

CURRICULUM VITAE

David Lipson

EDUCATION

<u>Institution</u>	<u>Year</u>	<u>Degree</u>
University of Colorado, Boulder	1998	Ph.D.
University of California, Berkeley	1993	B.A.

Title of Dissertation: Plant-Microbe Interactions and Organic Nitrogen Availability in an Alpine Dry Meadow

APPOINTMENTS

Director, Field Stations Program (2018-present)
Director, Joint Doctoral Program in Ecology (2010-2011, 2018-2019)
Professor, San Diego State University (2012-present)
Associate Professor, San Diego State University (2007-2012)
Assistant Professor, San Diego State University (2001-2007)
Post-doctoral Research Associate, University of Colorado (1999-2001)

PUBLICATIONS IN PEER-REVIEWED JOURNALS AND BOOKS

(* - SDSU graduate student, † - SDSU undergraduate)

- Oliver*, E.E., Houlton, B.Z., **Lipson, D.A.** (2020) Controls on soil microbial carbon use efficiency over long-term ecosystem development. *Biogeochemistry* (*accepted*)
- Lipson, D.A.**, Raab, T.K. Pérez Castro*, S., Powell†, A. (2020) Organohalide respiring bacteria at the heart of anaerobic metabolism in Arctic wet tundra soils. *Applied and Environmental Microbiology* AEM.01643-20; DOI: 10.1128/AEM.01643-20
- He*, L., Rodrigues, J.L.M., Soudzilovskaia, N.A., Barceló, M., Olsson, P.A., Song, C., Tedersoo, L., Yuan, F., Yuan, F., **Lipson, D.A.** and Xu, X. (2020) Global biogeography of fungal and bacterial biomass carbon in topsoil. *Soil Biology and Biochemistry*, 151, 108024.
- Xu, X., Wang, N., **Lipson, D.**, Sinsabaugh, R., Schimel, J., He*, L., Soudzilovskaia, N.A. and Tedersoo, L. (2020) Microbial macroecology: In search of mechanisms governing microbial biogeographic patterns. *Global Ecology and Biogeography*, 29(11),1870-1886.
- Bond-Lamberty, B., Christianson, D. S., Malhotra, A., Pennington, S. C., Sihi, D., AghaKouchak, A., ... **Lipson, D.**, ... & Ataka, M. (2020). COSORE: A community database for continuous soil respiration and other soil-atmosphere greenhouse gas flux data. *Global change biology*.
- Arndt*, K. A., **Lipson, D.A.**, Hashemi*, J., Oechel, W. C., & Zona, D. (2020). Snow melt stimulates ecosystem respiration in Arctic ecosystems. *Global Change Biology*, 26(9), 5042-5051.
- Zhang, L., Yuan, F., Bai, J., Duan, H., Gu, X., Hou, L., Huang, Y., Yang, M., He, J.-S.,

