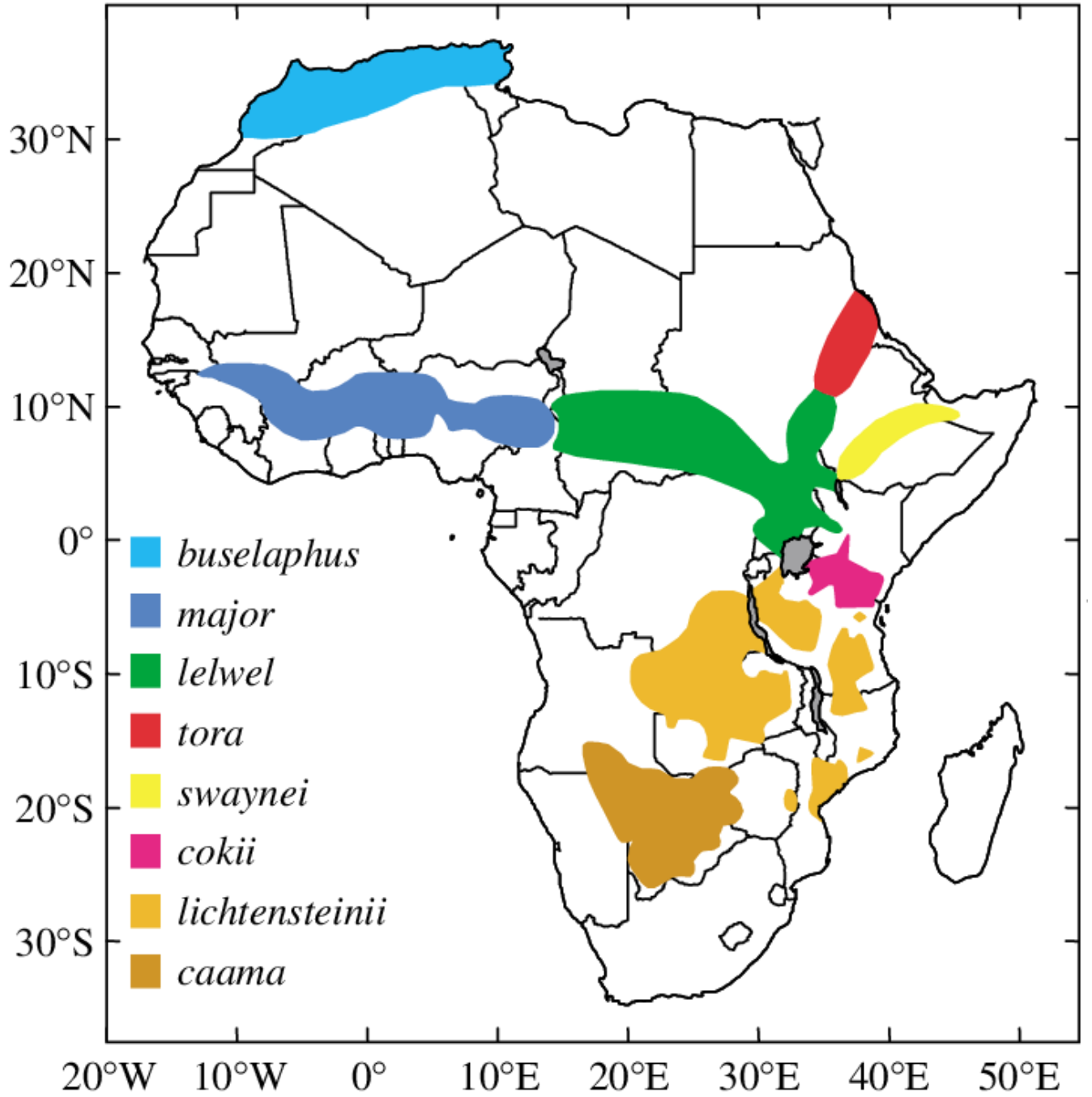
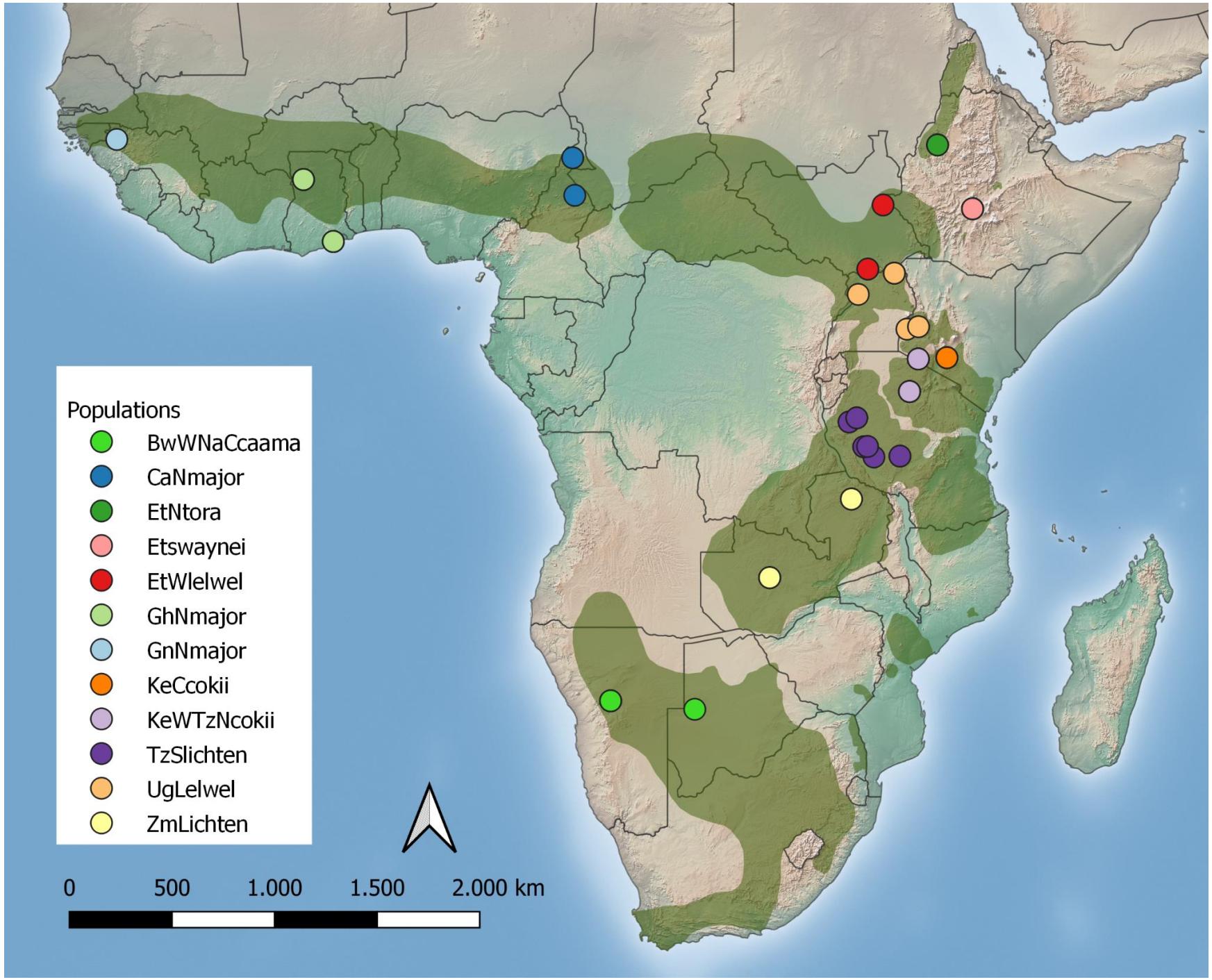
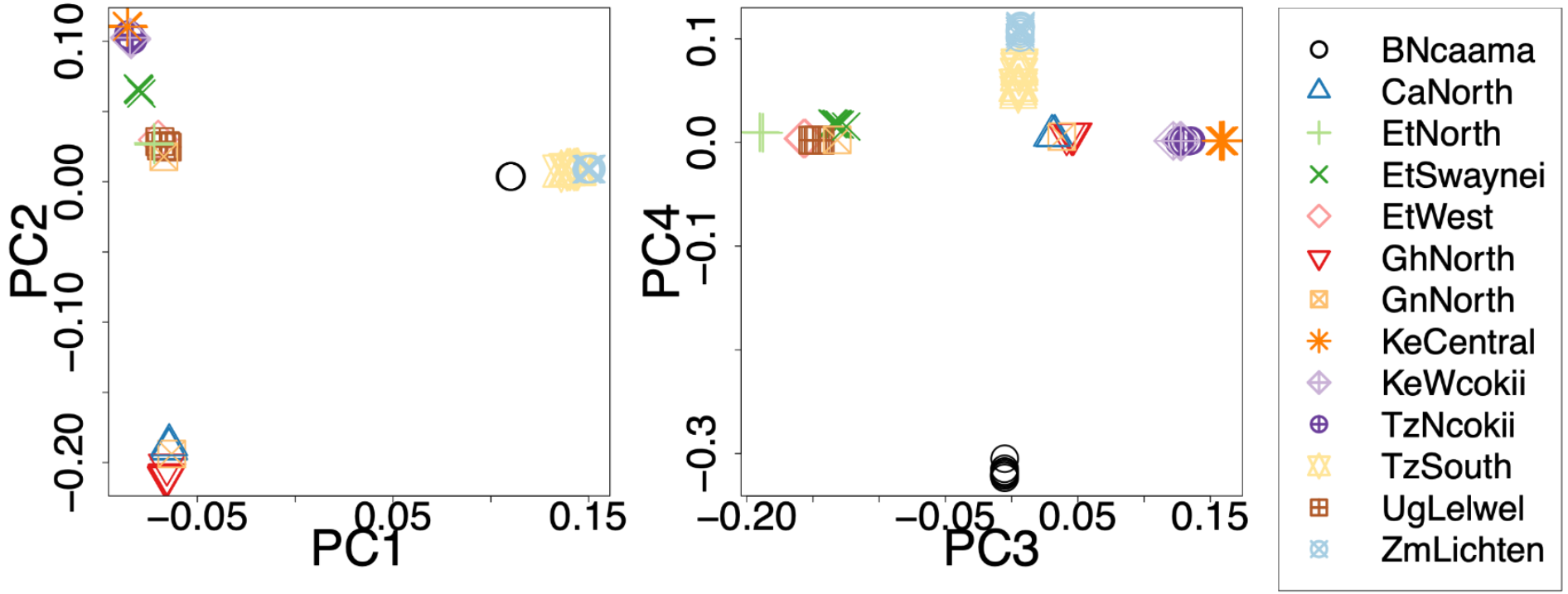
Population structure in African wildlife

