and engagement, a position she advocated to be developed in the Office of the Provost.

Bartell received a bachelor of science degree in human development from Cornell University in Ithaca, N.Y., and headed to the University of Texas at Austin, where she received a master of arts degree in child development and family relationships, and a doctorate in human development and family sciences in 1998 and 2002, respectively.

In the hall



Former Toledo women's basketball star Dana Drew-Shaw was inducted into the Mid-American Conference Hall of Fame and is shown here with Dr. Jon A. Steinbrecher, MAC commissioner, at the May 30 induction ceremony, which was held in Cleveland. Drew-Shaw was on the court for the Rockets from 1990 to 1995 and was named MAC Player of the Year and All-MAC First Team in her sophomore and junior years, leading Toledo to three NCAA Tournament appearances and one WNIT berth. She guided Toledo to three regular-season MAC Championships and three MAC Tournament Titles. Drew-Shaw was named to the MAC All-Tournament Team on four occasions and was the MAC Tournament Most Valuable Player three times. She ranks second on Toledo's all-time career assists (659) and fourth in scoring (1,919). She was named Academic All-American First Team twice (1994, 1995) and was named Academic All-MAC on three occasions (1991, 1994 and 1995). In addition to Drew-Shaw, the other inductees were Orel Hershiser (Bowling Green, baseball), Charlie Batch (Eastern Michigan, football), Dr. Carol Cartwright (MAC/Bowling Green/Kent State, administration) and Michael Turner (Northern Illinois, football).

Students gave 40,000 hours of community service in 2017-18

By Meghan Cunningham

Students completed nearly 40,000 hours of service to the community during the 2017-18 academic year through activities with their student organizations and athletic teams.

The 39,810 student service hours is a 59 percent increase from the previous year and is in addition to the thousands of hours students give back through student teaching, clinical and unpaid internships.

“Our students are proud to be members of the Toledo community and are passionate about getting involved to make a difference while building their leadership skills at the same time,” UT President Sharon L. Gaber said.

As part of the community engagement initiative launched last year, the University is updating processes to better track the activities of students, staff and faculty to measure the impact UT has on the community. The reporting of student service and philanthropy activities moved from an annual event to a semester basis this academic year, and next year students will be able to record their activities as they complete the service to ensure more accurate reporting.

“We know our students are out in our community giving back on a daily basis, and we are putting the processes in place to be sure we better count, connect and communicate those efforts,” said Margie Traband, director of strategic initiatives in the Office of

Government Relations, who is leading the community engagement initiative.

Among the service activities this year was the Big Event, which is the largest, student-run service project. This year, 823 students provided 2,100 service hours volunteering at 43 sites completing projects such as weeding, picking up garbage, and recovering and recycling bicycles.

“It is amazing to see the amount of people that come to the Big Event for the sole purpose of giving back to the community that surrounds our campus,” said Gabrielle Latreille, a recreational therapy student, who was the director of the 2018 Big Event. “It is our chance as students to say thank you to all of the residents that do so much for us. I truly have Big Event and the people I have worked with through this organization to thank for forming me into the person I am today.”

UT students also spent their time mentoring at-risk youth, making sandwiches to help individuals who are homeless, providing free medical services through the Community Care Clinic run by students in the College of Medicine and Life Sciences, building homes with Habitat for Humanity, spending time with seniors through the Adopt-a-Grandparent program, helping families at the Ronald McDonald House, and much more.

For additional information about UT's community engagement activities, visit utoledo.edu/engagement.

UT awarded \$275,000 to help restore native fish habitat in Great Lakes shipping corridor

By Christine Billau

As part of a large-scale effort by state, national and international agencies to restore giant, ancient sturgeon and other native fish to the Great Lakes, the U.S. Geological Survey awarded The University of Toledo \$275,000 for a yearlong project to study how well Lake St. Clair serves as nursery habitat for those species to spawn and grow.

Lake St. Clair, which connects Lake Huron to Lake Erie along with the Detroit River and St. Clair River, is 17 times smaller than Lake Ontario and sometimes referred to as the sixth Great Lake.

"This is a critical habitat corridor that historically served as home to stocks of important native fish such as walleye, yellow perch, whitefish and sturgeon that



Mayer

migrated from Lake Erie to spawn," said Dr. Christine Mayer, professor in the UT Department of Environmental Sciences and Lake Erie Center. "Our research will contribute to the ongoing multi-agency effort to restore fish habitat in this important Great Lakes passageway."

Mayer said in the early 1900s, the corridor was altered to accommodate shipping and industry, resulting in the destruction of rocky and shallow areas needed for young fish to spawn, feed and grow safely.

"This research project will examine how young fish use habitat within Lake St. Clair and help create a more complete picture of what habitats are still impaired and how future restoration of key habitat features may increase productivity of native fish species," Mayer said.

The research team is made up of aquatic ecologists in the UT Department of Environmental Sciences. The team is led by Dr. Robin DeBruyne, an assistant research professor, and includes Jason Fischer, a

PhD student who has studied how fish use constructed reefs and softened shorelines, as well as how future reefs can be positioned to minimize sand infiltration and maximize the benefit to fish.

UT also is involved in the project to restore lake sturgeon to Lake Erie. Most recently, researchers helped the Toledo Zoo secure \$90,000 in federal grant money to build a sturgeon rearing facility along the Maumee River, which flows into Lake Erie, by verifying that spawning and nursery habitat still exist in the Maumee River to sustain a population of the fish that can live to be 150 years old and grow up to 300 pounds and eight feet long.

13-year-old

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That means, much like Liu's skyrocketing academic journey, you skip grades or steps in the process, reducing the time and resources it takes to achieve results.

"This chemical reaction cuts up to five steps out of a process that normally takes six or seven," Liu said. "C-H activation also improves overall synthetic efficiency. We found a way to potentially help patients, farmers and the environment when it comes to how medicine and pesticides are made."

Dr. Mohit Kapoor, UT postdoctoral researcher in medicinal and sustainable chemistry, said Liu has demonstrated an incredible ability to learn and discover at the collegiate level.

"I now see him as a co-worker in my lab. He is a genius and a prodigy," Kapoor said. "But I remember in the beginning thinking, 'How could he handle all these things?' He has proven that he has the knowledge. He can do the work properly and learns quickly."