- Zhang, Z., Yu, L., Song, C., **Lipson, D.A.**, Zona, D., Oechel, W., Janssens, I.A., Xu, X. (2020). Phosphorus alleviation of nitrogen-suppressed methane sink in global grasslands. *Ecology Letters*, 23(5), 821-830.
- Bigelow*, A., Mladenov, N., **Lipson, D.**, & Williams, M. (2020). Dust deposition drives microbial metabolism in a remote, high-elevation catchment. *The Holocene*, 30(4), 589-596.
- Perez-Castro* S, Esch E., Eviner V., Cleland E.E., **Lipson D.A.** (2020) Exotic herbaceous species interact with severe drought to alter soil N cycling in a semi-arid shrubland. *Geoderma* 361:114111
- Wang* Y, Yuan F, Yuan F, Gu B, Hahn MS, Torn MS, Ricciuto DM, Kumar J, He* L, Zona D, **Lipson DA**, et al. (2019) Mechanistic Modeling of Microtopographic Impacts on CO₂ and CH₄ Fluxes in an Alaskan Tundra Ecosystem Using the CLM-Microbe Model. *Journal of Advances in Modeling Earth Systems*. 2019 Dec 12.
- Bigelow A., Mladenov N., **Lipson D.**, Williams M. (2019) Dust deposition drives microbial metabolism in a remote, high-elevation catchment. *The Holocene*, DOI: 10.1177/0959683619875191
- Edwards, R.A., Vega, A.A., Norman, H.M., Ohaeri, M., Levi, K., Dinsdale, E.A., ... **Lipson, D.**, et al. (117 authors) (2019). Global phylogeography and ancient evolution of the widespread human gut virus crAssphage. *Nature microbiology*, 4(10), 1727-1736.
- Esch E., **Lipson D.**, Cleland E. (2019) Invasion and drought alter phenological sensitivity and synergistically lower ecosystem production. *Ecology* e02802
- Perez-Castro*, S., Cleland, E. E., Wagner*, R., Al Sawad, R., & **Lipson, D.A.** (2019). Soil microbial responses to drought and exotic plants shift carbon metabolism. *The ISME journal*, 1. DOI: 10.1038/s41396-019-0389-9
- Puritty, C., Esch, E., Perez-Castro*, S., Ryan, E., **Lipson, D.A.**, Cleland, E.E. (2019). Drought in Southern California coastal sage scrub reduces biomass of herbaceous exotic species more than native species, but exotic growth recovers quickly when drought ends. *Plant Ecology* 220:151–169
- Lipson, D.A.**, Xu, X. (2019). Integrating Soil Microbiology into Ecosystem Science. In: Hurst C (ed), *Advances in Environmental Microbiology*, Vol. 6: Understanding Terrestrial Microbial Communities. Springer, Heidelberg, Germany.
- Miller*, K. E., Lai, C. T., Dahlgren, R. A., **Lipson, D.A.** (2019). Anaerobic Methane Oxidation in High-Arctic Alaskan Peatlands as a Significant Control on Net CH₄ Fluxes. *Soil Systems*, 3(1), 7.
- Wilkman*, E., Zona, D., Tang, Y., Gioli, B., **Lipson, D.A.**, & Oechel, W. (2018) Temperature response of respiration across the heterogeneous landscape of the Alaskan Arctic tundra. *Journal of Geophysical Research: Biogeosciences*.
- Oldani*, K.M., Mladenov, N., Williams, M.W., Campbell, C.M. and **Lipson, D.A.**, 2017. Seasonal Patterns of Dry Deposition at a High-Elevation Site in the Colorado Rocky Mountains. *Journal of Geophysical Research: Atmospheres*, 122(20).
- Wagner* R., Zona D., Oechel W., **Lipson D.** (2017). Microbial Community Structure and Soil pH Correspond to Methane Production in Arctic Alaska Soils. *Environmental Microbiology* 19 (8): 3398–3410
- Zlamal* J. E., Raab T. K., Little* M., Edwards R. A., **Lipson D.A.** (2017). Biological chlorine cycling in the Arctic Coastal Plain. *Biogeochemistry*, 134(3): 243-260

