



Newsletter December 2015

Welcome to the 8th edition of the PopGen ALUMNI newsletter!

Recent events

We're now on Twitter! @PopGenViennaPhD

August 2015: alumni career news

Congratulations to our former graduate student **Claudia Bank** who accepted a group leader position starting in January 2016 (following her Postdoc stay at the EFPL in Lausanne) at the Gulbenkian Institute in Portugal. The Bank lab website is already online: <http://evoldynamics.org/>

September 2015: New students and Introductory Course

Our four new PhD students attended this year's introductory course alongside with several external students. Manolis Lirakis and Eirini Christodoulaki are from Greece and will work with Christian Schlötterer along with Anna Langmüller from Upper Austria. Martin Pontz is a mathematician from Bavaria and will start his project with Reinhard Bürger once he's completed his master's.

October 2015: PhD retreat

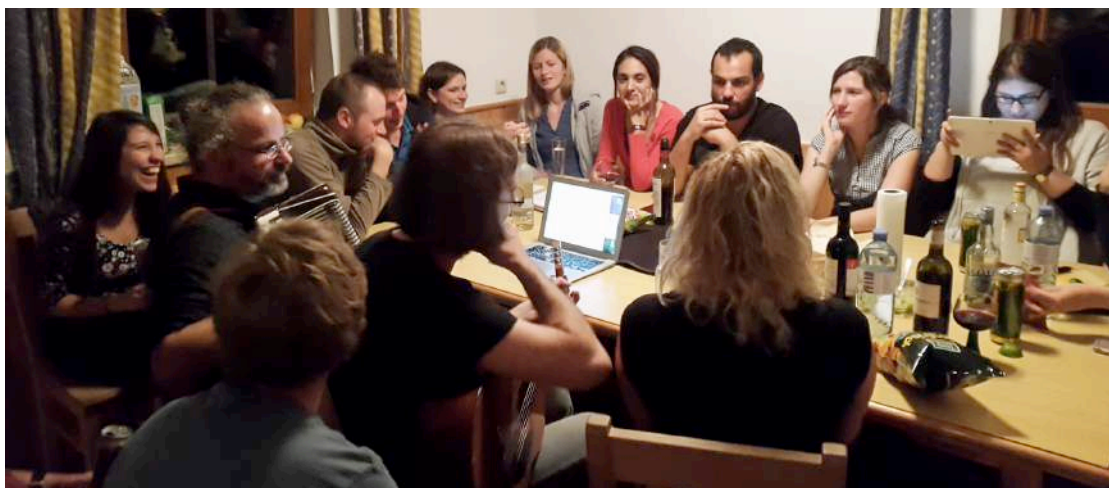
This year we went back to the hut village of good old Feuerkogel after two years at Altaussee. At 1592 m, high above Lake Traun, 31 new and senior PhD students, postdocs, faculty and associated guests of PopGen Vienna enjoyed a weekend with seminars and discussions. The weather was mild and sunny, and we enjoyed hiking, climbing and social dinner cooking inbetween the seminar programme.



Admiring all the food that had to be shopped for...



... the social cooking effort.



Jam session in the hut.



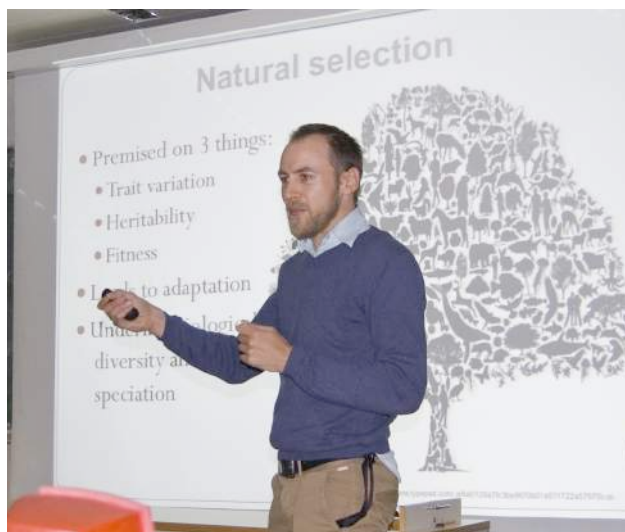
Lovely weather at the 2015 retreat.