"While this is highly unusual, Daniel has unusual talent and great support from his parents," Young said. "He has already taken most of the junior-level course work in the chemistry program. While he doesn't have the emotional maturity or physical stature of an older student, he is intellectually advanced compared to his peers."

Young, Kapoor and Liu are the three authors of the research paper. The scientists say Liu was involved in every step of the project, investing more than 400 hours of work.

"Daniel made many of the starting materials for the reactions and also performed many of the key reactions. He also remade the compounds to validate that we could do this, help make enough of them to characterize them, and prove they were what we said they were," Young said. "Plus, he helped us craft the manuscript. He went through and made suggestions on how to present our work."

UT has filed a provisional patent on the work, and the team is looking to market to pharmaceutical companies that make generic drugs.

"We're excited about the potential to commercialize this because it is much cheaper and more easily recyclable," Young said. "This really could be a benefit to the synthetic community."

Liu's passion lies in developing new pharmaceutical drugs to help people fight different diseases.

"I feel like this is the start of a career, and hopefully I can do more of this research in the future," Liu said. "I'm starting work on a couple of these projects by myself. I simply want to help people."

Liu started high school at the age of 10.

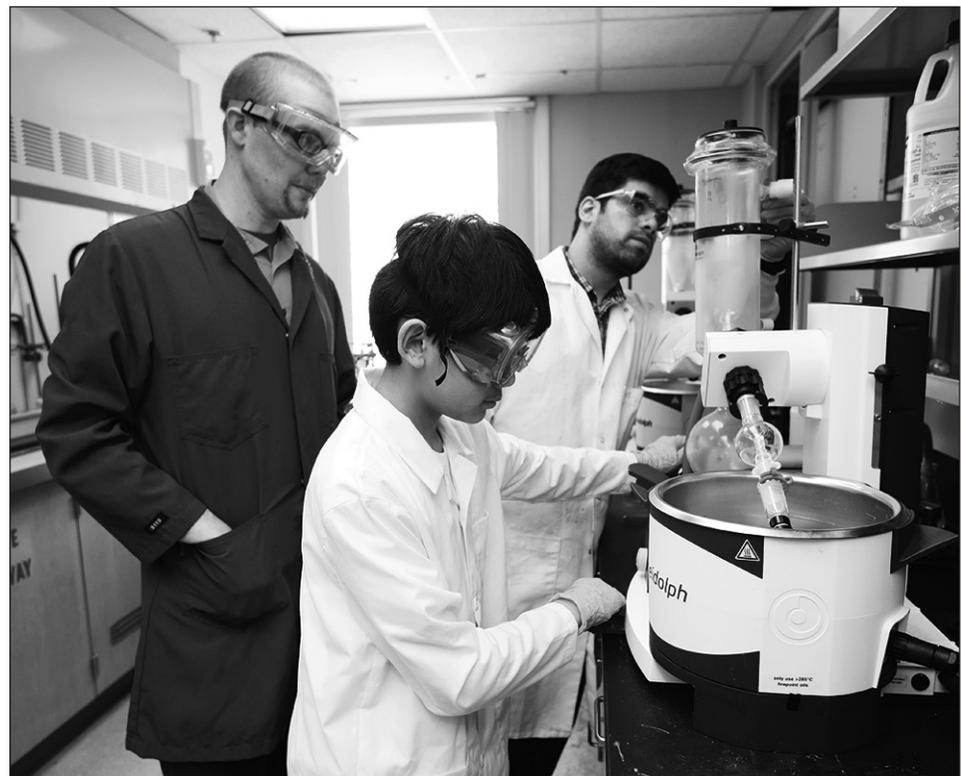


Photo by Daniel Miller

TEEN SPIRIT: Daniel Liu worked in the lab with Dr. Michael Young, left, and Dr. Mohit Kapoor, right.

In 2016, Liu visited the White House and met President Barack Obama after winning the national "You Be the Chemist" challenge — defeating 30,000 other students. He was the youngest ever to win the Chemical Education Foundation's competition.

Recently, he received high honors in the National Science Olympiad.

Liu also is assistant principal cellist in the University orchestra. It's one way he has

become involved in UT's vibrant, diverse campus.

"I had an adjustment period, but this is normal to me now," Liu said. "I feel at home here and supported in my studies. I'm trying to take advantage of all that UT has to offer so I can keep learning and growing. I want to go to graduate school. I'm also considering medical school. I want to do more stuff that changes the world and helps people."

Biodesign Challenge

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“One thing we thought was paramount in teaching this class: We were their peers. We were in the trenches with the students, asking questions, learning together,” Brian Carpenter, lecturer and gallery director in the UT Department of Art, said. “It’s been so inspiring. I tell everyone this is my favorite class I’ve taken.”

Carpenter and Zeigler will travel with the team to the Big Apple, where the UT students will vie with teams from across the country, Australia, Belgium, Canada, Colombia, France, Guatemala, Japan and Scotland for awards, including the Animal-Free Wool Prize sponsored by PETA, Stella McCartney and Stray Dog Capital.

“These finalists were selected from a pool of 450 participants,” Daniel Grushkin, founder and director of the Biodesign Challenge, said. “I firmly believe that they are leading us into a sustainable future with their visions.”

Tomczak and Pennetta worked with Jesse Grumelot, who graduated in May with a bachelor of science degree in bioengineering, and Lucya Keune, a senior studying visual arts, to create additions for the popular Langstroth hive to fight one of the bees’ biggest foes: mites.

“A fibrous brush filled with zebra mussel diatoms will target Varroa destructor mites on the surface of adult bees,” Grumelot said. “In addition, mint-infused wax frames will eliminate Acarapis woodi mites, as well as Varroa destructor juveniles.”

“We researched the problem, talking to specialists and professionals, and focused on natural ways to give bees a better environment to thrive,” Keune said.

Part of that new environment includes placing a brush at the hive entrance to use what beekeepers call the sugar shake — but in a new way. To encourage bees to be more hygienic, beekeepers sometimes put powder sugar on the insects so they’ll clean off the sweet stuff — and the nasty Varroa destructor mites.

