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S.RAMSEY@COLORADO.EDU

SAMUEL D. RAMSEY, Ph.D.

CURRENT POSITIONS

Marvin H. Caruthers Endowed Assistant Professor, (2022-Present)
BioFrontiers Institute & Department of Ecology and Evolutionary Biology
University of Colorado, Boulder

Founder/Director, Ramsey Research Foundation (2020-Present)
6207 Summerhill Rd, Temple Hills MD 20748

National Geographic Wayfinder, (2022-Present)

Host/Science Lesson Manager, Crash Course Biology (2022-Present)
8935 N Meridian St., Ste 100 Indianapolis, IN 46260

PREVIOUS POSITIONS

Science Lesson Producer, Khan Academy (2021)
1937 Landings Drive, Mountain View, CA 94043

Visiting Researcher Appointment, Chiang Mai University (2017)
Faculty of Science
Honey Bee Protection Laboratory

EDUCATION & TRAINING

Post-Doctoral Research Fellow, USDA-ARS (2018-2022)
Bee Research Laboratory
10300 Baltimore Avenue, Bldg 306, BARC – East, Beltsville MD 20705
PI: Jay Evans, Daniel Sonenshine, Steve Cook
Focus: Kleptocytosis: A NOVEL PARASITIC STRATEGY FOR ACCELERATED REPRODUCTION VIA HOST PROTEIN STEALING IN *VARROA DESTRUCTOR*

Doctor of Philosophy in Entomology
University of Maryland, College Park, MD (2012-2018)
Focus: Parasitic/Predatory Arthropod Behavior; Symbiosis & Insect Ecology
Dissertation: "NOVEL ADAPTATIONS IN MORPHOLOGY, DEVELOPMENT, AND NUTRIENT ACQUISITION FOR HOST EXPLOITATION IN THE MESOSTIGMATID HONEY BEE PARASITE *VARROA DESTRUCTOR*"
Advisor: Dennis vanEngelsdorp

Bachelor of Science in Entomology

Cornell University, Ithaca, NY (2007-2011)

Thesis: "WHY IS *HARMONIA AXYRIDIS* THE CULPRIT IN COCCINELLID BITING INCIDENTS? AN ANALYSIS OF MEANS, MOTIVE, AND OPPORTUNITY".

Advisor: John Losey

PUBLICATIONS

Sankovitz M, Steinhauer N, Yemor T, Cook S, Evans J, **Ramsey S**, (2024) 'Evaluation of Efficacy of Formic Acid and Thermal Remediation for Management of *Tropilaelaps* and *Varroa* Mites in Central Thailand" *Submitted, Pending Review: Journal of Biological Invasions*

Ramsey S, Cook S, Gulbranson C, vanEngelsdorp D, Evans J, Posada F, Sonenshine D (2023) Kleptocytosis: A Novel Parasitic Strategy for Accelerated Reproduction via Host Protein Stealing in *Varroa destructor*. *Proceedings of the National Academy of Sciences* (in Review).

Sonenshine D, Posada-Florez F, Laudier D, Gulbranson C, **Ramsey S**, Cook S (2022) Historical Atlas of the Internal Anatomy of Female *Varroa destructor* (Mesostigmata: Varroidae) Mites in Relation to Feeding and Reproduction. *Annals of the Entomological Society of America* 115 (2), 163-193.

Ramsey S (2021) 'Foreign Pests as Potential Threats to North American Apiculture: *Tropilaelaps mercedesae*, *Euvarroa* spp., *Vespa mandarinia*, and *Vespa velutina*" *Veterinary Clinics of North America: Food Animal Practice*.

Ramsey S, Ochoa R, Bauchan G, Gulbranson C, Mowery J, Cohen A, Lim D, Joklik J, Cicero J, Ellis J, Hawthorne D, vanEngelsdorp D. (2019) "*Varroa destructor* (Varroidae) Feeds on Honey Bee Fat Body Tissue Not Hemolymph" *Proceedings of the National Academy of Sciences* 116(5):1792-1801

- **"Highly Cited" study receiving more than 105 times more citations than average article published in PNAS**
- **Featured article in PNAS Volume 116**
- **Cover Image for PNAS Volume 116**

Ramsey S, Gulbranson C, Mowery J, Ochoa R, vanEngelsdorp D, Bauchan G. (2018) "A Multi-Microscopy Approach to Discover the Feeding Site and Host Tissue Consumed by *Varroa destructor* on Host Honey Bees" *Microscopy and Microanalysis* 24(S1):1258-1259

Chantawannakul P, **Ramsey S**, Khongphinitbunjong K, vanEngelsdorp D, Phokasem P. (2018) "The *Tropilaelaps* Mite: An Emerging Threat to European Honey Bees." *Current Opinions in Insect Science* 26:69-75.

- Chantawannakul P, **Ramsey S.** (2017) "Chapter 1: Introduction to Beekeeping in Asia: Parasites, Pathogens, and Other Stress Factors." *Asian Beekeeping in the 21st Century* pp. 4-37
- Khaliunaa Tsevegmid, Selenge Dooshin, **Ramsey S.** (2017) "Chapter 6: Beekeeping in Mongolia." *Asian Beekeeping in the 21st Century* pp. 94-109
- Neumann P, Williams G, Chantawannakul P, **Ramsey S.** (2017) "Chapter 9: Conclusions and Future Perspectives." *Asian Beekeeping in the 21st Century* pp. 154-159
- Ramsey S,** vanEngelsdorp D. (2016) "*Varroa destructor*: Beekeeping Public Enemy Number One." *Journal of Beekeeping/Arıcılık Dergisi* 16(1): 1-4
- Ramsey S,** and Losey J. (2012) "Why is *Harmonia axyridis* the Culprit in Coccinellid Biting Incidents? An Analysis of Means, Motive and Opportunity." *American Entomologist*. 58:166-170.
- Losey J, Perlman J, Kopco J, **Ramsey S,** Hesler L, Evans E, Allee L, and Smyth R. (2012). "Potential Causes and Consequences of Decreased Body Size in Field Populations of *Coccinella novemnotata*." *Biological Control*. 61:98-103.