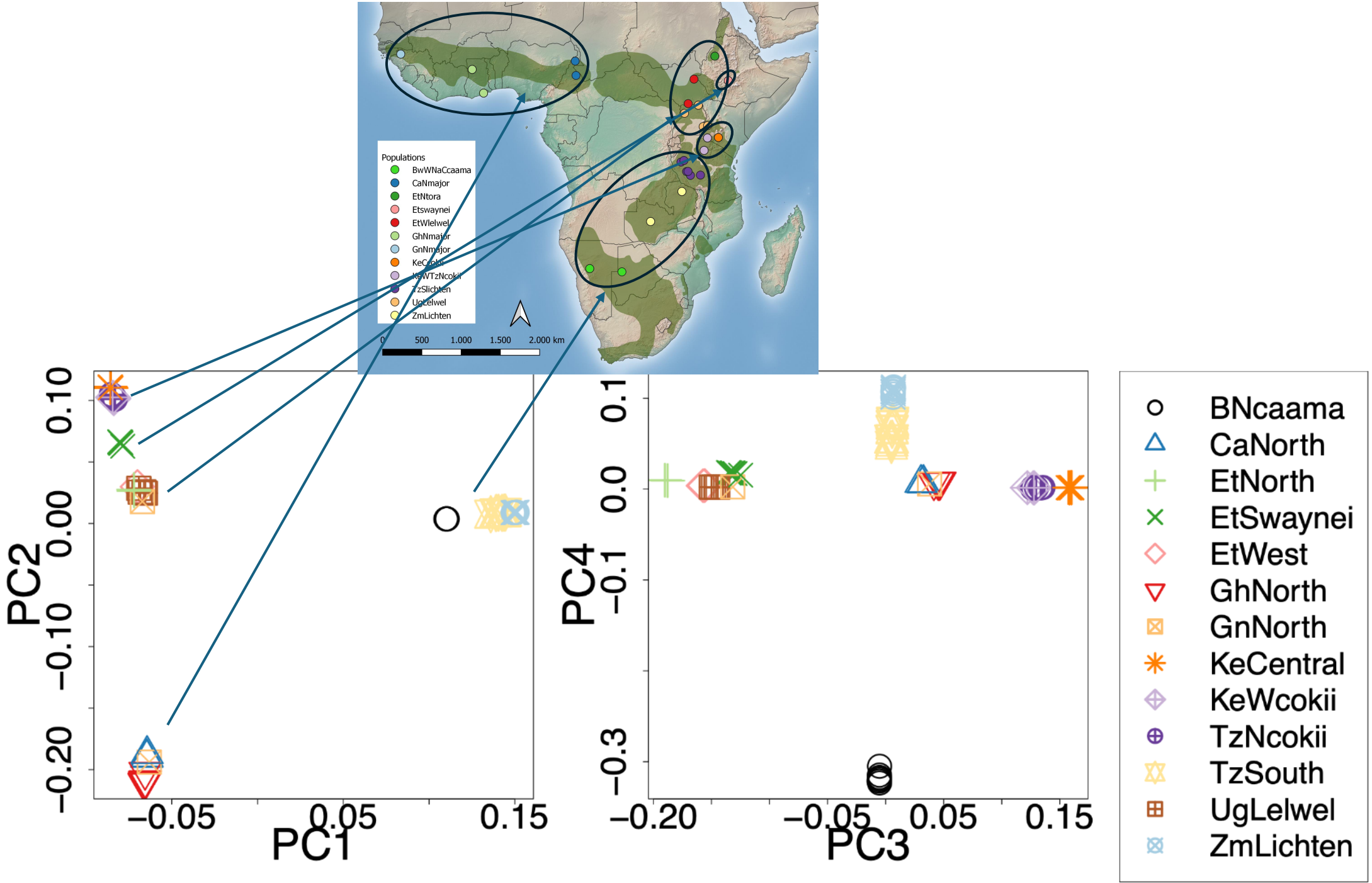
Day 3, Open Institute workshop, Kilifi, August 9th 2024

