Kalahari Basin Prehistory: Genetic divergence

Mark Stoneking
on behalf of the KBA geneticists

Kalahari Basin Area
Endangered Language & Population History Research
The blind researchers and the elephant

(with thanks to B. Pakendorf)
Outline

mtDNA: **maternal** history

Y chromosome: **paternal** history

Genome-wide data: **the other 99.5% of our ancestry**
Unraveling the Complex Maternal History of Southern African Khoisan Populations

Chiara Barbieri,¹* Tom Güldemann,²,³ Christfried Naumann,²,³ Linda Gerlach,¹ Falko Berthold,¹ Hirosi Nakagawa,⁴ Sununguko W. Mpoloka,⁵ Mark Stoneking,⁶ and Brigitte Pakendorf¹*
MtDNA

Multidimensional scaling (MDS) plot
Y-chromosome

MDS plot
Analysis of Molecular Variance: AMOVA

Larger genetic differences between groups

Smaller genetic differences between groups (and so more of the variance is within groups)

(with thanks to C. Barbieri)
AMOVA – populations excluded
AMOVA – Khoisan groups

- within groups
- between groups
AMOVA to test groupings

Larger genetic differences between groups
Smaller genetic differences among populations from the same group

Genetic differences are mostly between groups => groupings correspond to genetic structure
AMOVA to test groupings

Larger genetic differences among populations from the same group
Smaller genetic differences between groups

Genetic differences are mostly among populations from the same group
=> groupings DO NOT correspond to genetic structure
AMOVA – Khoisan populations

Within groups

Among populations within groups

Between groups
Geographic clusters (Khoisan only!)
AMOVA – Khoisan groups
Genome-wide data

The genetic prehistory of southern Africa

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Tree based on “Khoisan” ancestry
Tree based on “non-Bantu” ancestry
How old is this divergence?

• Developed an approach based on new mutations that occurred after the divergence of NW and SE Kalahari

• Result: divergence ~30,000 years ago

• many assumptions involved in the method that mean it is probably an upper bound

• however, a different method applied to a different dataset gives a similar date (~35,000 years ago; Schlebusch et al. 2012)

• the existence of further substructure within mtDNA lineages suggests divergence could be even older
Was there contact after divergence?

• YES: identical mtDNA sequences shared between NW and SE Kalahari groups

• Modeling shows that such sharing reflects contact within the past 7,500 years ago (if it were any older, mtDNA sequences would no longer be identical)

• Overall, the results suggest deep divergence between NW and SE Kalahari groups (possibly due to the presence of Makgadikgadi Lake?) followed by more recent contact (possibly due to drying of the lake?)
And don’t forget: extensive contact with other groups!