The molecular diversity of *Echinococcus multilocularis* in Europe: some updates possible new approaches

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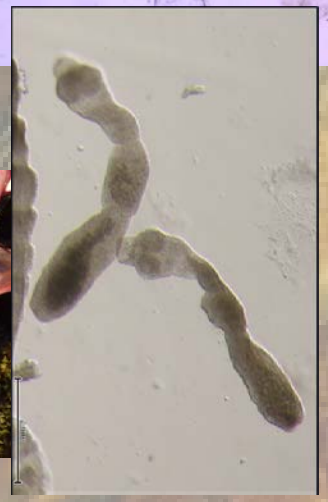
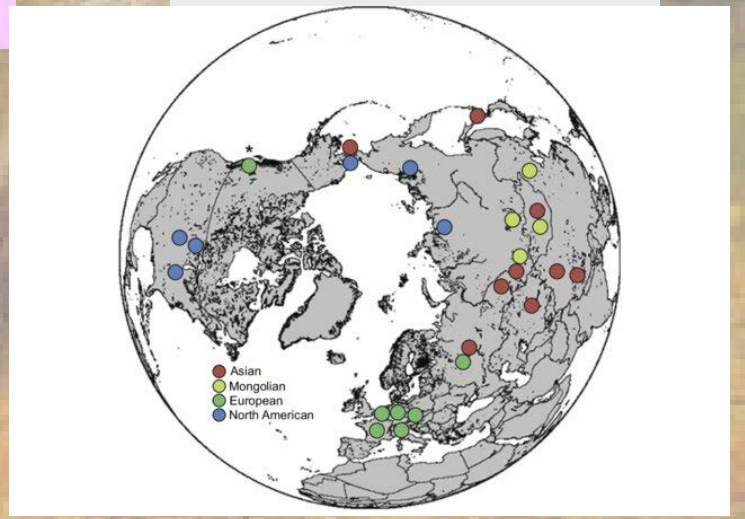
XIX Workshop of National Reference Laboratories for Parasites
Rome, 6th-7th November 2024

Aim

Describing the genetic diversity and phylogenetic relationships of *E. multilocularis* on the European scale.





Collaborative study

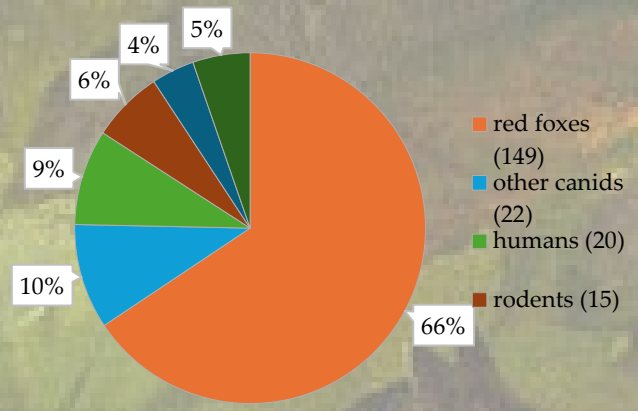
ISTITUTO SUPERIORE DI SANITA', ROME, ITALY