HONORS AND AWARDS

- | | |
|-------------|---|
| 2024 | Explorer Club: Fifty People Changing the World that the World Needs to Know About |
| 2023 | American Association of Professional Apiculturist Award for Outstanding Research Presentation |
| 2022 | American Association of Professional Apiculturist Award for Outstanding Research Presentation |
| 2022 | National Geographic Wayfinder Award for innovative pursuit of knowledge on a Global Scale |
| 2021 | University of Maryland's "Alumni Excellence Award" for "significant transformational impact in research" |
| 2020 | American Beekeeping Federation's Roger Hoopingarner Award for "Best Scientific Presentation" |
| 2019 | American Association of Professional Apiculturist Travel Award |
| 2019 | American Beekeeping Federation's Roger Hoopingarner Award for "Best Scientific Presentation" |

2018	Acarological Society of America's Highest Award for Advances in Acarology
2017	First Place and People's Choice Winner of the International Three-Minute Thesis Competition
2017	First Place in Maryland State Three-Minute Thesis Competition
2017	American Bee Research Conference's Award for Distinguished Research
2017	Represented the University of Maryland at the Agricultural Research Congressional Exhibition and Reception
2012	University of Maryland College of Computer, Mathematical and Natural Sciences Merit Award
2010	President's Award for Outstanding Undergraduate Research at Entomological Society of America Meeting

CONFERENCE PRESENTATIONS & INVITED SEMINARS (Oral/Poster)

"Pollinator Pandemic: Managing Honey Bee Health in a World of Invasive Parasites"

Ramsey S, Sankovitz M, Henry M, Evans J, Cook S
University of Illinois Urbana-Champaign, November 27th, 2023.

"Bridging Science and Policy: Using the Excitement Around Bees as a Conduit for Policy Change"

Ramsey S,
Entomological Society of America, November 7th, 2023.

"Pollinator Pandemic: Managing Honey Bee Health in a World of Invasive Parasites"

Ramsey S, Sankovitz M, Henry M, Evans J, Cook S
Cornell Department of Entomology Speaker Symposium, October 12th, 2023.

"Tropilaelaps: Current Knowledge on Invasive Bee Parasite"

Ramsey S
Keystone Policy Center, October 9, 2023

"Tropilaelaps Impacts on Pollinators"

- **Ramsey S**, Sankovitz M, Henry M, Evans J, Cook S
USDA/EPA Pollinator State of the Science, August 30, 2023. (Virtual)

"Tracking Tropi Mites Globally"

Ramsey S, Sankovitz M

- Eastern Apicultural Society, Annual Conference, August 4, 2023

“The Future of Bee Research”

Ramsey S

- Eastern Apicultural Society, Annual Conference, August 3, 2023

“From Lab to Life: Communicating Science to the Public”

Ramsey S

- Council of Graduate Schools Annual Conference, July 10, 2023

“Honey Bees as Landlord: How Symbioses Make or Break Bee Colonies”

Ramsey S,

American Bee Federation Conference, March 13th, 2023.

“Thermal Remediation Provides Inconsistent Control of Honey Bee Brood Parasites: *Varroa destructor* and *Tropilaelaps mercedesae*”

Ramsey S, Tanawat Y, Suwannapong G, Evans J

American Bee Federation Conference, January 5th, 2023.

“Effective Treatment Measures to Mitigate Spread and Establishment of Invasive *Tropilaelaps mites*”

Ramsey S, Tanawat Y, Suwannapong G, Evans J

North American Pollinator Protection Campaign, October 19th, 2022.

“Current Research Initiatives and Efforts to Exclude *Vespa mandarinia* in the Pacific Northwest”

Ramsey S, Gilligan T, Childers A.

Honey Bee Veterinary Consortium, September 22nd, 2020. (Virtual)

“*Tropilaelaps* Up Close and Personal: Understanding a Mysterious Bee Mite”

Ramsey S., Khongphinitbunjong K, Chantawannakul P.

American Beekeeping Federation Conference, January 8th, 2020.
Schaumburg, Illinois.

“Understanding the *Tropilaelaps* Mite: Analysis of Behavior, Lifecycle, and Potential Treatment Options”

Ramsey S, Chantawannakul P, Evans J, Cook S.

COLOSS Asia Conference, February 7th, 2020. Chiang Mai, Thailand.

“Deformed wing virus induces a posttranslational modification to AKT that leads to a reduction in the biochemical compounds required for sustained flight in the European honey bee *Apis mellifera*”

Heerman MC, Cook SC, Ryabov E, **Ramsey S,** Y Chen.

Entomological Society of America 67th Annual Meeting, November 19th, 2019. Louisville, Kentucky.

“Novel Adaptations in Nutrient Acquisition in *Varroa destructor*: Kleptocytosis of Host Fat Body Proteins”

Ramsey S, Sonenshine D, Evans J, Cook S.
Entomological Society of America 66th Annual Meeting, November 11-14th,
2018. Vancouver, Canada.

"*Varroa destructor*: A Paradigm Shift on What and Where They Feed"

Ramsey S, Ochoa R, Bauchan G, Gulbranson C, Mowery J,
vanEngelsdorp D.
Acarological Society of America Annual Meeting, November 11-12th, 2018.
Vancouver, Canada.

"A Multi-Microscopy Approach to Discover the Feeding Site and Tissue Consumed by *Varroa destructor* on Host Honey Bees"

Ramsey S, Gulbranson C, Mowery J, Ochoa R, vanEngelsdorp D,
Bauchan G.
Microscopy and Microanalysis Annual Meeting, August 5-9th, 2018.
Baltimore, Maryland.

"*Varroa destructor* Does Not Have a Phoretic Phase, Feeding on Adult Bees via Extra-oral Digestion"

Ramsey S, Ochoa R, Bauchan G, Mowery J, Gulbranson C,
vanEngelsdorp D.
American Bee Research Conference 75th Annual Meeting, January 9-13th,
2018. Reno, Nevada.

"*Varroa destructor* Feeds Primarily on Honey Bee Fat Body not Hemolymph"

Ramsey S, Ochoa R, Bauchan G, Gulbranson C, Mowery J, Cohen A, Lim
D, Joklik J, Cicero J, Ellis J, Hawthorne D, vanEngelsdorp D.
American Bee Research Conference 74th Annual Meeting, January 10-14th,
2017. Galveston, Texas.

"Identifying the Primary Host Tissue Composing the Diet of a Honey Bee Parasitic Mite *Varroa destructor*"

Ramsey S, Gulbranson C, Mowery J, Ochoa R, vanEngelsdorp D,
Bauchan G.
International Congress of Entomology 25th Meeting, September 25-30th,
2016. Orlando, Florida.

"Novel In-Vitro Rearing System for Honey Bee Parasitic Mite *Varroa destructor*"

Ramsey S, Ochoa R, vanEngelsdorp D.
International Conference in Pollinator Biology, Health, and Policy 3rd
Meeting, July 18-20th, 2016. University Park, Pennsylvania.

