Curriculum vitae

Peter Knut Lundquist

Assistant Professor
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Professional Positions

Aug 2018 - current	Assistant Professor	Department of Biochemistry & Molecular Biology *Michigan State University*

Professional Training

Feb 2016 – Jul 2018	Post-doctoral Researcher	Dr. Wolf R. Scheible *Noble Research Institute*
Jan 2013 – Jan 2016	Post-doctoral Researcher	Dr. Andreas P. M. Weber *Heinrich Heine Universitaet Düsseldorf*
May 2012 – Dec 2012	Post-doctoral Researcher	Dr. Klaas J. van Wijk *Cornell University*

Education

2012	Ph.D.	Plant Biology	Cornell University
2006	B.Sc.	Biochemistry	Kansas State University
2006	B.Sc.	Agronomy	Kansas State University

Extramural Funding

2021 – 2023 **NSF-MCB ($589,299)**
"Molecular Mechanisms of Protein Association with Plastoglobule Lipid Droplets"
PI: Peter Lundquist

2021 – 2023 **USDA-NIFA ($425,000)**
"Uncovering the Dynamic Functions of Plastoglobules for Enhanced Drought and Heat Tolerance"
PI: Peter Lundquist

2020 - 2023 **Ag Spectrum Company ($589,200)**
"Adaptive biochemical and physiological responses of maize hybrid lines to managed variables under abiotic stress"
PI: Peter Lundquist, co-PIs: Addie Thompson and Erich Grotewold

Intramural Funding

2023 **MTRAC Starter Grant ($39,369)**
"Enhancement of Corn Drought Tolerance Through a Stress-responsive Gene Family"
PI: Peter Lundquist

2022 **MSU AgBioResearch ($147,000)**
"Equipment Grant - NightSHADE LB 985 IKFlu XT in vivo plant imaging system from Berthold"
Proposal Lead: Peter Lundquist

2021 – 2023 **Project GREEEN & Bayer Corp. ($84,900)**
"Discovering the Site of Action of Indaziflam"
PI: Eric Patterson, co-PI: Peter Lundquist

Peer-Reviewed Publications *(* corresponding author; ‡ co-first-author)*

16) Ying, S., Scheible, W.-R., **Lundquist, P.K.*** (2023) A stress-inducible protein regulates drought tolerance and flowering time in Brachypodium and Arabidopsis. *Plant Physiology*. **191**(1) p. 643-659 https://doi.org/10.1093/plphys/kiac486

15) Shivaiah, K.-K., Susanto, F.A., Devadasu, E., **Lundquist, P.K.*** (2022) Plastoglobule lipid droplet isolation from plant leaf tissue and cyanobacteria. *Journal of Visualized Experiments.* 2022. **18** e64515 https://dx.doi.org/10.3791/64515

14) Wang, Q., Sun, L., **Lundquist, P.K.*** (2022). Large-scale top-down proteomics of the Arabidopsis thaliana leaf and chloroplast proteomes. *Proteomics.* 2022. e2100377 https://doi.org/10.1002/pmic.202100377

13) Bibik, J. D., Weraduwage, S.M., Banerjee, A., Robertson, K., Espinoza-Corral, R. Sharkey, T., **Lundquist, P.K.**, Hamberger, B. (2022). Pathway Engineering, Re-targeting, and Synthetic Scaffolding Improve the Production of Squalene in Plants. *ACS Synthetic Biology*. 2022. **11**(6) p. 2121-2133 https://pubs.acs.org/doi/abs/10.1021/acssynbio.2c00051

12) Espinoza-Corral, R.; **Lundquist, P.K.*** (2022) The plastoglobule-localized protein AtABC1K6 is a Mn^{2+}-dependent kinase necessary for timely transition to reproductive growth. *Journal of Biological Chemistry*, 2022. **298**(4) p. 101762 https://doi.org/10.1016/j.jbc.2022.101762 (Web of Science citations: 1)