EURLP: EUROPEAN UNION REFERENCE LABORATORY FOR PARASITES

29 INSTITUTIONS
15 NRLs

Academy of Sciences, Košice, Slovakia.
Anses, National Reference Laboratory Echinococcus spp., Malzéville, France.
Austrian Agency for Health and Food Safety, Innsbruck, Austria.
Croatian Veterinary Institute, Zagreb, Croatia.
Danish Veterinary and Food Administration, Glostrup, Denmark.
Faculty of Medicine, University of Bern, Bern, Switzerland.
Friedrich-Loeffler-Institut, Greifswald-Insel Riems, Germany.
Institute for Biological Research "Siniša Stanković", Belgrade, Serbia.
Institute for Fish and Wildlife Health, University of Bern, Bern, Switzerland.
Institute of Ecology and Earth Sciences, University of Tartu, Tartu, Estonia.
Institute of Food Safety, Animal health and Environment "BIOR", Riga, Latvia.
Institute of Tropical Medicine (ITM), Antwerp, Belgium.
Istituto Zooprofilattico Sperimentale delle Venezie (IZSVe), Belluno, Italy.
Latvian State Forest Research Institute "Silava", Salaspils, Latvia.
Lithuanian University of Health Sciences, Kaunas, Lithuania.
Medical University of Vienna, Austria.
Multidisciplinary Center for Inf. Diseases, University of Bern, Bern, Switzerland.
National Centre for Laboratory Research and Risk Assessment, Tartu, Estonia.
National Public Health Center, Budapest, Hungary.
National Veterinary Research Institute, Pulawy, 35 Poland.
Norwegian Polar Institute, Tromsø, Norway.
Norwegian Veterinary Institute, Tromsø, Norway.
State Veterinary Institute, Olomouc, Czech Republic.
Statens Serum Institut, Copenhagen S, Denmark.
Swedish Veterinary Agency, Uppsala, Sweden.
University of Hohenheim, Stuttgart, Germany.
University of Latvia, Riga, Latvia.
University of Ljubljana, Gerbičeva 60, 1000, Ljubljana, Slovenia.
Vetsuisse faculty, University of Bern, Bern, Switzerland.

Collection of 227 *E. multilocularis* isolates from 19 countries



Five mitochondrial genes examined (4,968bp)

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Mitochondrial genetic diversity and phylogenetic relationships of *Echinococcus multilocularis* in Europe ☆

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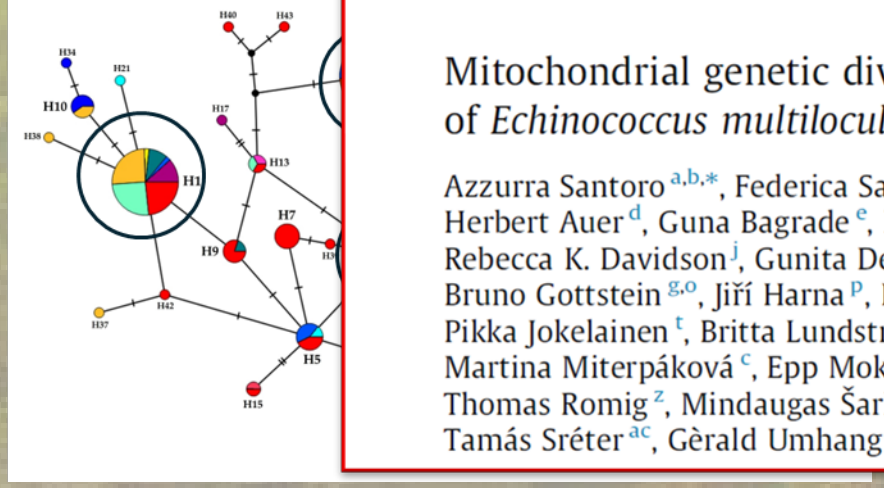
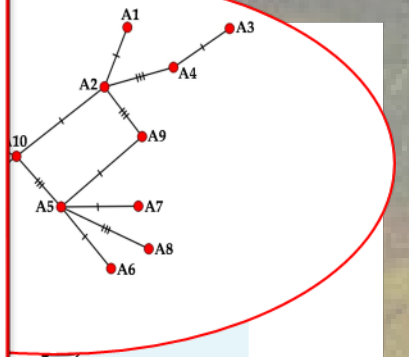