"Spatial Preference of *Varroa destructor* on Adult Honey Bees"

Ramsey S, Ochoa R, vanEngelsdorp D.
American Bee Research Conference 73rd Annual Meeting, January 5-9th,
2016. Jacksonville, Florida.

“Investigation of Interactions Between a Native and Exotic Egg Parasitoid of The Brown Marmorated Stink Bug, *Halyomorpha halys* (Hemiptera: Pentatomidae)”

Ramsey S, Dieckhoff C, Hoelmer K, Shrewsbury P.

Entomological Society of America 62nd Annual Meeting, November 16th-19th, 2014. Portland, Oregon.

“Biting Behavior of Beneficial Beetles: Quantification of Coccinellid Propensity to Bite Humans”

Ramsey S, Losey J.

Entomological Society of America 58th Annual Meeting, December 12-15th, 2010. San Diego, California.

NON-REFEREED PRESENTATIONS

“The Power of Peculiar Thinking: Problem Solving Through Creativity and Ingenuity”

Ramsey S

- Acuity Insurance Annual Strategic Planning Meeting, January 19th, 2024.
- Constellation Energy Group Annual Conference, November 16, 2023
- Association of Corporate Citizenship Professionals, October 17, 2023
- Council for Responsible Nutrition Annual Conference, October 6, 2023
- International City Management Association Annual Conference, October 4, 2023
- Qualifacts: Behavioral Health Software Company, September 26, 2023
- SYNK Developer Security Engineers, July 17, 2023

“Current Research from the Boulder Bee Lab”

Ramsey S

- Annual Conference for the National Association of Science Writers (NASW), October 8, 2023
- North Carolina State Beekeepers Association Conference, July 15, 2023

“Foreign Parasites as Potential Threats to Western Apiculture”

Ramsey S

- British Beekeepers Association, April 20, 2023 (Virtual)

“Documenting the Melitto-files: National Geographic Parasitological Survey of Honey Bees in Asia”

Ramsey S

- USDA Agricultural Outlook Forum, February 24, 2023
- National Parks Seminar Singapore, February 23, 2023

“*Tropilaelaps mercedesae*: Tracking its Expanding Geographic Range”
Ramsey S

- California State Beekeepers Association, November 14, 2023

“Exploiting Kleptocytosis: a Novel Pathway in the *Varroa* mite Reproductive System”
Ramsey S

- BioFrontiers Advisory Council, November 4, 2022

“*Varroa* After the Fat: How Recent Advances Can Help Us Fight the Mite”
Ramsey S

- North Carolina State Beekeepers Association Summer Conference 2023, July 14, 2023
- New South Wales Apiarists Association, May 19th, 2023.
- Northern Colorado Beekeepers, October 20, 2022
- Susquehanna Beekeepers, March 10, 2021

“Treating *Tropilaelaps*: Effective Measures Against the Invasive Bee Mite”
Ramsey S

- Apiculture New Zealand, June 30, 2022
- New South Wales Apiarists Association, May 19th, 2023.

“Using Lessons from the Pandemic to Preserve Pollinator Health”
Ramsey S

- Aspen Ideas Festival, April 25, 2022. (Virtual)

“The Importance of Effective Science Communication”
Ramsey S

- BioFrontiers 10th Annual IQ Biology Symposium, August 12, 2022
- USDA Orise Postdoc Seminar, May 26, 2022 (Virtual)
- Howard Hughes Medical Institute, April 25, 2022. (Virtual)

“How to Stop a Pollinator Pandemic”
Ramsey S

- World Affairs Council, April 22, 2022. (Virtual)

“Northern Giant Hornets in North America: The Battle Begins”
Ramsey S

- Michigan Beekeepers Association Monthly Meeting, March 5, 2021. (Virtual).
- Audubon Naturalist Society Speaker Series, February 11, 2021. (Virtual)

- Missouri Beekeepers Association Monthly Meeting, October 10, 2020. (Virtual).
- West Virginia Beekeepers Association Fall Conference, October 3, 2020. (Virtual).

“Biodiversity and Diversity in Bio: The Necessity of Both and Barriers to Achieving Them”

Ramsey S

- Georgia State Beekeepers, September 24, 2022
- University of Massachusetts Amherst, March 9, 2020. (Virtual)
- Audubon Naturalist Society Speaker Series, July 28th, 2021. (Virtual)

“Invasive Species: The Vexing Reality of our Global Ecosystem”

Ramsey S

- Beekeepers' Guild of San Mateo County, November 5, 2020. (Virtual)
- Nevada County Beekeepers Association, October 1, 2020. (Virtual)
- Audubon Naturalist Society, September 14, 2020. (Virtual)

“Invasive Species: Why North America Gets More than it Gives”

Ramsey S

- Audubon Naturalist Society, November 17, 2020. (Virtual)

“*Varroa & Tropilaelaps*: Ongoing Research Efforts to Fight the Mites”

Ramsey S, Suwannapong G., Chantawannakul P., Sonenshine D., Evans J.

- Somerset Beekeepers, November 4, 2021 (Virtual)
- University of Colorado Boulder, September 10, 2021 (Virtual)
- Cowlitz Beekeepers, June 17, 2021
- New Hampshire Beekeepers Association, April 10, 2021. (Virtual)
- Bees Beyond Borders, April 1, 2021. (Virtual)
- Calgary Beekeepers Association, March 24, 2021. (Virtual)
- British Columbia Honey Producers, March 20, 2021. (Virtual)
- Susquehanna Beekeepers Association, March 10, 2021. (Virtual)
- University of Massachusetts Amherst, March 8, 2020. (Virtual)
- Maryland Entomological Society, February 19, 2021. (Virtual)
- Anne Arundel Beekeepers, February 16, 2021. (Virtual)
- Buncombe County Beekeepers Association, February 1, 2021. (Virtual)
- Chicago Bee, October 18, 2020. (Virtual)
- Missouri State Beekeepers Association, October 10, 2020. (Virtual)
- Beekeepers’ Guild of San Mateo County, September 10, 2020. (Virtual)
- Alameda County Beekeepers Association, September 8, 2020. (Virtual)
- Eastern Piedmont Beekeepers Association, August 17, 2020. (Virtual)

- Tennessee Valley Beekeepers Association, July 14, 2020. (Virtual)

“Understanding the Mysterious *Tropilaelaps* Mite: Research Findings from Southeast Asia”

Ramsey S, Tanaway Y, Suwannapong G.

