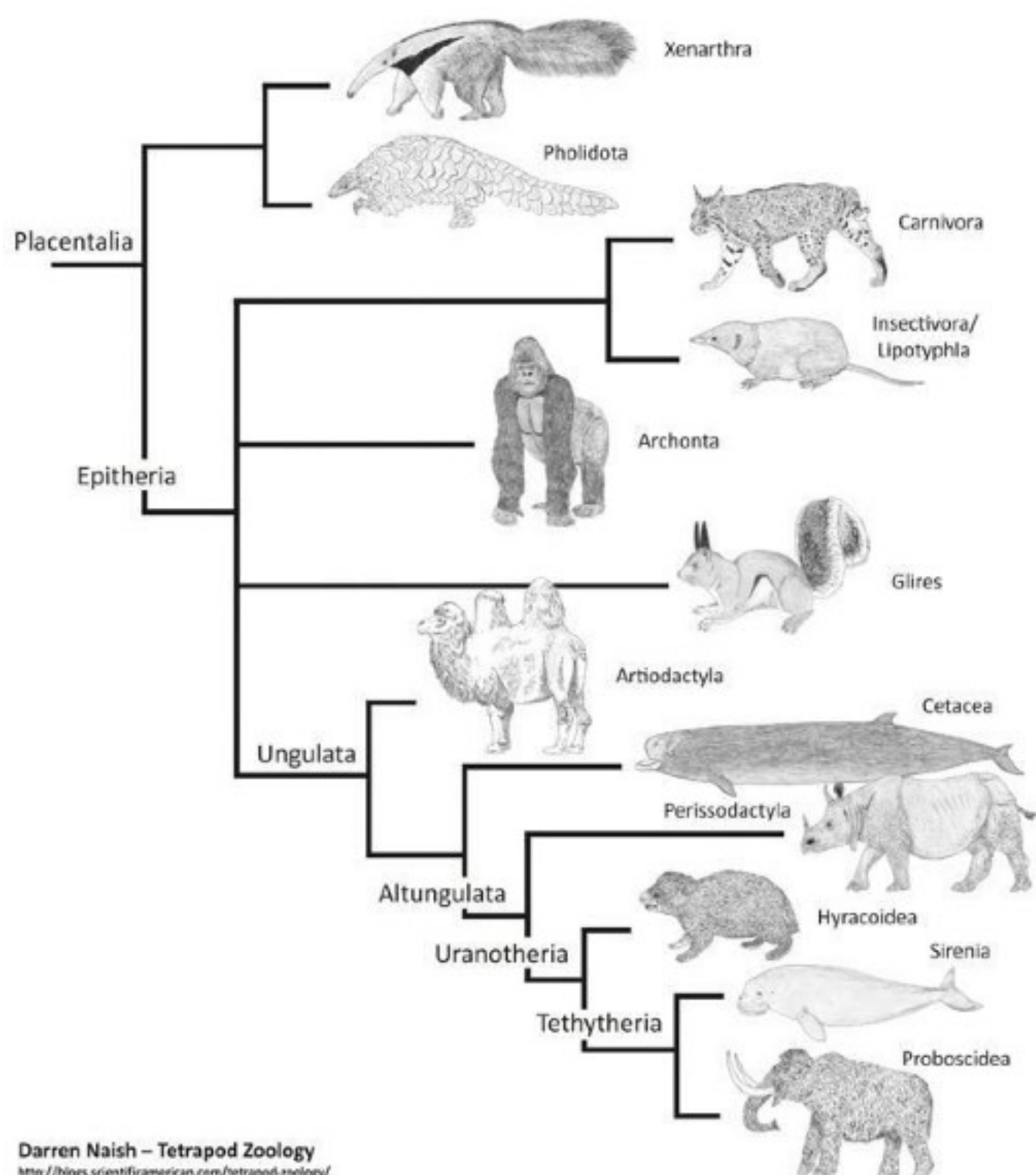


