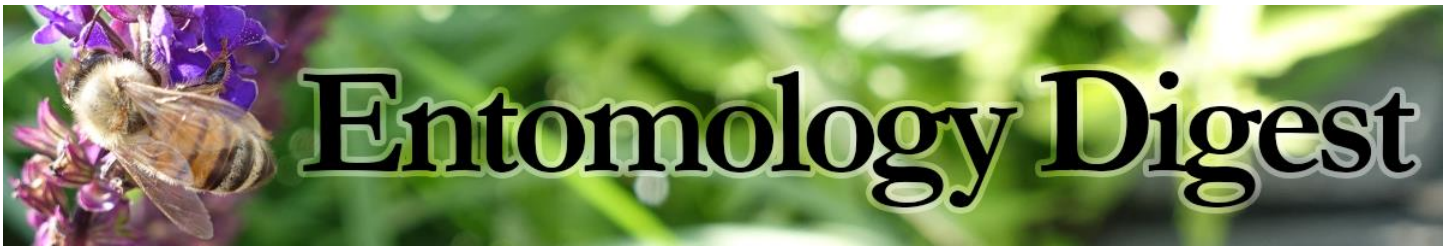

Entomology Digest – May, 2021

Letter from the Chair

Entomology Community and Friends of the Department,

The Spring '21 semester successfully concluded with a fun and interactive **Entomology Graduate Student Association (EGSA) picnic**. This event marked one of the first in-person events we have held as a Department since the beginning of the pandemic, where we enjoyed good conversation together with refreshments and a pleasant evening. We were also visited by Dr. Sammy Ramsay, a USDA-ARS Research Associate located in Beltsville, MD. Sammy was visiting Wisconsin and the Department on the advice of Dr. Sean Carroll, Professor Emeritus in Genetics here at UW-Madison, and Sammy shared his research experiences working on *Varroa destructor*, plus his interests in Brood X emerging on the east coast.

The Department also held a long-awaited, **Academic Retreat** focusing on graduate education and curriculum planning. Here again, this event was held as an approved (but socially distanced), in-person event to discuss refinements to our current graduate curriculum. Conversations and planning focused upon learning goals for our graduate programs, together with changes in our curriculum requirements that can better serve the needs of our current and incoming MS/PhD students. In the weeks ahead, we plan to continue our conversations around new course development and instructional priorities aligned with the Department's strategic planning that supports initiatives like the new **Global Health** (https://guide.wisc.edu/undergraduate/agricultural-life-sciences/entomology/global-health-bs/) and **Agricultural Ecosystems** undergraduate majors.

In this newsletter, we highlight our recent graduates (both undergraduate and graduate students), both in terms of degree conferral as well as awards. Please take a quick moment to recognize these accomplishments.

– *Russ Groves*

Awards

Dr. Claudio Gratton was recently awarded the prestigious Kellett Mid-Career Award! This award is comparable in competitiveness to the Romnes Faculty Fellowships and the WARF Professorships, but is intended to recognize and support mid-career faculty, seven to twenty years past their first promotion to a tenured position. The Mid-Career award was created to provide needed support and encouragement to faculty at a critical stage of their careers. This award cannot be awarded more than one time to any faculty member. More information here.

Taylor Tai, PhD Candidate in Integrative Biology and Entomology in the Gratton Lab, has been included among the recipients of the 2021 Graduate Student Service Scholarship. This scholarship recognizes and honors the graduate students who volunteer to take on service roles in addition to their research, work, and family obligations. While service can come in many different forms and all service to the university is appreciated, priority for this scholarship is given to students who conduct multiple service activities and/or whose service activity is notably impactful. The Graduate School recognizes that graduate students belonging to underrepresented groups disproportionately engage in unpaid service to the academy. While a scholarship alone does not rectify historic and current disparate expectations and obligations, this award is designed to reward and value graduate students' service roles that shape the university's future. Read more here.

Ben Iuliano, PhD candidate in the Gratton Lab, was recently awarded the **Jack & Marion Goetz Wisconsin Distinguished Graduate Fellowship**. This fellowship was established by Jack & Marion Goetz to support graduate research in CALS with emphasis on genetics and general environmental research at the agricultural research stations.

Victoria Lason Harrod, PhD candidate in the Groves Lab and the Barack Lab (Plant Pathology), was recently awarded the **2020-2021 Robert H. and Carol L. Deibel Distinguished Graduate Fellowship in Food Safety Research**. More information here.

