

PATTERNS OF *VESPA VELUTINA* INVASION IN WESTERN IBERIA AND ITALY AS REVEALED BY MOLECULAR MARKERS

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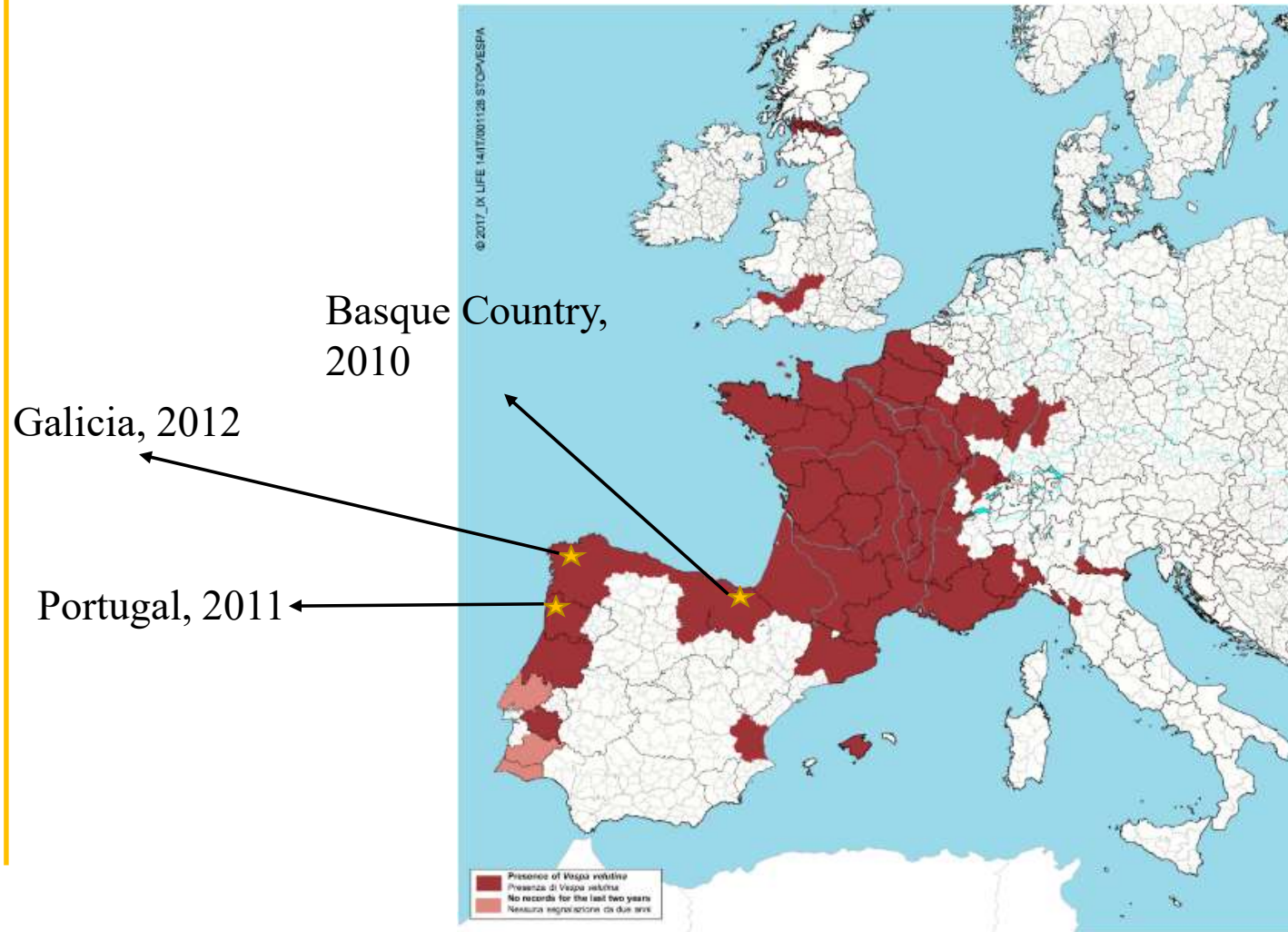
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INVASIVE AREAS OF VESPA VELUTINA



Successful invasion of European countries:

- 2004 - France
- 2010 – Basque Country, Spain
- 2011 – Belgium and Portugal
- 2012 – Galicia, Spain
- 2013 – Italy
- 2014 – Germany
- 2016 – UK
- 2017 – Switzerland



THREAT

Invasive species - major threat to the local biodiversity, through predation, competitive displacement and diseases.