Further knowledge

1

SAMPLING

-missing, known endemic, territories

-under-represented territories

Belarus, Hungary, Ukraine, Romania, European Russia, Serbia, and Sweden

2

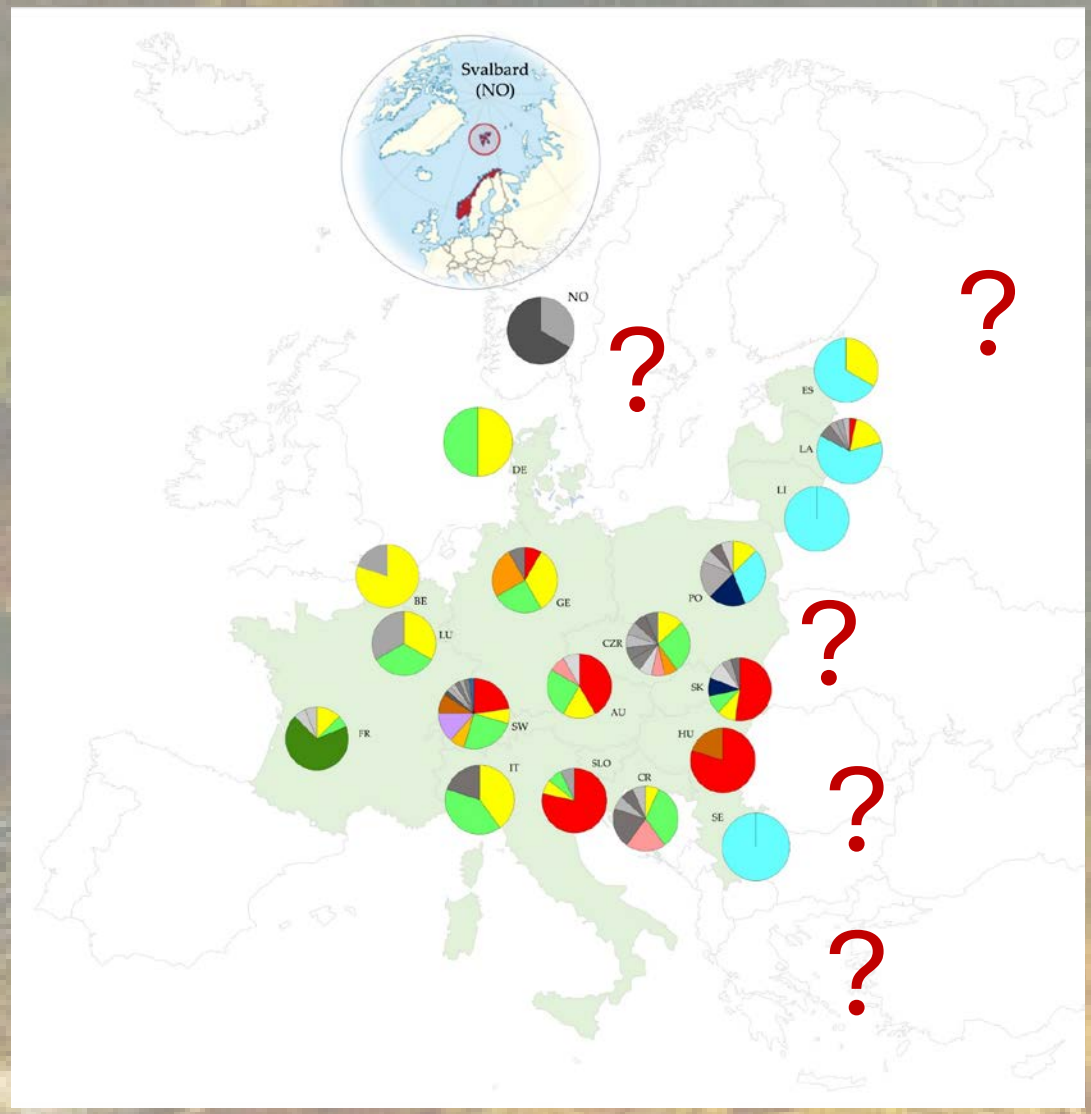
DATA

-more mitochondrial data?

-nuclear data?

--protein coding genes?

--neutral markers?