The **Carl W. Schaefer Scholarship Fund** in Entomology was established by Dr. Carl Schaefer in May 1998, for the purpose of supporting outstanding students in the Department of Entomology with a gift towards tuition support. Dr. Schaefer attended UW-Madison and earned a BS (1931), an MS (1933), and PhD (1937) in Entomology. In 2021, two awards were provided from the Carl W. Schaefer fund, and were awarded to **Claire Noelle Lawler** and **Willow S. Lovecky**, based upon their outstanding success and as a valued member of our undergraduate entomology program in the Department of Entomology.

The **Que Lan Undergraduate Student Support Fund** in Entomology was created to honor the memory of Professor Que Lan. Dr. Lan joined the Department in 2001 and was also associated with the UW Molecular and Environmental Toxicology Center. Dr. Lan's research focused on employing the tools of molecular biology to develop novel methods of pest control. Her keen interests in lipid metabolism led to the discovery of several inhibitors that blocked cholesterol utilization. Dr. Lan also served as a dedicated mentor for a number of high school students as well as undergraduates who worked with her laboratory. She relished the opportunity to don a lab coat and work in the lab beside her students and post-docs. Beyond science, she touched many lives professionally and personally as a colleague, mentor, teacher and friend. Dr. Lan's intelligence, gravity, sharp wit, scientific counsel and most of all, her big inviting smile reflect the importance of this award. This year we recognize five very-well deserving students for the Lan award: **Julia Wiessing**, **Kayla Hefner**, **Megan Johnson**, **Michael Smith** and **Skyler Finucane**.

Undergraduate Entomology

We have five new class of 2020 B.S. graduates as of spring:

- **Sarah Conroy**
- **Azbel Guerra-Colman**
- **Hunter Wiese**
- **Ashley Wollack**
- **Zhihong Zhan**

This from **Sarah**: I've had a great 4 years with the department all starting with Dr. Young's FIG! The selling factor for me was after I attended one Swarm my freshman year and being able to meet so many faculty members and graduate students; I felt like part of a family. My sophomore year I was fortunate to work with the Paskewitz lab to perform Lyme Disease research. Through the lab, I learned about the MCEVBD fellowship which I did Summer 2019. I started on some research in the Steffan lab in Spring 2020, but unfortunately that was cut short due to COVID-19. I filled in my semesters with various courses in entomology, some of my favorite included Medical Entomology and Taxonomy of Mature Insects. I have so many memories and I've met many interesting people; I couldn't imagine my life without this department! I want to thank Dr. Young, Dr. Paskewitz, Dr. Steffan, Bieneke, Xia, Ryan, Tela, Patrick, and my fellow freshly graduated friends in the department for making these past 4 years so wonderful.

Ashley writes: The FIG [*ENT 375: First Year Interest Groups*] did greatly impact my decision to become an entomology major, as I was terrified of bugs before college. As comical as it may sound, I would go inside for the remainder of the day if I saw a

single bee outside when I was a child. I am happy to have grown past this and learned to appreciate the countless invertebrates around us. My experience at UW-Madison was greatly improved by my involvement with research. I have been a part of the Lindroth lab for a year and a half conducting condensed tannin assays for research on phenotypic plasticity. I have also been a part of the Keefover-Ring lab for the past year working on hemp volatiles in collaboration with Professor Ellison. While it is disappointing to end my undergraduate degree in a pandemic, I believe these hands-on research experiences have been a highlight of my final years and will be something I remember fondly. I want to revisit the possibility of graduate school once I'm a handful of years older.

Zhihong notes: During my four-year undergraduate program at UW-Madison, I learned a lot and experienced many impressive and significant things. Personally speaking, my experience here at UW, especially the experience in our nice Entomology department, is associated with my major.I am interested in insects when I was a kid, and becoming one of the partners who could explore the world of insects is always my dream and goal. Being study at UW-Madison gives me a chance to fulfill my dream. I enjoyed all of the courses during my undergraduate program, and these courses often make me continue to study and learn after taking them. I think this kind of experience is significant. As I always know, here is something that I do not know before, and I enjoy the journey to explore and study that unknown knowledge.