“We use powdered zebra mussel to increase hygiene behaviors, which in turn helps kill the mites,” Tomczak said.

The zebra mussel powder acts like diatomaceous earth, which, when crushed, can be used as a treatment for fleas and ticks on household pets.

“Since diatomaceous earth is often from oceanic rocks, we wanted to bring this part of the hive closer to home by looking at Lake Erie,” Tomczak said. “Zebra mussel shells are abundant and easy to collect, and can be ground down to a fine powder.”

The powder is then baked, sterilized, and made even finer with a mortar and pestle. It will prompt the bees to clean up and get rid of the mites, and it will help kill any mites inside the hive.

And to tackle the Acarapis woodi mites, which invade the hive and lay eggs, the team turned to a natural deterrent: mint.

“We wanted to avoid the chemical sprays that can be harmful and stressful to the bee colony,” Keune said. “We learned mint

is used to fight mites; it’s better for the bees and the honey.”

“Our new hive features starting frames of beeswax infused with natural corn mint and peppermint,” Grumelot said. “This method is a more accurate way to focus on the mite infestation, and it avoids spraying the entire hive, leaving the honey untouched and the bees happy.”

In New York, the UT students will present their project to more than 200 scientists, designers, entrepreneurs and artists.

“This is a great resumé-builder for our students,” Zeigler said. “Their design is economically feasible; beekeepers would just add two simple modifications to their existing hives. It’s a happy solution, and one that could have tremendous market impact all over the world.”

“This challenge is fantastic. It encourages students to think creatively, take risks, and gather science and data. They realize their designs can work,” Carpenter said.

“I hope that by participating in this challenge that others will begin to look at relevant issues critically and try to find better solutions in creative ways,” Pennetta said.

APIGIENE HIVE
RETHINKING BEE HYGIENE

INNOVATING THE LANGSTROTH HIVE
The Apigiene Hive will be a new design for the popular Langstroth hive that is currently used today. Our new addition focuses on preventing the colony collapse of our pollinating bees in order to prevent increased extinction and keep our pollinating bee numbers steady. A fibrous brush filled with zebra mussel diatoms will target Varroa destructor mites on the surface of adult bees. In addition, mint-infused wax frames will eliminate Acarapis woodi as well as Varroa destructor.

THREATS & FUTURE
The bees we use to pollinate our crops are under the possible threat of extinction. If trends continue the way they are, then nothing is done to alleviate this threat. The hives are collapsing at an alarming rate. Bee colonies are dying off, and researchers in the field of bee research are having a difficult time trying to identify the main cause of this. There has been work done in attempt to create synthetic bees and bee hives, but we see this as a heavy and possibly harmful solution to the issue. There are many natural ways to give bees a better environment to thrive in before we even consider replacing them with machines.

SHARP DIATOMS
Diatomaceous earth is a powder made from crushed rock containing the fossilized remains of diatoms. This powder is often used as a treatment for fleas and ticks on household pets. The sharp, abrasive diatoms pierce the exoskeletons of the bees and ticks, and causes them to dry out from the inside. Since diatomaceous earth is often sourced from oceanic rocks, we wanted to take the part of the hive closer to home by looking at our own water source, Lake Erie. The zebra mussel shells are abundant and easy to collect, and can be ground down to a fine powder. The powder can then be baked, sterilized, and then ground into a finer powder with a mortar and pestle. The zebra mussel shells powdered sugar, and will have the same effect on the diatomaceous earth.

UNNATURAL SPRAYS
The most effective method that is used in removing Acarapis woodi mite infestation is the use of toxic chemicals as well as natural mite deterrent sprays. The chemical sprays can be harmful and stressful to the colony, and prevent the possibility of contamination in the honey being produced. We wanted to avoid these harsh chemicals not only to protect the bees but to protect the environment as well. Finding an alternative to the chemical spray was a huge component to the frames of our new hive, which focus on using natural mite deterrents such as:

HYGIENIC BEHAVIOR
A small percentage of bees are very resistant to mite infestation, and this is based on the fact that these bees consume are better at cleaning themselves. This is called Varroa sensitive hygienic. It is common for some beekeepers to use a method known as the sugar shake. This method coats the bees in powdered sugar, encouraging the bees to become more hygienic and clean off the sugar. We wanted to build upon this idea and have integrated it into our product to use the natural behavior of bees. Instead of sugar, we use powdered zebra mussel to not only encourage hygiene, but to kill the mites as well.