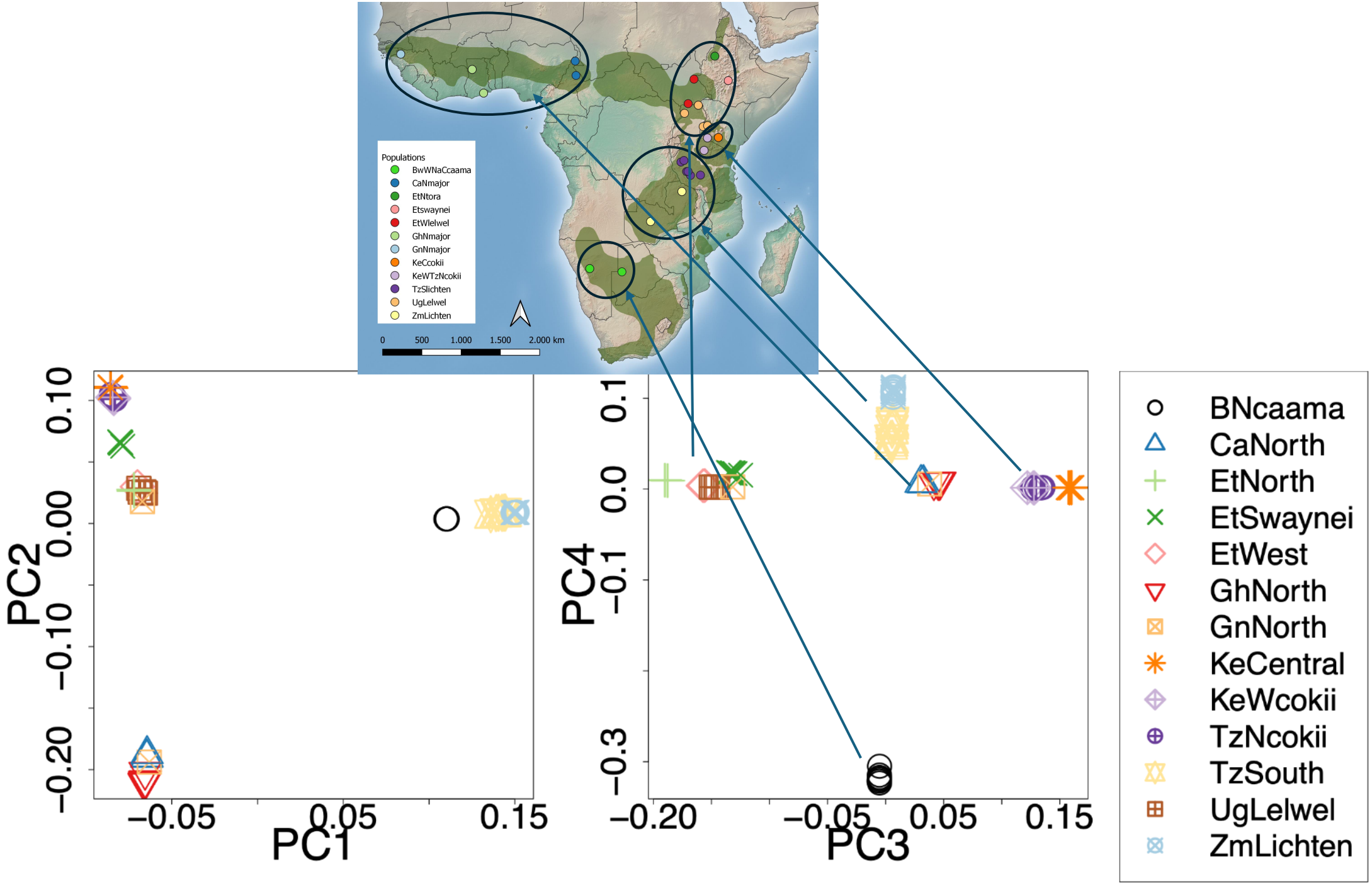
Assoc. Prof. Rasmus Heller, UCPH


30°N
20°N
10°N
0°
10°S
20°S
30°S
20°W
10°W
0°
10°E
20°E
30°E
40°E
50°E
buselaphus
major
lelwel
tora
swaynei
cokii
lichtensteinii
caama


Populations
BwWNaCcaama
CaNmajor
EtNtora
Etswaynei
EtWlelwel
GhNmajor
GnNmajor
KeCcokii
KeWTzNcokii
TzSlichten
UgLelwel
ZmLichten
0
500
1.000
1.500
2.000 km


PC2
0.10
0.00
−0.10
−0.20
−0.05
0.05
0.15
PC1
PC4
0.1
0.0
−0.1
−0.3
−0.20
−0.05
0.05
0.15
PC3
BNcaama
CaNorth
EtNorth
EtSwaynei
EtWest
GhNorth
GnNorth
KeCentral
KeWcokii
TzNcokii
TzSouth
UgLelwel
ZmLichten