My experience is also associated with our nice Entomology Department. All professors and faculties in the department are knowledgeable and friendly. My mentor, Dr. Daniel K. Young, is the best professor on campus. His major courses that tell the story of taxonomy attracted me tightly. He taught me major knowledge about entomology and taught me how to carry out research studies and what attitude I should have toward nature. I will always keep his words, "Entomology is so vast that cannot be held by a single human wisdom to grasp. No one can be truly called an Entomologist" in my heart and carry them with me throughout the career. From Dr. Young, I can feel and experience his enthusiasm towards insects and education. Herein, I decide to become his graduate student and continue my entomology career with his guide.

In my next step, I will still stay at UW-Madison and study with Dr. Young, trying my best to tell the story of Coleoptera. I feel lucky that I could be one of the badgers at UW-Madison, and I feel lucky again for I can still study what I love with the mentor I admire for my graduate career.

– Dan Young

Insect Diagnostic Lab update

Caseload is definitely picking up for the year at the UW Insect Diagnostic Lab and I'm expecting to hit full "summer mode" by Memorial Day. I'm sure I'll see many of Wisconsin's commonest insects at the lab this summer, but I also know there will be plenty of curiosities as well. My "case of the year" thus far involves an unusual family of true bugs (Heterogastridae), a vehicle imported from overseas, and the Smithsonian. It's a long and interesting story, so ask me in the hallway or stay tuned for my next departmental seminar to hear the full scoop!

– PJ Liesch

Insect Research Collection (WIRC) update

The pandemic has significantly hampered our abilities to move forward with our two current NSF supported research projects. Both involve digitizing WIRC specimen collection event records associated with (1) our TPT-TCN (Terrestrial Parasite Tracker Thematic Collections Network) as well as (2) our LepNet-TCN-PEN (Partnerships Enhancing Networks: Digitization: Enhancing LepNet: Digitization and integration of significant butterfly and moth collections from the upper Midwest Tension Zone region). We have a 3rd NSF proposal pending: iDigBees-TCN (Collaborative Research: Digitization TCN: iDigBees

Network, Towards Complete Digitization of US Bee Collections to Promote Ecological and Evolutionary Research in a Keystone Clade).

In spite of the pandemic, the WIRC has made truly historic collection upgrades in the past year. Recognized as one of the UW-Madison Research Cores, the WIRC was successful in the 2020 RCRP (Research Core Revitalization Program) competition and was allocated $233,317 in support of our project, "Infrastructural Upgrade and Expansion for the Pinned Collections in the UW Insect Research Collection (WIRC)." A projected shortfall in the proposed costs was graciously covered by CALS Research in the amount of $41,174. In addition, **Dr. Craig Brabant** was awarded an ILM (Instructional Laboratory Modernization) grant to support equipment and research workstation upgrades essential to our ongoing research and instructional support projects.

– Dan Young

EGSA update

The **Entomology Graduate Student Association (EGSA)** held three graduate student socials and two workshops this semester. We played trivia and did crafts together virtually and we ended the year with our annual departmental Spring Picnic in the Russell Labs backyard, where it was so great to see many of you in person! We learned about the history of Black student activism at UW from **Ben Iuliano** and **Jacki Whisenant**. Jacki also taught us how to make digital and hand-drawn insect illustrations for our presentations and publications. We have one final workshop coming up on Thursday May 27th at 2pm via Zoom, where **Dan Young** will review the insect orders and **PJ Liesch** will talk about notable insects in Wisconsin. This workshop is open to the whole Ento community (and anyone else who is interested), so please join us!

The **Student & Field Safety Sub-committee of the DEI Committee** has developed a sign-up for **field safety items**. The Department purchased 17 safety vests and 6 magnets for displaying a university affiliation on personal vehicles that are available to be checked out from the Russell Snack Room (242). You can find the instructions in the Department Resources section of the website. We suggest reserving items ahead of time on the Google Calendar (see instructions), but there will also be a QR code and instructions for reserving items the day of use from the Snack Room.

– Hanna McIntosh

Diversity, Equity, and Inclusion Committee update

The DEI committee has been very busy this academic year and I would like to personally thank all the members of this committee for their service and commitment to making our department a safe, friendly, inclusive, and welcoming space for everyone in our community and beyond. We hosted several town halls in the department and conducted a departmental climate survey and participated in the CALS climate survey. We worked extensively on improving communication in the Department, with the implementation of a Google Drive called Entomology Share [*note: log in with you @wisc.edu account to view*] where each committee is posting their working documents and encouraging everyone to participate in committee meetings. The DEI committee also put together a field safety document with guidelines for everyone to use as needed and is working on developing DEI in our curriculum.

