

FHF prosjekt 900706:

“Sporing av laks: SNP-tilnærming”

“Tracing the origin of farmed Atlantic salmon escapees by DNA parentage assignment; optimizing methods, and real-life validation studies”



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CIGENE



- Cigene Est. 2003 and funded by the Norwegian Government for:
 - high-throughput genotyping in humans, micro-organisms, plants, animals and fish.
 - integration of experimental and theoretical methods needed to bridge the genotype-phenotype gap.
 - development of a competence base to advance livestock and marine functional genomics

WP1.2 Utvalg av markører samt teknisk og kostnadmessig optimalisering av SNP-basert genotyping.

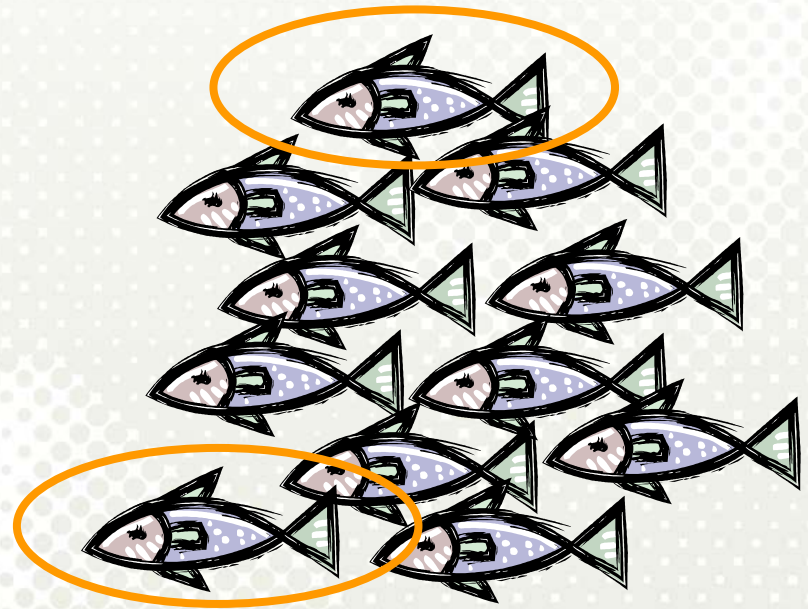
- I denne arbeidspakken vil man arbeide videre med å velge ut antall og finne optimal gjennomføringsmodus for SNP-basert tilordning av foreldrefisk.

Sample



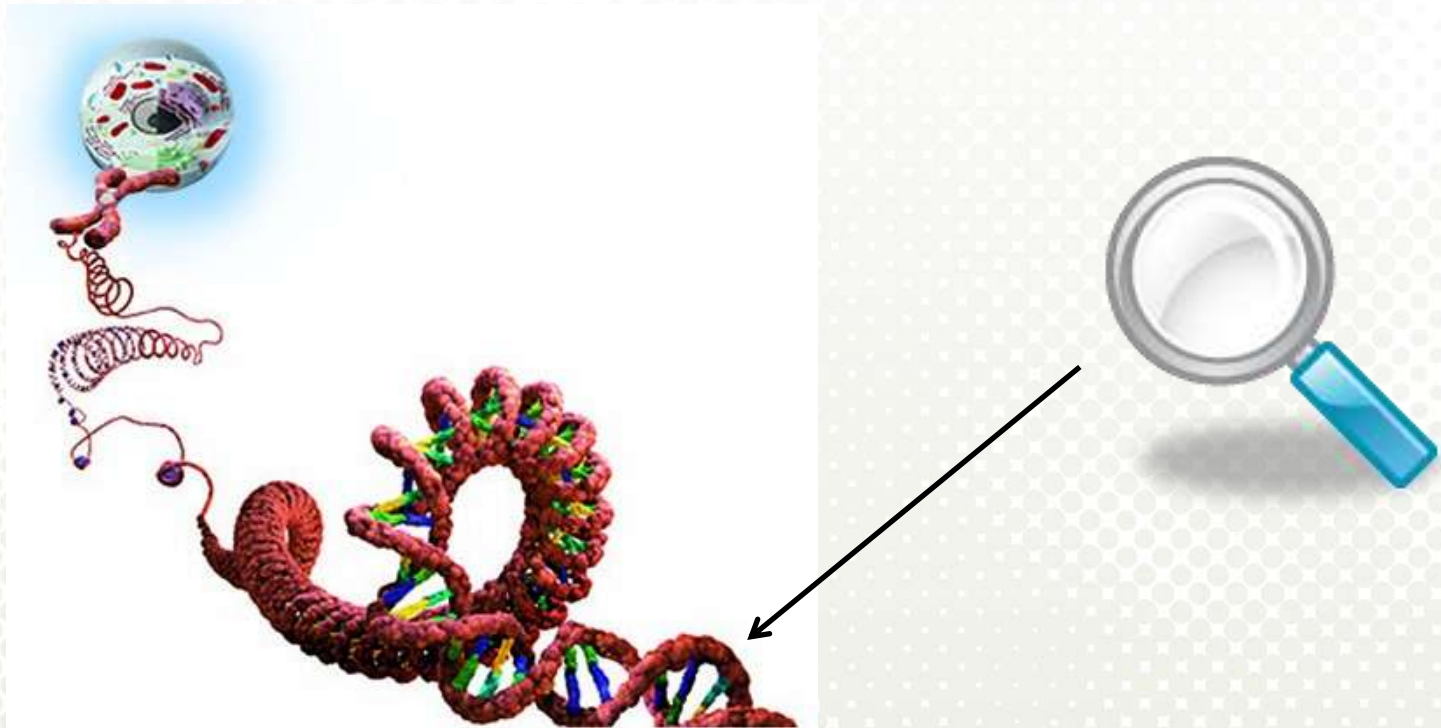
?