Vespa velutina - generalist predator, consuming a large variety of insects (honeybees, *Vespula* spp. or Diptera) and scavenging a variety of proteins (fish or shrimp) and fruits.

Represents a serious threat to the Beekeeping in Europe



SAMPLES

Microsatellites:

Portugal = 190

Spain = 45

Italy = 11

Total = 246

MtDNA:

Portugal = 22

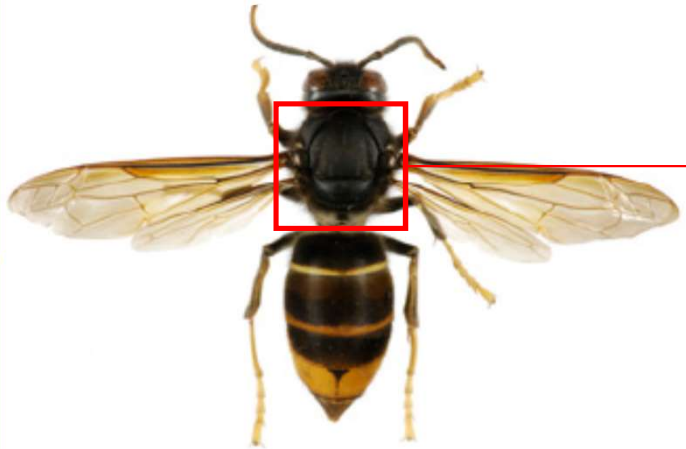
Spain = 13

Italy = 3

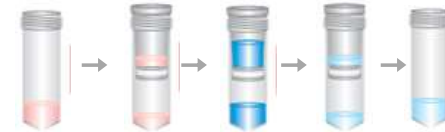
Total = 38



MICROSATELLITES



DNA extraction

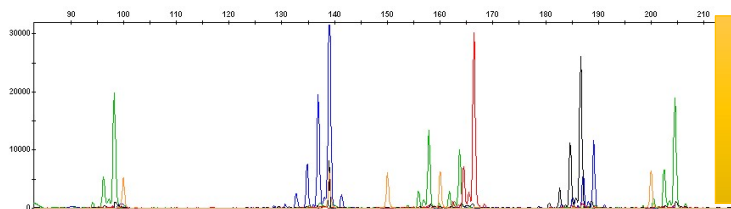


PCR



Capillary electrophoresis
(ABI 3730x1 DNA Analyzer,
Applied Biosystems)