To keep up with all the activities that the DEI committee has been working on, feel free to visit this folder where you can find all the documents that we are working on as well as resources and notes taken during town halls, and more.

We are planning to have a town hall sometime this summer to check on everyone and bring us all together. We hope that these activities are valuable to all and we welcome feedback, suggestions, and comments as we continue to work on DEI activities in the future. Feel free to direct those to Christelle Guédot at guedot@wisc.edu or Allee Hochmuth at abhochmuth@wisc.edu.

Have a great summer and field season! *– Christelle Guédot and the entire DEI Committee.*

Lab updates

Gratton Lab

An interesting paper from our group that might be of interest:

- Spiesman BJ*, Gratton C, Hatfield RG, Hsu WH, Jepsen S, McCornack B, et al. Assessing the potential for deep learning and computer vision to identify bumble bee species from images. **Scientific Reports** 2021;11: 7580. doi:10.1038/s41598-021-87210-1. Link to article.

*Brian was a post-doc here and is not on the faculty at Kansas State; see the related http://beemachine.ai that is based on that paper.

Erin Lowe's meta-analysis on the effects of field-edge flower plantings on pollinator conservation was recently published:

- Lowe, E. B., Groves, R., & Gratton, C. (2021). Impacts of field-edge flower plantings on pollinator conservation and ecosystem service delivery – A meta-analysis. Agriculture, Ecosystems and Environment, 310(December 2020), 107290. https://doi.org/10.1016/j.agee.2020.107290

Lindroth Lab

Some recent publications out of the Lindroth lab:

- Cole, C.T., H.L. Barker, K.F. Rubert-Nason, C.J. Morrow, J.F.L. Riehl, T.G. Köllner, N.D. Lackus, and R.L. Lindroth. 2021. Growing up aspen: ontogeny and tradeoffs shape growth, defense, and reproduction in a foundation species. *Annals of Botany* 127:505–517. DOI: 10.1093/aob/mcaa070. Link to article.
- Rubert-Nason, K.F., and R.L. Lindroth. 2021. Causes and consequences of condensed tannin variation in *Populus*: a molecules to ecosystems perspective. Pp. 69-112, in *Recent Advances in Polyphenol Research*. Vol. 7. John Wiley DOI: 10.1002/9781119545958.ch4

Young Lab

Ann Marsh completed her M.S. in 2020: A Survey of Mycetoporini of Wisconsin (Coleoptera: Staphylinidae: Tachyporinnae) and immediately accepted a temporary lecturer position to teach ENT 201 during Professor Schoville's sabbatical. Ann will rejoin the Young Lab in the fall to continue her staphylinid research in a Ph.D. program. Meanwhile, **Jacki Whisenant** is completing her M.S. in the Young Lab: A Survey of the Tetratomidae of Wisconsin (Coleoptera: Tenebrionoidea). Jacki continues to work on the 3rd floor entomological mural and will also be teaching an entomological illustration short course this summer.

Jacki proposed an outreach project idea: "**Insect Adventures**" – through Fanuel Muindi's Science Advocacy Institute, which is an incubator for K12 science outreach and engagement projects. It was accepted and awarded a small amount of seed funding for further workshopping during this past spring semester, and was selected as one of the two top projects of the cohort during our final pitch presentation. From here, Jacki will be applying for a Chrysalis Fund to expand this development (after she graduates).

As noted above, **Zhihong (Jason) Zhan**, pandemic willing, will be rejoining the department as a new M.S. student in the Young lab working on taxonomic elements of the Chinese stag beetle (Coleoptera: Scarabaeoidea: Lucanidae) fauna.

Dan Young continues to teach largely in-person through the pandemic and is preparing for the summer ENT 468 Capstone course. On tap for the fall is ENT 302 (Introduction to Entomology – as always), ENT 331 (Taxonomy of Adult Insects), and ENT 375 (the F.I.G. – First year Interest Group course, Biodiversity and the Sixth Mass Extinction). Dan is also once again

working on beetle chapters for the new version of the classic American Beetles. The new title is Beetles of Canada and the United States (BOCUS). Dan is section leader for the suborder Archostemata and is also contributing chapters for a number of additional families.