- Alabama State Beekeepers, February 5, 2022 (Virtual)
- Howard County Beekeepers Association, June 8, 2021. (Virtual)
- Long Island Bee Club, May 19, 2021. (Virtual)
- Orange County Beekeepers Association, January 14, 2021. (Virtual)
- American Honey Producers Association Winter Conference, December 3, 2020. (Virtual)
- Texas Beekeepers Association, November 7, 2020. (Virtual)
- Virginia State Beekeepers Association, October 8, 2020. (Virtual)
- West Virginia Beekeepers Association Fall Conference, October 3, 2020. (Virtual)
- Montgomery County Beekeepers Association, June 25, 2020. (Virtual)

“The Honey Bee Landlord: Understanding Symbiosis in Pollinators”

Ramsey S

- Honey Bee Veterinary Consortium Conference, Sept 1st, 2021 (Virtual)
- Texas Beekeepers Association, November 7, 2020. (Virtual)
- West Virginia Beekeepers Association, October 2, 2020. (Virtual)
- Audubon Naturalist Society, September 14, 2020. *Chevy Chase, MD (Virtual)*

“*Tropilaelaps mercedesae*: A Fate Worse than *Varroa destructor*”

Ramsey S, Suwannapong G.

- North Carolina State Beekeepers Association Summer Conference 2023, July 15, 2023
- Portland Urban Beekeepers, August 4, 2020 (Virtual)
- New Hampshire Beekeepers Association, October 17, 2020. (Virtual)
- El Dorado Beekeepers, CA, October 12, 2020. (Virtual)
- Nevada County Beekeepers Association, July 6, 2020. *(Virtual)*

“*Tropilaelaps*: An Emerging Threat to Western Apiculture”

Ramsey S, Khongphinitbunjong K, Chantawannakul P.

- Weimarer Bee Symposium Germany, November 19, 2021
- Central Ontario Beekeepers Association, July 14, 2021. (Virtual)
- ApiNZ Conference and Trade Exhibition, June 27-29, 2019. *Rotorua, New Zealand.*
- British Beekeepers Association Spring Convention, April 12-14, 2019. Harper Adams University, *Shropshire, England.*

- Chester County Beekeepers Association Annual Beekeeping Conference, March 9, 2019. *West Chester, Pennsylvania.*
- Tri-County Beekeepers Association Spring Workshop, March 2, 2019. *Wooster, Ohio.*
- Integrated Pest Management Workshop, February 4-5, 2019. *Leduc, Alberta, Canada.*
- Maryland State Beekeepers Spring Meeting, February 2, 2019. *Bel Air, Maryland.*
- American Beekeeping Federation Annual Conference, January 8-9, 2019. *Myrtle Beach, South Carolina.*
- Catskill Mountain Beekeepers Club Meeting, November 27, 2018. *East Durham, New York.*
- Massachusetts Beekeepers Association Fall Meeting, November 16-17th, 2018. *Fall River, Massachusetts.*
- Iowa Honey Producers Annual Meeting, November 9-10th, 2018. *Ames, Iowa.*
- Pennsylvania State Beekeepers Association Meeting, November 3rd, 2018. *State College, Pennsylvania.*
- Long Island Beekeeping Club Meeting, October 14th, 2018. *Smithtown, New York.*
- Florida State Beekeepers Association Annual Meeting, October 12-13th, 2018. Institute of Food and Agricultural Science Research Extension Center; *Gainesville, Florida.*
- West Virginia Beekeepers Association Annual Conference, August 24-25th, 2018. *Fairmont, West Virginia.*
- Eastern Apicultural Society 30th Annual Meeting, August 13-17th, 2018. *Hampton, Virginia.*
- Frederick County Beekeepers Association, August 1st, 2018. *Frederick, Maryland.*
- Heartland Apicultural Society 17th Annual Meeting, July 11-13th, 2018. *Washington University – St. Louis, Missouri.*
- Seminole/Volusia County Beekeepers Joint Meeting; June 6th, 2018. *Sanford, Florida.*
- Alameda/Marin County Beekeepers Joint Meeting; April 7th, 2018. *San Rafael, California.*
- Mason Valley Nevada Beekeepers Symposium; February 24th, 2018. *Yerington, Nevada.*

“Pollinators: Underpaid, Understaffed, and Underappreciated”

Ramsey S, vanEngelsdorp D.

- Beltsville Garden Club, May 25, 2022.
- New Hampshire Beekeepers Association, January 28, 2021. (Virtual)
- Audubon Naturalist Society Annual Meeting, October 18, 2018. *Chevy Chase, Maryland.*

“Varroa Management: How Mites Should be Treated”

Ramsey S, vanEngelsdorp D.

- Tualatin Valley Beekeepers Association, September 26, 2023
- Humboldt County Beekeepers, October 6, 2022
- Honey Bee Veterinary Consortium Conference, Sept 1, 2021. (Virtual)
- Rhode Island Beekeepers Association, June 10, 2021. (Virtual)
- Tennessee Valley Beekeepers Association, May 25, 2021. (Virtual)
- Summit County Beekeepers Association, April 15, 2021. (Virtual)
- Kansas Honey Producers Spring Conference, March 6, 2021. (Virtual)
- New Hampshire Beekeepers Association Monthly Meeting, February 22, 2021. (Virtual)
- Santa Clara Bee Guild, November 2, 2020. (Virtual)
- Chester County Beekeepers Association, August 13, 2020. (Virtual)
- Urban Toronto Beekeepers Association, August 4, 2020. (Virtual)
- Langley Bee Club, June 2, 2020. *British Columbia, Canada.* (Virtual)
- Chester County Beekeepers Association Annual Beekeeping Conference, March 9, 2019. *West Chester, Pennsylvania.*
- University of Florida Bee College, October 12-13, 2018. University of Florida Bee Research Extension Laboratory; *Gainesville, Florida.*
- Mason Valley Nevada Beekeepers Symposium; February 24, 2018. *Yerington, Nevada.*

“Honey Bee Internal Anatomy: A Live Guided Dissection”

Ramsey S, Ochoa R.

- West Virginia Beekeepers Association Annual Conference, August 24-25, 2018. *Fairmont, West Virginia.*
- Bee Day Arkansas 5th Annual Festival, May 5, 2018. *Little Rock, Arkansas.*
- Honey Bee Forum on Nutrition 9th Annual Conference, March 25, 2018. *Chicago, Illinois.*

“Varroa Anatomy and Why It Matters to Your Bees”

Ramsey S, Gulbranson C, Mowery J, Bauchan G, vanEngelsdorp D, Ochoa R.

