

Podisma pedestris – First insights from genomic data

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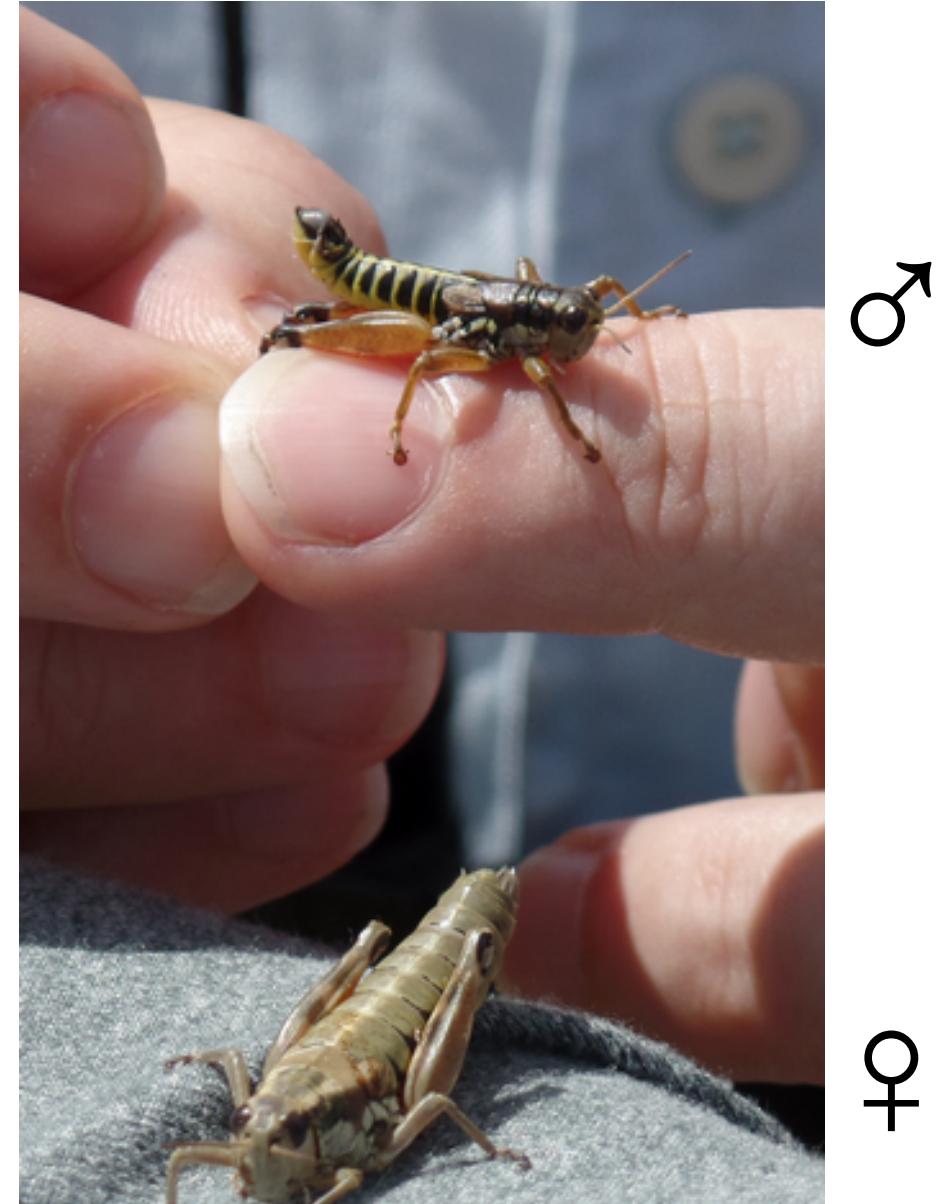
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<http://hannesbecher.github.io>