1

SAMPLING

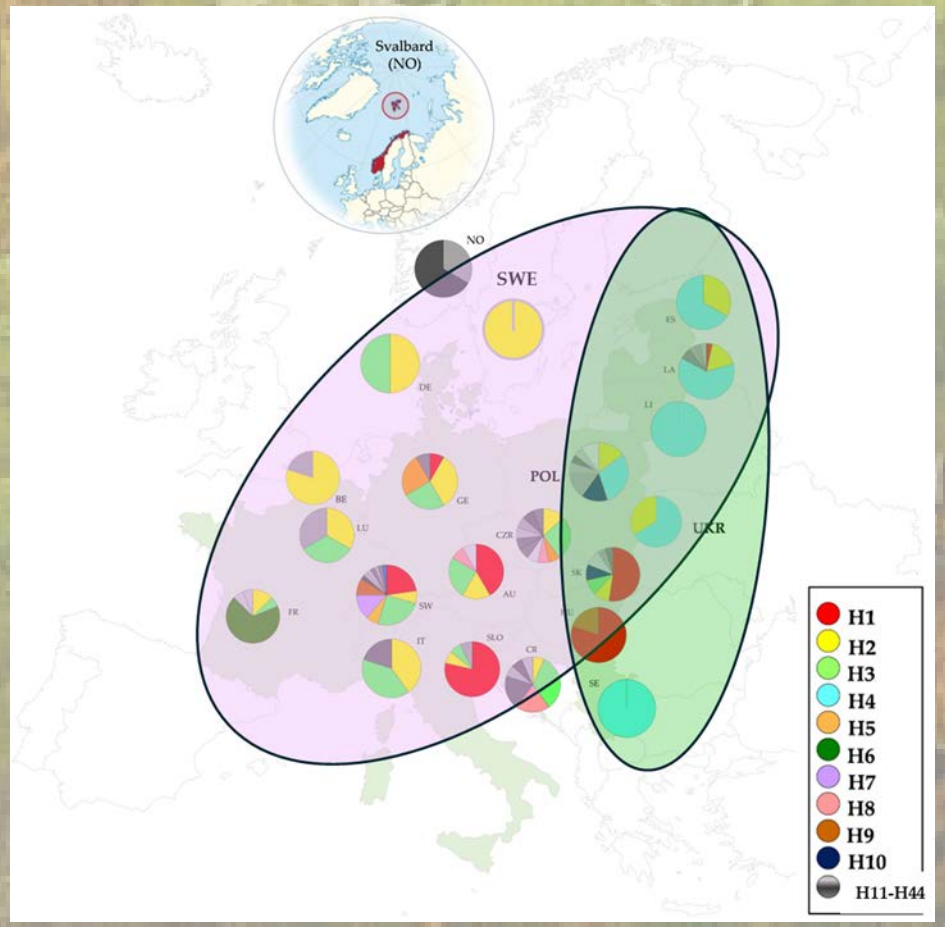
Newly acquired:

-4 samples from Poland (West and South)

-3 samples from Ukraine (Lviv, East)

-2 samples from Sweden (South)