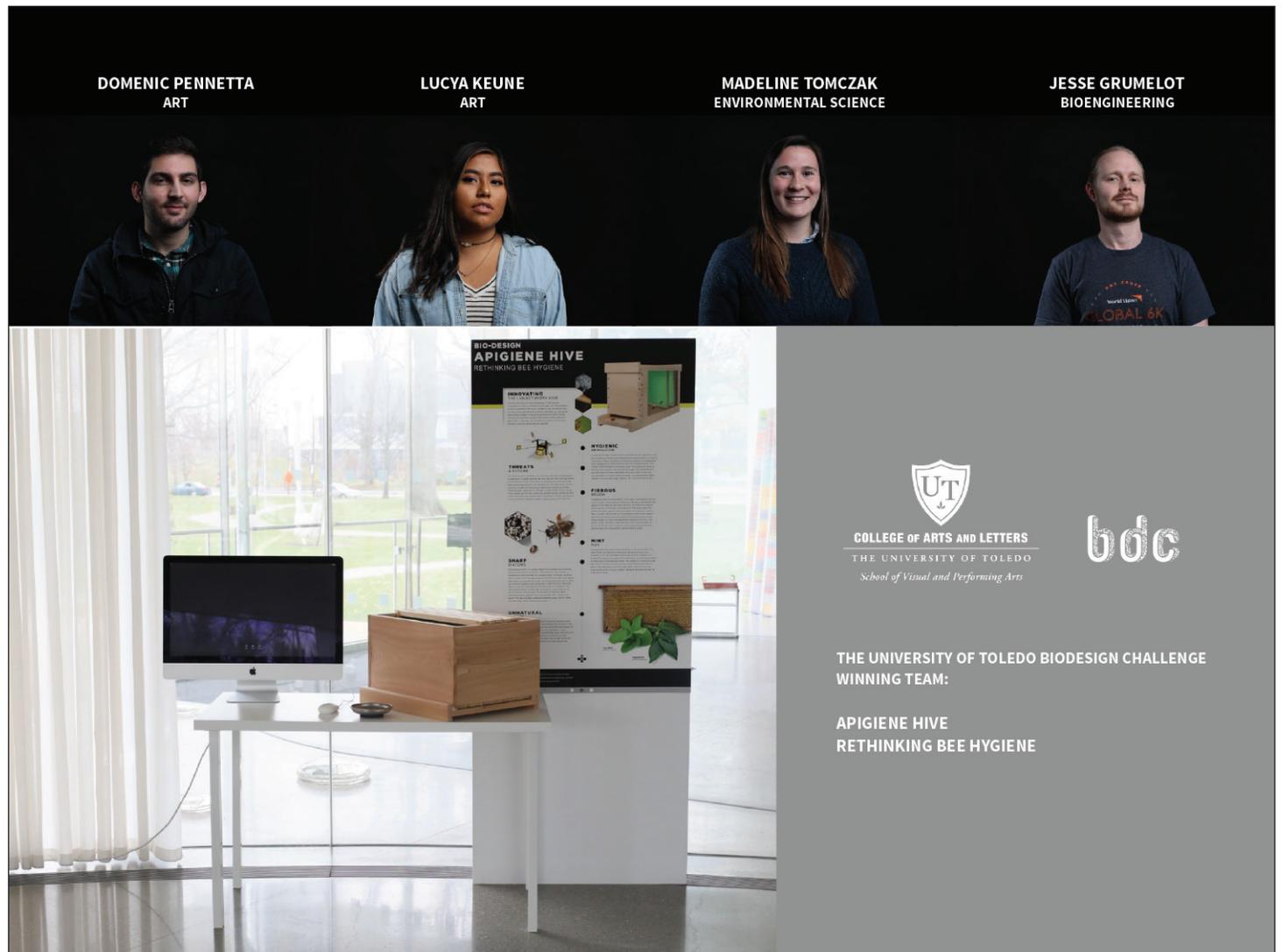
FIBROUS BRUSH
To apply the zebra mussel powder to the bees, we designed a fibrous brush to place at the entrance of the hive. The brush will deposit the powder on the bees as they enter the hive, therefore encouraging better hygiene for the bees. According to more information about the powder method, hygienic bees can reduce their infestation rates by 70% or greater. We decided to fit our beehive with a brush made of natural coconut fibers that are coated in the zebra mussel powder. These brushes will hang from above the entrance of the hive. This powder will be harmless to the bees and would cause the bees to groom themselves more frequently, effectively ensuring what the hygienic bees do to significantly reduce infestation rates.

MINT WAX
Among these more natural chemical sprays is the use of mint oil to deter mites. Our additional measure to prevent colony mite infestation will take advantage of this natural mint oil method, but instead of spraying it throughout the entire hive, we will infuse it within the wax of the starting frames. This method is a more accurate way to focus on the real root of concern with Varroa mites which is where they reproduce, within the brood pads. This way we avoid spraying the entire hive and possibly damaging the honey as well as irritating the bees.

Core Mint
Mentha arvensis

Peppermint
Mentha piperita

https://www.4mat.gov/pdfs/11866-protectionofhoneybees-finalreport-010618.pdf
https://www.thoughtco.com/why-honeybees-are-dying-6661921.html
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4312873/



UT engineering team first to make 3D objects with high-temperature shape memory alloys

By Cherie Spino

A University of Toledo engineering team's research on additive manufacturing, better known as 3D printing, could lead to smaller, lighter aircraft and biomedical devices that can be customized to a patient's specific needs.

The team, led by UT Professor Mohammad Elahinia, was the first to successfully make 3D objects using high-temperature shape memory alloys, smart materials used in the next generation of airplanes and UAVs (unmanned aerial vehicles).

The group published its findings in the March issue of *Scripta Materialia*, a peer-reviewed scientific journal.

To understand the importance of this research, one needs to understand actuators. Actuators are the components of a machine that control motion, like the mechanisms that trigger anti-lock brakes, open a valve, or help a prosthetic limb move.

Scientists are always seeking to improve the manufacture of actuators and to find ways that they can better mimic organic motion.

Shape memory materials offer simple and lightweight actuators. Unfortunately, the usual process of machining creates heat, which makes manufacturing challenging.

Additive manufacturing — building a 3D shape by adding layer upon layer of a material — solves that problem.

It has other benefits as well. It allows for the creation of more complex shapes, Elahinia

said, and is a quicker, more efficient and adaptable process that can be customized to specific needs.

Another huge plus: Manufacturers can make actuators with more flexible motion, such as the ones used for morphing airplane wing tips.

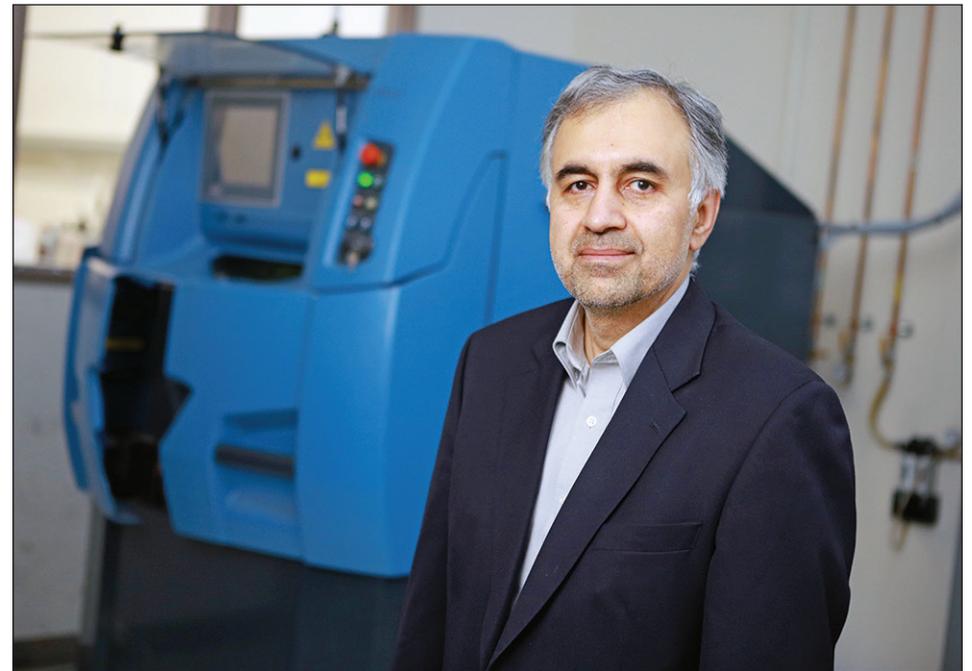
The UT research is of special interest to NASA, which helped fund the work and is a partner in the project, said Elahinia, professor of mechanical, industrial and manufacturing engineering in the College of Engineering.