11) Espinoza-Corral, R.; Herrera-Tequia, A; **Lundquist, P.K.*** (2021) Insights into topology and membrane interaction characteristics of plastoglobule-localized AtFBN1a and AtLOX2. *Plant, Signaling, and Behavior*, 2021. **16**(10), 1945213 https://doi.org/10.1080/15592324.2021.1945213 (Web of Science citations: 1)

10) Espinoza-Corral, R.; Schwenkert, S.; **Lundquist, P.K.*** (2021) Molecular changes of Arabidopsis thaliana plastoglobules facilitate thylakoid membrane remodeling under high light stress. *The Plant Journal*, 2021. **106**(6) p. 1571-1587 https://doi.org/10.1111/tpj.15253 (Web of Science citations: 9)

9) **Lundquist, P.K.***; Shivaiah, K.-K.; Espinoza-Corral, R. (2020) Lipid droplets throughout the evolutionary tree. *Progress in Lipid Research,* **78,** 101029 https://doi.org/10.1016/j.plipres.2020.101029 (Web of Science citations: 27)

8) Boschiero, C.; Dai, X.; **Lundquist, P.K.**; Roy, S.; de Bang, T.; Scheible, W.R.; Zhao, P.X. (2020) MtSSPdb: The *Medicago truncatula* Small Secreted Peptide Database. *Plant Physiology*, 2020. **183**(1) p. 399-413 https://doi.org/10.1104/pp.19.01088 (Web of Science citations: 18)

7) Roy, S; **Lundquist, P.K.‡**; Udvardi, M.K.; Scheible, W.R. (2018) Small & mighty: Peptide hormones in plant biology. *The Plant Cell. Teaching Tools in Plant Biology, TTP38.* https://doi.org/10.1105/tpc.118.tt0718

6) de Bang, T. C.; **Lundquist, P.K.*,‡**; Dai, X.; Boschiero, C.; Zhuang, Z.; Pant, P.; Torres-Jerez, I.; Roy, S.; Nogales, J; Veerappan, V; Dickstein, R.; Udvardi, M.K.; Zhao, P.X.; Scheible, W.R.* (2017) Genome-wide Identification of Medicago Peptides Involved in Macronutrient Responses and Nodulation. *Plant Physiology*, 2017. **175**(4) p. 1669-1689 https://doi.org/10.1104/pp.17.01096 (Web of Science citations: 60)

5) **Lundquist, P.K.***; Mantegazza, O.; Stefanski, A.; Stuehler, K.; Weber, A.P.M.* (2017) Surveying the Oligomeric State of *Arabidopsis thaliana* Chloroplasts. *Molecular Plant*, 2017. **10**(1) p. 197-211 https://doi.org/10.1016/j.molp.2016.10.011 (Web of Science citations: 14)

4) **Lundquist, P.K.**; Rosar, C.; Braütigam, A.; Weber, A.P.M. (2014) Plastid Signals and the Bundle Sheath: Mesophyll Development in Reticulate Mutants. *Molecular Plant*, 2014. **7**(1): p. 14-29

https://doi.org/10.1093/mp/sst133 (Web of Science citations: 41)

3) **Lundquist, P.K.**; Poliakov, A.; Giacomelli, L.; Friso, G.; Appel, M.; McQuinn, R.P.; Krasnoff, S.B.; Rowland, E.; Ponnala, L.; Sun, Q.; van Wijk, K.J. (2013) Loss of Plastoglobule Kinases ABC1K1 and ABC1K3 Causes Conditional Degreening, Modified Prenyl-Lipids and Recruitment of the Jasmonic Acid Pathway. *The Plant Cell*, 2012. **25**(5): p. 1818-1839
https://doi.org/10.1105/tpc.113.111120 (Web of Science citations: 66)

2) **Lundquist, P.K.**, Davis, J.I., van Wijk, K.J. (2012) ABC1K atypical kinases in plants; filling the organellar kinase void. *Trends in Plant Science*, 2012. **17**(9): p. 546-555
https://doi.org/10.1016/j.tplants.2012.05.010 (Web of Science citations: 46)