Potential Parents



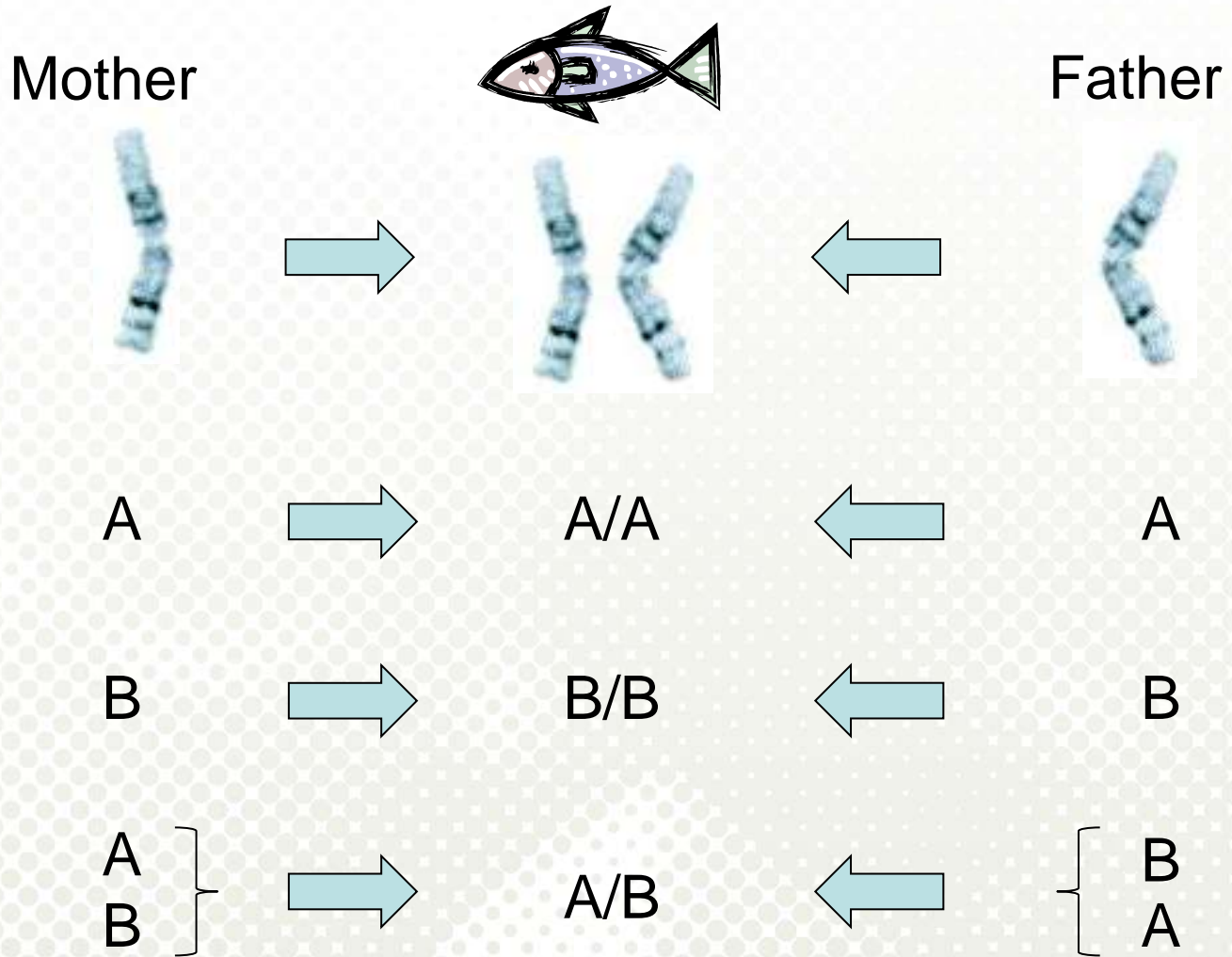
Single Nucleotide Polymorphisms (SNP)

- SNPs are small genetic variations within chromosomes that are passed on through generations



- They are easy to assay, and easy to code (binary).