A pedestrian grasshopper

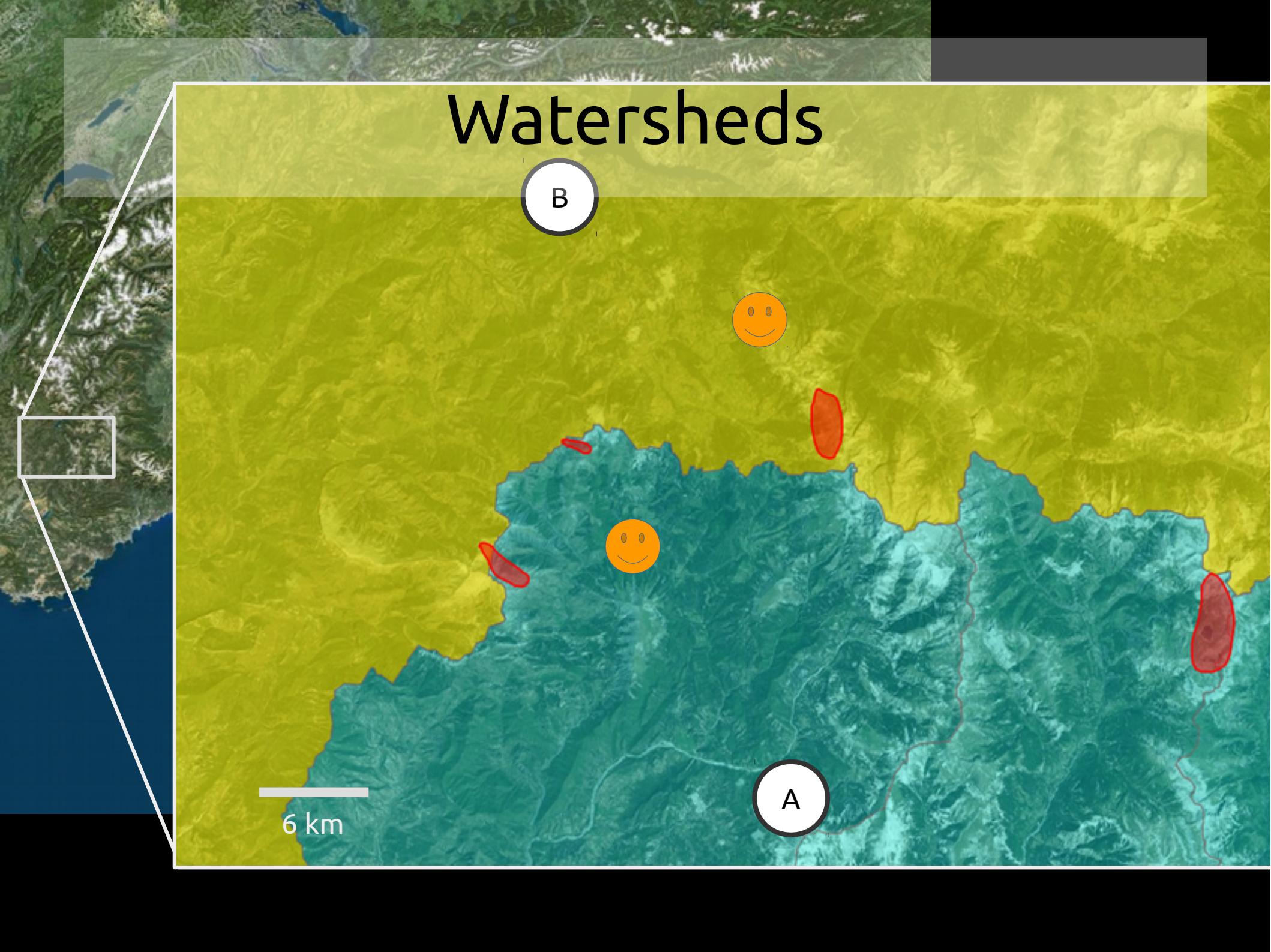
- *Podisma pedestris*
- Two hybridising races
- Parapatric
- Sex-chromosome polymorphism
- No race-specific differences known except sex chromosomes
- Strong selection against hybrids
- Genome size approx. 17 Gbp