October 2015: Mini-Symposium

To celebrate the 250th anniversary of the Vetmeduni Vienna, we organised a Mini-Symposium on behalf of the Department: *Animal Genetics: The Step Ahead*. **Michel Georges** (GIGA-R & Faculty of Veterinary Medicine, Unit of Animal Genomics, Univ. of Liege) gave a very interesting talk about "NGS-based reverse genetic screen for embryonic lethal mutations compromising fertility in livestock". The second speaker, Leif Andersson (Dept. of Medical Biochemistry and Microbiology, Uppsala University) unfortunately had to cancel his visit.

November 2015: PhD defense

Ray Tobler successfully defended his thesis "*Adaptation to Thermal Stress in Experimental Drosophila Populations*" on November 4. Congratulations, Ray, and all the best for your Postdoc position Down Under!



Ray Tobler, PhD!

December 2015: Xmas Party

On December 4th we fearlessly hit the ice and then went to Bieramt for some Christmas Bock beer and US/Austrian cross over food with Schweinsbraten, ribs, burgers, Kasnockerl & co. It turned out that our PhD student Daniel Gomez-Sanchez not only has a knack for code and game heroes but also for magic card tricks! It was a great night out!





Alumni lab portraits

We feature a brief report about one of PopGen's graduate and faculty alumni in every Newsletter. This time, alumna **Johanna Bertl** gives us some insight into her postdoc research in **Aarhus, Denmark** (Group of Jakob Skou Pedersen):

"It was really a big surprise to myself that I moved to Aarhus for a post-doc position in cancer research. I had never been in Denmark, until I was invited to the job interview, and I had never thought of cancer research either. But it turned out that cancer has a lot to do with evolution, and of course statistics (as everything else in the world), and when I came to Aarhus for the first time, even the notorious Danish weather was good, so I was convinced quickly.

Now, I have been living here for a bit more than a year and I really like it. I am working in the bioinformatics group in the Molecular Cancer Research Department at the University Hospital in Aarhus, but we are also collaborating with the population geneticists at the bioinformatics research center (some of you might remember Asger Hobolth from a visit in Vienna).

I am working on a project where we try to distinguish the "driver" mutations from the "passenger" mutations in cancer genomes. The drivers are the ones that drive cancer development, e. g. by increasing the rate of cell division. But cancer cells usually have a very high mutation rate, so it is not so easy to find them among all the other mutations. In population genetic terms: We are looking for the loci that are under positive selection in tumors. Currently, I am working on a large multinomial logistic regression model that models the neutral mutation rate in cancer genomes to identify the drivers by contrasting them to the neutral null model.

I also enjoy living in Denmark. It took me a little while to get over the fact that the highest elevation in Denmark is not even a mountain, but the pylons of the longest bridge -- but soon I realized that I should rather enjoy living at the sea

(my house is 5 minutes from the harbour and 10 minutes from a sandy beach) instead of missing the Alps. So I joined a sea rowing club, and in the summer, I went on a bike tour along the west coast of Jutland, along the longest sand beach you imagine, north until the magic spot where the Baltic Sea and the North Sea meet..."



Johanna Bertl at the University campus in Aarhus...



...and wearing the geeky T-Shirt of the "useR" conference

Out of sight, out of mind?

Experiences of our students abroad

Many of our students choose to spend 3 months in foreign labs during their study time.

Derek Setter (advisors Joachim Hermisson, Reinhard Bürger and Andrea Betancourt) was hosted in Jeff Jensen's lab (Lausanne) at the end of 2014:

"Last fall, the DK afforded me the opportunity to spend three months living in Lausanne, Switzerland and begin a collaborative project with Jeff Jensen. And I mean afforded – a pizza sans beer for 25 Euros. Seriously! Luckily, Greg and Jayne Ewing, everyone's favorite Kiwi couple, adopted me for a reasonable monthly fee.

Jeff's lab was the clear choice for a stay abroad. In addition to being Jeff's shorter and scrawnier doppelgänger, it's nearly mandatory that Joachim's group members spend a stint in Jeff's lab – Greg Ewing, Claudia Bank, and Sebastian Matuszewski have all done it.