"They have expertise in alloy development and were instrumental in identifying the right composition of alloy for our research," he said.

The breakthrough in UT's research involved the high-temperature shape memory alloys. The team was able to 3D print the alloys to harness their ability for faster and more powerful actuation, which makes them more practical to use when manufacturing actuators in the aviation, automotive and biomedical fields. Actuators made with these alloys can operate at much higher temperatures and are faster and more powerful, Elahinia said.

"It's an enabling technology," he said. "Once you harness it, you can use it for many systems and make many different shapes. It opens the door to a lot of possibilities."

For instance, it could be possible to replace the heavy, noisy hydraulic systems in the wings of fighter jets, drones and



Elahinia

commercial airplanes with lighter, less costly actuators. An added bonus? Nervous flyers would no longer hear the churning hum of the hydraulic system as the plane takes off and descends.

Additive manufacturing with high-temperature alloys also could have implications for the biomedical field, Elahinia said, because manufacturers could customize medical devices quickly based on the anatomical needs of the patient.

This new technology probably won't replace conventional manufacturing, Elahinia said, but is a better alternative for building

actuators that are sensitive to heat and complicated to create.

The UT team's next step is to fabricate prototype actuators using this technology and test them in vehicles.

Elahinia's research was funded by more than \$700,000 in grants from the Ohio Federal Research Network and the NASA Glenn Research Center. Research partners include the University of Dayton Research Institute, Case Western Reserve University and Ohio State University.

Sperm

continued from p. 1

also may have a role in early pregnancy loss and embryo development defects."

The centriole is the only essential cellular structure contributed solely by the father. It is the origin of all of the centrioles in the trillions of cells that make up the adult human body. Centrioles are essential for building the cell's antennae, known as cilia, and cytoskeleton, as well as completing accurate cell division.

A zygote, or fertilized egg cell, needs two centrioles to start life. It was previously thought that sperm provides a single centriole to the egg and then duplicates itself.

"Since the mother's egg does not provide centrioles, and the father's sperm possesses only one recognizable centriole, we wanted to know where the second centriole in zygotes comes from," Avidor-Reiss said. "We found

the previously elusive centriole using cutting-edge techniques and microscopes. It was overlooked in the past because it's completely different from the known centriole in terms of structure and protein composition."

The atypical centriole contains a small core set of proteins needed for the known sperm centriole to form a fully functional centriole after fertilization in the zygote using the egg's proteins.

This discovery may provide new avenues for diagnostics and therapeutic strategies for male infertility and insights into early embryo developmental defects, according to the research titled "A Novel Atypical Sperm Centriole is Functional During Human Fertilization" that was published June 7 in *Nature Communications*.

In addition to human sperm, Avidor-Reiss and his research team studied the sperm of flies, beetles and cattle.

"The whole idea for this study started with the fly," said Lilli Fishman, UT PhD candidate, who is being honored with the 2018 Lalor Foundation Merit Award from the Society for the Study of Reproduction for her work on the project. "Basic fly research indicated the misconception in sperm structure. It has been incredible to be part of the ensuing process that included incredible scientists from four states and two countries."

The leading-edge techniques and microscopes used on this research include super-resolution microscopy; electron microscopy with high-pressure freezing; and correlative light and electron microscopy.

"The super-resolution microscopy was critical for this discovery," Avidor-Reiss said. "The technology allows you to see proteins at the highest resolution."

The University of Toronto, National Cancer Institute, the University of Michigan, and the University of Pittsburgh also contributed to the research.

Avidor-Reiss and his team are taking this research to the clinical level.

"We are working with the Urology Department at The University of Toledo Medical Center to study the clinical implications of the atypical centriole to figure out if it's associated with infertility and what kind of infertility," Avidor-Reiss said.

Two faculty members recognized by Ohio Arts Council

Dr. Jim Ferris, professor and Ability Center of Greater Toledo Endowed Chair in Disability Studies, and Dr. Benjamin Stroud, associate professor of English, are recipients of the Ohio Arts Council's 2018 Individual Excellence Award.



Ferris

The Individual Excellence Awards are peer recognition of creative artists for the exceptional merit of a body of their work that advances or exemplifies the discipline

and the larger artistic community.

These awards support artists' growth and development and recognize their work in Ohio and beyond.



Stroud

"It's an honor to receive the Individual Excellence Award from the Ohio Arts Council," Ferris said. "Making poems is a lot of fun all by itself, and having my work

recognized by my peers is a great bonus."

"It's a really nice thing to happen," Stroud said. "You submit your work anonymously, and send it off and hope. For the panel to choose your work is really gratifying. And it's great that Ohio continues to support artists and the arts in this way."

Applications for the \$5,000 awards are accepted in the categories of choreography,

criticism, fiction/nonfiction, music composition, playwriting, and poetry.

Ferris has a passion for poetry and uses his words to influence his commitment to diversity and inclusion within the Toledo community.

His books include "Slouching Towards Guantanamo," "Facts of Life: Poems" and "The Hospital Poems." The Lucas Count poet laureate also is the author of "Laborare," a poem he wrote by request for Wade Kapszukiewicz and read when the new mayor of Toledo was sworn in.

"Words are one of the most important ways we clothe ideas," Ferris said. "Poetry can help people find better ways not only to experience this world, but to imagine new ways of being in the world."

Ferris said he plans to use this accomplishment as motivation to follow his passions and enhance his commitment to the community.