1) **Lundquist, P.K.**; Poliakov, A.; Bhuiyan N.H.; Zybailov, B.; Sun, Q.; van Wijk, K.J. (2012) The Functional Network of the *Arabidopsis thaliana* Plastoglobule Proteome Based on Quantitative Proteomics and Genome-Wide Coexpression Analysis. *Plant Physiology*, 2012. **158**(3): p. 1172-1192
https://doi.org/10.1104/pp.111.193144 (Web of Science citations: 144; "Highly Cited Paper")

Non-Peer Reviewed Scientific Publications *(* corresponding author)*

4) **Lundquist, P.K.*** (2022) Chromoplast differentiation: a central role for plastoglobule lipid droplets comes into focus. *New Phytologist*, 2023. **237**(5)
https://doi.org/10.1111/nph.18700

3) **Lundquist, P.K.*** (2022) Tracking sub-plastidic localization of carotenoid metabolic enzymes. *Methods in Enzymology - Carotenoid and apocarotenoid biosynthesis, metabolic engineering and synthetic biology*. (book chapter)
https://doi.org/10.1016/bs.mie.2022.01.011

2) **Lundquist, P.K.***; Susanto, F. (2021) Biogenesis of Lipid Droplets. *Encyclopedia of Biological Chemistry 3rd Ed.* (book chapter)
https://doi.org/10.1016/B978-0-12-819460-7.00120-1

1) Boschiero, C.; **Lundquist, P.K.**; Roy, S.; Dai, X.; Zhao, P.X.; Scheible, W.R. (2019) Identification and functional investigation of genome-encoded, small, secreted peptides in plants. *Current Protocols in Plant Biology, 2019. **4**(3) e20098*
https://doi.org/10.1002/cppb.20098

Intellectual Property

Lundquist, P.K., Ying, S., Scheible, W.-R. "Conferring Drought Tolerance and Biomass Accumulation Through the Plant-specific RFS Gene Family", Docket #: 3000.211PRV. Provisional filing date: 12 September 2022.

Professional Societies

Mar 2012 – present	Member	American Society of Plant Biologists (ASPB)
Jan 2013 – present	Member	American Association for the Advancement of Science (AAAS)
Aug 2018 – present	Member	American Society for Biochemistry & Molecular Biology (ASBMB)
Jan 2022 – present	Member	Phytochemical Society of North America

Service and Professional Responsibilities

- Chair of BMB Department Retreat Planning Committee (2022-2023)
- Co-advisor of undergraduate student MSU Biochemistry Club (2022 – current)
- Ad hoc reviewer for National Science Foundation – Directorate of Biological Sciences grant proposal (October 2022)
- Ad hoc reviewer for Department of Energy – Basic Energy Sciences grant proposal (February 2022)

- Faculty Advisory Committee (FAC) committee member (Jan 2022 – current)
- Chair of ASBMB Annual Meeting Spotlight Session – New Insights into Fatty Acid Biology (2020 July 2)
- Faculty search committee, Plant Biology Dept. (2019 – 2020)
- Seminar committee, Biochemistry & Molecular Biology Dept. (2019 – 2021)
- Planning committee for local Fascination of Plants Day event (2019 – current)
- Manuscript Peer-Reviewer for:
  - *Proceedings of the National Academy of Sciences (PNAS)*
  - *The Plant Cell*
  - *Journal of Experimental Botany*
  - *Scientific Reports*
  - *Trends in Plant Science*
  - *Plant Science*
  - *Plant Cell Reports*
  - *Plant, Cell, and Environment*
  - *Planta*
  - *Physiologia Plantarum*
  - *Vegetos*
  - *Progress in Lipid Research*
  - *New Phytologist*