- Cambridgeshire Beekeepers, June 2022 (Virtual)
- New Mexico Beekeepers, February 5, 2022 (Virtual)
- Honey Bee Veterinary Consortium Conference, Sept 1, 2021 (Virtual)
- Nevada County Beekeepers Association, May 3, 2021. (Virtual)
- Missouri State Beekeepers Association, October 10, 2020. (Virtual)
- Montgomery County Beekeepers Association, February 13, 2019. *Derwood, Maryland.*
- Heartland Apicultural Society 17th Annual Meeting, July 11-13, 2018. *Washington University – St. Louis, Missouri.*

“Drivers of Honey Bee Colony Losses: What the Data Actually Say”

Ramsey S, Steinhauer N, vanEngelsdorp D.

- Texas State Beekeepers Association, November 5, 2022
- Honey Bee Veterinary Consortium Conference, Sept 1, 2021 (Virtual)
- Mt. Baker Beekeepers Association, June 30, 2021
- New Hampshire Beekeepers Association, April 10, 2021. (Virtual)
- Kansas Honey Producers Spring Conference, March 6, 2021. (Virtual)
- Frederick County Beekeepers Association, November 4, 2020 (Virtual)
- Institute of Northern Ireland Beekeepers, October 19, 2019. *Dublin, Ireland*
- ApiNZ Conference and Trade Exhibition 2019, June 27-29, 2019. *Rotorua, New Zealand.*
- Chester County Beekeepers Association Annual Beekeeping Conference, March 9, 2019. *West Chester, Pennsylvania.*
- Iowa Honey Producers Annual Meeting, November 9-10, 2018. *Ames, Iowa.*
- University of Florida Bee College, October 12-13, 2018. University of Florida; *Gainesville, Florida.*
- National Honey Bee Day Festival, August 18, 2018. *University of Florida IFAS Extension – Orlando, Florida.*
- Southern Adirondack Beekeepers Association Annual Seminar, March 10, 2018. Ballston Spa, New York.
- Coastal Virginia Beekeepers Association Annual Seminar, January 27, 2018. *Hampton, Virginia.*
- Bristol County Beekeepers Association Annual Meeting, August 19, 2017. *North Dighton, Massachusetts.*
- Mason Valley Nevada Beekeepers Symposium; February 24-25, 2017. *Yerington, Nevada.*

“*Varroa destructor* (Varroidae) Feeds on Honey Bee Fat Body Tissue Not Hemolymph”

Ramsey S, Ochoa R, Bauchan G, Cohen A, Mowery J, Gulbranson C, Lim D, Joklik J, Cicero J, Ellis J, vanEngelsdorp D.

- Georgia State Beekeepers, September 24, 2022
- Weimarer Bee Symposium Germany, November 19, 2021
- Anergie Bee Conference France, November 16, 2021
- Essig Museum of Entomology Brunch Seminar, October 30, 2020. (Virtual)
- New Hampshire Beekeepers Association, October 17, 2020. (Virtual)
- Burapha University Doctoral Thesis Seminar, August 19, 2020. (Virtual)
- Wellington Beekeepers Association Meeting, July 1, 2019. *Wellington, New Zealand*
- ApiNZ Conference and Trade Exhibition 2019, June 27-29, 2019. *Rotorua, New Zealand.*
- Northern Virginia Beekeepers Association Meeting, April 30, 2019. *Annadale, Virginia.*
- British Beekeepers Association Spring Convention, April 12-14, 2019. Harper Adams University, *Shropshire, England.*

- Backyard Beekeepers Association Meeting, March 26, 2019. *Weston, Connecticut.*
- Prince William Regional Beekeepers Association Meeting, March 12, 2019. *Manassas, Virginia.*
- Chester County Beekeepers Association Annual Beekeeping Conference, March 9, 2019. *West Chester, Pennsylvania.*
- Knox County Beekeepers Association, March 3, 2019. *Mount Vernon, Ohio.*
- Tri-County Beekeepers Association Spring Workshop, March 2, 2019. *Wooster, Ohio.*
- Integrated Pest Management Workshop, February 4-5, 2019. *Leduc, Alberta, Canada.*
- Maryland State Beekeepers Spring Meeting, February 2, 2019. *Bel Air, Maryland.*
- Ulster County Beekeepers Association Meeting, November 26, 2018. *Hudson Valley, New York.*
- Massachusetts Beekeepers Association Fall Meeting, November 16-17th, 2018. *Fall River, Massachusetts.*
- Iowa Honey Producers Annual Meeting, November 9-10th, 2018. *Ames, Iowa.*
- Pennsylvania State Beekeepers Association Meeting, November 3rd, 2018. *State College, Pennsylvania.*
- Long Island Beekeeping Club Meeting, October 14th, 2018. *Smithtown, New York.*
- Florida State Beekeepers Association Annual Meeting, October 12-13th, 2018. Institute of Food and Agricultural Science Research Extension Center; *Gainesville, Florida.*
- EurBee 8th International Congress of Apidology, September 20th, 2018. *Ghent, Belgium.*
- Buncombe County Beekeepers Association, September 1st, 2018. *Fletcher, North Carolina.*
- West Virginia Beekeepers Association Annual Conference, August 24-25th, 2018. *Fairmont, West Virginia.*
- Eastern Apicultural Society 30th Annual Meeting, August 13-17th, 2018. *Hampton, Virginia.*
- Coastal Maine Botanical Gardens Special Topic Seminar on Honey Bees, July 27th, 2018. *Boothbay, Maine.*
- Carroll County Beekeepers Association Meeting, July 18th, 2018. *Westminster, Maryland.*
- Heartland Apicultural Society 17th Annual Meeting, July 11-13th, 2018. *Washington University – St. Louis, Missouri.*
- Danish Beekeepers Association Annual Summer Webinar, July 6th, 2018. *Aarhus, Denmark.*
- Vermont Beekeepers Association Annual Conference, June 23rd, 2018. *Burlington, Vermont.*
- Barnstable County Beekeepers Association Meeting, June 12th, 2018. *Barnstable, Massachusetts.*