- Esch E.H., **Lipson D.**, Cleland E.E. (2016) Direct and indirect effects of shifting rainfall on soil microbial respiration and enzyme activity in a semi-arid system. *Plant and Soil* DOI 10.1007/s11104-016-3027-6
- Zona D., Gioli B., Commane R., Lindaas J., Wofsy S.C., Miller C.E., Dinardo S.J., Dengel S., Sweeney C., Karion A., Chang R.Y.-W., Henderson J.M., Murphy P.C., Goodrich J.P., Moreaux V., Liljedahl A., Watts J.D., Kimball J.S., **Lipson D.A.**, Oechel W.C. (2016) Cold season emissions dominate the Arctic tundra methane budget. *PNAS* 113 (1) 40-45
- Lipson D.A.** (2015) The complex relationship between microbial growth rate and yield and its implications for ecosystem processes. *Frontiers in Microbiology* 6:615. doi: 10.3389/fmicb.2015.00615
- Lipson D.A.**, T. K. Raab, M. Parker†, S. T. Kelley, C. J. Brislawn, J. Jansson (2015) Changes in microbial communities along redox gradients in polygonized Arctic wet tundra soils. *Environmental Microbiology Reports* 7(4): 649-657.
- Miller* K.E., Lai C-T., Friedman E.S., Angenent L.T., **Lipson D.A.** (2015) Methane Suppression by Iron and Humic Acids in Soils of the Arctic Coastal Plain. *Soil Biology and Biochemistry* 83: 176–183
- Lipson D.A.**, Kelley S.T. (2014) Plant-Microbe Interactions, *In*: R. Monson (ed.) *Ecology and the Environment, The Plant Sciences*, Vol. 8, DOI 10.1007/978-1-4614-7612-2_10-1, Springer, New York.
- Zona D., **D.A. Lipson**, J. H. Richards, G. K. Phoenix, A. K. Liljedahl, M. Ueyama, C. S. Sturtevant, and W. C. Oechel (2014) Delayed responses of an Arctic ecosystem to an extremely dry summer: impacts on net ecosystem exchange and vegetation functioning. *Biogeosciences* 11:5877-5888
- Mauritz* M., Cleland E., Merkley† M., **Lipson D.A.** (2014) The influence of altered rainfall regimes on early season N partitioning among early phenology annual plants, a late phenology shrub, and microbes in a semi-arid ecosystem. *Ecosystems*, DOI 10.1007/s10021-014-9800-6
- Lipson D.A.**, Kuske C.R., Gallegos-Graves L, Oechel W.C. (2014) Elevated atmospheric CO₂ stimulates soil fungal diversity through increased fine root production in a semiarid shrubland ecosystem. *Global Change Biology* 20:2555–2565, DOI 10.1111/gcb.12609
- Mauritz* M., **Lipson D.A.** (2013) Altered phenology and temperature sensitivity of invasive annual grasses and forbs changes autotrophic and heterotrophic respiration rates in a semi-arid shrub community. *Biogeosciences Discuss.*, 10:6335-6375
- Friedman E.S., Miller* K.E., **Lipson D.A.** Angenent L.T. (2013) Potentiostatically poised electrodes mimic iron oxide and interact with soil microbial communities to alter the biogeochemistry of Arctic peat soils. *Minerals* 3:318-336
- Bozzolo* F.H., **Lipson D.A.** (2013) Differential responses of native and exotic coastal sage scrub plant species to N additions and the soil microbial community. *Plant and Soil* DOI 10.1007/s11104-013-1668-2
- Lipson D.A.**, Haggerty* J.M., Srinivas* A., Raab T.K., Sathe* S., Dinsdale E.A. (2013) Metagenomic insights into anaerobic metabolism along an Arctic peat soil profile. *PLOS ONE* 8(5): e64659. doi:10.1371/journal.pone.0064659