Oral Presentations and Posters at Research Meetings

2022 **Phytochemical Society of North America Annual Meeting** (Blacksburg, VA)
"The Responsive to Flowering and Stress Protein Family - Interplay between lipid metabolism, flowering and drought" (virtual)

2022 **NextPLANT Symposium** – MSU/Uni Duesseldorf (East Lansing, MI)
"Atypical ABC1 Protein Kinases of Plastoglobule Lipid Droplets" (oral)

2022 **ASBMB Annual Meeting Spotlight Session – Atypical Signaling Mechanisms** (Philadelphia, PA)
"The plastoglobule-localized AtABC1K6 is a Mn^{2+}-dependent protein kinase necessary for timely transition to reproductive growth" (oral)

2021 **AgSpectrum Maximum Farming Club Conference** (Palm Coast, FL)
"Promoting Stress Tolerance Through Agricultural Inputs" (oral)

2021 **AgSpectrum National Dealer Seminar** (Palm Coast, FL)
"The Physiology of Crop Stress and Adaptation" (oral)

2020 **ASBMB Annual Meeting Spotlight Session – New Insights into Fatty Acid Biology** (virtual)
"The Dynamic Proteome and Lipidome of Plastoglobule Lipid Droplets of Plant Plastids" (oral)

2019 **Gordon Research Conference – Plant Lipids: Structure, Function and Metabolism (**Galveston, TX**)**
"Plastoglobules: New Horizons in Plastid Lipid Research" (oral)

2017 **Plant Peptides & Receptors Workshop** (Helsingor, Denmark)
"Identification and Screening of SSPs with Nodule-and Nutrient-Responsive Expression in Medicago truncatula" (poster)

2017 **Plant & Animal Genome Conference** (San Diego, CA)
"Re-Annotation of the Medicago truncatula Genome for the Identification of Small Secreted Peptides Involved in Nodulation & Nutrient-Deficiency" (poster)

2016 **Plant Peptides & Receptors Workshop** (Bischoffsheim, France)
"Identification of Small Signaling Peptides with Nodule- & Nutrient-Responsive Expression in Medicago truncatula" (oral presentation & poster)

2015 **CEPLAS Young Researchers Retreat** (Bad Honnef, Germany)
"DEL Proteins of the Chloroplast Envelope Membrane" (oral presentation & poster)

2015 **CEPLAS Symposium** (Köln, Germany)
"A Mass-Western Approach to BN-PAGE-Resolved Chloroplasts" (poster)

2014 **Gordon Research Conference – Mitochondria and Chloroplasts** (Barga, Toscana, Italy)

"Plastid Envelope Remodeling During Plant Development" (poster)

2014 **CEPLAS Symposium** (Düsseldorf, Germany)
"Plastid Envelope Remodeling by DEL1" (poster)

2013 **Botanikertagung – Meeting of the German Botanical Society** (Tübingen, Germany)
"Plastid Envelope Remodeling During Plant Development" (poster)

2012 **American Society of Plant Biologists annual meeting** (Austin, Texas)
"Plastid-localized kinases of the ABC1K family are necessary for light-stress adaptation" (poster)

2011 **Gordon Research Conference and Gordon Research Seminar – Plant Metabolic Engineering** (Waterville Valley, NH) "Functional Analysis of *Arabidopsis thaliana* Plastoglobules in the Light Stress Response" (poster)

2010 **American Society of Plant Biologists annual meeting** (Montreal, Quebec, Canada)
"Plastoglobule-localized ABC1K2 and ABC1K3 are Putative Kinases Necessary for Light Stress Adaptation and Prenyl-lipid Metabolism" (poster)

2010 **Third Pan-American Plant Membrane Biology Workshop** (Puebla, Mexico)
"Thylakoid-associated lipoprotein particles involved in metabolite flux and recycling" (oral presentation)

University-Level Teaching & Mentoring Responsibilities at Michigan State University

