

Genetic determinism of the evolution of outstanding olfactory capacities in *Astyanax mexicanus*



Louis Valay

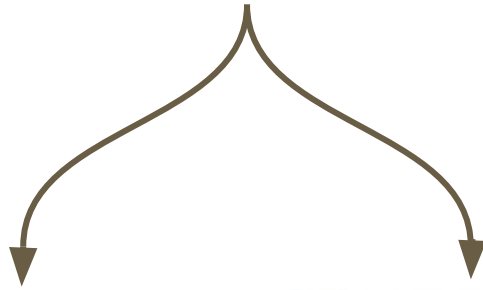
Under the supervision of Dr. Sylvie Rétaux and Dr. Maryline Blin

Astyanax mexicanus



Surface

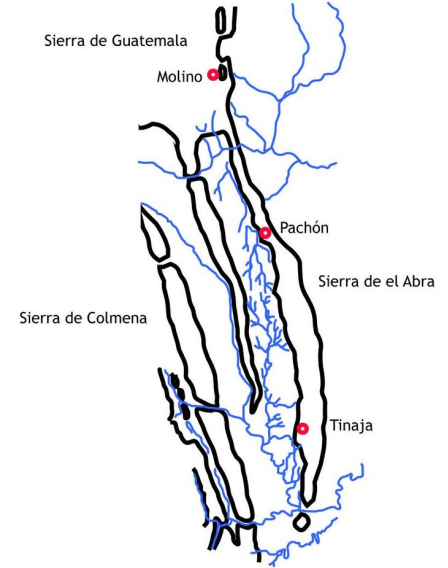
~20 000 years



Surface



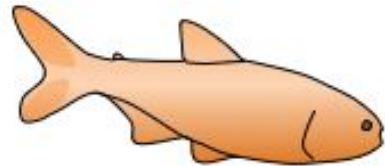
Pachón



- Loss of eyes and pigmentation
- Changes of behavior (social, feeding...)
- Increased olfaction

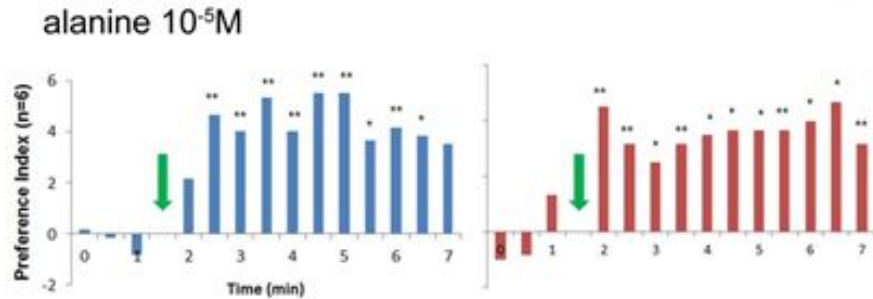
General information

- $2n = 50$ chromosomes
- ~30 cave populations
- Inter fecundity

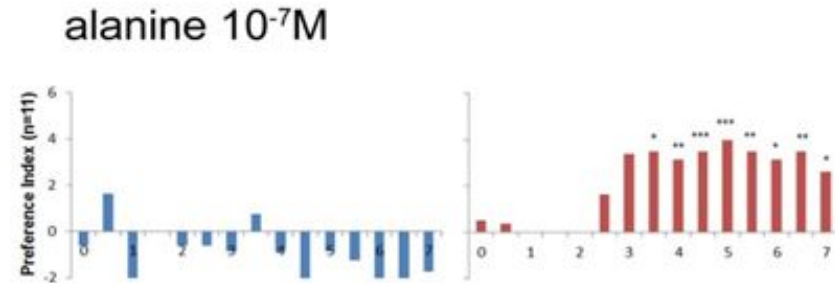


Olfaction changes

- Cave fish olfaction is **100,000** times better



Alanine [$10^{-5} M$]



Alanine [$10^{-6} M$ to $10^{-10} M$]