"Making poems that are meaningful to people is important to me," Ferris said. "I try to do work that is useful, and making

compelling experience with language is one of the most useful things we humans can do."

Stroud specializes in creative writing and 20th-century American fiction.

"Writing is in part about making sense of some aspect of the world that surrounds us by building a little world in a story," Stroud said. "It's that chance to build these worlds and keep thinking about the people who inhabit them that's always drawing me back to the page."

Stroud is the author of the story collection titled "Byzantium," which won the 2012 Bread Loaf Writers' Conference Bakeless Fiction Prize and was selected as a Best Book of the Summer in 2013 by Publisher's Weekly and the Chicago Tribune.

His stories have appeared in Harper's Magazine, One Story, Electric Literature, Boston Review and more.

UT director to conduct choral concert for Father's Day

Join whateverandeveramen for "Songs of Fatherhood," a concert celebrating dad, Sunday, June 17, at Trinity Episcopal Church, 316 Adams St. in Toledo.

Dr. Brad Pierson, UT assistant professor of music and director of choral activities, will conduct the 3 p.m. concert.

Founded in 2014, whateverandeveramen performs regular events in Toledo, Seattle and Las Vegas. Singers for the concert will include area students and professionals.

The concert will feature "A Father" by Sylvania-based composer Kevin Foster, who also will sing and play piano at the event.

The central piece of the concert will be "Songs of Fatherhood," a five-song-cycle composed by David V. Montoya, commissioned and premiered by whateverandeveramen in 2014.

In lieu of traditional concert programs, guests will be given an 11x17 poster featuring artwork created specifically to pair with the music. Children will be provided crayons, making this a family-friendly event, according to Pierson.

Tickets are \$10 for general admission and are available at songsoffatherhood.brownpapertickets.com. Children 12 and younger will be admitted free to the concert.

whateverandeveramen. presents

Songs of Fatherhood

A Father's Day Concert

Sunday, June 17 - 3pm
Trinity Episcopal Church
316 Adams St., Toledo, OH

\$10 GA - Children 12 & Under Free / Tickets Available via Brown Paper Tickets

www.whateverchoir.org

College Mentors for Kids Program comes to UT

College Mentors for Kids Inc., in partnership with the Hylant Family Foundation, is opening a new chapter at The University of Toledo.

This national youth-mentoring organization brings students from local elementary schools onto college campuses for weekly one-on-one, experiential mentoring activities with college student mentors. The program exposes children to higher education at a young age, when habits are still forming, while simultaneously providing college students with leadership and growth opportunities.

“As native Toledoans, the Hylant family is thrilled to be sponsoring the new College Mentors for Kids chapter at The University of Toledo,” said Clare Hylant of the Hylant Family Foundation. “This program provides the opportunity to make a significant difference for the youth of Toledo, a true chance to change what they think is possible and encourage them to reach for their dreams.”

The new chapter will serve children from Old Orchard Elementary School of Toledo Public Schools beginning this fall.

“Partnerships are critical to the success of our program in the community. Hylant has been a longtime supporter of College Mentors for Kids, and we are excited to partner with the Hylant Family Foundation to serve kids and college students in Toledo,” said College Mentors for Kids Board Chair Sheila Dollaske.

The University of Toledo is the fourth chapter in Ohio.

“One of UT’s core values is to ‘improve the human condition.’ As an educator, it is imperative that we create opportunities to expose young scholars (little buddies) to what they can aspire to become,” Dr. Phillip “Flapp” Cockrell, UT vice president for student affairs, said. “UT is committed to moving the student success needle forward by fostering environments for both mentors and little buddies to learn.”

“The University of Toledo students will benefit a great deal from the College Mentors for Kids organization, because it is a wonderful opportunity for the amazing Rocket spirit of service to our community to be on full display,” said Demond Pryor, director of the Office of Recreation in the Division of Student Affairs. “All Rockets



COLLEGE MENTORS FOR KIDS

believe in enhancing, improving and providing opportunities for young people in our greater Toledo community, and that is exactly what College Mentors for Kids does.”

“I am very excited to get the program up and running here,” said Brianna Becraft, UT student and founding chapter leader. “I can’t wait to see the effect the program will have on the kids involved. I hope the program will expand in the future and that the community will see The University

of Toledo as a big support system for the Toledo Public Schools.”

College Mentors for Kids is an innovative nonprofit with a mission to connect college students with the most to give to kids who are in need. The organization operates 34 campus-based chapters across Illinois, Indiana, Kentucky, Maryland, Missouri, New York, North Carolina, Ohio and Virginia.

For more information, visit collegementors.org.

Women & Philanthropy raising funds to purchase books for Toledo Public Schools

By Marla Gootee

Women & Philanthropy at The University of Toledo is partnering with the Judith Herb College of Education to help provide books to 40 second-grade classrooms in the Toledo Public Schools.

Last year, the organization’s Holiday Project raised enough funds to donate 1,000 books to 33 second-grade classrooms in 19 of the 40 TPS elementary schools.

Women & Philanthropy is getting an early start on this year’s project and is accepting donations through Tuesday, July 31.

With the help of donations from the community, Women & Philanthropy hopes to provide \$200 worth of books to the second-grade classrooms in the remaining 21 TPS elementary schools before the academic year starts.

In order to do so, \$8,000 in donations will be needed.

The Holiday Project is also accepting good-as-new used children’s books at second- and third-grade reading levels.