336 isolates

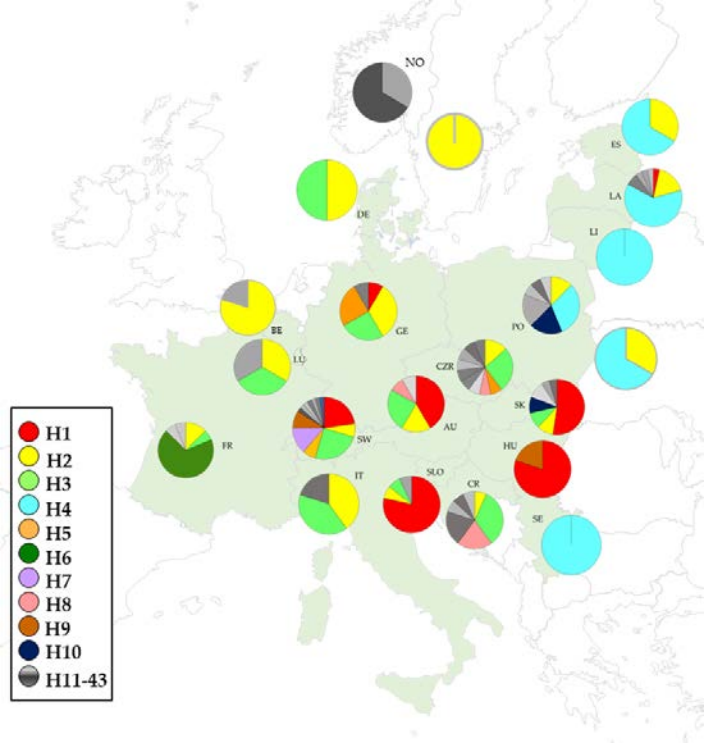


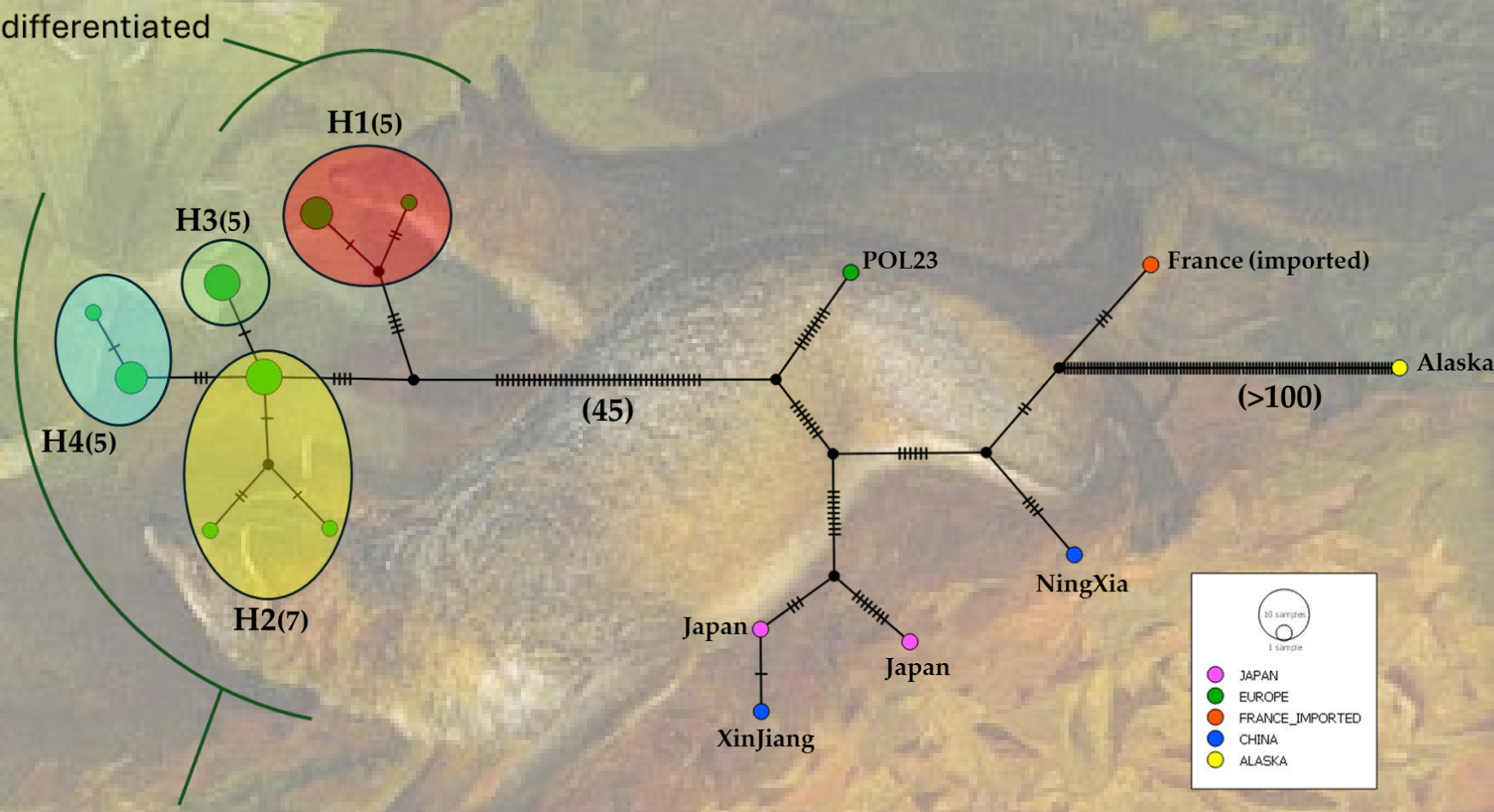
2

DATA
-more mitochondrial data?

23 mitogenomes obtained by Sanger sequencing (~13kbp)

A selection of H1(5), H2(7) H3(5), H4(5) and one Asian-like isolates





2

DATA

-more mitochondrial data?

