George M. Stack, Ph.D.

Founder – Topcross Genomics LLC | george@topcrossgenomics.com

Education

Cornell University Ithaca, NY
Ph.D. in Plant Breeding & Genetics May 2023

- Minors: Plant Pathology & Entomology
- Major Professor: Dr. Lawrence Smart
- Title: Elucidating the genetic basis of cultivar performance and biotic interactions in hemp

B.S. in Plant Sciences with Distinction in Research | Summa Cum Laude May 2019

- Concentration: Plant Breeding and Genetics
- Minor: Entomology
- Thesis Advisor: Dr. Jennifer Thaler, Dept. of Entomology
- Title: Interacting over a lifetime: how ontogeny shapes plant-herbivore interactions

Research Experience

Postdoctoral Researcher – Larry Smart Lab, Cornell University 04/25 to present
Comparative genomic analysis of regions containing cannabinoid oxidocyclases. Linkage mapping of cannabinoid trait QTL. Stakeholder-driven design of a new DArTag genotyping platform for *Cannabis sativa*.

Postdoctoral Researcher – Plant Genetic Resources Unit, USDA-ARS 07/24 to 03/25
Work with collaborators to phenotype >450 hemp accessions and genotype with long-read low-pass PacBio.

Postdoctoral Researcher – Larry Smart Lab, Cornell University 04/23 to 07/24
Applied hemp breeding of grain and fiber hemp cultivars. Identification of genetic factors resulting in CBG-dominant hemp. Assembly and analysis of 7 new hemp genomes. Development of high-throughput genotyping platforms (SureSelect probeset, molecular marker assays).

Ph.D. Candidate – Larry Smart Lab, Cornell University 05/19 to 04/23
Research on hemp cultivar evaluation and breeding with a focus on biotic interactions including resistance to powdery mildew and the role of cannabinoids in insect resistance in addition to variation in cannabinoid accumulation, plant morphology, and flowering phenology.

Research Assistant /Honors Thesis – Jennifer Thaler Lab, Cornell University 04/17 to 05/19
Designed and executed a series of experiments investigating the effects of plant and insect ontogeny on herbivore responses to induced plant defenses.

Relevant skills developed: Communication of research results and emerging scientific findings through reports, presentations, and lectures | Research team management and coordination | R, Python, and Linux programming languages | Bioinformatic analysis of genomic and phenomic data | Genome assembly | genotyping assay design | Trait mapping: linkage mapping, BSA, GWAS | Statistical analysis of highly-dimensional datasets | Applied breeding program design and coordination: recurrent bulk selection, marker-assisted selection, backcrossing, field trial design, hybrid development and evaluation | Greenhouse and field trial management | Plant phenotyping method development

Publications

Stack, G.M., Quade, M.A., Wilkerson, D.G., Monserrate, L.A., Bentz, P.C., Carey, S.B., Grimwood, J., Toth, J.A., Crawford, S., Harkess, A., & Smart, L.B. (2025). Comparison of recombination rate, reference bias, and unique pangenomic haplotypes in Cannabis sativa using seven de novo genome assemblies. *International Journal of Molecular Sciences*, *26*(3), 1165.

Suchoff, D.H.; Inoa, S.H.; **Stack, G.M.**; Wares, A.J.; Snyder, S.I.; Murdock, M.J.; Rose, J.K.C.; Smart, L.B.; Caton, T.A.; Pearce, R.C. Characterization of agronomic performance and sterility in triploid and diploid cannabinoid hemp. *Agron. J.* 2024, doi:10.1002/agj2.21618.

Stack, G.M.; Cala, A.R.; Quade, M.A.; Toth, J.A.; Monserrate, L.A.; Wilkerson, D.G.; Carlson, C.H.; Mamerto, A.; Michael, T.P.; Crawford, S.; Smart, C.D.; Smart, L.B. Genetic mapping, identification, and characterization of a candidate susceptibility gene for powdery mildew in *Cannabis sativa*. *Mol. Plant. Microbe. Interact.* 2024, *37*, 51–61, doi:10.1094/MPMI-04-23-0043-R.

