

Workshop on Genomics

Český Krumlov
2013



objectives of this presentation

- provide some information about the setting and logistics
- provide some background information about the Workshop
- help you establish an appropriate set of expectations

frequently asked questions

- Where is the restroom?
- Coffee and internet?
 - Next door, lodging, House of Prelate (computer lab)
- Where do I eat?
 - Workshop Google Map
- Where is the pub?
- Where is the computer laboratory?
 - walk after this session
- How long will the materials on the web site be available?

who

you

- proportions (n = 59)
 - 0.39 graduate students (0.52)
 - 0.32 postdoctoral scholars (0.34)
 - 0.22 staff and other (0.06)
 - 0.07 faculty/principal investigators (0.07)
- broad international representation (n=21)
 - Sweden (n=15), Czech Republic (n=11), USA (n=6), Denmark (n=4), United Kingdom and Poland (n=3), Ireland and Spain (n=2), Belgium, Brazil, Canada, Croatia, Italy, Japan, Mexico, Netherlands, Norway, New Zealand, Russia, Switzerland

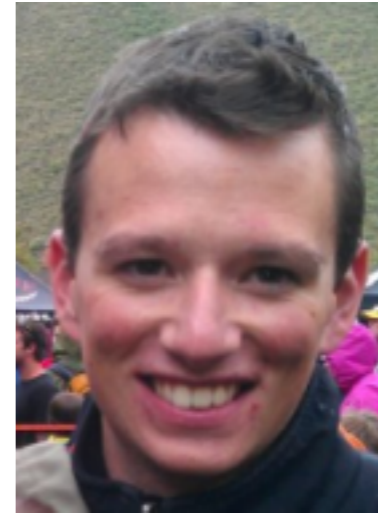
research interests

transcriptomics (n=9)
genomics (n=9)
comparative genomics (n=8)
RAD, population genomics (n=8)
de novo genome assembly (n=7)
RNA-seq (n=4)
metagenomics (n=5)
phylogenomics (n=5)
evolutionary genomics (n=2)



transcriptomics
comparative genomics
genome assembly
metagenomics
evolutionary and population genomics