- **Courses Taught**
  - **Biochemistry & Molecular Biology 856, Plant Molecular and Omic Biology**
    - Graduate level
      - Spring 2021, 15 students, 2 lectures, 2 hours
      - Fall 2019, 20 students, 1 lecture, 2 hours
  - **Biological Sciences 161, Cells and Molecules**
    - Undergraduate, introductory cell/molecular biology course
      - Spring 2021, 237 students, 12 lectures, 18 hours
      - Spring 2020, 218 students, 6 lectures, 9 hours
  - **Biochemistry & Molecular Biology 960, Selected Topics in Molecular Plant Sciences**
    - Graduate-level journal club style course
      - Spring 2020, 12 students, 12 classes, 12 hours
- **Mentoring, Advising, and Supervision**
  - **Post-Docs**
    - Dr. Kiran-Kumar Shivaiah
      - April 2019 – current
    - Dr. Sheng Ying
      - April 2021 - current
    - Dr. Elsinraju Devadasu
      - May 2021 - current
    - Dr. Roberto Espinoza-Corral
      - April 2019 – August 2021
  - **PhD Students**
    - Major Advisor
      - Qianjie Wang (dual BMB & Chemistry programs)
        - January 2019 - current
        - Co-mentoring with Dr. Liangliang Sun (Chemistry Dept., MSU)
      - Febri Susanto (BMB program)

- January 2020 – current
- PhD committees
  - Diego Granados-Villanueva (BMB program)
    - Committee Member, August 2021 – current
    - Major advisor: Dr. Kelly Kim
  - Brandon Webster (Plant Breeding and Genetics – Plant Biology program)
    - Committee Member, August 2021 - current
    - Major advisor: Dr. Addie Thompson
  - Bianca Serda (BMB program)
    - Committee Member, November 2019 - current
    - Major advisor: Dr. Tom Sharkey
  - Stephanie Rett (Horticulture program)
    - Committee Member, November 2019 - current
    - Major advisor: Dr. Rebecca Grumet
  - Ron Cook (BMB program)
    - Reader, September 2019
    - Major advisor: Dr. Christoph Benning
  - Philip Engelgau
    - Reader, June 2020
    - Major Advisor: Dr. Randolph Beaudry

- **Masters Students**
  - Major Advisor
    - Mohit Mahey (Crop and Soil Science program)
      - August 2021 - current
      - Co-mentoring with Dr. Eric Patterson (Plant, Soil and Microbial Sciences Dept., MSU)
- **Undergraduate Researchers**
  - Earl Givens (May 2022 – July 2022) **Summer REU student**
  - Katarina Jarmoluk (February 2022 – current)
  - Alec Fowler (February 2022 – current)
  - Joel Landa (May 2021 – May 2022) **Summer REU student**
  - Elizabeth Dubuque (January 2021 – May 2022)
  - John Kim (August 2019 – current)
  - Najah Lazim (April 2019 – March 2020)
  - Fadhlin Kuahmadpuzi (April 2019 – August 2019)
  - Amanda Lafay (November 2018 – May 2019)

University-Level Teaching and Mentoring Responsibilities at Previous Institutions

Courses Taught

- **Introductory Biology (BIOG109)**
  - B.Sc. students; 4 classes of 13-14 students each at Cornell University
  - 1 semester course (4 months), taught once (Fall 2007)
  - Taught laboratory classes, including introductory lectures, student supervision and led separate weekly discussion sections
  - Prepared and graded exams and quizzes, prepared and guided discussions with lead-in questions
- **Introductory Biology (BIOG110)**
  - B.Sc. students; 4 classes of 13-14 students each at Cornell University
  - 1 semester course (4 months), taught once (Spring 2008)
  - Taught laboratory classes, including introductory lectures, student supervision and led separate weekly discussion sections