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- Zona D., **Lipson D.A.**, Paw U K.T., Oberbauer S.F., Olivas P., Gioli B., Oechel W.C. (2012) Increased CO₂ loss from vegetated drained lake tundra ecosystems due to flooding. *Global Biogeochemical Cycles* 26, GB2004, doi:10.1029/2011GB004037
- Friedman E. S., Rosenbaum M. A., Lee A. W., **Lipson D. A.**, Land B. R. and Angenent L. T. (2012). A cost-effective and field-ready potentiostat that poises subsurface electrodes to monitor bacterial respiration. *Biosensors and Bioelectronics*, Vol. 32:309– 313
- Lipson D.A.**, Zona D., Raab T.K., Bozzolo* F., Mauritz* M., Oechel W.C. (2012) Water-table height and microtopography control biogeochemical cycling in an Arctic coastal tundra ecosystem. *Biogeosciences* 9:1-15.
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- Benson* C., Bizzoco R., **Lipson D.**, Kelley S (2011) Microbial Diversity in Non-sulfur, Sulfur and Iron Geothermal Steam Vents. *FEMS Microbiology Ecology*. 76:74–88
- Allen* B., Willner* D., Oechel W.C., **Lipson D.A.** (2010) Topdown control of microbial activity and biomass in an Arctic soil ecosystem. *Environmental Microbiology* 12: 642 - 648
- Lipson, D.A.**, Jha*, M., Raab, T.K., and Oechel, W.C. (2010) Reduction of iron (III) and humic substances plays a major role in anaerobic respiration in an Arctic peat soil. *J Geophys Res-Biogeosci (G)* 115, G00I06, doi:10.1029/2009JG001147
- Raab, T.K., **Lipson, D.A.** (2010) The Rhizosphere: A Synchrotron-Based View of Nutrient Flow in the Root Zone. *In: M. Grafe, B. Singh (eds), Advances in understanding soil environments by application of synchrotron-based techniques*, 1st Edition (Developments in Soil Science, Volume 34). Elsevier, The Netherlands
- Rodriguez-Brito* B, Li L., Wegley* L., Furlan* M., Angly* F., Breitbart* M., Buchanan J., Desnues C., Dinsdale E., Edwards R., Felts B., Haynes M., Liu* H., **Lipson D.**, Mahaffy J., Martin-Cuadrado A.B., Mira A., Nulton J., Pasic L., Rayhawk S., Rodriguez-Mueller J., Rodriguez-Valera F., Salamon P., Srinagesh S., Thingstad T.F., Tran T., Thurber R.V., Willner* D., Youle M., Rohwer F. (2010) Viral and microbial community dynamics in four aquatic environments. *ISME Journal* 2010:1-13
- Wolkovich E.M., **Lipson D.A.**, Virginia R.A., Cottingham K.L., Bolger D.T. (2010) Grass invasion causes rapid increase in ecosystem carbon and nitrogen storage in a semiarid shrubland. *Global Change Biology* 16: 1351-1365.
- Zona D., Oechel W.C., Kochendorfer J., Paw U K.T., Salyuk A.N., Olivas P.C., Oberbauer S.F., **Lipson D.A.** (2009) Methane fluxes during the initiation of a large-scale water table manipulation experiment in the Alaskan Arctic tundra. *Global Biogeochemical Cycles* 23, GB2013, doi:10.1029/2009GB003487.
- Lipson D.A.**, Monson R.K., Schmidt S.K., Weintraub M.N. (2009) The trade-off between growth rate and yield in microbial communities and the consequences for under-snow soil respiration in a high elevation coniferous forest. *Biogeochemistry* 95:23-35, DOI: 10.1007/s10533-008-9252-1.