instructors and co-directors



Adam Bazinet

Kristina Cammen

Pete Batzel

Luke Ursell

Daniel McDonald



Scott Handley

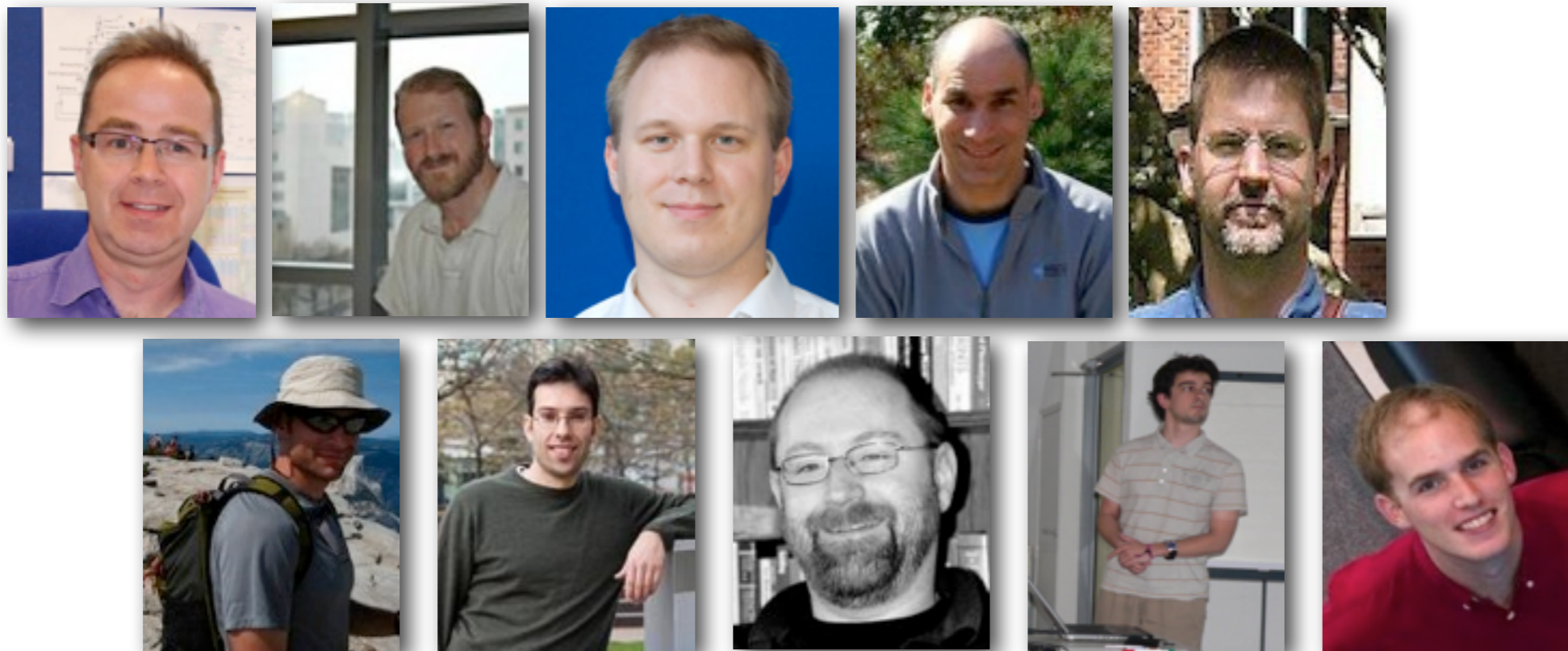


Karin Rengefors



Naiara
Rodríguez-Ezpeleta

faculty



partners



Graduate Research School in Genomic Ecology
LUND UNIVERSITY, SWEDEN





- Interdisciplinary graduate school for PhD students in Genomic Ecology
- Genomic Ecology - interface between ecology & evolution, molecular biology and genomics
- GENECO is funded by the Swedish Research Council

GENECO Program

Trainees

- 90 past and current PhD students
- Universities in Sweden, Norway, and Finland
- Activities: Annual Winter & Summer Meetings, PhD courses, Mentor programs, travel grants



www.geneco.se

Courses

- Understanding population genetics
- Fermentors, HPLC & experimental evolution
- Introduction to molecular ecology
- Quantitative PCR
- Introduction to using R
- Sequencing to assess microbial diversity: high throughput sequencing and amplicon sequencing
- Microarray analyses in non-model organisms
- Evolutionary processes