- Seminole/Volusia County Beekeepers Joint Meeting; June 6th, 2018. *Sanford, Florida.*
- Honey Bee Forum on Nutrition 9th Annual Conference, March 25th, 2018. *Chicago, Illinois.*
- Susquehanna Beekeepers Association Meeting, March 14th, 2018. *Fallston, Maryland.*
- Southern Adirondack Beekeepers Association Annual Seminar, March 10th, 2018. *Ballston Spa, New York.*
- Honey Bee Health Coalition Hive Management Working Group Webinar, *March 3^d, 2018.*
- Howard County Beekeeping Association Meeting, February 13th, 2018. *West Friendship, Maryland.*
- Seminole County Beekeepers Association Meeting, February 7th, 2018. *Sanford, Florida.*
- Coastal Virginia Beekeepers Association Annual Seminar, January 27th, 2018. *Hampton, Virginia.*
- Nevada County Beekeepers Association Meeting, April 2nd, 2018. *Grass Valley, California.*
- Alameda County Beekeepers Association Meeting, April 3rd, 2018. *Oakland, California.*
- Marin County Beekeepers Association Meeting, April 5th, 2018. *San Anselmo, California.*
- USDA Special Symposium, December 13th, 2017. *Washington, DC.*
- Chiang Mai University Beekeeper Symposium, September 25th, 2017. *Chiang Mai, Thailand.*
- Philadelphia Beekeeper Guild Symposium, February 4th, 2017. *Philadelphia, Pennsylvania.*
- Eastern Missouri Beekeepers Association Meeting, June 14th, 2017. *St. Louis, Missouri.*
- Central Maryland Beekeepers Association Meeting, July 11th, 2017. *Cockeysville, Maryland.*
- Bristol County Beekeepers Association Annual Meeting, August 19th, 2017. *North Dighton, Massachusetts.*
- USDA APHIS Special Seminar, May 15th, 2018. *University of Maryland – College Park, Maryland.*
- Bee Day Arkansas 5th Annual Festival, May 5th, 2018. *Little Rock, Arkansas.*
- York County Beekeepers Association Meeting, August 24th, 2017. *York, Pennsylvania.*
- Virginia State Beekeepers Association Meeting, June 16-17th, 2017. *Ferrum, Virginia.*
- Mason Valley Nevada Beekeepers Symposium; February 24-25th, 2017. *Yerington, Nevada.*
- Frederick County Beekeepers Association, July 5th, 2017. *Frederick, Maryland.*
- Southern Maryland Beekeepers Association, January 21st, 2017. *Hughesville, Maryland.*
- Dickinson College's Clark Forum on Beekeeping, March 1st, 2017.

- *Carlisle, Pennsylvania.*
- Capitol Area Beekeeper Association Tri-Country Meeting, March 7th, 2017. *Hershey, Pennsylvania.*
- New Jersey Beekeeper Association Winter Meeting, February 11-12th, 2017. *Bordentown, New Jersey.*
- Geezer Ridge Farm Beekeeper Continuing Education Course, September 19th, 2016. *Martinsburg, West Virginia.*
- Eastern Apicultural Society 28th Annual Meeting, July 25-29th, 2016. *Calloway, New Jersey.*
- Bowie-Upper Marlboro Beekeeping Club Meeting, October 6th, 2016. *Greater Upper Marlboro, Maryland.*
- Maryland State Beekeeper Association Meeting, November 12th, 2016. *Annapolis, Maryland.*
- Long Island Beekeeping Club Meeting, November 27th, 2016. *Smithtown, New York.*
- Honey Bee Health Coalition Meeting, October 17-18th, 2016. University of Maryland – *College Park, Maryland.*

“How to Communicate Science”

Ramsey S

- National Junior Science and Humanities Symposium, May 2-5th 2018, *Hunt Valley, Maryland.*

“Insects: The Most Interesting Thing You’ve Ever Stepped On”

Ramsey S

- TEDx Montgomery Blair, April 6th, 2017. *Silver Spring, Maryland.*

“The Merits of Biological Control in Lieu of Chemical Treatment in Sensitive Government Accounts”

Ramsey S

- National Library of Medicine at the National Institutes of Health Special Topics Seminar, September 11th, 2014. *Bethesda, Maryland.*

OUTREACH & VOLUNTEER WORK

Mentoring Underrepresented Minority College Students through the Jackie Robinson Foundation
April 2023-Present

“How to Give your Best Presentation” 3 Minute Thesis Prep Seminar

Trained CU students in how to succeed in the International 3 Minute Thesis Competition in partnership with the Center for Academic Success and Engagement Workshop, October 17, 2023

SERVICE

Provided constructive criticism and mentoring to preparing for the 3-Minute Thesis Competition, October 2022

Served on Ecology and Evolutionary Biology Department's Executive Committee August 2023-Present

Junior Science and Humanities Symposium Early Researcher Mentor March 2021

Served on University of California Riverside's: Entomology Careers in Academia & Beyond Panel
June 2nd, 2021

Partnered with Scholastic to Organize Earth Day Event Elementary and Middle School Students
April 22nd, 2021

Partnered with Burapha University in Chonburi, Thailand to Teach Students Essential Skills for a Professional Career as a Researcher
2020-Present

Partnered with Multiple School Systems to Encourage Minority Students to Pursue Careers in STEM via Appearances at Career Days and Other Enrichment Events
2018-Present

Partnered with Maryland Department of Agriculture in Facilitating Maryland Pollinator Protection Plan Summit
January 20th, 2016. College Park, Maryland.

Acarology Symposium Moderator at the International Congress of Entomology.
September 25-30th, 2016. Orlando, Florida

Created "Doctor Buggs Online Outreach Initiative"
October 6th, 2015-Present.

Adjunct Training Faculty Member for Government Pest Management Professionals with American Pest Management
2014-2017. Fulton, Maryland.

Created the Head First Program: "Learning How to Jump In" Designed to Narrow the Achievement Gap Between Minority/Underprivileged Students and Their Peers

January 23^d, 2015-2016. College Park, Maryland.

"Celebrity Scientist" for Museum Without Walls Children's Science Center

August 3^d, 2014. Fairfax, Virginia.

University of Maryland Entomology Department Insect Zoo Coordinator

April 27th, 2013-2017. College Park, Maryland.

Local Career Day Presenter/Extension Outreach Researcher

2011-Present. Maryland; Washington D.C.; Virginia.