Two imagos of *P. pedestris*



Taken from <https://www.geoportail.gouv.fr/>



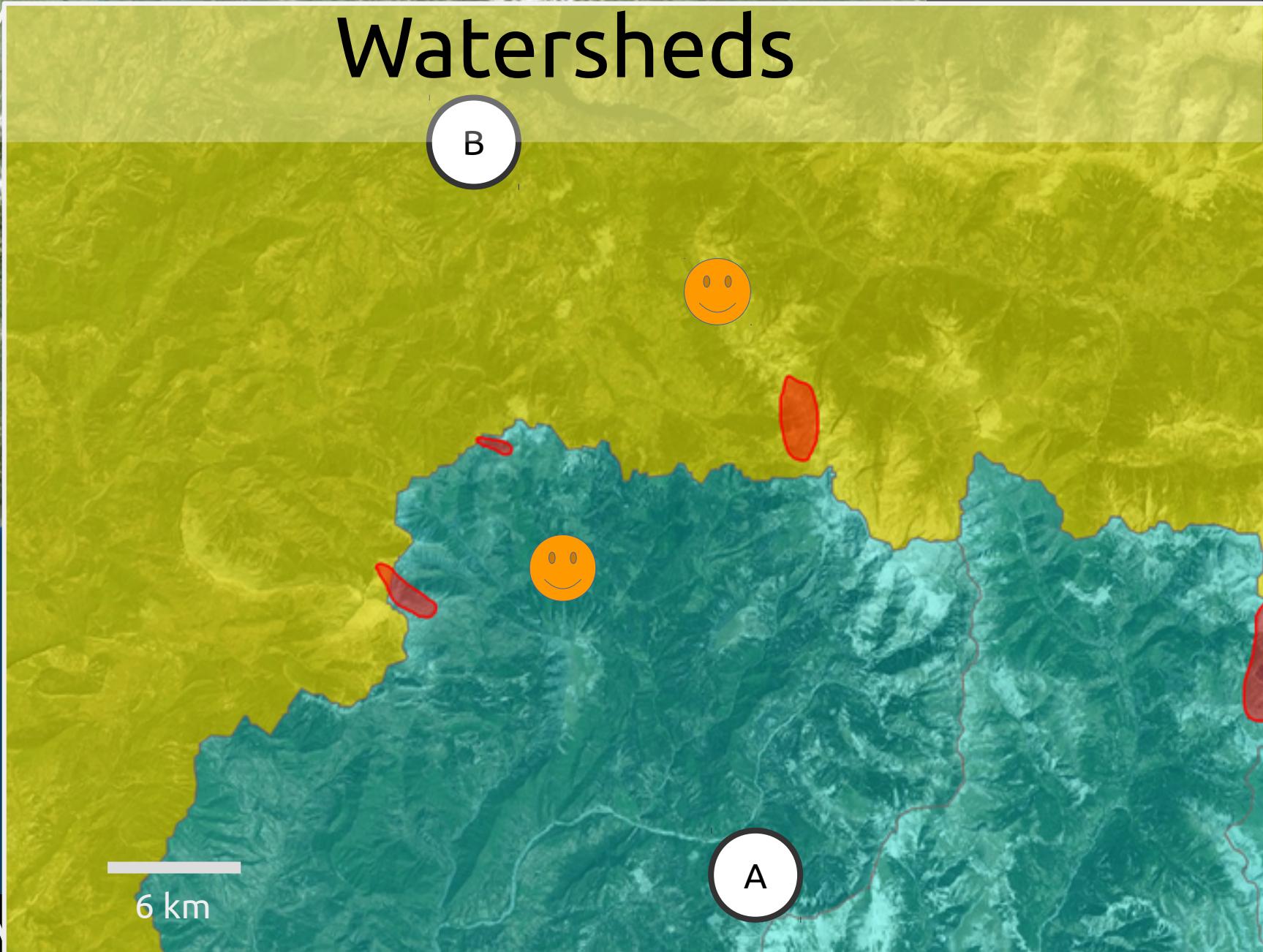
Watersheds

B



A

6 km

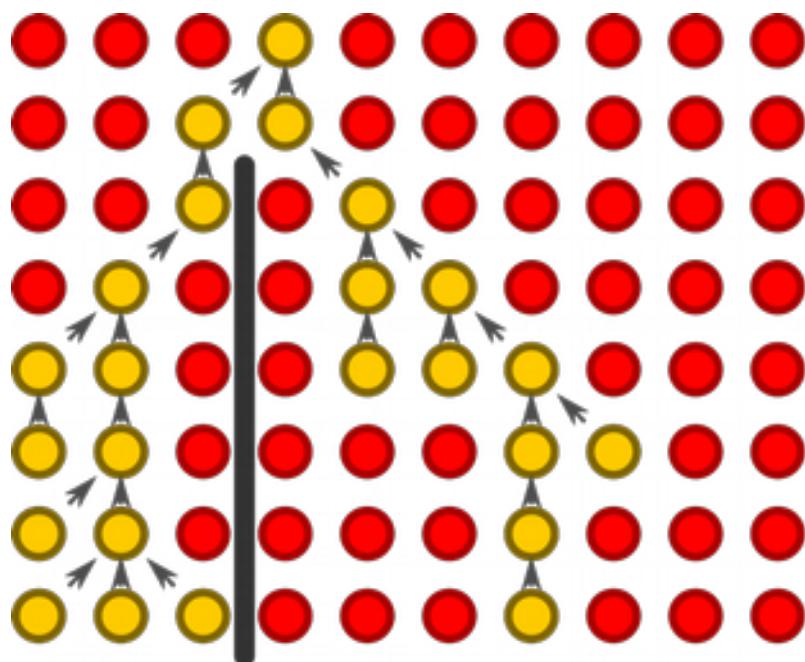


Questions:

- Two races?
- Population sizes
- Age of the split
- Colonisation assumption reasonable?
- Geneflow?

Many SNPs from few transcriptomes