  - Prepared and graded exams and quizzes, prepared and guided discussions with lead-in questions
- **Introductory Plant Biodiversity and Evolution (PLBIO 2410)**
  - B.Sc. students; 2 classes of 17-18 students each at Cornell University
  - 1 semester course (4 months), taught once (Fall 2010)
  - Taught laboratory classes, including introductory lectures and student supervision
  - Prepared and graded exams and quizzes, prepared and guided discussions with lead-in questions and held weekly office hours for one-on-one teaching
- **Laboratory Investigations of Plant Function and Growth (PLBIO2421)**
  - B.Sc. students; 3 classes of 15 students each at Cornell University
  - 1 semester course (4 months), taught once (Spring 2012)
  - Taught laboratory classes, including introductory lectures and student supervision
  - Prepared and graded exams and quizzes and held weekly office hours for one-on-one teaching
- **Molecular physiology and biochemistry of primary carbon metabolism (V430)**
  - B.Sc. students; 3 classes of 15 students each at University of Duesseldorf
  - 2-week intensive course, taught once (Fall 2014)
  - Guided students in their experiments
  - Graded quizzes and student presentations

➢ **<u>Research Supervision</u>**

- **Bachelor's Theses**
  - **Mason Appel**
    - Supervised his research project resulting in his Bachelor's Research Thesis from Cornell University
    - Developed and phenotyped plastoglobule genetic mutants including lipid metabolite profiling
    - Taught relevant concepts and lab techniques
    - 2 years; April 2009 – May 2011
  - **Inga Mohr**
    - Supervised her research project resulting in her Bachelor's Research Thesis from University of Duesseldorf
    - Developed tools for protein-protein interaction analyses via Yeast-2 Hybrid, Bimolecular Fluorescence Complementation, and protein pull-down assays.
    - Taught relevant concepts and lab techniques
    - 6 months; March 2013 – August 2013
  - **Philipp Yuen**
    - Supervised his research project resulting in his Bachelor's Research Thesis from University of Duesseldorf
    - Investigated the membrane topology of an chloroplast envelope integral membrane protein
    - Taught relevant concepts and lab techniques
    - 6 months; March 2014 – August 2014
  - **Nhi Nguyen**
    - Supervised her research project resulting in her Bachelor's Research Thesis from University of Duesseldorf
    - Developed Arabidopsis over-expression lines of tagged chloroplast proteins for protein pull down assays
    - Taught relevant concepts and lab techniques
    - 6 months; March 2015 – August 2015
- **Undergraduate Summer Research Scholars**
  - **Kevin Murphy**
    - Supervised his research project at Cornell University

        - Taught relevant concepts and lab techniques
        - Supported by a National Science Foundation Grant for Undergraduate Research Experience
        - 10 weeks; May 2010 – August 2010
    - **Christina Chiu**
        - Supervised her research project at Noble Research Institute
        - Taught relevant concepts and lab techniques
        - Supported by National Science Foundation funding
        - 10 weeks; May 2016 – August 2016
    - **Sarah Dysinger**
        - Supervised her research project
        - Taught relevant concepts and lab techniques
        - Supported by National Science Foundation funding
        - 10 weeks; June 2017 – August 2017
    - **Kaylynn Ashby**
        - Supervised her summer research project at Noble Research Institute
        - Taught relevant concepts and lab techniques
        - Supported by National Science Foundation funding
        - 6 weeks; May 2018 – July 2018

- **Undergraduate Research Internships**
    - **Zheng Ser**
        - Supervised his research project at Cornell University
        - Taught relevant concepts and lab techniques
        - 15 months; September 2011 – December 2012
    - **Aurelian Fiszl**
        - Supervised his research at University of Duesseldorf
        - Taught relevant concepts and lab techniques
        - 6 weeks; April 2014 – May 2014
- **High School Students**
    - **Cody Burton**
        - Taught relevant concepts and lab techniques
        - Supervised his research project at Noble Research Institute
        - 6 months; February 2018 – July 2018
    - **Sierra Long**
        - Taught relevant concepts and lab techniques
        - Supervised her research project at Noble Research Institute
        - 4 months; February 2017 – May 2017