what

basis

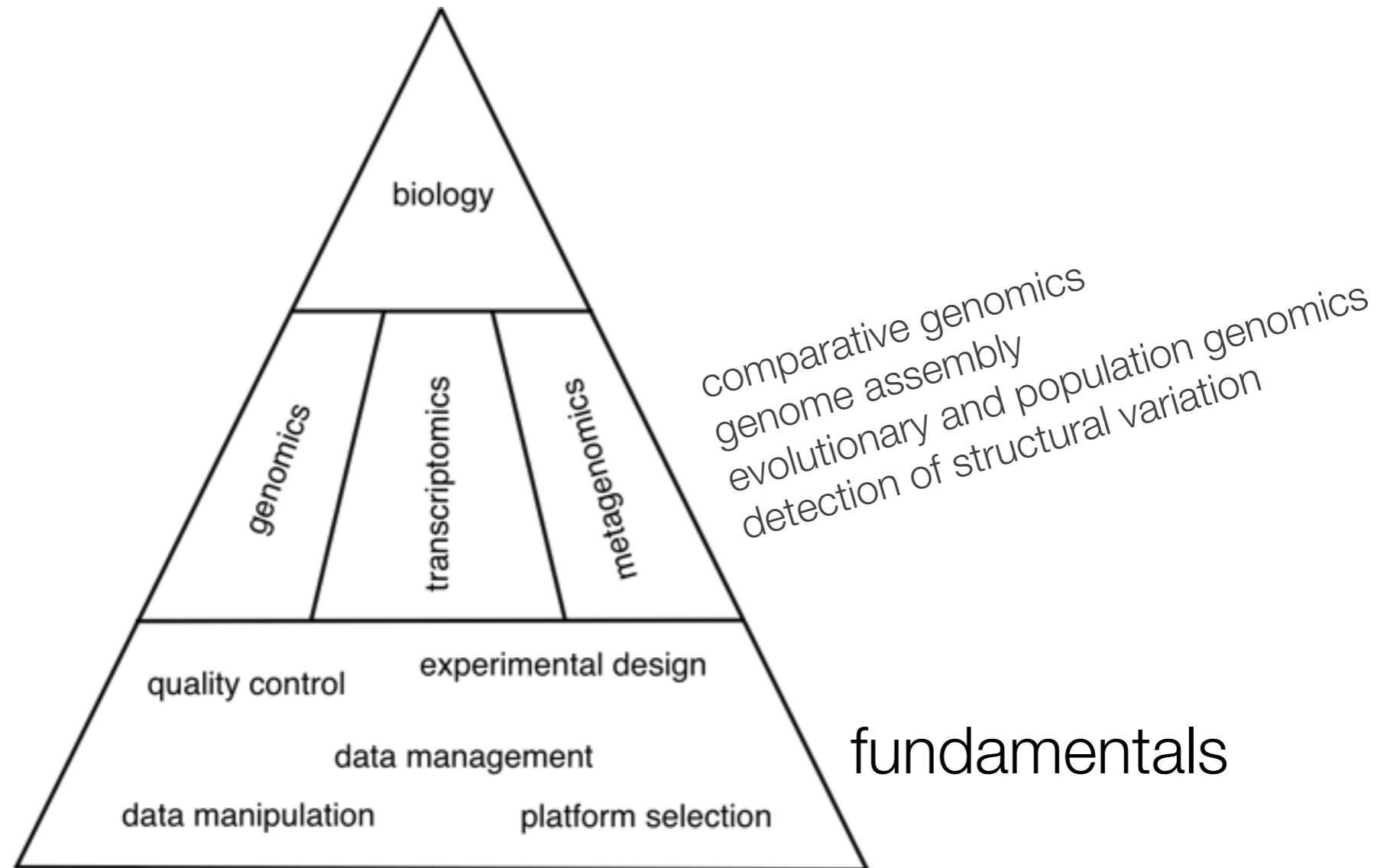
Workshop on Molecular Evolution

- focused on molecular phylogenetics and population genetics
- Woods Hole, Marine Biological Laboratory
- Centers for Disease Control and Prevention
- Smithsonian Institution
- Workshop on Comparative Genomics
 - ▶ Czech Republic - January 2011
 - ▶ Fort Collins, USA - July 2011
 - ▶ Smithsonian Institution - November 2011

Lessons

- immersive and intensive
- workshop not a symposium
- isolated, idyllic, easy access, infrastructure

curriculum design



- broad range of biological disciplines and levels of experience

schedule

- Workshop website
 - <http://evomics.org>

Week 1



Monday

Comparison of Mammalian Genomes

Laboratory Introduction



Tuesday

Sequencing Technology

Unix

Data Quality Control



Wednesday

Study Design

Advanced Unix

Participant discussions



Thursday

Assembly

Assembly Lab



Friday

Variant Calling

Short Read Genomics



Saturday

Introductions to R and Python

Week 2



Monday

Transcriptomics

Transcriptomics



Tuesday

*Next-gen sequencing for
Non-Model Organisms*

STACKS



Wednesday

Metagenomics

Metagenomics



Thursday

*Metagenomics and
Detection of Selection*

Open Lab



Friday

Evolutionary genomics

*Closing Discussions and
Open Lab Time*

Saturday

Departure

participant presentations

- two stages (Wednesday and Friday)
 - small group discussions
 - participant presentations
- goals:
 - get to know each other
 - learn about the other participant research interests and projects
 - identify common strategies, issues and problems within sub-disciplines of the genomic sciences
 - prepare concise questions for faculty members

Social Events

- Saturday
 - Meet at approximately 18:00 (location TBD) to take a group tour of Český Krumlov
 - Tour will finish at Eggenberg Brewery where with a couple of 0.5 L of beer
- Sunday
 - Special Castle Tour
- More possibilities exist. Please visit the town Infocentrum for details

why

need

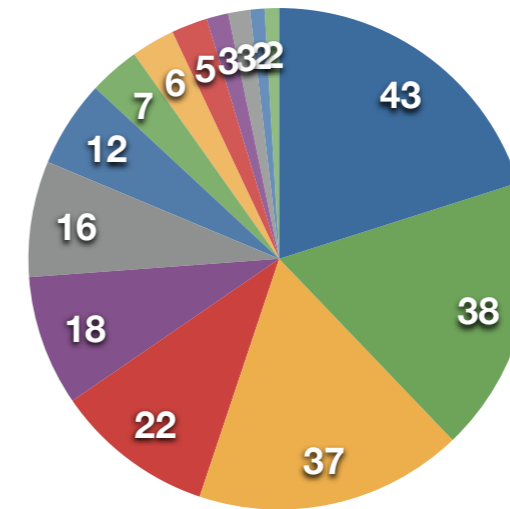
Instrument	Run Time	Millions of reads/run	Reagent cost per run	Reagent cost/ MB	Data file Sizes (GB)
3730xl capillary	2 hours	0.000096	~\$100	~\$1500	0.03
Illumina HiSeq 2000	8 days	1000	~\$20,000	\$0.10	1200



bioinformatic landscape



As of 8 January 2012 SEQwiki contains pages for 587 (530 last year) bioinformatics applications related to genomic analysis!