Stack, G.M.; Snyder, S.I.; Toth, J.A.; Quade, M.A.; Crawford, J.L.; McKay, J.K.; Jackowetz, J.N.; Wang, P.; Philippe, G.; Hansen, J.L.; Moore, V.M.; Rose, J.K.C.; Smart, L.B. Cannabinoids function in defense against chewing herbivores in *Cannabis sativa* L. *Hortic Res* 2023, uhad207, doi:10.1093/hr/uhad207.

Stack, G.M.; Carlson, C.H.; Toth, J.A.; Philippe, G.; Crawford, J.L.; Hansen, J.L.; Viands, D.R.; Rose, J.K.C.; Smart, L.B. Correlations among morphological and biochemical traits in high-cannabidiol hemp (*Cannabis sativa* L.). *Plant Direct* 2023, *7*, e503, doi:10.1002/pld3.503.

Brym, Z.T.; Philpott, S.C.; Rheay, H.; Monserrate, L.A.; Bernstein, N.; Chase, C.A.; Ellison, S.L.; Shock, C.C.; Smart, L.B.; **Stack, G.M.**; Suchoff, D.H. Hemp morphology and physiology standards for research and industry applications. *HortScience* 2023, *58*, 756–760, doi:10.21273/HORTSCI17093-23.

Toth, J.A.; **Stack, G.M.**; Carlson, C.H.; Smart, L.B. Identification and mapping of major-effect flowering time loci *Autoflower1* and *Early1* in *Cannabis sativa* L. *Front. Plant Sci.* 2022, *13*, 991680, doi:10.3389/fpls.2022.991680.

Smart, L.B.; Toth, J.A.; **Stack, G.M.**; Monserrate, L.A.; Smart, C.D. Breeding of hemp (*Cannabis sativa*). In *Plant Breeding Reviews*; Goldman, I., Ed.; Wiley, 2022; Vol. 46, pp. 239–288 ISBN 9781119874126.

Toth, J.A.; Smart, L.B.; Smart, C.D.; **Stack, G.M.**; Carlson, C.H.; Philippe, G.; Rose, J.K.C. Limited effect of environmental stress on cannabinoid profiles in high-cannabidiol hemp (*Cannabis sativa* L.). *Glob. Change Biol. Bioenergy* 2021, *13*, 1666–1674, doi:10.1111/gcbb.12880.

Carlson, C.H.; **Stack, G.M.**; Jiang, Y.; Taşkıran, B.; Cala, A.R.; Toth, J.A.; Philippe, G.; Rose, J.K.C.; Smart, C.D.; Smart, L.B. Morphometric relationships and their contribution to biomass and cannabinoid yield in hybrids of hemp (*Cannabis sativa*). *J. Exp. Bot.* 2021, *72*, 7694–7709, doi:10.1093/jxb/erab346.

Stack, G.M.; Toth, J.A.; Carlson, C.H.; Cala, A.R.; Marrero-González, M.I.; Wilk, R.L.; Gentner, D.R.; Crawford, J.L.; Philippe, G.; Rose, J.K.C.; Viands, D.R.; Smart, C.D.; Smart, L.B. Season-long

characterization of high-cannabinoid hemp (*Cannabis sativa* L.) reveals variation in cannabinoid accumulation, flowering time, and disease resistance. *Glob. Change Biol. Bioenergy* 2021, *13*, 546–561, doi:10.1111/gcbb.12793.

Getman-Pickering, Z.L.; **Stack, G.M.**; Thaler, J.S. Fertilizer quantity and type alter mycorrhizae-conferred growth and resistance to herbivores. *J. Appl. Ecol.* 2021, *58*, 931–940, doi:10.1111/1365-2664.13833.

Toth, J.A.; **Stack, G.M.**; Cala, A.R.; Carlson, C.H.; Wilk, R.L.; Crawford, J.L.; Viands, D.R.; Philippe, G.; Smart, C.D.; Rose, J.K.C.; Smart, C.D.; Smart, L.B. Development and validation of genetic markers for sex and cannabinoid chemotype in *Cannabis sativa* L. *Glob. Change Biol. Bioenergy* 2020, *12*, 213–222, doi:10.1111/gcbb.12667.