To make a donation to the cause, checks can be made payable to the UT Foundation with “2018 W&P Holiday Project” in the memo line and sent to:

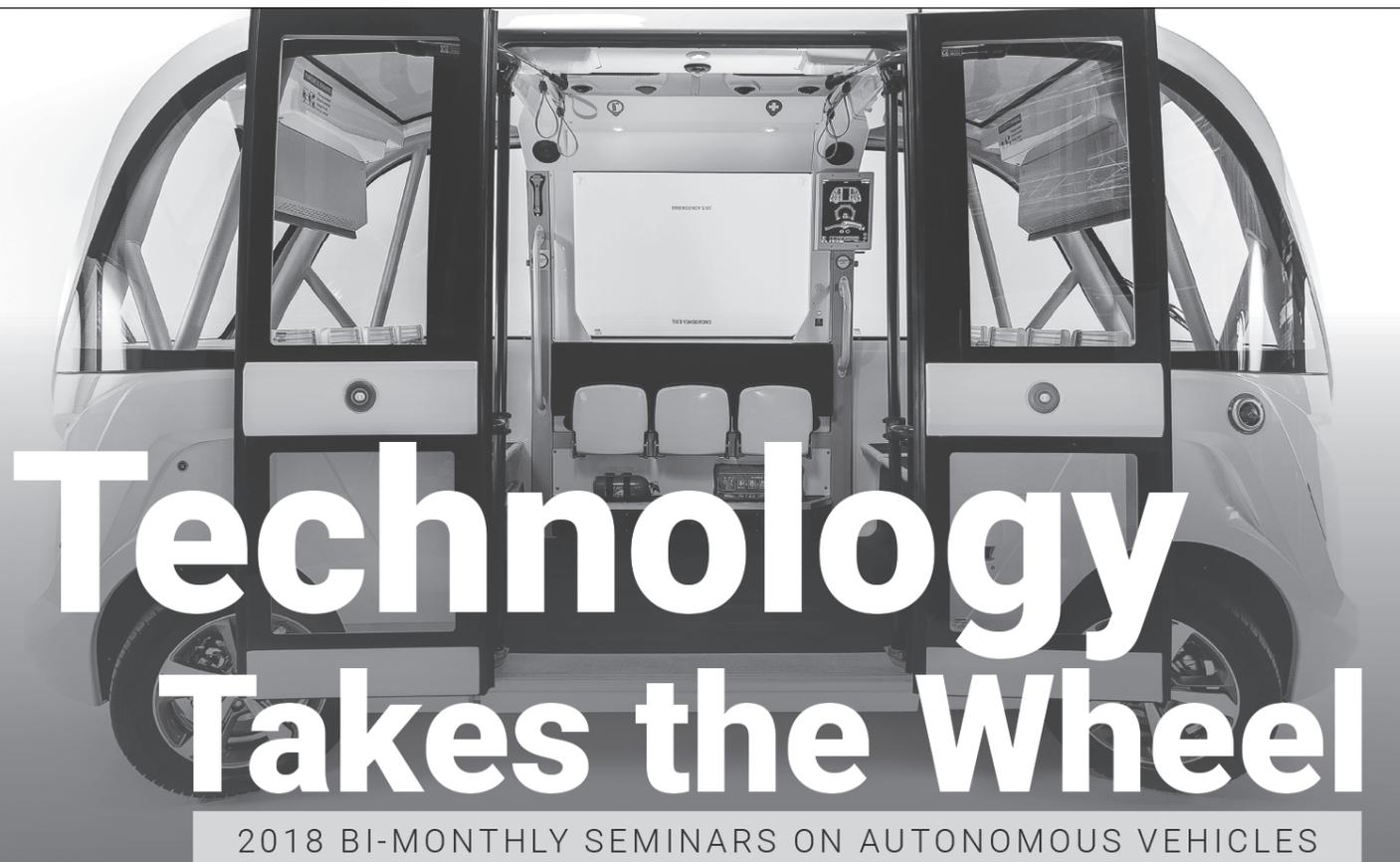
Sarah Metzger
UT Foundation
Driscoll Alumni Center, MS 301
2800 W. Bancroft St.
Toledo OH 43606

New or gently used books may be dropped off to Metzger in Driscoll Alumni Center Room 2014A.



Photo by Daniel Miller

READ ON: Second-graders at Old Orchard Elementary School checked out some of the books donated to Toledo Public Schools by UT’s Women & Philanthropy and the Judith Herb College of Education. The books were distributed to 33 second-grade classrooms at 19 TPS schools March 15 during a ceremony at Old Orchard Elementary.



2018 BI-MONTHLY SEMINARS ON AUTONOMOUS VEHICLES

Please join us for a free, educational series exploring autonomous vehicles and their societal impacts. Co-sponsored by The University of Toledo's College of Engineering and AAA Northwest Ohio, this series will address how autonomous vehicles will impact the engineering world, as well as the world at-large. Upcoming topics include infrastructure, government regulation and accessibility.

Public Transportation and Autonomous Vehicles Thursday, June 21, 2018 • 9-11 a.m.

Nitschke Auditorium on UT's Main Campus (1600 N. Westwood Ave.),
with continental breakfast served at 8:30 a.m. in adjacent Brady Center

Guest speakers

- **Lissa Guyton, Emcee**, 13abc
- **Jim Gee**, General Manager, Toledo Area Regional Transit Authority (TARTA)
- **Chris Pauly**, Director of Business Development for North America, NAVYA
- **Lt. Col. (retired) John Tucker**, Sales Specialist, Path Master Inc.
- **Panel discussion** with speakers and UT researcher Dr. Eddie Chou, College of Engineering

Register for the seminar online at utoledo.edu/engineering.

This series is free and open to the public.

Co-sponsored by
The University of Toledo College of Engineering
and AAA Northwest Ohio



COLLEGE OF ENGINEERING
THE UNIVERSITY OF TOLEDO



UTMC recognized for outstanding stroke care

UT Medical Center again has been recognized by the American Heart Association/American Stroke Association for outstanding stroke care with the Get With the Guidelines Stroke Gold Plus award.

The award recognizes UTMC's commitment to ensuring stroke patients receive the most appropriate treatment according to nationally recognized, research-based guidelines according to the latest scientific evidence.

The hospital earned the award by meeting specific quality achievement measures for the diagnosis and treatment of stroke patients at a set level for at least



the last two calendar years. These measures include evaluation of the proper use of medications and other stroke treatments aligned with the most up-to-date, evidence-based guidelines with the goal of speeding recovery and reducing death and disability for stroke patients.

In addition, UTMC this year received the Target: Stroke Elite Plus award, recognizing hospitals achieving Time to Intravenous Thrombolytic Therapy less than or equal to 60 minutes in 75 percent or more of applicable acute ischemic stroke patients treated with IV tPA and door-to-needle time.

In memoriam

Brenda L. (Carrol) Hoot, Waterville, Ohio, a former MUO employee, died May 22 at age 58.

