

Jonathan Z. Shik  
Associate Professor, Associate Professor  
Ecology and Evolution

Ecology and Evolution

**Postal address:**

Universitetsparken 15, 2100 København Ø

**Postal address:**

Universitetsparken 15

2100

København Ø

**Email:** Jonathan.Shik@bio.ku.dk

**Phone:** +4535331883

**Web address:** <http://www.jonathanshik.com>, <http://www.jonathanshik.com>,  
<https://www1.bio.ku.dk/english/research/ecology-evolution/>



## Short presentation

I am a community ecologist leading a research group that explores how physiological traits govern performance and species co-existence across environmental gradients in a changing climate. I have a special fondness for ants from danish grasslands to panamanian rainforests. Visit my website ([www.jonathanshik.com](http://www.jonathanshik.com)) for more information about my work and to find opportunities to join my team!

## Employment

### Associate Professor

Ecology and Evolution

København Ø, Denmark

14 Apr 2016 → nu

## Research outputs

### Ecological strategies of (pl)ants: Towards a world-wide worker economic spectrum for ants

Gibb, H., Bishop, T. R., Leahy, L., Parr, C. L., Lessard, J., Sanders, N. J., Shik, Jonathan Z., Ibarra-Isassi, J., Narendra, A., Dunn, R. R. & Wright, I. J., 2023, In: *Functional Ecology*. 37, 1, 13 p.

### Evidence that the domesticated fungus *Leucoagaricus gongylophorus* recycles its cytoplasmic contents as nutritional rewards to feed its leafcutter ant farmers

A. Leal-Dutra, Caio, Yuen, L. M., Guedes, B. A. M., Contreras Serrano, Marta, Marques, P. E. & Shik, Jonathan Z., 2023, In: *IMA Fungus*. 14, 1, 13 p., 19.

### Reciprocal nutritional provisioning between leafcutter ants and their fungal cultivar mediates performance of symbiotic farming systems

Bolander, M., Andersen, J. E., Conlon, B. H., Arnan, X., Michelsen, Anders & Shik, Jonathan Z., 2023, In: *Functional Ecology*. 37, 12, p. 3079-3090 12 p.

### A fungal symbiont converts provisioned cellulose into edible yield for its leafcutter ant farmers

Conlon, B. H., O'Tuama, D., Michelsen, Anders, Crumière, A. J. J. & Shik, Jonathan Z., 2022, In: *Biology Letters*. 18, 4, 6 p., 20220022.

### Male ant reproductive investment in a seasonal wet tropical forest: Consequences of future climate change

Donoso, D. A., Basset, Y., Shik, Jonathan Z., Forrister, D. L., Uquillas, A., Salazar-Méndez, Y., Arizala, S., Polanco, P., Beckett, S., Diego Dominguez, G. & Barrios, H., 2022, In: *PLoS ONE*. 17, 3, 13 p., e0266222.

### Nutritional challenges of feeding a mutualist: Testing for a nutrient-toxin tradeoff in fungus-farming leafcutter ants

Crumière, A. J. J., Mallett, S., Michelsen, Anders, Rinnan, Riikka & Shik, Jonathan Z., 2022, In: *Ecology*. 103, 6, 12 p., e3684.

### **Orthogonal protocols for DNA extraction from filamentous fungi**

Conlon, B. H., Schmidt, Suzanne, Poulsen, Michael & Shik, Jonathan Z., 2022, In: STAR Protocols. 3, 1, 10 p., 101126.

### **Nutritional niches reveal fundamental domestication trade-offs in fungus-farming ants**

Shik, Jonathan Z., Kooij, P. W., Donoso, D. A., Santos, J. C., Gomez, E. B., Franco, M., Crumière, A. J. J., Arnan, X., Howe, Jack, Wcislo, W. T. & Boomsma, Jacobus J., 2021, In: Nature Ecology & Evolution. 5, 1, p. 122-134

### **The multidimensional nutritional niche of fungus-cultivar provisioning in free-ranging colonies of a neotropical leafcutter ant**

Crumière, A. J. J., James, A., Lannes, P., Mallett, S., Michelsen, Anders, Rinnan, Riikka & Shik, Jonathan Z., 2021, In: Ecology Letters. 24, 11, p. 2439-2451 13 p.