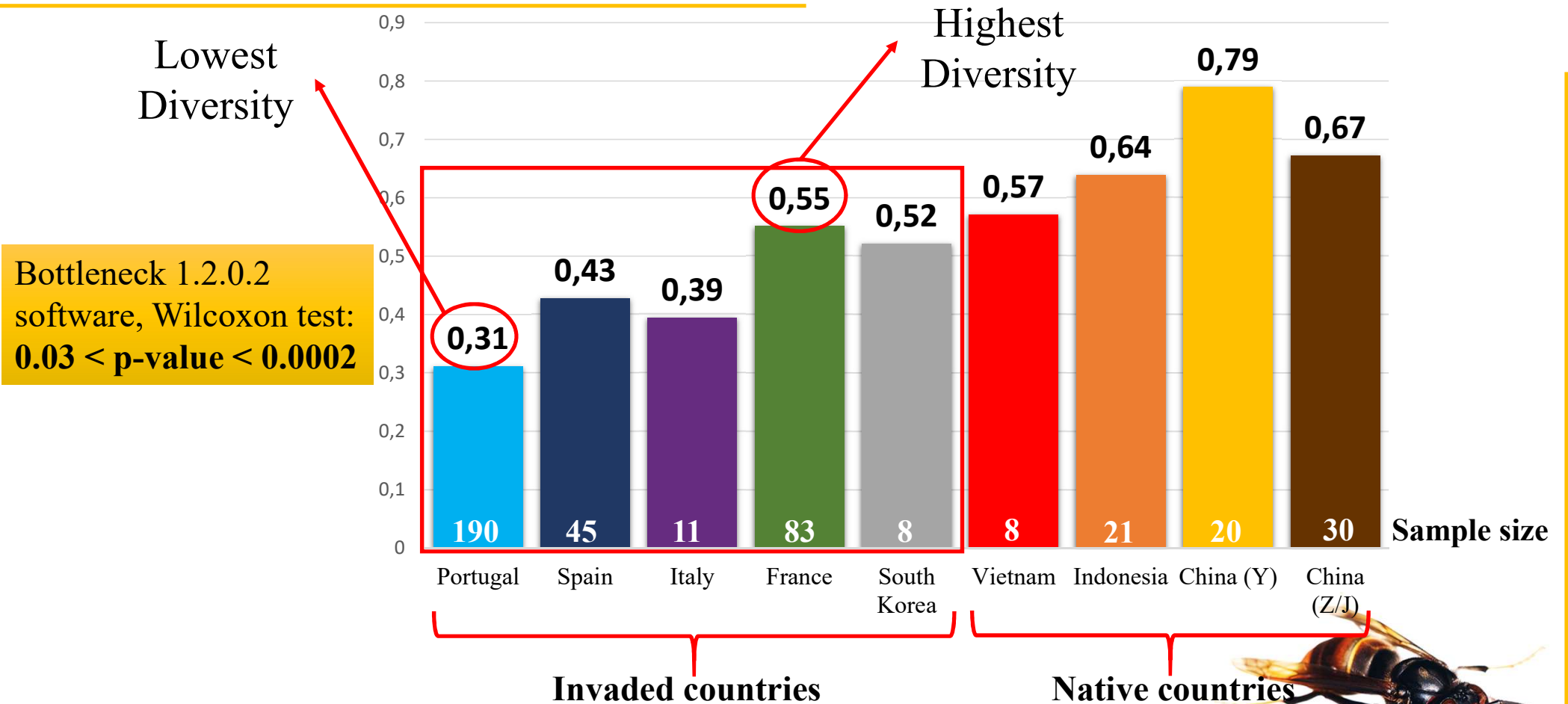
21 dinucleotide microsatellite loci
developed by Hasegawa and
Takahashi (2002), Daly *et al.*
(2002) and Arca *et al.* (2011)



Genotyping
(GeneMapper 3.7,
Applied Biosystems)

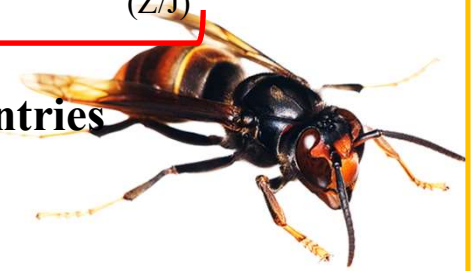


GENETIC DIVERSITY (UHE)