Populations
BwWNaCcaama
CaNmajor
EtNtora
Etswaynei
EtWlelwel
GhNmajor
GnNmajor
KeCoKon
KeWTzNcokii
TzSlichten
UgLelwel
ZmLichten
0
500
1.000
1.500
2.000 km
PC2
PC1
PC4
PC3
BNcaama
CaNorth
EtNorth
EtSwaynei
EtWest
GhNorth
GnNorth
KeCentral
KeWcokii
TzNcokii
TzSouth
UgLelwel
ZmLichten


Populations
BwWNaCcaama
CaNmajor
EtNtora
Etswaynei
EtWlelwel
GhNmajor
GnNmajor
KeCcokii
KeWTzNcokii
TzSlichten
UgLelwel
ZmLichten
0
500
1.000
1.500
2.000 km
PC2
PC1
PC4
PC3
BNcaama
CaNorth
EtNorth
EtSwaynei
EtWest
GhNorth
GnNorth
KeCentral
KeWcokii
TzNcokii
TzSouth
UgLelwel
ZmLichten

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How would you characterize population structure in hartebeests (is it strong/weak, geographically sorted, does it correspond to the described subspecies, etc.).

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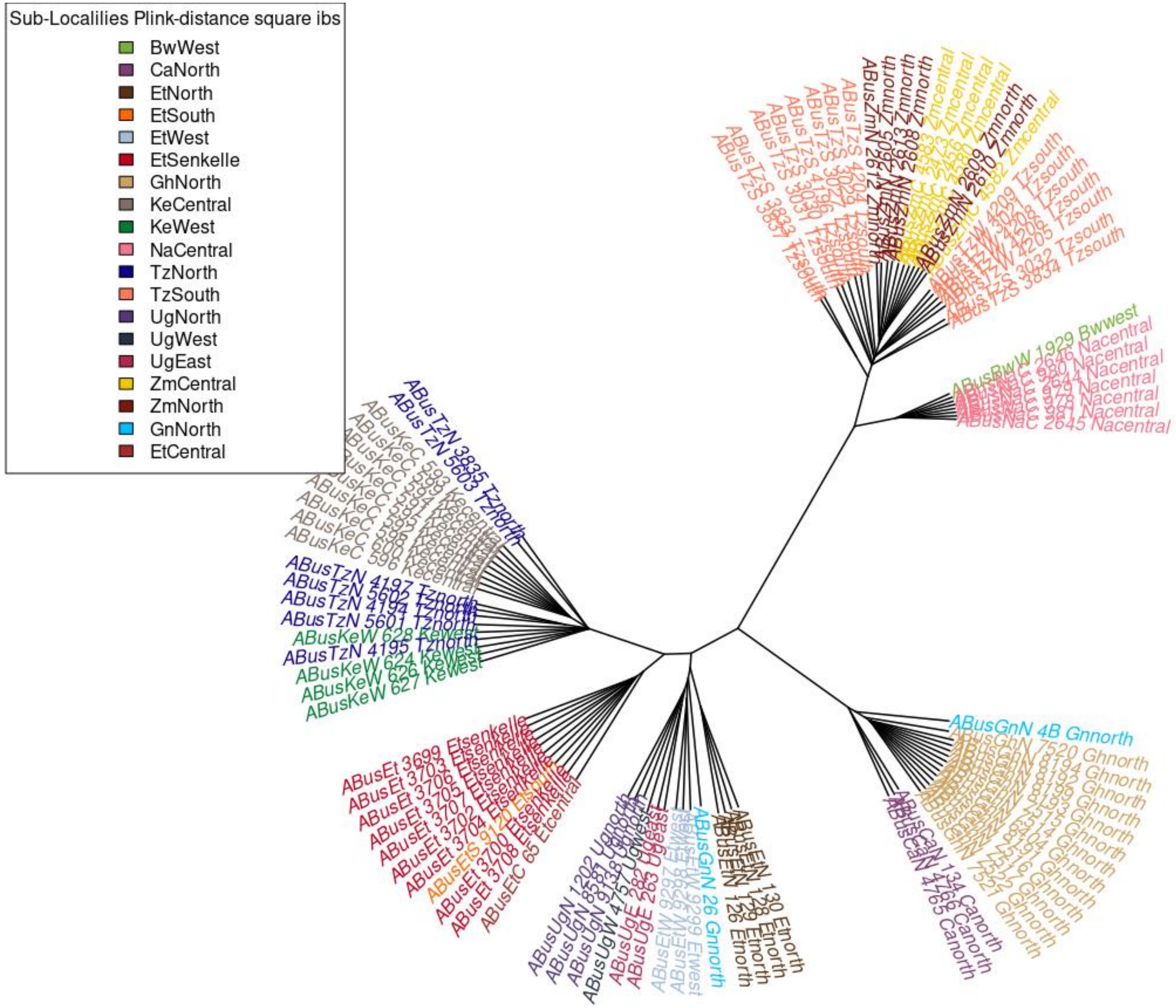
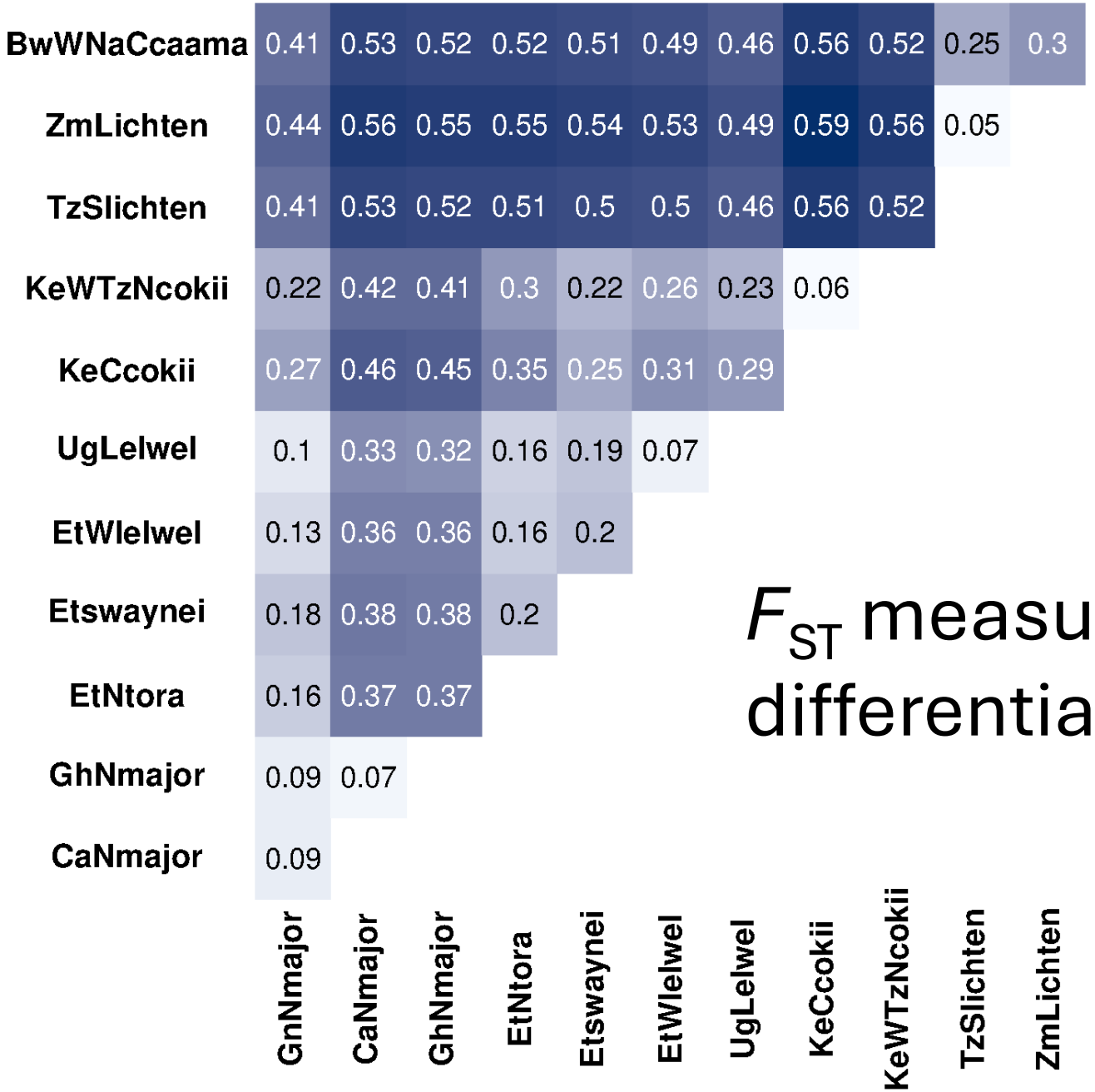