### **24 Messages on a Sustainable Career in Research at UCPH**

Larsen, K. R. (ed.), Wegener, H. C., Stein, A., Bach, A., Williams, A. R., Gall, C., Gravert, C., Gloriam, D. E., Lorenzen, E., Yvanez, E., Cappellini, E., Poulsen, F., Mortensen, J., Bentzen, J. S., Shik, J. Z., Miskowiak, K. W., Elgaard, K. K. E., Jønsson, K. A., Won, K. J., Nørgaard, L. C. & 9 others, Cantarero Arevalo, Lourdes, Kristiansen, Maria, Lund, Marianne N., Borregaard, Michael Krabbe, Høyland-Kroghsbo, Nina Molin, Iversen, Rune, Viskum, U., Nosch, Marie Louise Bech & Hjorth, Jens, 2020, University of Copenhagen. 31 p.

### **Nutritional Dimensions of Invasive Success**

Shik, Jonathan Z. & Dussutour, A., 2020, In: Trends in Ecology and Evolution. 35, 8, p. 691-703 13 p.

### **The evolution of multicellular complexity: the role of relatedness and environmental constraints**

Fisher, Roberta May, Shik, Jonathan Z. & Boomsma, Jacobus J., 2020, In: Proceedings of the Royal Society B: Biological Sciences. 287, 1931, 8 p., 20192963.

### **Using Nutritional Geometry to Explore How Social Insects Navigate Nutritional Landscapes**

Crumiere, A. J. J., Stephenson, C. J., Nagel, M. & Shik, Jonathan Z., 2020, In: Insects. 11, 1, 14 p., 53.

### **Can interaction specificity in the fungus-farming termite symbiosis be explained by nutritional requirements of the fungal crop?**

da Costa, R. R., Vreeburg, S. M. E., Shik, Jonathan Z., Aanen, D. K. & Poulsen, Michael, 2019, In: Fungal Ecology. 38, p. 54-61

### **Evidence for locally adaptive metabolic rates among ant populations along an elevational gradient**

Shik, Jonathan Z., Arnan, X., Oms, C. S., Cerdá, X. & Boulay, R., 2019, In: Journal of Animal Ecology. 88, 8, p. 1240-1249 10 p.

### **Using nutritional geometry to define the fundamental macronutrient niche of the widespread invasive ant *Monomorium pharaonis***

Krabbe, B. A., Arnan, X., Lannes, P., Bergstedt, C. E., Larsen, Rasmus Stenbak, Pedersen, Jes Sørensen & Shik, Jonathan Z., 2019, In: PLoS ONE. 14, 6, 17 p., e0218764.

### **The farming ant *Sericomyrmex amabilis* nutritionally manages its fungal symbiont and social parasite**

Shik, Jonathan Z., Consilio, A., Kaae, T. & Adams, R. M. M., Aug 2018, In: Ecological Entomology. 43, 4, p. 440-446

### **Context is everything: mapping *Cyphomyrmex*-derived compounds to the fungus-growing ant phylogeny**

Hamilton, N., Jones, T. H., Shik, Jonathan Z., Wall, B., Schultz, T. R., Blair, H. A. & Adams, R. M. M., 2018, In: Chemoecology. 28, 4-5, p. 137-144

### **Cryptic Diversity in Colombian Edible Leaf-Cutting Ants (Hymenoptera: Formicidae)**

Kooij, P. W., Dentinger, B. M., Donoso, D. A., Shik, Jonathan Z. & Gaya, E., 2018, In: Insects. 9, 4, p. 1-12 191.

### **Disentangling nutritional pathways linking leafcutter ants and their co-evolved fungal symbionts using stable isotopes**

Shik, Jonathan Z., Rytter, W., Arnan, X. & Michelsen, Anders, 2018, In: Ecology. 99, 9, p. 1999-2009

**Reconstructing the functions of endosymbiotic Mollicutes in fungus-growing ants**

Sapountzis, P., Zhukova, M., Shik, Jonathan Z., Schiøtt, M. & Boomsma, Jacobus J., 2018, In: eLife. 7, p. 1-31 e39209.

**Extreme polygyny in the previously unstudied subtropical ant *Temnothorax tuscaloosae* with implications for the biogeographic study of the evolution of polygyny**

Guénard, B., Shik, Jonathan Z., Booher, D., Lubertazzi, D. & Alpert, G., 2016, In: Insectes Sociaux. 63, 4, p. 543-551 9 p.

**Liquid foraging behaviour in leafcutting ants: the lunchbox hypothesis**

Rytter, W. & Shik, Jonathan Z., 2016, In: Animal Behaviour. 117, p. 179-186 8 p.