As noted above, Dan continues to work actively as Director of the WIRC with curator, Dr. Craig Brabant to secure funding and new space to enhance the profile and long-term position of the WIRC. In additional to actively adding material to the collection from our own field work, we have been quite successful in acquiring important collections and specimen donations from amateur entomologists around Wisconsin and the country.

Schoville Lab

From my lab, the highlights might include these new papers:

- **Gates, D.**, B. Jackson, and **D. Schoville**. 2021. Impacts of fire on butterfly genetic diversity and connectivity. *Journal of Heredity* Link to article
- **Weng, Y-M.**, C.B. Francoeur, C.R. Currie, D.H. Kavanaugh, and **D. Schoville**. 2021. A high-quality carabid genome provides insights into beetle genome evolution and cold adaptation. *Molecular Ecology Resources* Link to article
- Arango, R.A., **D. Schoville**, C.R. Currie, and C. Carlos-Shanley. 2021. Experimental warming reduces survival, cold tolerance, and gut prokaryotic diversity of the eastern subterranean termite, *Reticulitermes flavipes* (Kollar). *Frontiers in Microbiology* Link to article

Crall Lab

The first peer-reviewed paper from the lab (led by postdoctoral fellow **Dr. Matt Smith**, 'Long-term tracking and classification of individual behavior in bumble bee colonies'), was accepted for publication as part of the DARS-SWARM biology and engineering conference. Congrats Matt and all co-authors!

Graduate student **August Easton-Calabria** was selected to be a member of the upcoming cohort of Planetary Health Scholars, for his research on developing new tools for quantifying the behavioral impacts of insecticides and other environmental stressors on bees. Congrats August!

Dr. Crall is the PI on a new pilot GARDEN grant from CALS Global, which will be used to explore adapting behavioral tracking systems developed in the lab to an important, endemic native bumble bee species in Mexico (*Bombus epphipiatus*), in collaboration with researchers at El Colegio de la Frontera Sur in Chiapas, Mexico.

And the lab is gearing up for the first summer field season in Wisconsin, including welcoming undergraduate researchers **Julia Wiessing** and **Madalyn Laskowski** who will support experiments rearing bumble bee colonies in the lab, as well as field experiments on foraging and pollinator community dynamics at Arlington Research Station. We are also really looking forward to welcoming new lab members in the coming months, including graduate students **Anupreksha Jain** (starting June 2021) and **Gigi Melone** (starting August 2021), as well as postdoctoral fellow **Olivia Bernauer** (a former member of the department, who has recently been award a USDA-NIFA Postdoctoral Fellowship, starting November 2021).

Groves Lab

In the Groves lab, Ben has been working on updates to the Vegetable Disease and Insect Forecasting Network (VDIFN) website, which is a map-based tool that uses hourly gridded NOAA weather data to model predicted disease and insect pressure across the state. Diseases are typically modeled using daily temperature and relative humidity values, while insect models use degree days. VDIFN can also be used to display any degree day model of your choosing to track insects not already in the

system, or other phenological events across Wisconsin, such as apple bloom. Daily weather data for any point in Wisconsin can be accessed by clicking on the appropriate grid cell on the map. Feedback on VDIFN is welcome!

Ben would also like to make a plug for the Gratton Lab's WiBee smartphone app, a citizen science project aimed at monitoring pollinator activity and diversity across the state (an beyond!) and engaging the public in pollinator awareness and conservation. Pollinator surveys taken by WiBee contributors can be viewed, explored, and downloaded on the WiBee data dashboard, which Ben developed. Since the project began last spring, 262 contributors have completed 1253 surveys and logged over 42,000 pollinator visits! Grab your phone, find some flowers, and get counting!

Finally, some recent publications from the Groves lab:

- Clements, J., Lamour, K., Frost, K., Dwyer, J., Huseth, A., & Groves, R. L. (2021). Targeted RNA sequencing reveals differential patterns of transcript expression in geographically discrete, insecticide resistant populations of *Leptinotarsa decemlineata*. *Pest Management Science*, February. https://doi.org/10.1002/ps.6393
- Harrod, V. L., Groves, R. L., Maurice, M. A., & Barak, J. D. (2021). *Frankliniella occidentalis* facilitate *Salmonella enterica* survival in the phyllosphere. *PLoS ONE*, 16(2 February 2021), 1–16. https://doi.org/10.1371/journal.pone.0247325
- Mishra, S., Dee, J., Moar, W., Dufner-Beattie, J., Baum, J., Dias, N. P., Alyokhin, A., Buzza, A., Rondon, S. I., Clough, M., Menasha, S., Groves, R., Clements, J., Ostlie, K., Felton, G., Waters, T., Snyder, W. E., & Jurat-Fuentes, J. L. (2021). Selection for high levels of resistance to double-stranded RNA (dsRNA) in Colorado potato beetle (*Leptinotarsa decemlineata* Say) using non-transgenic foliar delivery. *Scientific Reports*, 11(1), 1–12. https://doi.org/10.1038/s41598-021-85876-1