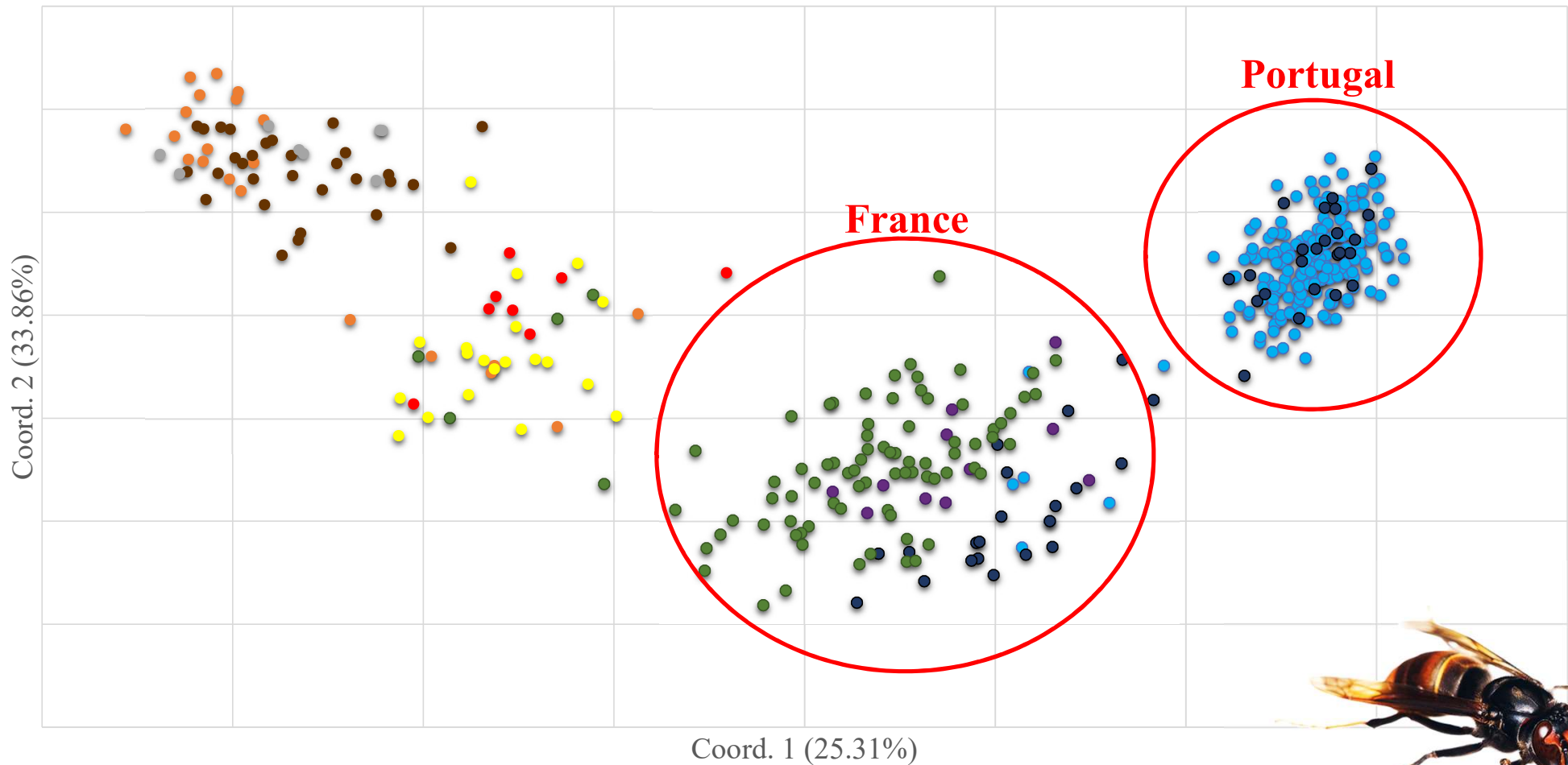


Reference populations from Asia and France (Arca *et al.* 2015)

GenAlEx 6.5 (Peakall and Smouse 2006)



PRINCIPAL COORDINATES (PCoA)