Sub-Localilies Plink-distance square ibs
BwWest
CaNorth
EtNorth
EtSouth
EtWest
EtSenkelle
GhNorth
KeCentral
KeWest
NaCentral
TzNorth
TzSouth
UgNorth
UgWest
UgEast
ZmCentral
ZmNorth
GnNorth
EtCentral



F_{ST} measures differentiation

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Can you deduce the deepest evolutionary divergence in hartebeests? What about the second deepest?

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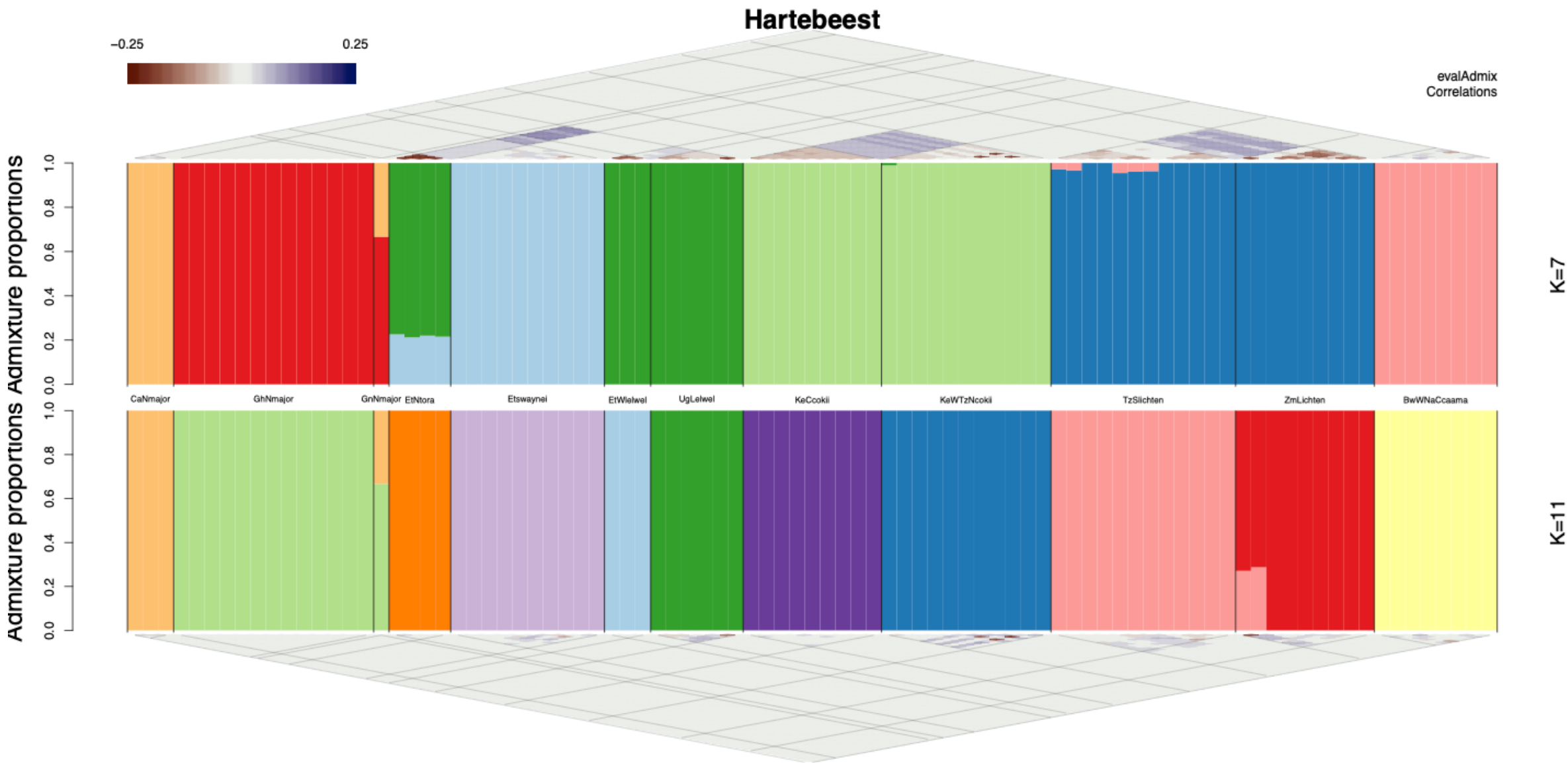
Hartebeest
−0.25
0.25
evalAdmix
Correlations
Admixture proportions
0.0
0.2
0.4
0.6
0.8
1.0
CaNmajor
GhNmajor
GnNmajor
EtNtora
Etswaynel
EtWlelwel
UgLelwel
KeCcokii
KeWTzNcokii
TzSilichten
ZmLichten
BwWNaCcaama
K=7
K=11

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How many hartebeest populations are there in this data? Are they admixing?