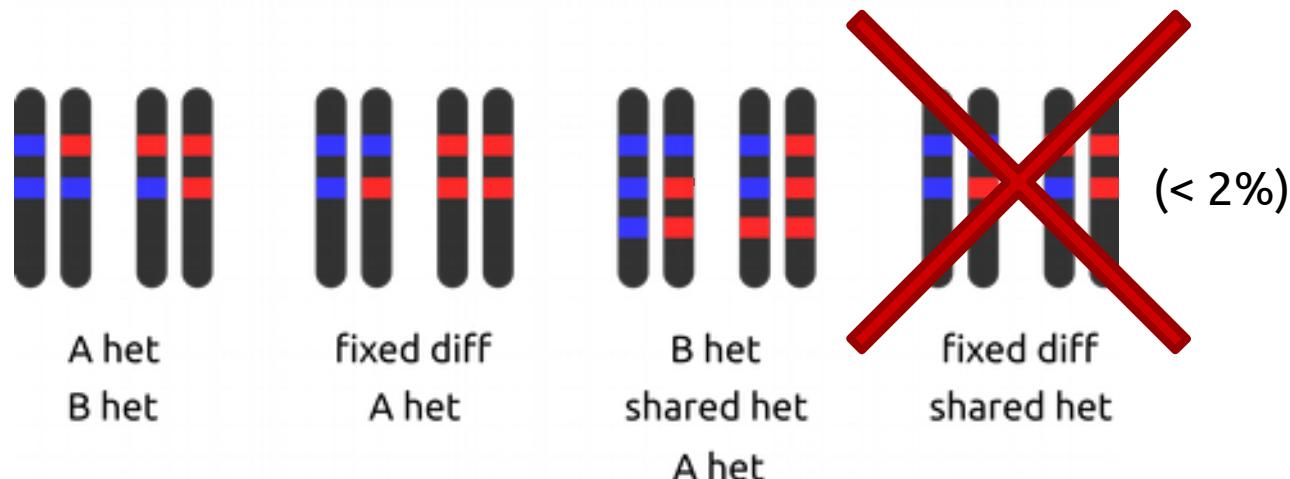
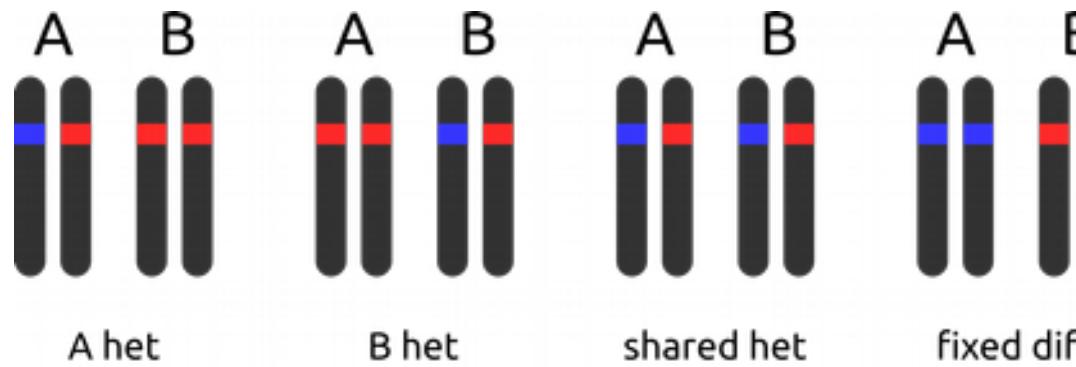
- Two *de novo* transcriptomes from short reads
- Orthologues *sensu* Nürnberger *et al.* 2016
- Coalescence thinking – backwards in time
- Assuming infinite sites and no recombination
- More samples increase certainty less than expected