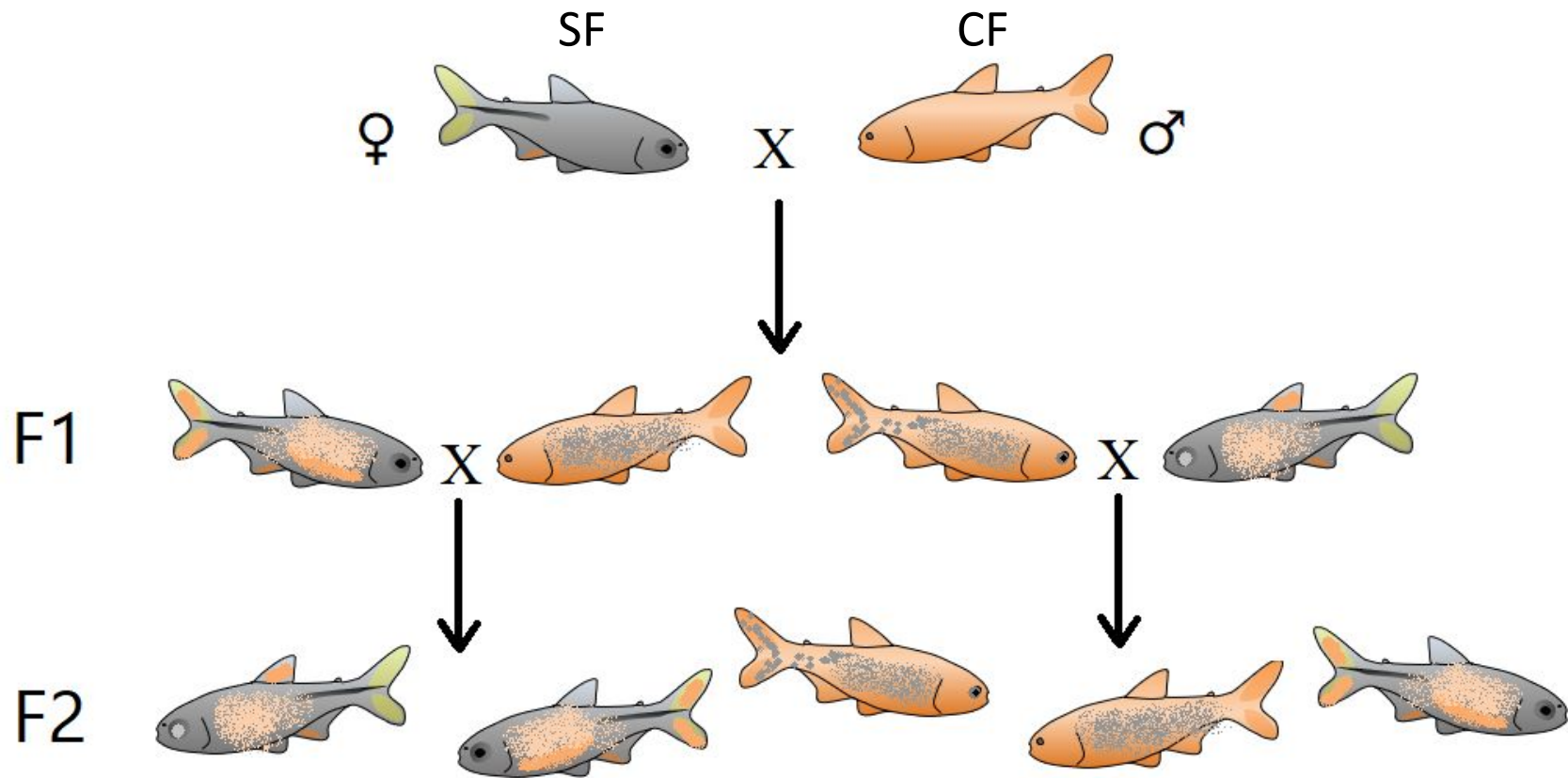
Objective

What is the genetic variations responsible for this radical change?