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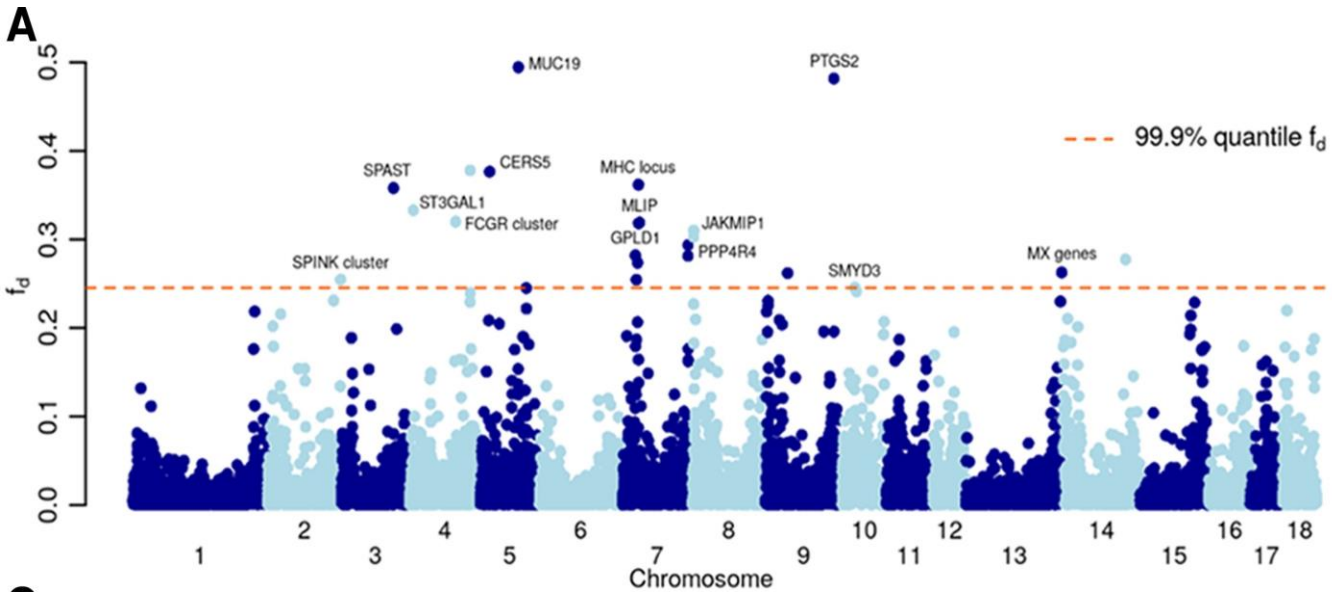
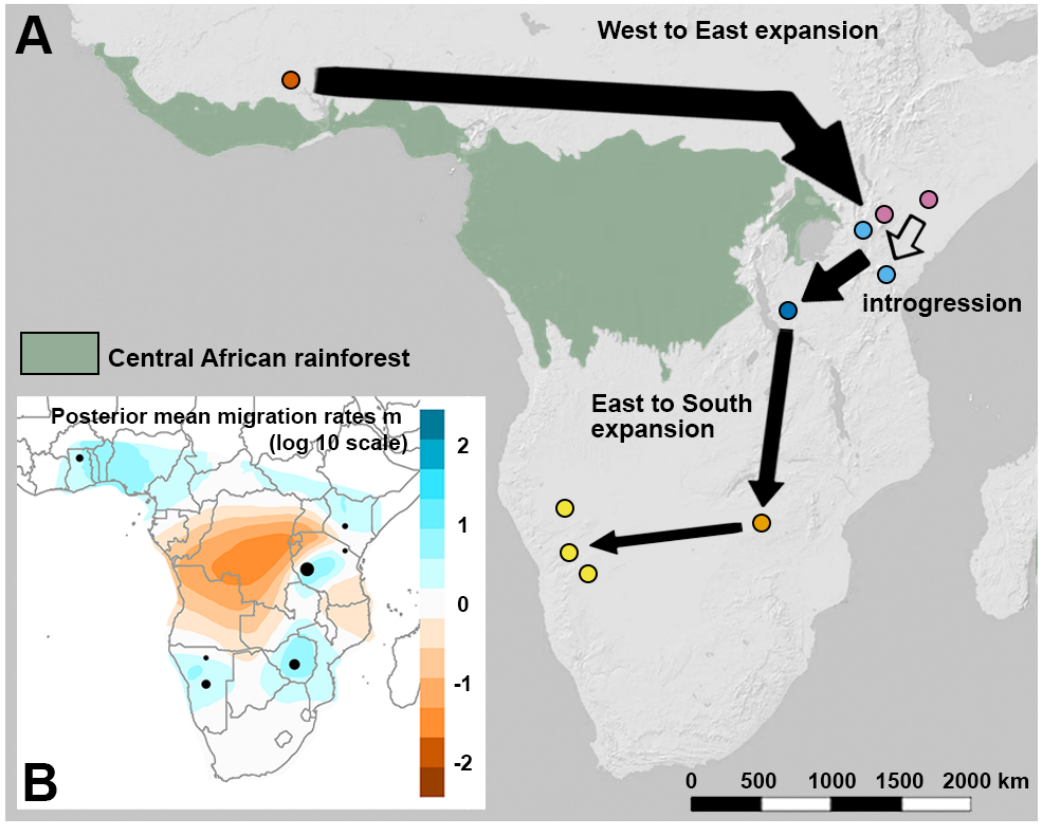
Examples of admixture in African wildlife