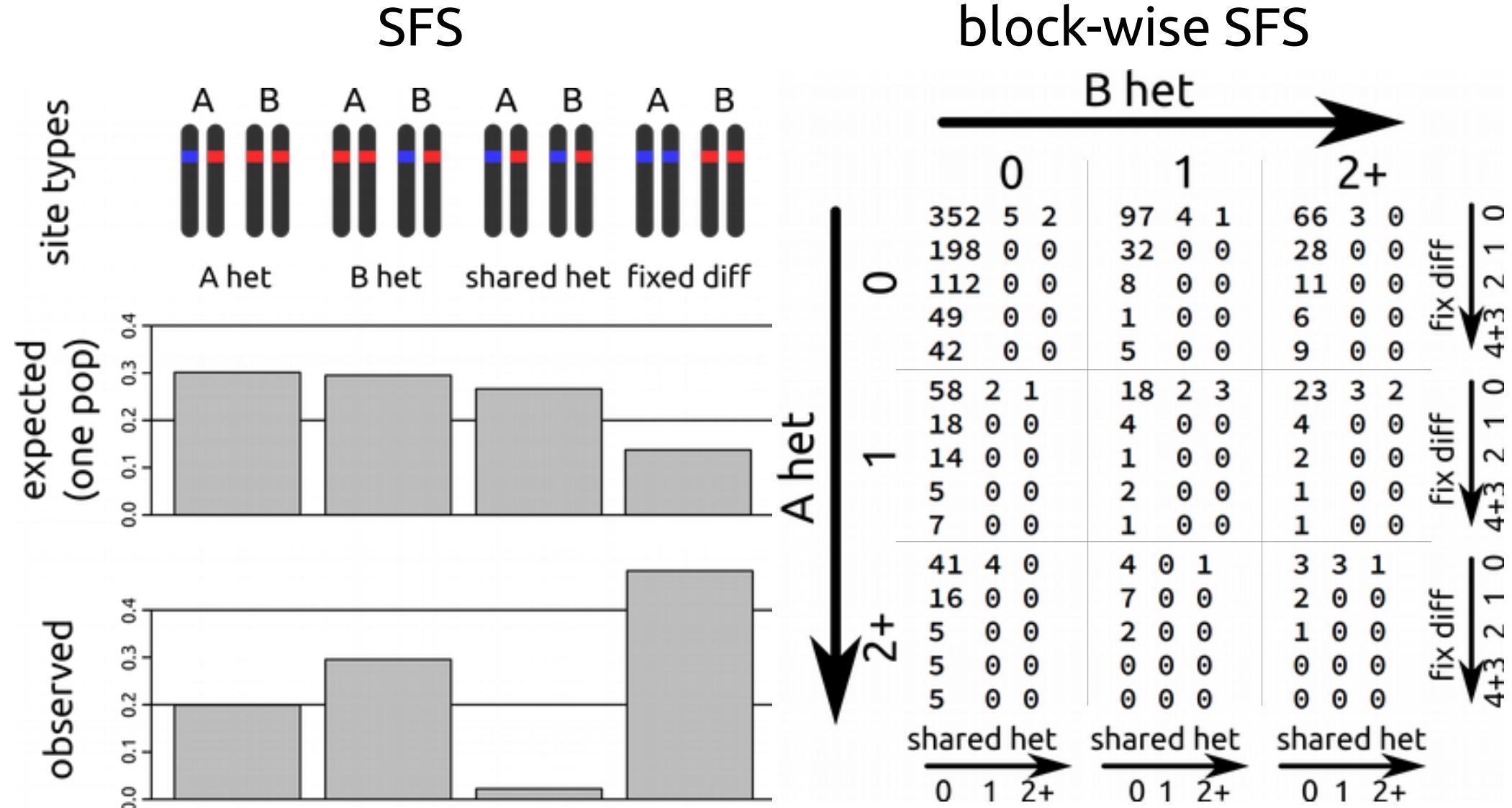
- More markers give more power

Data summary