- Schmidt S.K., Wilson K.L., Monson R.K., **Lipson D.A.** (2009) Exponential growth of “snow molds” at sub-zero temperatures: an explanation for high beneath-snow respiration rates and Q10 values. *Biogeochemistry* 95:13-21, DOI: 10.1007/s10533-008-9247-y.
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- Lipson D.A.** (2007) Relationships between Temperature Responses and Bacterial Community Structure along Seasonal and Altitudinal Gradients. *FEMS Microbiology Ecology* 59:418-427.
- Lipson D.A.** (2007) Introduction and Overview: Soil, Rhizosphere and Phyllosphere. In: *Manual of Environmental Microbiology, 3rd Edition*, C. Hurst, editor.
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- Monson R.K., **Lipson D.A.**, Burns S.P., Turnipseed A.A., Delany A., Williams M.W., Schmidt S.K. (2006) High sensitivity to climate in the early-spring carbon cycle of a forest ecosystem. *Nature* 439:711-714.
- Monson R.K., Rosenstiel T.N., Forbis T.A., **Lipson D.A.**, Jaeger C.H. III (2006) Nitrogen and carbon storage in alpine plants. *Integrative and Comparative Biology* 46:35-48
- Lipson D.A.**, Blair† M., Grieve K., Barron-Gafford G., Murthy R. (2006) Relationships between microbial community structure and soil processes under elevated atmospheric carbon dioxide. *Microbial Ecology* 51:302-314.
- Lipson D.A.**, Wilson* R.A., Oechel W.C. (2005) Effects of elevated atmospheric CO₂ on soil microbial biomass, activity and diversity in a chaparral ecosystem. *Applied and Environmental Microbiology* 71:8573-8580.
- Barron-Gafford G., Martens D., Grieve K., McLain J.E., **Lipson D.**, Murthy R. (2005) Growth of Eastern Cottonwoods (*Populus deltoides*) in elevated CO₂ stimulates stand-level respiration and rhizodeposition of carbohydrates, accelerates soil nutrient depletion, yet stimulates above and belowground biomass production. *Global Change Biology* 11:1220-1233
- Lipson, D.A.**, and Schmidt, S.K. (2004) Seasonal changes in an alpine soil bacterial community in the Colorado Rocky Mountains. *Applied and Environmental Microbiology* 70: 2867-2879
- Meyer, A.F., **Lipson, D.A.**, Martin, A.P., Schadt, C.W., and Schmidt, S.K. (2004) Molecular and metabolic characterization of cold tolerant, alpine soil *Pseudomonas*, *sensu stricto*. *Applied and Environmental Microbiology* 70:483-489
- Schmidt, S.K. and **Lipson, D.A.** (2004) Microbial growth under the snow: Implications for nutrient and allelochemical availability in temperate soils *Plant and Soil* 259:1-7.
- Schmidt, S.K., **Lipson, D.A.**, Ley, R.E., Fisk, M.C. and West, A.E. (2004) Impacts of chronic nitrogen additions vary seasonally and by microbial functional group in tundra soils. *Biogeochemistry* 69:1-17.
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- Lipson, D.A.**, and Schmidt, S.K. (2002) Kinetics of Microbial Processes and Population Growth in Soil. *In: (Gabriel Bitton, Ed.) The Encyclopedia of Environmental Microbiology*, Wiley and Sons, NY and *In: (Gabriel Bitton, Ed.) The Encyclopedia of Agrochemicals*, Wiley and Sons, NY
- Ley, R.E., **Lipson, D.A.**, Schmidt, S.K. (2001) Microbial biomass levels in barren and vegetated high altitude talus soils. *Soil Science Society of America Journal* 65:111-117
- Lipson, D.A.** and Näsholm, T. (2001) The unexpected versatility of plants: organic N use and availability in terrestrial ecosystems. *Oecologia* 128:305-316
- Lipson, D.A.**, Raab, T.K., Schmidt, S.K., and Monson, R.K. (2001) An empirical model of amino acid transformations in an alpine soil. *Soil Biology and Biochemistry* 33:189-198
- Lipson, D.A.**, Schmidt, S.K. and Monson, R.K. (2000) Carbon availability and temperature control the post-snowmelt decline of microbial biomass in an alpine soil. *Soil Biology and Biochemistry* 32(4):441-448
- Schmidt, S.K., **Lipson, D.A.** and Raab, T.K. (2000) The effect of willows (*Salix brachycarpa*) on populations of salicylate-mineralizing microorganisms in alpine soils. *Journal of Chemical Ecology* 26:2049-2057
- Lipson, D.A.**, Raab, T.K., Schmidt, S.K. and Monson, R.K. (1999) Variation in competitive abilities of plants and microbes for specific amino acids. *Biology and Fertility of Soils* 29:257-261.
- Lipson, D.A.**, Schmidt, S.K. and Monson, R.K. (1999) Links between microbial population dynamics and N availability in an alpine ecosystem. *Ecology* 80:1623-1631
- Lipson, D.A.**, Schadt, C.W., Schmidt, S.K. and Monson, R.K. (1999) Ectomycorrhizal transfer of amino acid N to the alpine sedge, *Kobresia myosuroides*. *New Phytologist* 142:163-167
- Raab, T.K., **Lipson, D.A.** and Monson, R.K. (1999) Soil amino acid utilization among species of the Cyperaceae: plant and soil processes, *Ecology* 80:2408-2419
- Lipson, D.A.** and Monson, R.K. (1998) Plant-microbe competition for soil amino acids in the alpine tundra: effects of freeze-thaw and dry-rewet events. *Oecologia* 113:406-414
- Lipson, D.A.**, Bowman, W.D. and Monson, R.K. (1996) Luxury uptake and storage of N in the rhizomatous alpine herb, *Bistorta bistortoides*. *Ecology* 77:1277-1285
- Lipson, D.A.**, Raab, T.K. and Monson, R.K. (1996) δ -Acetylmethionine as a major nitrogen storage compound in *Bistorta bistortoides*. *Phytochemistry* 41:29-30
- Raab, T.K., **Lipson, D.A.** and Monson, R.K. (1996) Non-mycorrhizal uptake of amino acids by roots of the alpine sedge *Kobresia myosuroides*: implications for the alpine nitrogen cycle. *Oecologia* 108:488-494