QTL analysis on F2 generation

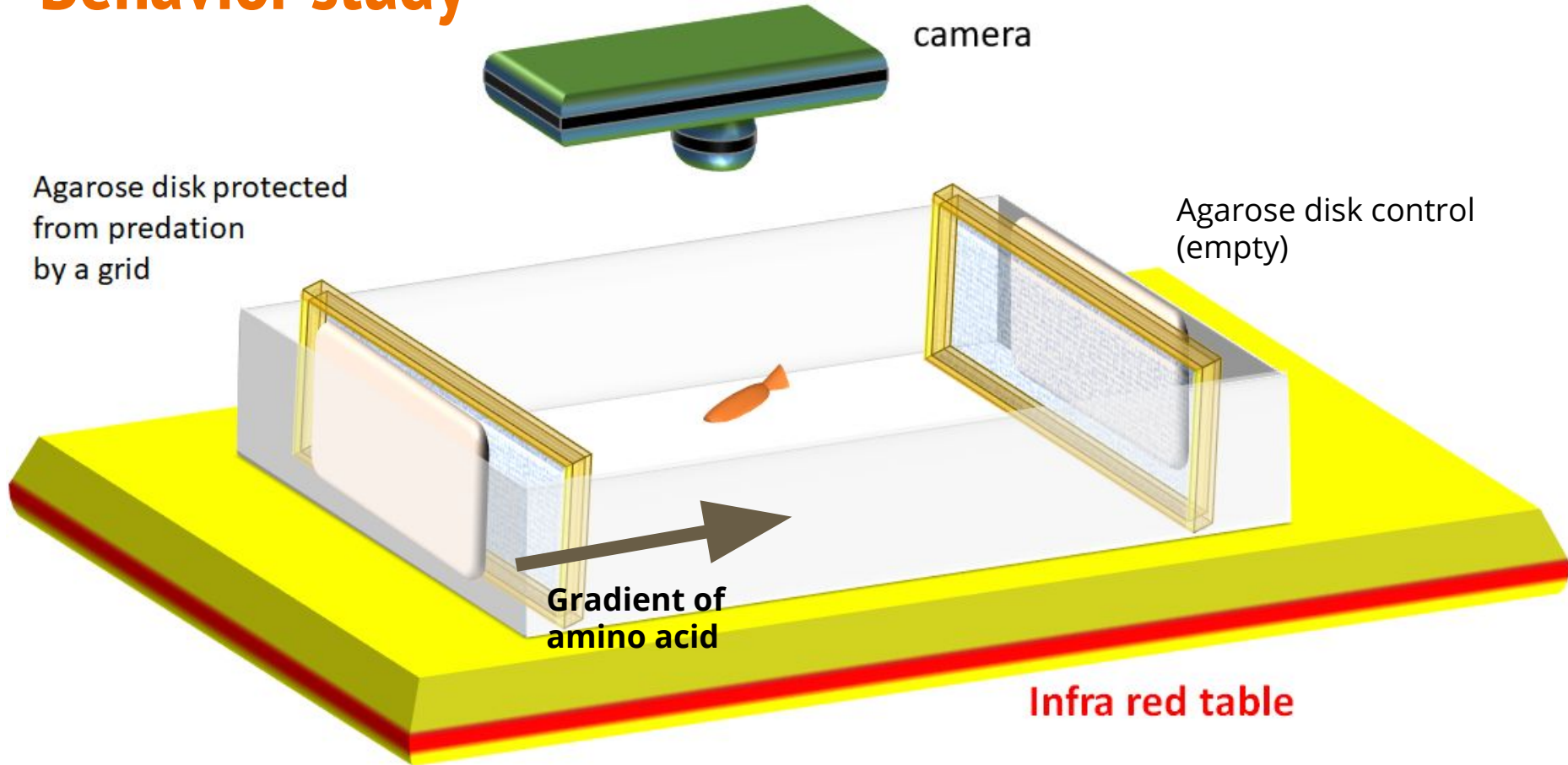
F2 Generation



Behavior study

- Test on alanine and serine sensitivity with chondroitine as positive control
- Concentration between 10^{-4} M and 10^{-7} M
- Test on 400 one month old F2 individuals

Behavior study



QTL analysis

"genotyping by sequencing": High density of anonymous SNP markers

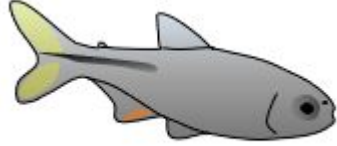
Analysis using R/qtl package -> Link markers and increased olfaction phenotype

Expected results: various olfaction sensitivity and multiple QTL hits

Perspectives: Further analyses of 2-3 QTL with CRISPR-Cas9

Why

- Good model to better understand evolution and speciation processes on a genetic level
- Better understanding of genetics of the olfaction



Thank You !