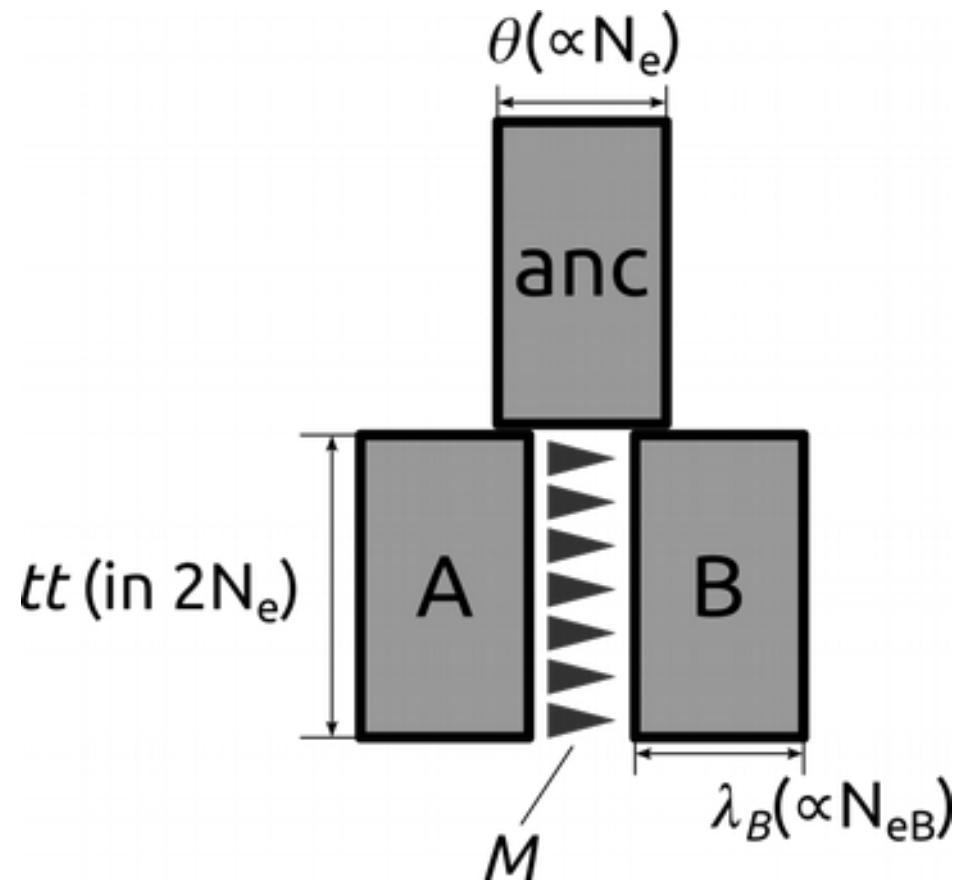
- 1303 blocks (genes)
- 150 consecutive, degenerate sites