Collaborated with Superintendent of Prince Georges County Public Schools to Reform Science Education on the Secondary School Reform Advisory Council

2011-2014. Lanham, Maryland

INTERVIEWS/MEDIA CONTRIBUTIONS

- Betterbee (Beekeeping Today Podcast), Varroa and Tropilaelaps Updates with Dr. Sammy Ramsey, November 20, 2023
- KQED/Deep Look, "Varrora Mites Are a Honeybee's 8-Legged Nightmare", October 24, 2023
- National Public Radio's Life Kit, "Sweet, Goopy Poop and A Taste for Grapes: 7 Wild Facts About the Spotted Lanternfly", September 15, 2023
- Colorado Arts & Sciences Magazine, "You Can't Be What You See", September 15, 2023
- PBS Nature, "Is This the Bug to End All Bees? (And What You Can Do About It) Going Wild with Dr. Rae Wynn-Grant Featured Guest Dr. Samuel Ramsey", September 12, 2023
- Boulder Weekly, "The Black Sheep Beekeeper", August 10, 2023
- Fox 5 Local Affiliate, "Hammerhead Worms Invading DC Area", July 27, 2023
- CBS Colorado, "Hot Summer and Wet Spring Causes Mosquito Population to Explode in Colorado", July 18, 2023
- Colorado Arts & Sciences Magazine, "Fight for the bumblebees", July 6, 2023

- WJLA Local CBS Affiliate, "Interview with the Science Communicator Teaching Your Kids Through YouTube", June 16, 2023
- ABC Local News, "Interview with Dr. Buggs", June 2, 2023
- Shared Planet, Shared Health "For the Love of Bees: Pollinators in a Connected World", May 2, 2023
- Mother Earth News Podcast, "Bee Parasites and Diseases in Your Hive", March 22, 2023
- Scholastic Magazine, "Entomologist Samuel Ramsey Shares Why Insects Are Awesome" February 2023
- The Takeaway, "Dr. Sammy Ramsey on What the Biodiversity of Insects Can Teach Us About Ourselves", February 23, 2023
- The World PRX/NPR, "Bee mite crusader", January 6, 2023
- Scholastic Magazine, "Entomologist Samuel Ramsey Shares Why Insects Are Awesome" February 2023
- Beekeeping Today Podcast "Updates in Bee Research", October 27, 2022
- Seeker, "The Threat to Bees that You Haven't Heard About: Tropic Mites" September 23rd, 2021
- Wired, "Entomologist Answers Your Questions", July 12, 2021
- Cheddar News, "First Asian Giant Hornet of the Year Discovered in Residential Area in Washington State" June 25th, 2021.
- The Today Show, "Cicadas are Just Like Us After the Pandemic, Entomologist Says" June 13th, 2021.
- WJLA News (ABC Local Affiliate), "Cicada Expert Tells 7 News Why Thousands of Cicadas Washed Up on This Maryland Beach". June 11th 2021.
- CBS News, "Brood X Cicadas Light Up National Weather Radar as U.S. Grapples with Swarms". June 10th, 2021.
- WJLA News (ABC Local Affiliate), "Why Did Cicadas Swarm the White House Press Plane? We Asked Dr. Buggs". June 9th, 2021.
- Wired, "Quick Turn: Cicadas Compose a Symphony Entomologist Says" May 12th, 2021

- WUSA News (CBS Local Affiliate), "Entomologist Explains How to Protect Your Trees, Gardens from Cicadas". May 7th, 2021.
 - CBS This Morning, "Trillions of Cicadas as Loud as Lawnmowers Emerge in 15 States" May 6th, 2021.
 - Scholastic Classroom, "This is What an Entomologist Looks Like" April 15, 2021.
 - BBC Earth "Honey Bee Research Profile" March 2, 2021

 - Good Morning America, "Researchers Trap Murder Hornet" August 3rd, 2020.
 - National Public Radio, "Bug Hunt: Bumblebee Millipede That Could Be a Pet." July 7th, 2020.
 - National Public Radio, "Bug Hunt: Fuzzy-Reddish Nonflying Ant That is Actually A Wasp". July 20th, 2020.
 - The Washington Post, "A Quarantine Project That's a Win for You, Your Garden and Pollinators". June 24, 2020.
 - The Pollinators (Documentary). June 23rd, 2020.
 - BBC World Bee Day, "The State of Our Bees". May 20th, 2020.
 - Roland Martin Unfiltered, "Tell Me About These Murder Hornets Doc". May 17th, 2020.
 - WUSA News (CBS Local Affiliate) "Doctor Warns of Impact Murder Hornets Could Have on Humans". May 11th 2020
 - WJZ News (CBS Local Affiliate) "It's 'Highly Unlikely' That 'Murder Hornets' are in Maryland, State Says After Getting Many Calls When Insect Was Found in Washington State". May 4th 2020.
 - WJZ News (CBS Local Affiliate) "Maryland Entomologist Working to Understand, Control Threats to Honey Bee Population". July 23rd 2019.
 - The Project New Zealand, "Impending Bee Extinction?" June 26th, 2019
 - WJZ News (CBS Local Affiliate) "There's a Decline in the Honey Bee Population. A UMD Researcher Has Found the Cause". February 7th, 2019.
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PROFESSIONAL PROFILE ARTICLES

- University of Maryland Alumni Association, "Profile on Research Award Winner: Samuel Ramsey Ph.D. '18" January 12, 2021
- The Washington Post, "Cicada Season Started with a Police Encounter and Ended with a Love Song for this Entomologist" 2020
- *Bee Culture Magazine*, "Annual Interview: Meet Dr. Samuel Ramsey" December 1st, 2018
- *Detusches Bienen-Journal* (German Bee Journal) "Werwölfe Statt Vampire (Werewolves Instead of Vampires)" November 3^d, 2018
- *Bee Culture Magazine*, "Downtown New Hope in the Fight Against Varroa" January 1st, 2018
- University of Maryland's *GradTerp Magazine* "PhD Student Wins International Thesis Competition" December 20th, 2017
- Stem Prof Issue 70, "PhD Student Wins Three-Minute Thesis" December 5th, 2017
- *Diamondback* "Honey Bees are Dying. In Three Minutes, a UMD Student Can Tell You Why" November 2nd, 2017
- *The Times Higher Education* "Bee Decline PhD Student Wins Three-Minute Thesis Prize" October 31st, 2017
- Featured in University of Maryland "Fearless Researcher" Advertising Campaign August 4th, 2016
- *Atlas Obscura's* "Insect Rearing" for "Bug Week" (2016) June 21st, 2016.
- *Pest Control Technology Magazine* titled "Future Leader" September 28th, 2012

TECHNICAL SKILLS/EXPERIENCE

- Able to Speak Thai Conversationally

- Proficiency with *Noldus Observer* Behavioral Observation Software
- Experienced with Analytical Chemistry and Immunodetection
- Proficiency with fine scale histology and fluorescent labeling of tissues & proteins
- Proficiency with in-vitro rearing of parasitic mites and a diverse range of insects
- Proficiency in beekeeping and honey bee pest management
- Proficiency in effective science communication to researchers and general public