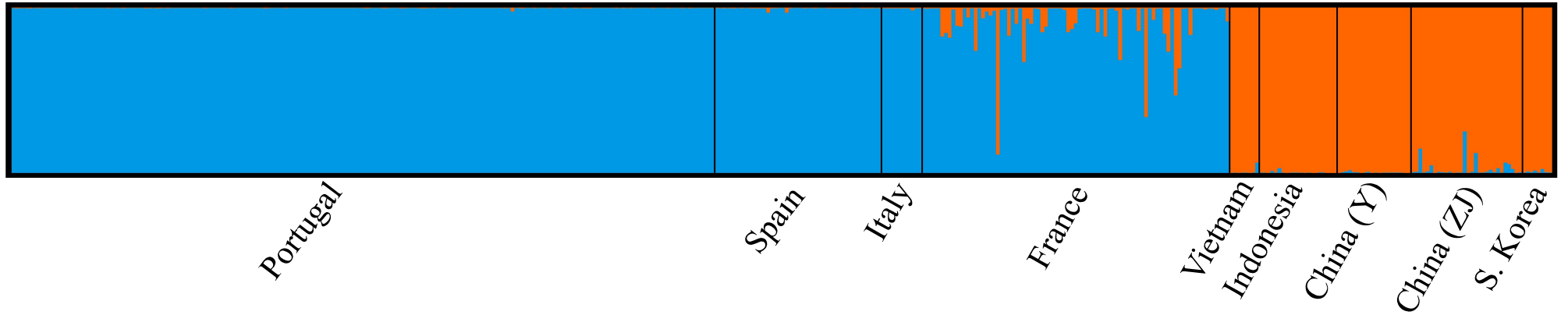
● Portugal ● Spain ● Italy ● France ● Vietnam ● Indonesia ● China (Y) ● China (ZJ) ● South Korea



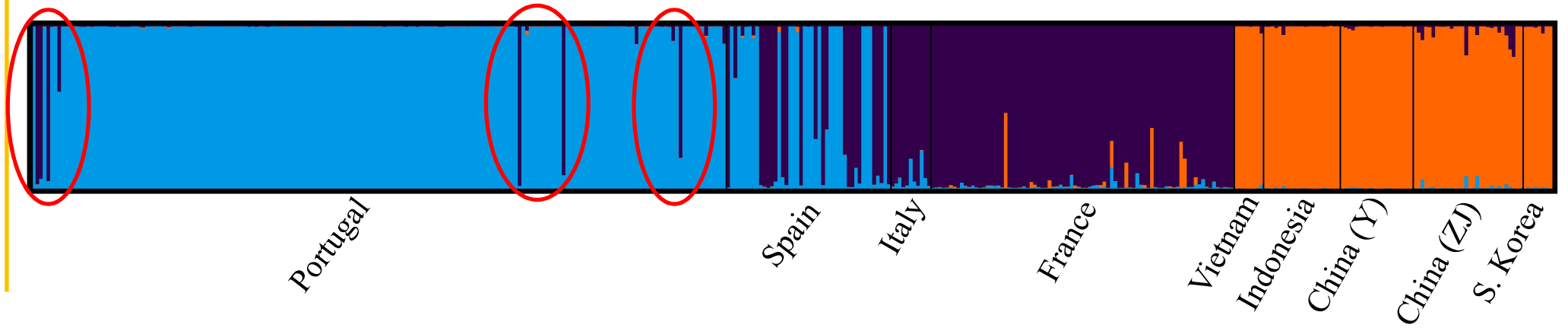
GenAlEx 6.5 (Peakall and Smouse 2006)

STRUCTURE ANALYSIS

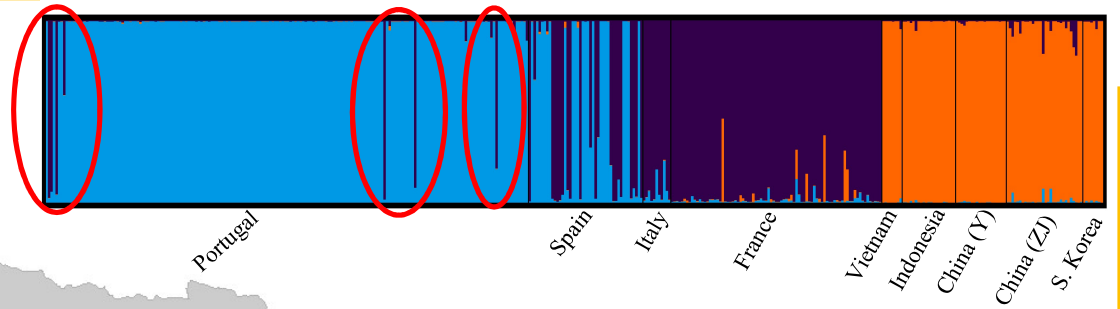
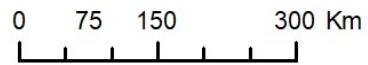
K=2, optimum K (Evanno et al. 2005)