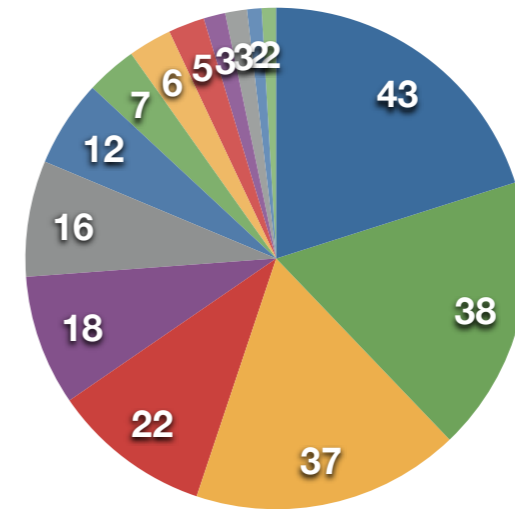
- RNA-Seq
- SNP discovery
- ChIP-Seq
- Metagenomics
- Copy number estimation
- DNA Methylation
- Whole Genome Resequencing
- Genomics
- De-novo assembly
- Structural variants
- Epigenomics
- InDel discovery
- Alignment
- Mapping



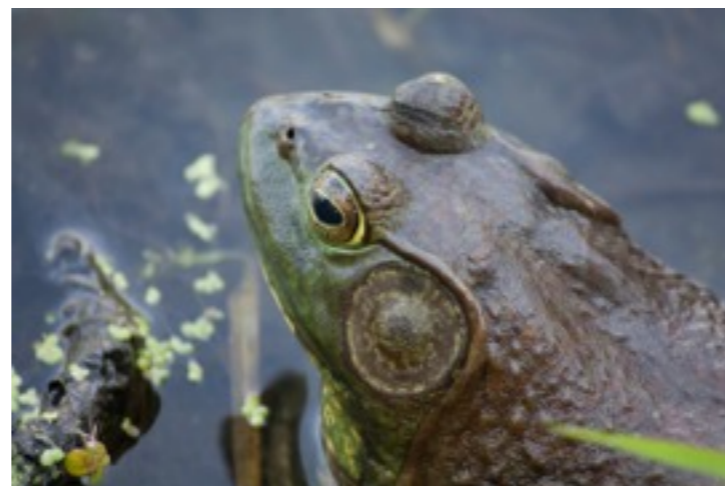
current challenge



+



- RNA-Seq
- SNP discovery
- ChIP-Seq
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why Český Krumlov