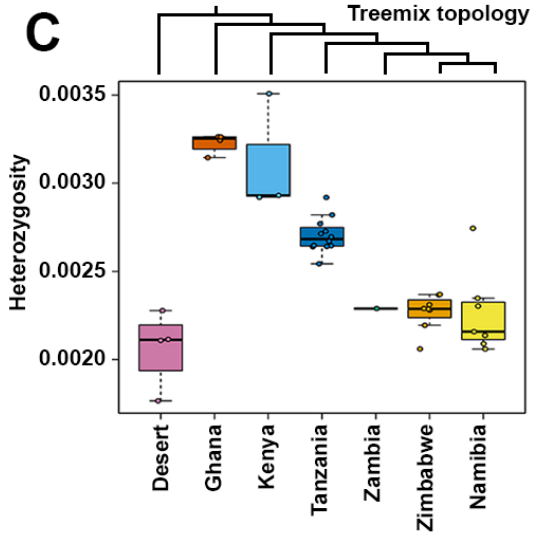
Case: warthogs

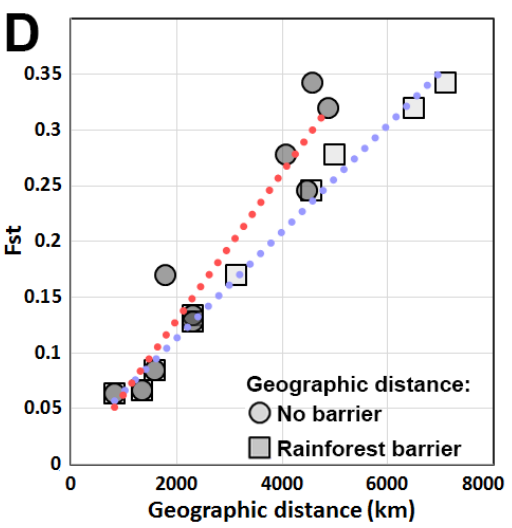
Case: warthogs



Immune system genes introgressed from desert to common warthog







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Why would immune genes introgress as common warthogs expanded their range?

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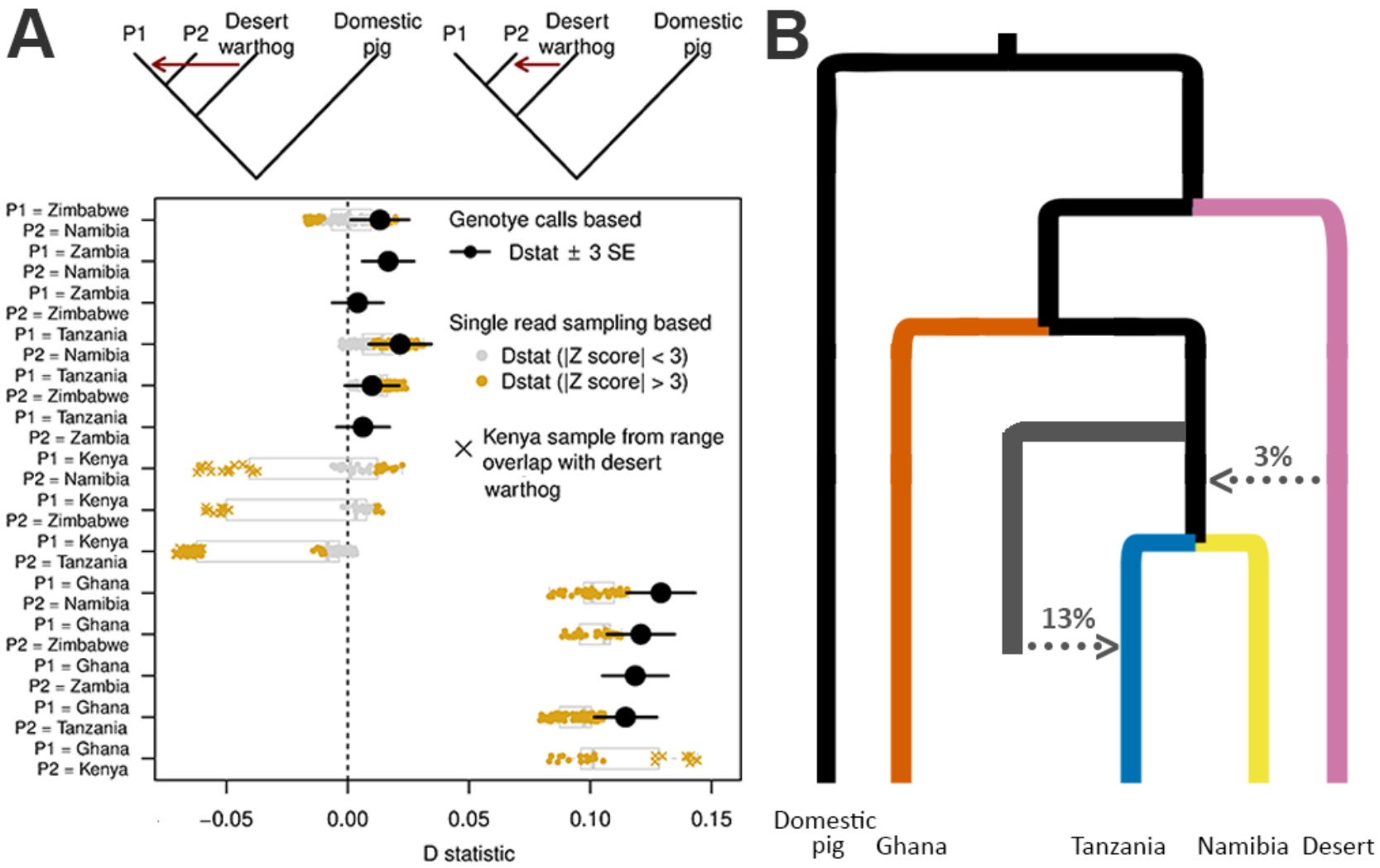
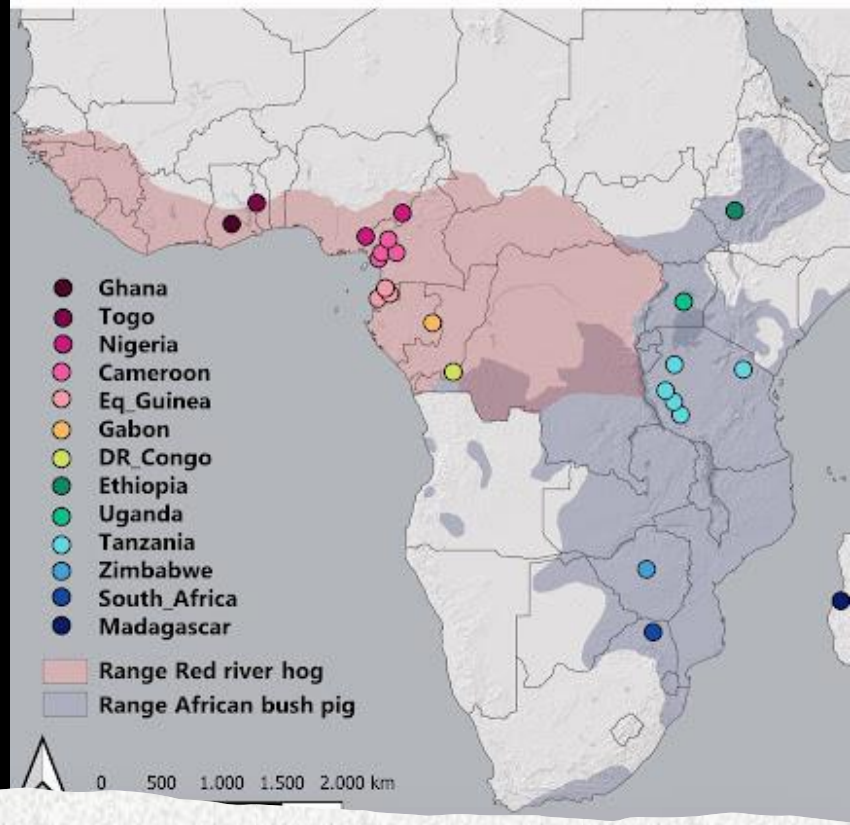
How do we know there was introgression?