Awards

ASHS Outstanding Graduate Student	04/2022
Barbara McClintock Graduate Student Award	02/2022
Charles A. Ring Memorial Award (Cornell SIPS)	05/2019
NSF GRFP Honorable Mention	03/2019

Selected Presentations (7 of 20+)

Society for In Vitro Biology – Norfolk, VA 06/2025
Talk Title: Characterization of agronomic performance and sterility in triploid and diploid cannabinoid hemp

Plant & Animal Genome Conference – San Diego, CA 01/2025
Talk Title: Development of novel genotyping technologies for hemp (*Cannabis sativa* L.)
Talk Title: Developing community-driven resources for hemp genotyping and phenotyping

Plant & Animal Genome Conference – San Diego, CA 01/2024
Talk Title: Characterization of unique cannabinoid oxidocyclase inactivations resulting in CBG-dominant *Cannabis sativa*
Talk Title: Using Persephone as a tool to investigate structural and allelic variation in *Cannabis sativa*

Plant & Animal Genome Conference – San Diego, CA 01/2023
Talk Title: Identification and characterization of host resistance to powdery mildew in hemp

American Society for Horticultural Science Meeting – Denver, CO 08/2022
Talk Title: Identification and characterization of host resistance to powdery mildew in hemp

Plant & Animal Genome Conference – Virtual 01/2022
Talk Title: Foliar herbivory is inversely correlated with cannabinoid content in a segregating population of *Cannabis sativa* L.

American Society for Horticultural Science Meeting – Denver, CO 08/2021
Talk Title: Architecture to biochemistry: Associations among morphometric, phenological, and biochemical traits in high-cannabinoid hemp cultivars

Lectures

Cannabis: Biology, Society, and Industry (PLSCI 5190) – Cornell University 2020-2023
Recurring Guest Lectures Fall Semester: *Cannabis sativa* L. domestication, taxonomy, and plant biology, uses of hemp

Hemp Production Systems (PLSCI 5015) – Cornell University 2021-2023
Recurring Guest Lectures Fall Semester: Hemp regulation and testing, hemp cultivar selection

Hemp Breeding and Genetics (PLSCI 5030) – Cornell University 2022-2024
Recurring Guest Lectures Spring Semester: Selection schemes, heterosis, trait introgression. IP

Cannabis Cultivation (AGRN 351) – SUNY Cobleskill 2024-present
Recurring Guest Lecture: Breeding and Genetics of *Cannabis sativa*

Cannabis Cultivation (HRT 236) – Finger Lakes Community College Spring 2023
Guest Lecture: Breeding and Genetics of *Cannabis sativa*

Leadership, Outreach, and Mentorship

Undergraduate & High School Students Mentored

Andrew Komatz, *University of Florida* Summer 2023
Natalie McFadden, *Geneva High School* Summer 2021
Justin Closser, *Finger Lakes Community College* Summer 2020
Mariana Marrero- González, *University of Puerto Rico at Mayaguez* Summer 2019

Hemp Extension & Outreach

- Collaborated with USDA-ARS hemp research group to organize hemp seminar series for Spring 2022 focused on reaching undergraduates at HBCUs across the United States. More than 500 people attended the live webinars and the recordings have over 400k views on YouTube.

Committee Member – Grad. Student Comm. | ASHS Hemp Interest Group 08/20 to 04/23
Coordinate with a team of graduate students to organize hemp-related programming and presentation sessions as part of annual ASHS (American Soc. for Horticultural Science) conferences.

Skype a Scientist 01/20 to present
Talk with K-12 classrooms from around the globe about plants, entomology, careers, etc. Matched with 8+ classrooms.

Board President – High Council | Alpha Zeta Fraternity 03/21 to present
Elected member of national board that oversees 20+ chapters across the United States. Alpha Zeta is an honors and professional fraternity focused on promotion of careers in agriculture and the life sciences.