PATENTS

Menon S.M., Orchard S., Badger J., **Lipson D.**, Guidi S., Newman D., Sircar J.C., Alisala K. (2013) Pharmaceutical products from fungal strains Patent# US 20130149333 A1

Menon S.M., Orchard S.S., Badger J., **Lipson D.**, Guidi S., Newman D. (2012) Bioreactors Comprising Fungal Strains, Patent # 20120034344

Other Selected Professional Activities:

1. Volume Editor for Manual of Environmental Microbiology, 3rd edition.
2. Collaborated with artists on art-science pieces (Soil Blind and Microbial Knot) exhibited at Oceanside Museum of Art as part of Urban Succession exhibit (2013)
3. Musical Greenhouse (constructed working greenhouse with integrated musical components for JCS Middle School, 2015-2016)
4. Embers of Life: The Art and Science of Finnish Snow Microbiology (Art-Science collaboration exhibited at San Diego arts organizations, Art Produce and Ship in the Woods, 2017-2018)
5. Voices of the Sea Ice: Engaging an Arctic Community to Communicate Impacts of Climate Change (Abstract accepted to EGU General Assembly 2020, session ITS5.9/EOS4.14, Trans-disciplinary aspects of researching Arctic change: science communication, outreach and education, integration, monitoring, modeling and risk perception)

External Grants (current and past)

- NSF ANS, Methane at the zero curtain, co-PI, 4/1/2017-3/31/2021, \$350,005
- NSF ANS, EAGER: Linking the Chlorine and Carbon Cycles in the Arctic Coastal Plain, PI (4/1/2017-3/31/2021), \$211,359.
- CSU COAST, Using El Nino to examine the impact of extreme climate on salt marshes, co-PI, 2/2016-10/2016, \$7,500.
- NSF DEB, Collaborative Research: The influence of plant functional traits on ecosystem responses to altered rainfall, PI, 3/2012-2/2017, \$465,856.
- NSF, Methane loss from Arctic: towards an annual budget of CH₄ emissions from tundra ecosystems across a latitudinal gradient, co-PI, 12/2012-12/2015, \$995,619.
- NSF ANS, Reduction of iron and humic substances as a dominant respiratory process in arctic peat soils, PI, 9/2008-12/2012, \$586,013.
- US Navy (STTR with Menon & Associates), Multiplexed Aerobic Fermentation of Broad-Spectrum Feedstocks for Biofuel Production, 7/2009-2/2010, \$16,406.
- NSF EAR (BE: Coupled Biogeochemical Cycles), Biocomplexity Associated With the Response of Tundra Carbon Balance to Warming and Drying Across Multiple Spatial and Temporal Scales, Co-I, 9/01/04-8/31/08. Total award: \$2,000,000. Allocation to Lipson: ~\$90,000.
- NSF DIBN (Evolutionary and Ecological Physiology), Soil Respiration and Microbial Diversity in a Subalpine Forest, Co-PI, 8/15/02-8/14/05. Total amount: \$481,333, subcontract to Lipson: \$144,033.
- Columbia University, Effects of elevated CO₂ on microbial diversity at Biosphere 2, PI 7/1/02-6/30/04, \$21,900.

Other Awards/Honors

Fulbright Specialist Program, Environmental Science, University of Jyväskylä, Finland (April-May 2016)

Outstanding Faculty Award, Department of Biology (2016-2017)