Most important, however, is that Jeff has a knack for bridging theory and data. My previous projects were purely theoretical work concerning the likelihood for adaptive introgression to occur despite genetic barriers. From this work, it was clear that linked deleterious variation and population divergence would affect the signature of positive selection on introgressive variation. Working with Jeff, we developed a model of polygenic adaptation from introgressive variation to explore this footprint.

Preliminary simulations quickly showed us that adaptive introgression alleles, contrary to de-novo mutations, can increase diversity by dragging divergent neutral variation to appreciable frequency as it spreads to a foreign population. In addition, we developed structured-coalescent-based methods to study the influence of linked deleterious variation on these patterns. This project is the focus of my doctoral work, and we are currently writing the paper for the conclusion of my PhD.

My time in Lausanne was great fun. The Jensen lab is full of colorful people, and I still miss hanging out with them. Luckily I got to see everyone twice this summer both at SMBE in Vienna and at ESEB in Lausanne. During my stay, I also joined Catalyst, an improvisation acting group for researchers at EPFL and UNIL. I found out that pretending to be a researcher with two heads that speak simultaneously is a great way to make friends and learn to communicate better in science.

To my surprise, Lausanne had an amazing and relatively cheap restaurant that served my favorite food. Thus, I'll shall conclude with a quote from Ray Tobler's Nov 2014 tale of his time at Stanford, "...but the real highlight was the burrito, perhaps the most delicious brick-shaped object ever to come out of Mexico/Texas/a truck."



Lausanne view from one of Derek's hikes.

Upcoming events

The 2016 SAB meeting will take place from April 25 to 27.

Upcoming seminars

Several international speakers are still lined up for the running term: Eva Stukenbrock, Aoife McLysaght and Stuart Baird will visit us for chats and seminars.

Merry Xmas and a Happy New Year!

Publications of our students

Several publications of our students and graduates came out in 2015:

C. Vogl and **J. Bergman**: Inference of directional selection and mutation parameters assuming equilibrium. *Theor Popul Biol.* 106:71-82 (2015)

C. Huber, M. DeGiorgio, I. Hellmann and R. Nielsen: Detecting recent selective sweeps while controlling for mutation rate and background selection. *Molecular Ecology* doi: 10.1111/mec.13351 (2015)

N. De Maio, **D. Schrempf** and C. Kosiol: PoMo: An allele frequency-based approach for species tree estimation. *Systematic Biology* doi: 10.1093/sysbio/syv048 (2015)

R. Tobler, J. Hermisson and C. Schlötterer: Parallel trait adaptation across opposing thermal environments in experimental *Drosophila melanogaster* populations. *Evolution* 17. doi: 10.1111/evo.12705 (2015)

R. Kofler, **T. Hill**, V. Nolte, A.J. Betancourt and C. Schlötterer: The recent invasion of natural *Drosophila simulans* populations by the P-element. *Proc Natl Acad Sci U S A.* 26;112(21):6659-63 (2015)

K.M. Tanaka, **C. Hopfen**, M.R. Herbert, C. Schlötterer, D.L. Stern, J.P. Masly, A.P. McGregor, M.D. Nunes. Genetic architecture and functional characterization of genes underlying the rapid diversification of male external genitalia between *Drosophila simulans* and *Drosophila mauritiana*. *Genetics.* 200(1):357-69 (2015)

D.K. Fabian, J.B. Lack, V. Mathur, C. Schlötterer, P.S. Schmidt, J.E. Pool and T. Flatt: Spatially varying selection shapes life history clines among populations of *Drosophila melanogaster* from sub-Saharan Africa. *Journal of Evolutionary Biology* 28: 826-840 (2015)

H. Topa, **A. Jónás**, R. Kofler, C. Kosiol and A. Honkela: Gaussian process test for high-throughput sequencing time series: application to experimental evolution. *Bioinformatics* pii: btv014 (2015)

H. Uecker, **D. Setter** and J. Hermisson. Adaptive gene introgression after secondary contact. *J Math Biol.* 70(7):1523-80 (2015)

S. Franssen, V. Nolte, **R. Tobler** and C. Schlötterer: Patterns of linkage disequilibrium and long range hitchhiking in evolving experimental *Drosophila melanogaster* populations. *Molecular Biology and Evolution* 32(2):495-509 (2015)

L. Geroldinger and R. Bürger: Clines in quantitative traits: The role of migration patterns and selection scenarios. *Theoretical Population Biology* 99:43-66 (2015)