– Ben Bradford

Bugs in the news

- **At Mating Time, These Ants Carry Their Young Queen to a Neighbor's Nest**. We humans have Tinder, Hinge, eHarmony and Grindr. For other animals, there's a real dearth of matchmaking services, not even Bumble or Plenty of Fish. But for future queens of one ant species, sterile worker ants seem to serve this function by physically carrying their royal sisters to neighboring nests. There, the queens-to-be can mate with unrelated male ants, according to researchers in a study published this month in Communications Biology. Source: The New York Times, May 13, 2021. Read more…
- **This Moth Is Huge in Australia**. Children and staff members at the Mount Cotton State School, an elementary school near a rainforest in Queensland, Australia, have spotted wallabies, koalas and snakes over the years. But recently, builders who were adding new classrooms to the school made a discovery that stood out even among the famously diverse fauna of Australia. The builders found a giant wood moth, which can have a wingspan of up to nine inches. The moth — fuzzy-looking and mottled gray, with a passing resemblance to a well-loved stuffed animal — was found on the side of the new building. Source: The New York Times, May 7, 2021. Read more…
- **Roads pose significant threat to bee movement and flower pollination.** Roads can be barriers to wildlife of all sorts, and scientists have studied road impacts on animals ranging from Florida panthers and grizzly bears to box turtles, mice, rattlesnakes and salamanders. But much less is known about the impact of roads on pollinating insects such as bees and to what extent these structures disrupt insect pollination, which is essential to reproduction in many plant species. In a paper published online May 10 in the Journal of Applied Ecology, University of Michigan researchers describe how they used fluorescent pigment as an analog for pollen. They applied the luminous pigment to the flowers of roadside plants

to study how roads affected the movement of pollen between plants at 47 sites in Ann Arbor, Michigan. Source: Science Daily, May 11, 2021. Read more...

- **Wasps are valuable for ecosystems, economy and human health (just like bees).** Wasps deserve to be just as highly valued as other insects, like bees, due to their roles as predators, pollinators, and more, according to a new review paper led by UCL and University of East Anglia researchers. The study, published in Biological Reviews, compiles evidence from over 500 academic papers to review how roughly 33,000 species of stinging (aculeate) wasps contribute to their ecosystems, and how this can benefit the economy, human health, and society. Source: Science Daily, April 30, 2021. Read more...
- **Hungry fruit flies are extreme ultramarathon fliers – In search of food, a fly can travel six million times its body length.** In 2005, an ultramarathon runner ran continuously 560 kilometers (350 miles) in 80 hours, without sleeping or stopping. This distance was roughly 324,000 times the runner's body length. Yet this extreme feat pales in comparison to the relative distances that fruit flies can travel in a single flight, according to new research from Caltech. Caltech scientists have now discovered that fruit flies can fly up to 15 kilometers (about 9 miles) in a single journey — 6 million times their body length, or the equivalent of over 10,000 kilometers for the average human. In comparison to body length, this is further than many migratory species of birds can fly in a day. To discover this, the team conducted experiments in a dry lakebed in California's Mojave Desert, releasing flies and luring them into traps containing fermenting juice in order to determine their top speeds. Source: Science Daily, April 22, 2021. Read more...
- **Simple genetic modification aims to stop mosquitoes spreading malaria – Genetically modifying mosquitoes to express antimalarial genes and pass them on to their offspring is being tested as a new strategy to eliminate malaria.** Altering a mosquito's gut genes to make them spread antimalarial genes to the next generation of their species shows promise as an approach to curb malaria, suggests a preliminary study published today in eLife. The study is the latest in a series of steps toward using CRISPR-Cas9 gene-editing technology to make changes in mosquito genes that could reduce their ability to spread malaria. If further studies support this approach, it could provide a new way to reduce illnesses and deaths caused by malaria. Source: Science Daily, April 13, 2021. Read more...