Single Nucleotide Polymorphisms (SNP)



SNP marker panel selection

- 5,500 SNPs tested in 756 samples collected from MOWI, Salmobreed and Aqua Gen.
- A subset of SNPs (n=114) was identified using the following criteria:
 - SNPs must have high minor allele frequency (MAF >0.45)
 - 3-4 SNPs from each chromosome
 - 3 SNPs from mitochondrial genome to provide extra assurance for female assignment
- Further reduced to **59 SNPs** compatible for analysis in a single reaction



Genotyping protocol



Sample

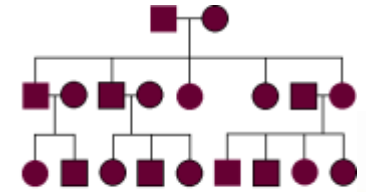


DNA extraction



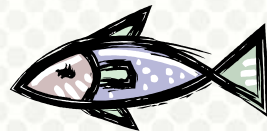
SNP Testing (genotyping)

Assignment



- Assignment uses the principle of exclusion to identify possible parents:

Offspring



A/A

Parents



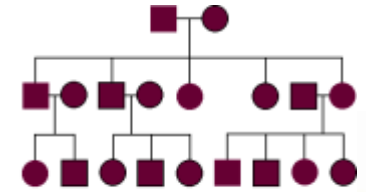
A/A



A/B

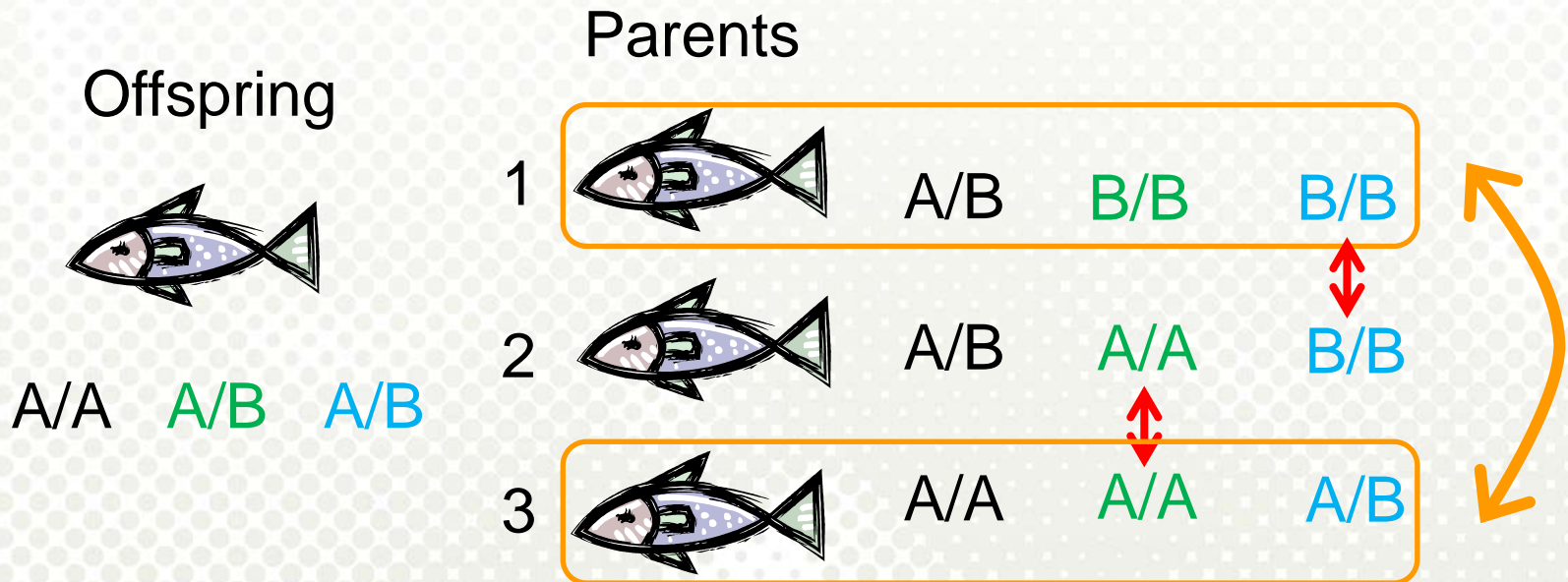


B/B



Assignment

- After identifying *candidate parents*, exclude impossible parent x parent combinations. For example:



Pilot experiment 1



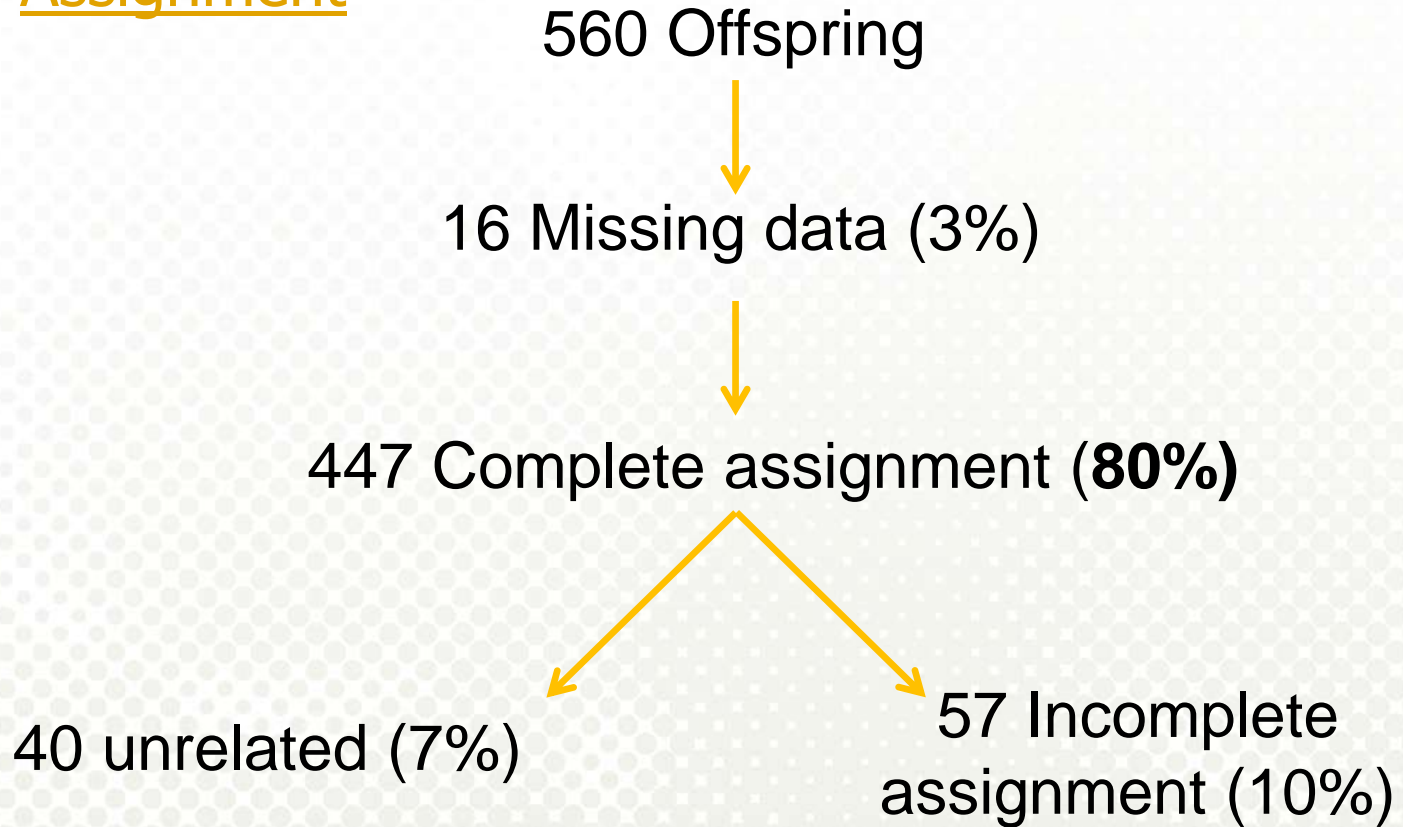
229 Parents

520 Blinded offspring

40 Unrelated fish



Assignment



Assignment has not been confirmed

Assignment – Continued

- Reduce the percentage of incomplete assignments by
 - including additional information:
 - Sex of parents (utilize mitochondrial SNPs)
 - Parental crossings (reduce possible combinations)
 - include additional SNP sets

Assignment has not been confirmed

Coming activity

- Test assignment with a large excess of potential parents
- Test assignment in blinded material from other breeding companies (Salmobreed, Rauma, Marine Harvest)
- Test ability of assignment panel to differentiate wild and farmed salmon

Thanks