Sue M. (Martin) Shew, Toledo, a founding member of UT Women & Philanthropy, died May 29 at age 87. An alumna of the University, she received a master of education degree in guidance and counselor education in 1980.

Helen Marie (Majka) Wodarski, Toledo, died May 29 at age 85. She worked in the College of Education and the American Language Institute, retiring from the University in 1994.

UTMC quality scores reach new heights

UT Medical Center has achieved record high rankings in two important questions asked in the Hospital Consumer Assessment of Healthcare Providers and Systems patient satisfaction survey.

When asked to rank the hospital on a scale of one to 10, UTMC has reached the 30th percentile nationally.

UTMC also is in the 36th percentile for patients "highly recommending" the hospital.

The survey scores are an indicator of patient perspectives about the hospital and are used as a quality measurement by the Center for Medicare Services; the scores influence the hospital's reimbursement rate from the center.

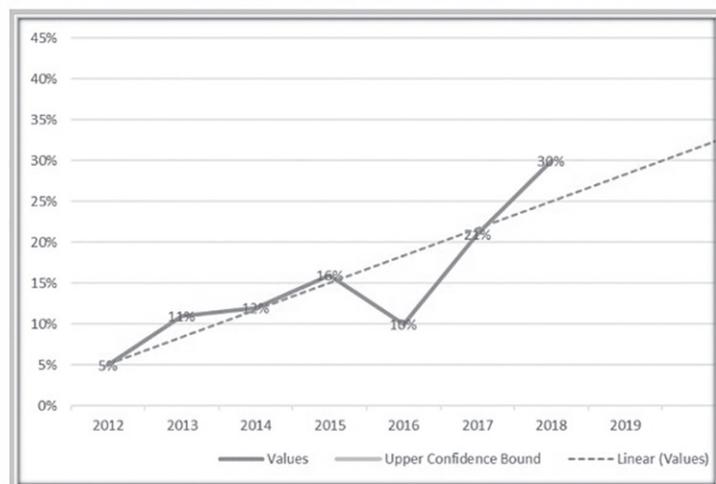
Staff and physicians continue to ensure patients and their families have an excellent

experience when they trust UTMC with their health and healing.

"UTMC has a great story to tell, and our people are delivering a positive trend," said Mario Toussaint, chief experience officer at UTMC. "As we continue our strategy to emphasize this care model, I expect we will see even more positive outcomes."

The hospital receives monthly reports on the Hospital Consumer Assessment of Healthcare Providers and Systems scores through Press Ganey, an independent third-party survey administrator. That data will be shared monthly in the electronic UTMC newsletter so that employees can see how their efforts are contributing to the hospital's success.

RATE THE HOSPITAL: 0-10 2012 – 2018 to Date



*Honorable Mention: NPS – "Would you recommend" = 35%tile YTD

UTNEWS

UT News is published for faculty, staff and students by the University Marketing and Communications Office weekly during the academic year and periodically during the summer. Copies are mailed to employees and placed in newsstands on the Main, Health Science, Scott Park and Toledo Museum of Art campuses. UT News strives to present accurate, fair and timely communication of interest to employees. Story ideas and comments from the UT community are welcome. Send information by campus mail to #949, University Marketing and Communications Office, Vicki Kroll. Email: vicki.kroll@utoledo.edu. Fax: 419.530.4618. Phone: 419.530.2248. Mailing address: University Marketing and Communications Office, Mail Stop 949, The University of Toledo, Toledo, OH 43606-3390.

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Rocket Battalion ROTC participates in Joint Field Training Exercise

By Cadet Michael T. Chung

In April, The University of Toledo's Army ROTC program conducted its annual Joint Field Training Exercise for spring semester with Bowling Green State University's Army ROTC.

During this three-day event, cadets got the opportunity to apply the skills they learned in class and during leadership labs throughout the semester in various situations. This event also helped juniors prepare for Cadet Summer Training at Fort Knox, Ky., this summer.

Upon arriving at Fort Custer Training Center in Michigan, we immediately practiced our marksmanship skills by applying the fundamentals of marksmanship at the shooting range.

The second part of the day focused on land navigation. At dusk, we had four hours to find seven markers throughout a large wooded course.

The following day, we woke up to an icy morning consisting of freezing rain and below-freezing temperatures. This did not deter our motivation as we pressed forward with the training, which consisted of simulated urban combat and situational training exercises.

Cadets spent the morning going over how to use a standard Army radio for communication and training on how to maneuver in an urban environment.

In the afternoon, cadets conducted situational training exercise lanes, where they were given missions to complete within a short time period. Some of the missions included conducting a reconnaissance of an area and attacking an objective.

Upon completing their last mission, the junior class faced one last challenge: an ambush conducted by the freshmen and sophomores on their route back to the staging area.

On day three, cadets finished the Joint Field Training Exercise by conducting patrol base operations. Underclassmen walked through the step-by-step layout of setting up a patrol base, while the juniors were evaluated on their performance on creating a patrol base at the standard that is expected at Cadet Summer Training.

Though the sudden change in weather made the second day miserable, we remained steadfast in completing training and showed enthusiasm throughout the exercise. The junior class got a chance to see what is expected of them at Advance Camp and were assessed on what they need to do to improve and better themselves as leaders. The freshmen and sophomores got a

taste of being in a tactical environment and leading each other in the situational training exercises.

Though the weather did not cooperate that weekend, Cadets pushed through the events; some were even emboldened by the freezing conditions and felt that it made the training that much better. It was a fun experience for everyone. Cadets got to apply the knowledge and skills they learned throughout the semester and built comradery by working with cadets from Bowling Green's ROTC program.

Chung is a senior majoring in electrical engineering.



Cadets moved in formation to begin recovery operations after completing training on day three.



Photos by Cadet Michael T. Chung

Green and yellow smoke added realism to the simulated combat and situational training exercise while cadets maneuvered.



Cadet Levi Wick, left, and Cadet Taylor Opp, right, assisted Cadet Patrick Taylor on the land navigation course.



The 26th Annual
UT Alumni Association
Outdoor Juried Art Fair

Art ON THE Mall

10 A.M. TO 5 P.M. **JULY 29**
Free Admission

Original art, jazz, food and a children's area
Main Campus – The University of Toledo