**Nutrition mediates the expression of cultivar-farmer conflict in a fungus-growing ant**

Shik, Jonathan Z., Gomez, E. B., Kooij, P. W., Santos, J. C., Wcislo, W. T. & Boomsma, Jacobus J., 2016, In: National Academy of Sciences. Proceedings. 113, 36, p. 10121-10126 6 p.

**Aphid honeydew provides a nutritionally balanced resource for incipient Argentine ant mutualists**

Shik, Jonathan Z., Kay, A. D. & Silverman, J., 2014, In: Animal Behaviour. 95, p. 33-39 7 p.

**Diet specialization in an extreme omnivore: nutritional regulation in glucose-averse German cockroaches**

Shik, Jonathan Z., Schal, C. & Silverman, J., 2014, In: Journal of Evolutionary Biology. 27, 10, p. 2096-2105 10 p.

**Metabolism and the rise of fungus cultivation by ants**

Shik, Jonathan Z., Santos, J. C., Seal, J. N., Kay, A., Mueller, U. G. & Kaspari, M., 2014, In: American Naturalist. 184, 3, p. 364-373 10 p.

**Prey handling performance facilitates competitive dominance of an invasive over a native keystone ant**

Bednar, D., Shik, Jonathan Z. & Silverman, J., 2013, In: Behavioral Ecology. 24, 6, p. 1312-1319

**The life history continuum hypothesis links traits of male ants with life outside the nest.**

Shik, Jonathan Z., Donoso, D. A. & Kaspari, M., 2013, In: Entomologia Experimentalis et Applicata. 149, 2, p. 99-109

**Towards a nutritional ecology of invasive establishment: aphid mutualists provide better fuel for incipient Argentine ant colonies than insect prey**

Shik, Jonathan Z. & Silverman, J., 2013, In: Biological Invasions. 15, 4, p. 829-836

**A life history continuum in the males of a Neotropical ant assemblage: refuting the sperm vessel hypothesis**

Shik, Jonathan Z., Flatt, D., Kay, A. & Kaspari, M., 2012, In: Naturwissenschaften. 99, 3, p. 191-197

**Diet composition does not affect ant colony tempo.**

Kay, A. D., Shik, Jonathan Z., Van Alst, A., Miller, K. A. & Kaspari, M., 2012, In: Functional Ecology. 26, 2, p. 317-323

**Effect of scattered and discrete hydramethylnon bait placement on the Asian needle ant**

Rice, E. S., Shik, Jonathan Z. & Silverman, J., 2012, In: Journal of Economic Entomology. 105, 5, p. 1751-1757

**Toward a general life history model of the superorganism: predicting the survival, growth, and reproduction of ant societies**

Shik, Jonathan Z., Hou, C., Kay, A., Kaspari, M. & Gillooly, J. F., 2012, In: Biology Letters. 8, 6, p. 1059-1062

**Preliminary assessment of metabolic costs of the nematode *Myrmeconema neotropicum* on its host, the tropical ant *Cephalotes atratus***

Shik, Jonathan Z., Kaspari, M. & Yanoviak, S. P., 2011, In: Journal of Parasitology. 97, 5, p. 958-959

**More food, less habitat: how necromass and leaf litter decomposition combine to regulate a litter ant community**  
Shik, Jonathan Z. & Kaspari, M., 2010, In: Ecological Entomology. 35, 2, p. 158-165

**Scaling community structure: how bacteria, fungi, and ant taxocenes differentiate along a tropical forest floor**  
Kaspari, M., Stevenson, B. S., Shik, Jonathan Z. & Kerekes, J. F., 2010, In: Ecology. 91, 8, p. 2221-2226

**The metabolic costs of building ant colonies from variably sized subunits**  
Shik, Jonathan Z., 2010, In: Behavioral Ecology and Sociobiology. 64, 12, p. 1981-1990

**Lifespan in male ants linked to mating syndrome**  
Shik, Jonathan Z. & Kaspari, M., 2009, In: Insectes Sociaux. 56, 2, p. 131-134

**Ant colony size and the scaling of reproductive effort**  
Shik, Jonathan Z., 2008, In: Functional Ecology. 22, 4, p. 674-681

**The Effect of Human Activity on Ant Species (Hymenoptera: Formicidae) Richness at the Mont St. Hilaire Biosphere Reserve, Quebec**  
Shik, Jonathan Z., Francoeur, A. & Buddle, C. M., 2005, In: The Canadian Field-Naturalist. 119, 1, p. 38-42