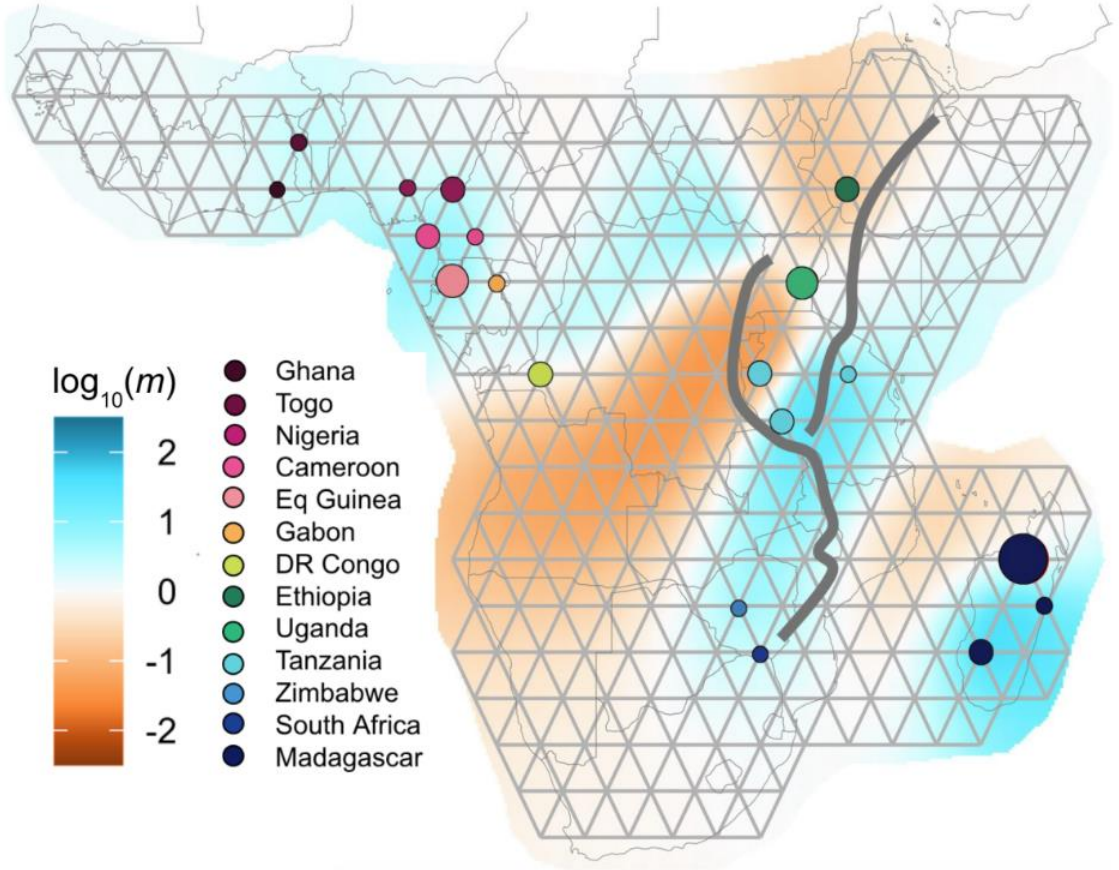


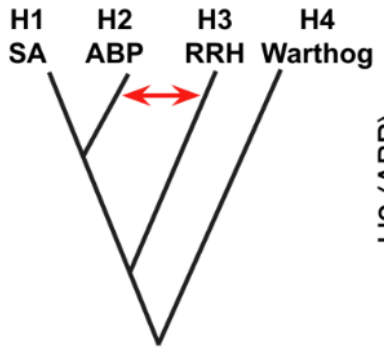
Case: river hogs

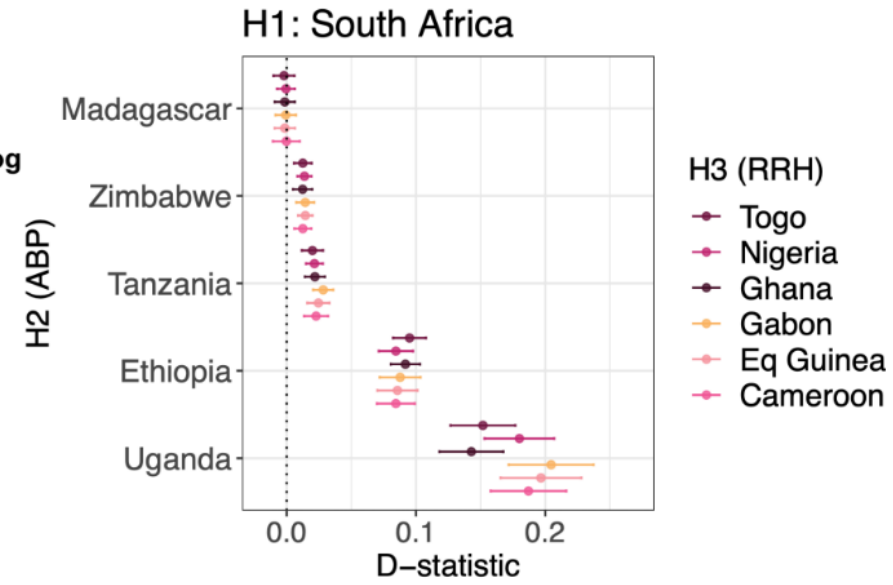
"...the two populations are morphologically distinct with no indication of gene flow"
Peter Grubb, 1993

Case: river hogs

b







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Are there two species of Potamochoerus, and how does it influence their conservation?

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Case: river hogs