Ancient DNA provides novel insights into the origin of dogs

Laurent A. F. Frantz

*University of Oxford*
Dog domestication
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Wang et al. 2015, Cell Research
Dog domestication

Thalmann et al. 2014, *Science*
Dog domestication

Shannon et al. 2015, PNAS
Newgrange dog

- 4,800 calBP
- >70% endogenous DNA
- 25x coverage
- Late Neolithic in Ireland

- 60 mtDNA sequences from European ancient dogs
East / West split in modern dogs
Demographic history

a.

Effective Population size

Time in generations

Wolf-1
Wolf-2
Newgrange
Portugal Village Dog1
Portugal Village Dog2
Chinese Village Dog1
Chinese Village Dog2

b.

Effective Population size

Time in generations

Wolves
Western Eurasia
East Asia
Demographic history

$\mu = 0.3e^{-8}$

$\mu = 0.4e^{-8}$

a.

b.

-East to West migration
Split time – calibrating mutation rate
Split time – calibrating mutation rate

Estimate highly similar to Skoglund et al. 2015
Time of divergence

0.3 \times 10^{-8}

0.4 \times 10^{-8}
mtDNA replacement

a.

b.

c.
mtDNA replacement

a. 

b. 

- Ancient - 3,090 BP to 14,700 BP 
- Total frequency
- Haplogroups A, B, C, D 
- n=50
- n=1
- n=5
- n=10
- n=20

- Modern 
- Total frequency 
- Haplogroups A, B, C, D 
- n=167
Modeling the history of domestic dogs

- $0.3 \times 10^{-8}$
- $0.4 \times 10^{-8}$
Modeling the history of domestic dogs

$c. \quad 0.3 \times 10^{-8} \quad 0.4 \times 10^{-8}$
Modeling the history of domestic dogs
Conclusions

• East to West transport of domestic dogs
  – From East Asia? (Wang et al. 2015, Cell Research)
  – From Central Asia? (Shannon et al. 2015, PNAS)
  – Yamnya?

• Near complete replacement of Late Paleolithic indigenous European dogs

• Ancient European dogs – a separate domestication?
  – Thalmann et al. 2014, Science

• Dual origin of domestic dogs (Europe and Asia)?
  – Similar scenario in pigs.
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