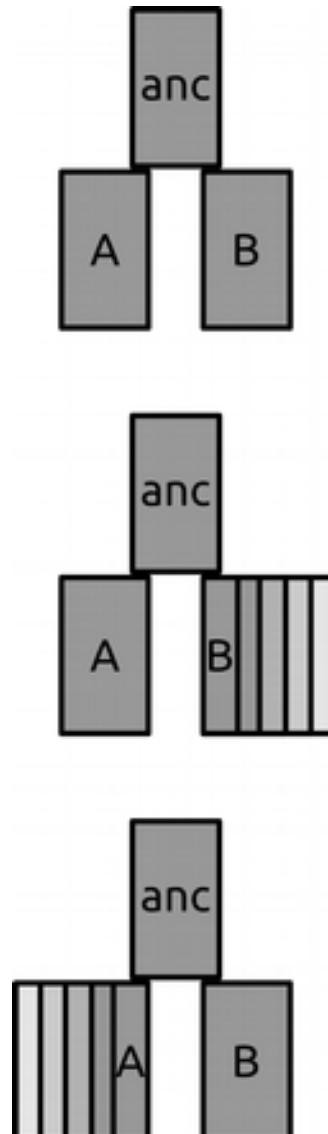
Data summary



The model – Parameters



No migration – Results

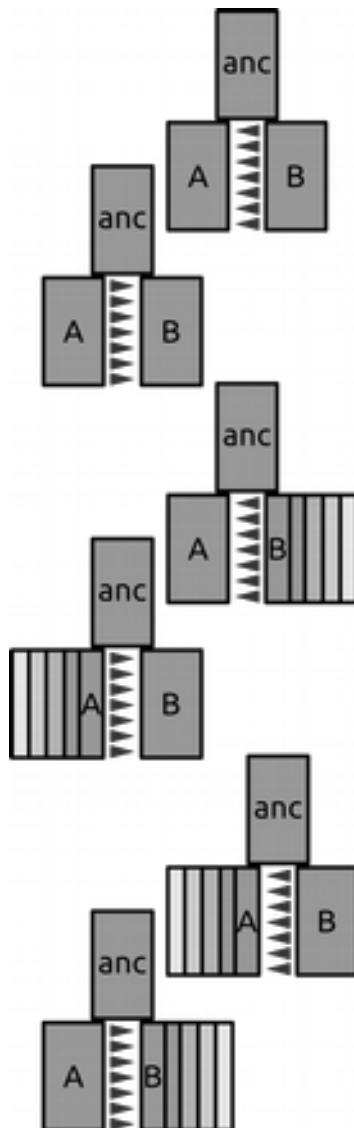


Name	LL	θ	tt	λ
Div	-3761	0.4956	1.411	(set to 1)
Div _B	-3760	0.5040	1.373	1.043
Div _A	-3719	0.6510	0.8656	2.141

Great!
“A” is the fused (derived) race.

Assuming $\mu = 3 \times 10^{-9}$
 $N_e = 350,000$ and
split time = 605,000 a

More complex models



Name	LL	θ	tt	M
IM	-3786	0.3083	9.999	0.5782
IMrev	-3686	0.301	6.981	0.4973

Best LL so far, but split estimate > 2Mya!

Summary

- Molecular data agree with classic view
- modelling suggests:
 - two sub-populations
 - fused race has smaller N_e
 - Split in Quaternary but several glacial cycles ago
- models can be useful to understand data but knowledge about biology required to interpret
- Outlook:
 - different model?
 - More individuals: spacial replication and clines



Photo: Karl Clemens

Thank you!