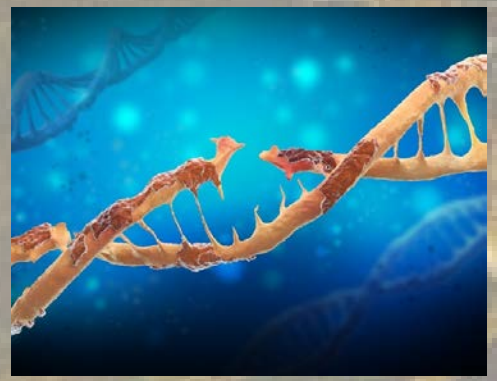
Limitations:

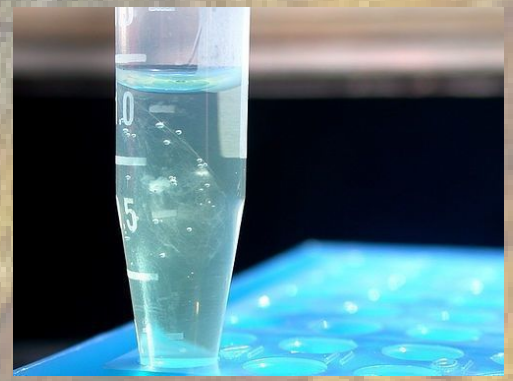
1. Sanger sequencing mitogenomes is not practical

   Solution: using more feasible approach (NGS)

2. Convenience DNA samples (leftovers, low amount, low quality DNA not usable for long PCR)

   Solution: keeping on the five mitochondrial genes dataset





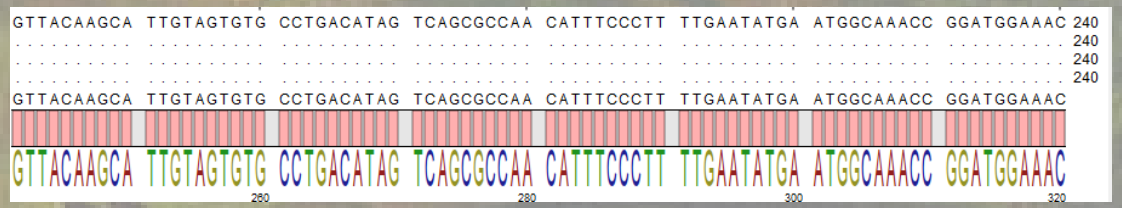
2

DATA
-nuclear data?
Protein coding genes

From literature:
Elp antigen protein (Nakao 2009)
Ef1a (Nakao 2010)
actII (Snabel)

Not particularly polymorphic

Tests for protein-coding nuclear markers (Excretory-secretory protein)

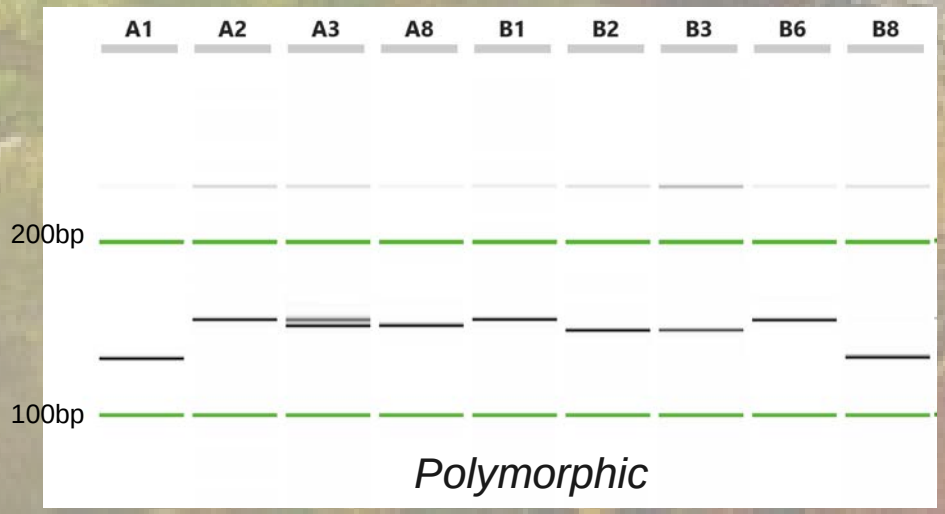


Not promising

2

DATA
-nuclear data?
Neutral markers (eg microsatellite?)

EmW_scaffold_09
Repeat (CTT)n



Polymorphic

Useful for population structure inference

Promising

Aiming to disclose more...
It’s time for new samples

I thank you for the attention

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Photo by Adam Sage