SCIENCE COMMUNICATION EXPERIENCE

Crash Course Science Educator/Host	October 2022-Present
Tasked with communicating complex scientific concepts in an engaging way to high school and college students in educational videos	
Khan Academy Science Educator	January 2021-October 2021
Tasked with communicating complex scientific concepts to high school and college students via accurate and entertaining teaching videos	
Twig Education Science Educator	January 2021-Present
Tasked with communicating complex scientific concepts to middle and high school students through distance learning	
Mystery Science Science Educator	October 2020-2021
Tasked with communicating complex scientific concepts to kindergarten and elementary school students through distance learning	
NPR Shortwave Podcast Entomology Expert	July 2020-Present
Tasked with explaining the complexities of insect biology to an unspecialized audience	

TEACHING EXPERIENCE (Class/Seminar)

2023-Present Instructor	University of Colorado <i>EBIO 6100: Effective Science Communication</i>	Boulder, CO
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Developed course to teach best practices in communicating science to diverse and targeted audience contexts. Established active learning activities as a dynamic of each week and facilitated hands-on experience for students to communicate science at schools, local trade groups, and in academic seminars.

2022-Present
Instructor University of Colorado Boulder, CO
EBIO 4660: Insect Biology

Taught students about the diversity of insects, constructed active learning activities, and field trips for hands on engagement with entomology.

2019 University of Maryland College Park, MD
Guest Lecturer Honey Bee Research: What's Left to Learn?
Presented about recent findings in honey bee research that reveal that we still have much to learn about this celebrated organism.
BSCI121: Introduction to Beekeeping

2019 Greenwich High School Greenwich, CT
Organizer/Presenter Developing A Solid Thesis Project
Presented to an auditorium of high school students what will be demanded of them should they choose to pursue a graduate level education and how they can best go about developing a project from conception to fruition.

2018 American Society of Agronomy Baltimore, MD
Co-Organizer/Presenter "Engaging Science 101: Effective Communication by Video in the YouTube Generation"

Structured workshop to familiarize researchers with how to make use of the unique offerings of YouTube to educate the general populace about complicated scientific concepts. This work was conducted in partnership with the Crop Science Society of America, The Canadian Society of Agronomy, and the American Society of Agronomy.

2018 University of Maryland College Park, MD
Teaching Assistant
Presented weekly lectures to supplement content from the main lectures, developed and organized engaging lab lessons, created assignments, managed online grading system, corresponded with students
BSCI120: The Insects

Apr 11, 2017 University of Maryland College Park, MD
Guest Lecturer "*Diversity in Arthropoda*"
Discussed the wide-ranging diversity of arthropods and why they are classified into their respective groups
BSCI120: The Insects

Fall 2013-2017 American Pest Management Fulton, MD

Staff Instructor "Keeping the "I" in IPM"
Created presentations to teach pest control professionals about aspects of insect biology that would promote problem solving and translate to greater efficiency on the job

2016 University of Maryland College Park, MD
Lab Instructor
Presented weekly supplementary lectures and organized hands-on lab lessons
BSCI105: Principles of Ecology and Evolutionary Biology

2015 University of Maryland College Park, MD
Lab Instructor
Organized hands-on lessons, maintained equipment to be used by students, graded assignments and exams as necessary
BSCI121: Introduction to Beekeeping

2015 University of Maryland College Park, MD
Guest Lecturer "Biology of Parasitoids"
Prepared and presented lecture about the unique life strategies of parasitoids
BSCI106: Principles of Biology

2014 University of Maryland College Park, MD
Lab Instructor
Presented weekly supplementary lectures and organized hands-on lab lessons
BSCI105: Principles of Ecology and Evolutionary Biology

OTHER EMPLOYMENT

**2012-2014 Staff Entomologist, American Pest Management, Fulton MD
Quality Control, National Institute of Health, Bethesda MD**
Duties APM: Worked to identify unusual insects found in homes, collected specimens for further study, trained technicians in insect identification and understanding of insect biology

Duties NIH: Inspected facilities, consulted with and advised staff in developing non-chemical control protocols for sensitive accounts

2011-2012 Intern, Congressman Adam Schiff, Washington, DC
Duties: Attended congressional hearings, addressed concerns leveled by constituents, contacted television stations to relay public statements and press releases, organized written correspondence and performed other duties as assigned

2008-2009 Intern, United States Supreme Court, Washington, DC, Clerk's Office
Duties: Organized docketed Supreme Court cases, handled written and phone correspondence for the Justices, distributed briefs, explained the filing process to litigants and performed other duties as assigned.

PROFESSIONAL MEMBERSHIPS

Acarological Society of America

Jackie Robinson Foundation

Horatio Alger Association of Distinguished Americans

Entomological Society of America

American Beekeeping Federation

Leading Authorities Speaker Bureau

CORE COMPETENCIES AND AREAS OF INTEREST

- *Arthropod symbiosis*: elucidating how dispensable interactions between arthropods and other organisms develop, stabilize, and adapt along the transition to stable symbiosis
- *Honey Bee Resistance/Resilience*: deepening knowledge of how the other 10 species of honey bees residing in Southeast Asia, aside from the cosmopolitan *Apis mellifera*, thrive in the face of the same stress factors and how we can translate those traits to our population of honey bees
- *Refining Biological Control Efforts*: determining qualities that establish balanced symbioses which can lead to more accurate host-range testing and risk/benefit analysis
- *Pollinator Health*: assessing the multiple interacting factors leading to the globally observed decline in pollinator health and testing methods to mitigate this decline
- *Melittophiles and Other non-Apis Hive Associates*: deepening our understanding of how hive associates remain in honey bee colonies despite evolutionarily refined instincts of the host to exclude these organisms. Methods such as providing a significant service to the bees, avoiding detection through complex camouflage, or taking advantage of only the weak and unguarded are sparsely studied strategies but may be integral to disrupting negative relations or promoting those that lead to greater colony health.
- *Parasite Behavior*: the novel methods employed by parasitic/parasitoid organisms to live in or on hosts and exploit them for resources. Better

understanding of these methods could lead to new means of managing parasites that cause economic or medical injury.

- *Insect Morphology & Physiology*: using dissection, Mass Spectrometry, immunodetection, Micro CT imaging, and varying forms of microscopy to better understand the external and internal physiology of various arthropods