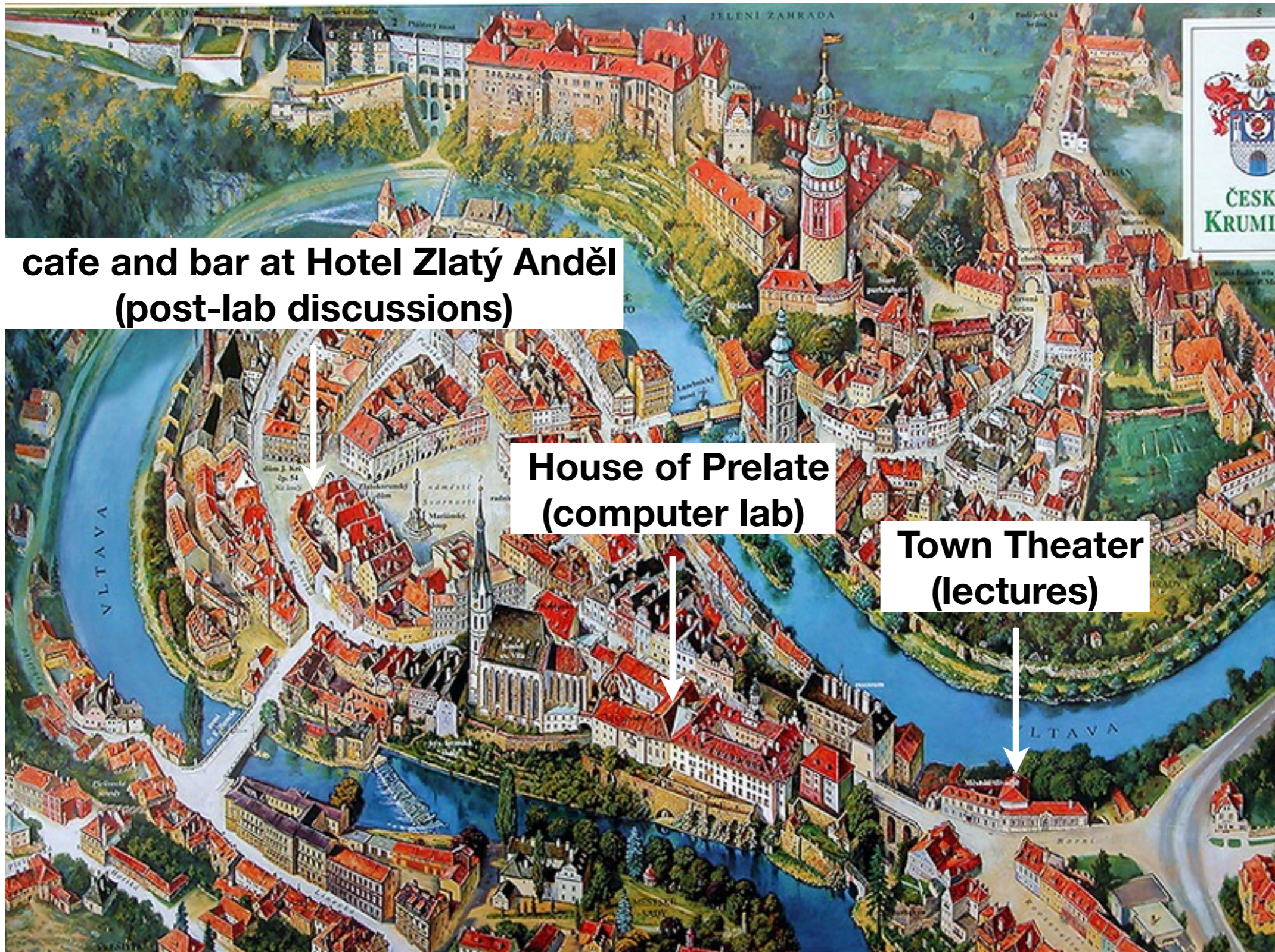


important considerations

- relatively inexpensive
- relatively isolated
- idyllic
- conveniently and centrally located in Europe
- appropriate infrastructure
- outstanding support from the town

where

here



**cafe and bar at Hotel Zlatý Anděl
(post-lab discussions)**

**House of Prelate
(computer lab)**

**Town Theater
(lectures)**

expectations

realistic expectations

- exhaustion
 - please try to relax and drink responsibly
- computing environment
 - highly specialized customized Linux distribution
 - bioinformatics applications are moody
 - you may not get everything installed or finished every exercise during the allotted session
- everything will be available on the web-site after you leave

discussion opportunities

- the Workshop provides extensive opportunities for discussions
 - with faculty
 - with instructors
 - with other participants
- these opportunities include
 - lecture and lab breaks
 - meals
 - at the cafe and bar after lab
- you are well advised to take advantage of these opportunities
- faculty arrival and departure dates are on the web site

feedback

- please provide feedback
 - topics covered
 - constructive. how to improve in future years
- end of Workshop survey