K=3

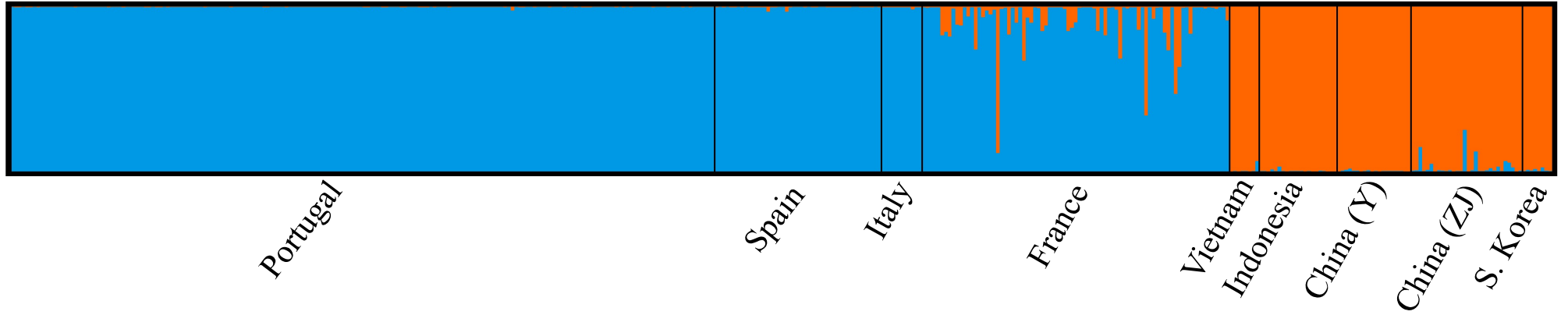


STRUCTURE ANALYSIS

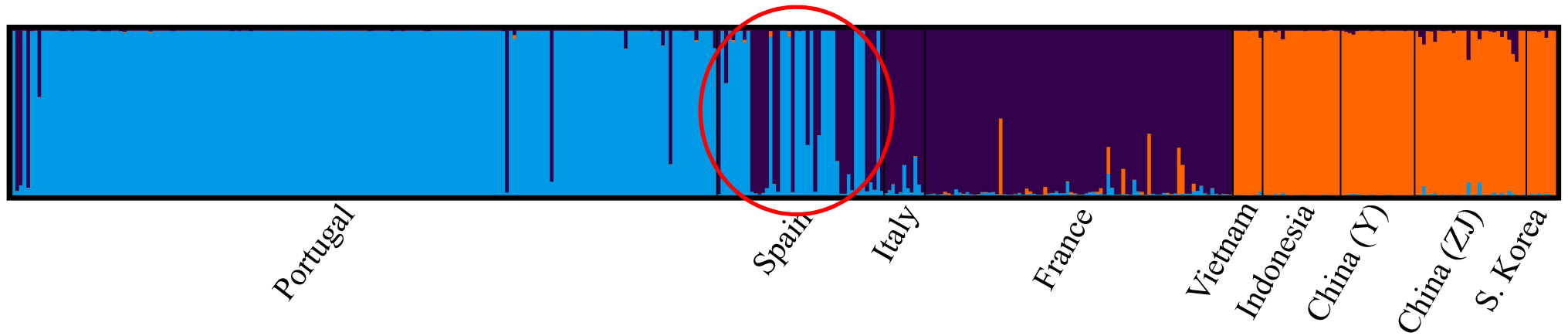


STRUCTURE ANALYSIS

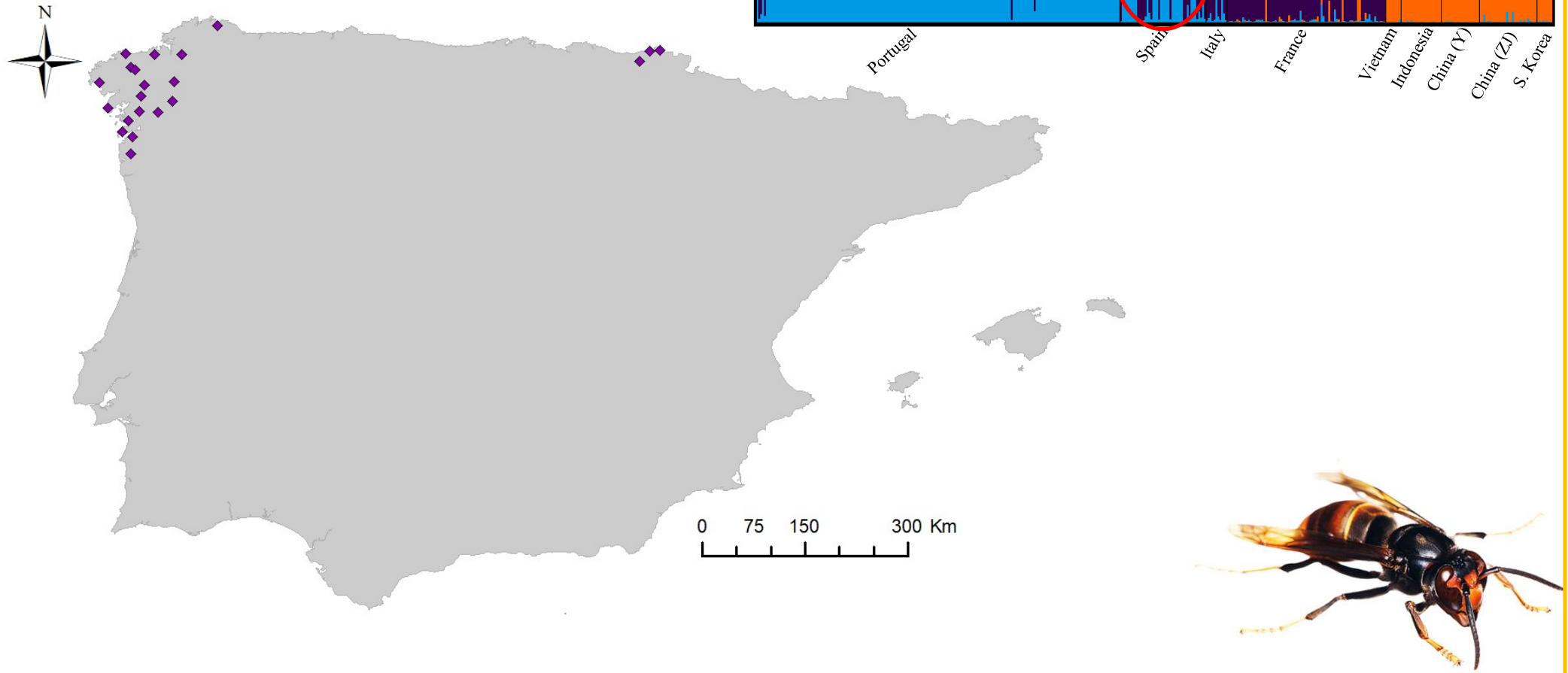
K=2, optimum K



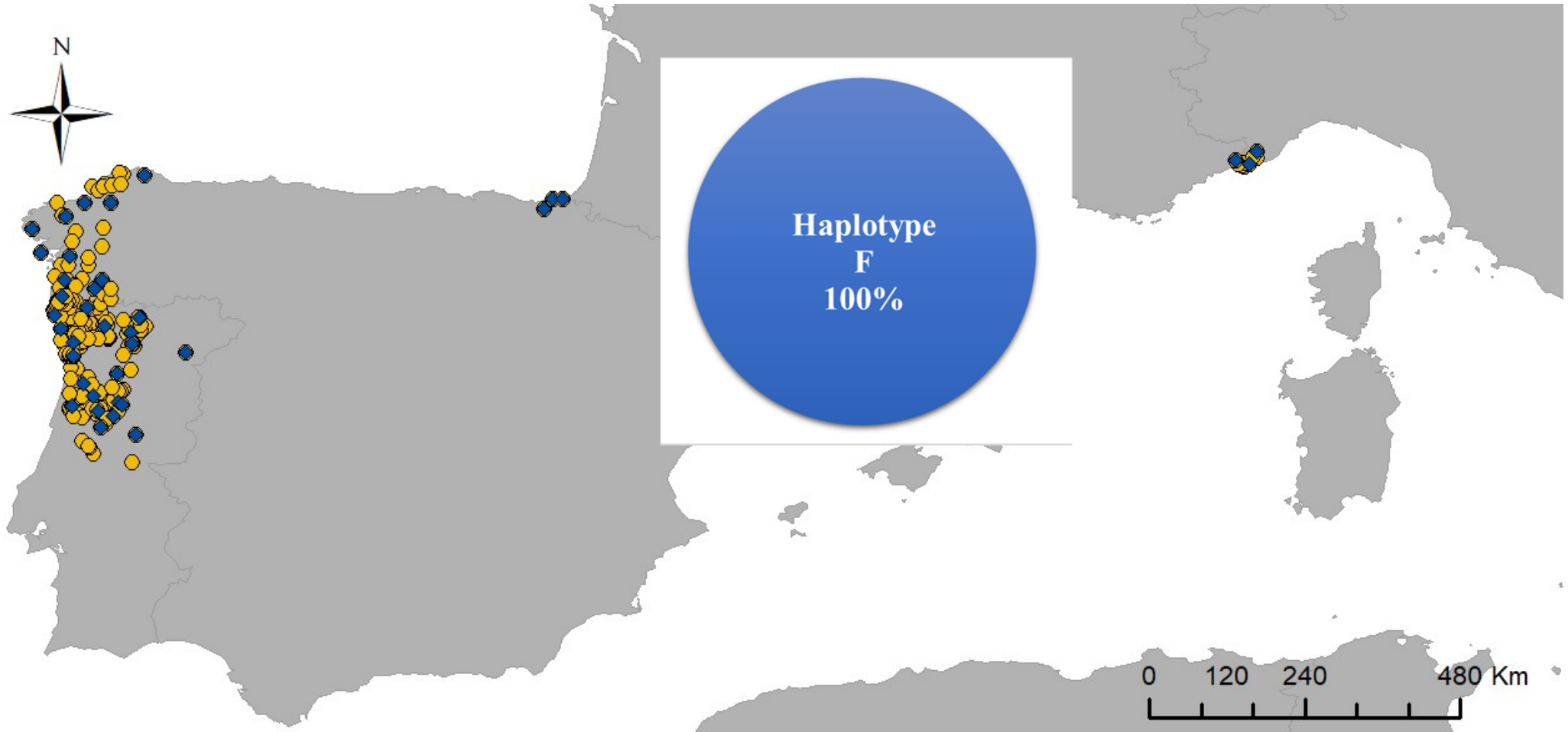
K=3



STRUCTURE ANALYSIS



MITOCHONDRIAL DNA



FINAL REMARKS

- ✓ Lower genetic diversity of invasive species, especially in Portugal;
- ✓ There are two (probable) ways of expansion:
 - A land expansion from France, through Pyrenees;
 - An independent entrance in Portugal (anecdotal reports of entrance in a cargo ship with wood)
- ✓ Some individuals in Portugal may have entered independently from the first Portuguese invasion through human transportation.



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Thank you!!