computer lab



Monday, January 7, 13

House of Prelate

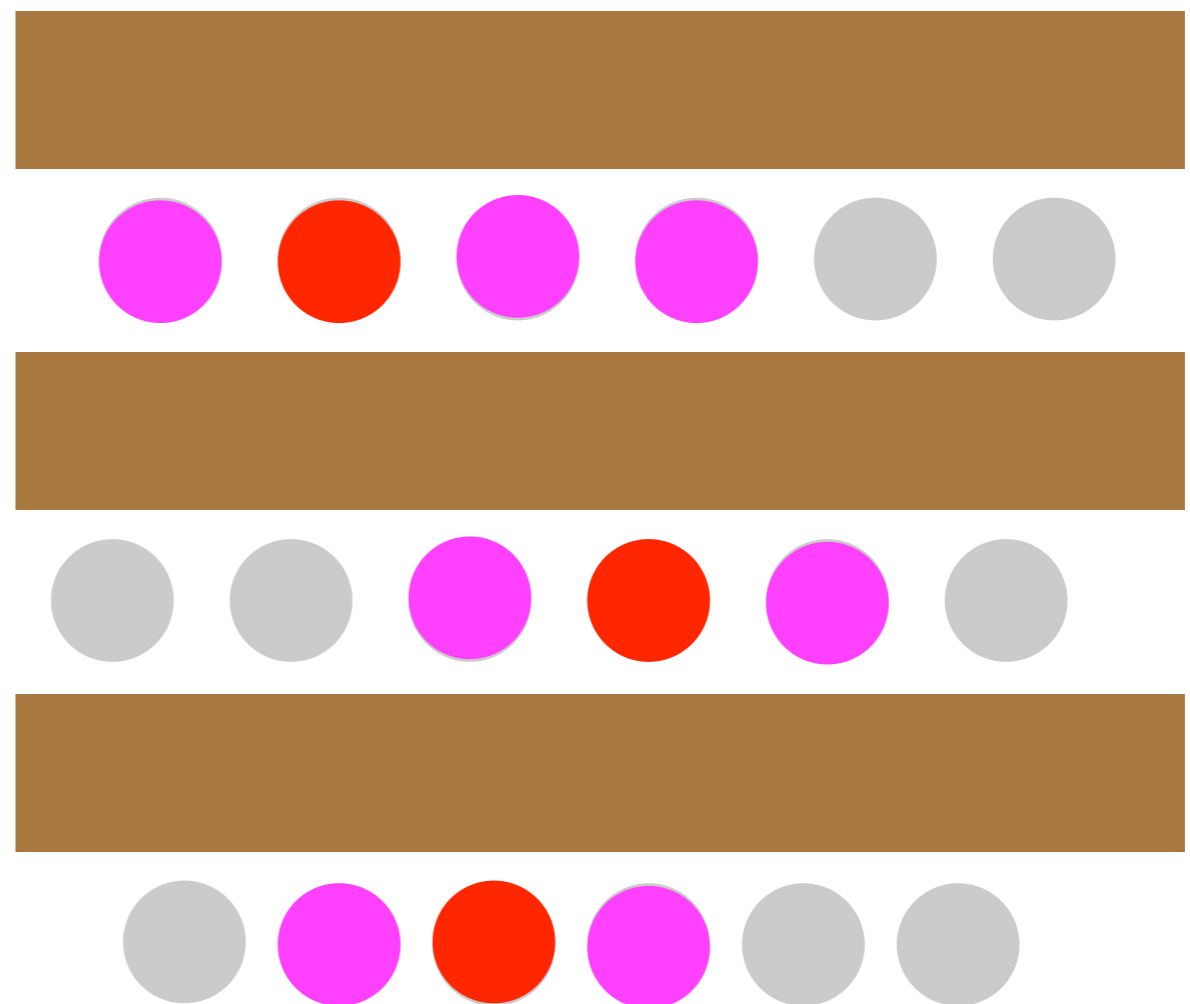
- dates back to second half of the 14th century
- a wing of the building held a brewery from 1596 until 1865
- significant renovations in 1576, 1624, 1652, 1768, 1897-1902, 1924, and last half of 20th century
- break area and coat room with coffee and tea available
- fully wired and wireless internet
- power distribution

general lab policy issues

- no food or drink inside building
- wipe feet before entering
- coats in coat room
- do not touch walls
 - the painter is unavailable for repainting (he died in 1791)
- remove your things at end of each lab session
- please wear your name tag!
- we have strict arrival and departure times

Laboratory Best Practices

- Work together in groups
 - Variations in computing power
 - Variations in expertise
 - Variations in patience



post-lab discussions

- an important feature of the Workshop
- Music Bar behind Hotel Zlatý Anděl
- it is not about the drinking, it is about the discussions

t-shirt competition

- <http://evomics.org/registration-form/t-shirt-competition/>
- the top designs will receive a very special gift
- fame, fortune! your design will be worn by people from around the world for years to come

Non-Workshop Activities

thanks



**Graduate Research School in
Genomic Ecology
Lund, Sweden**



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