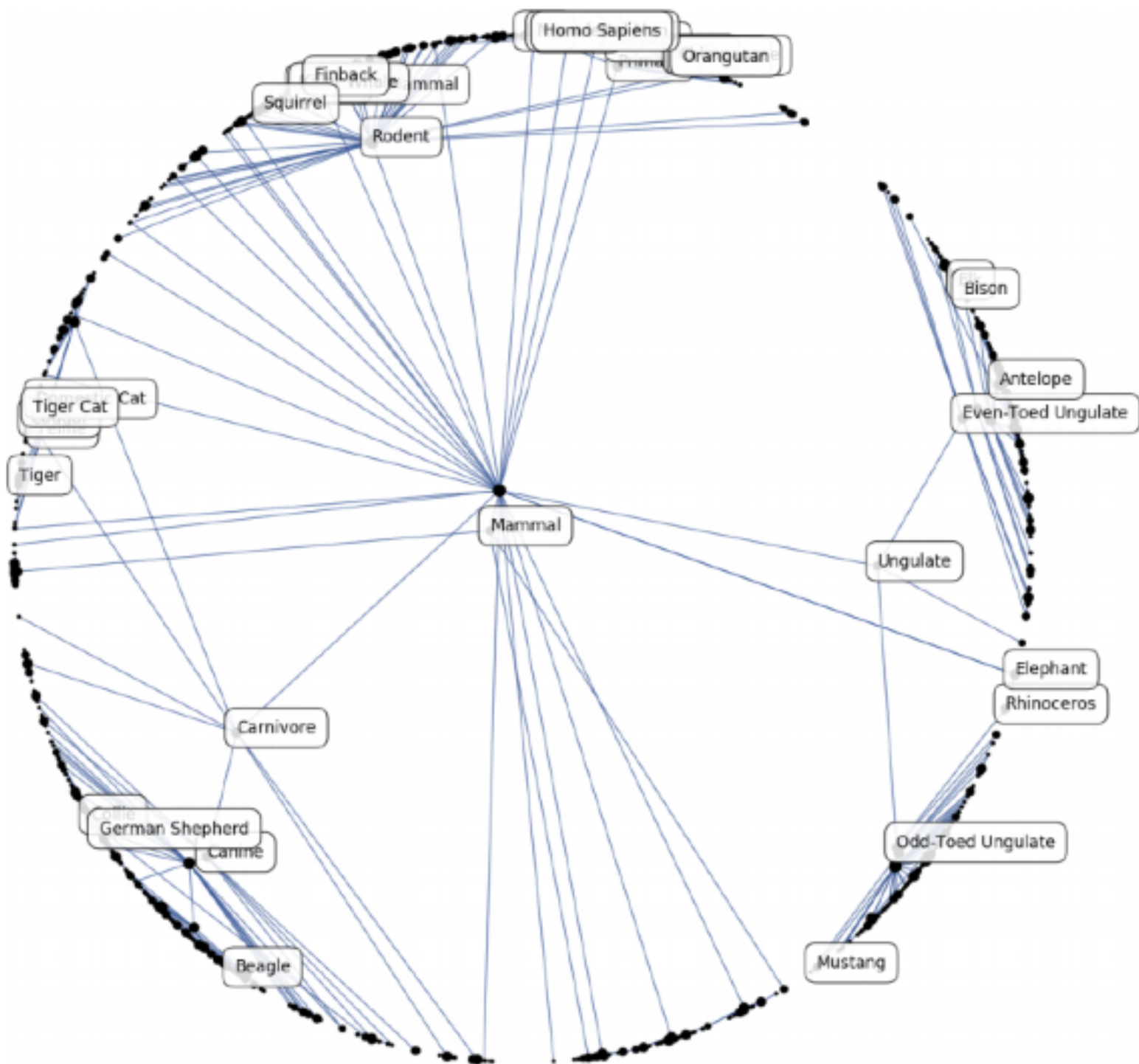


marutshre

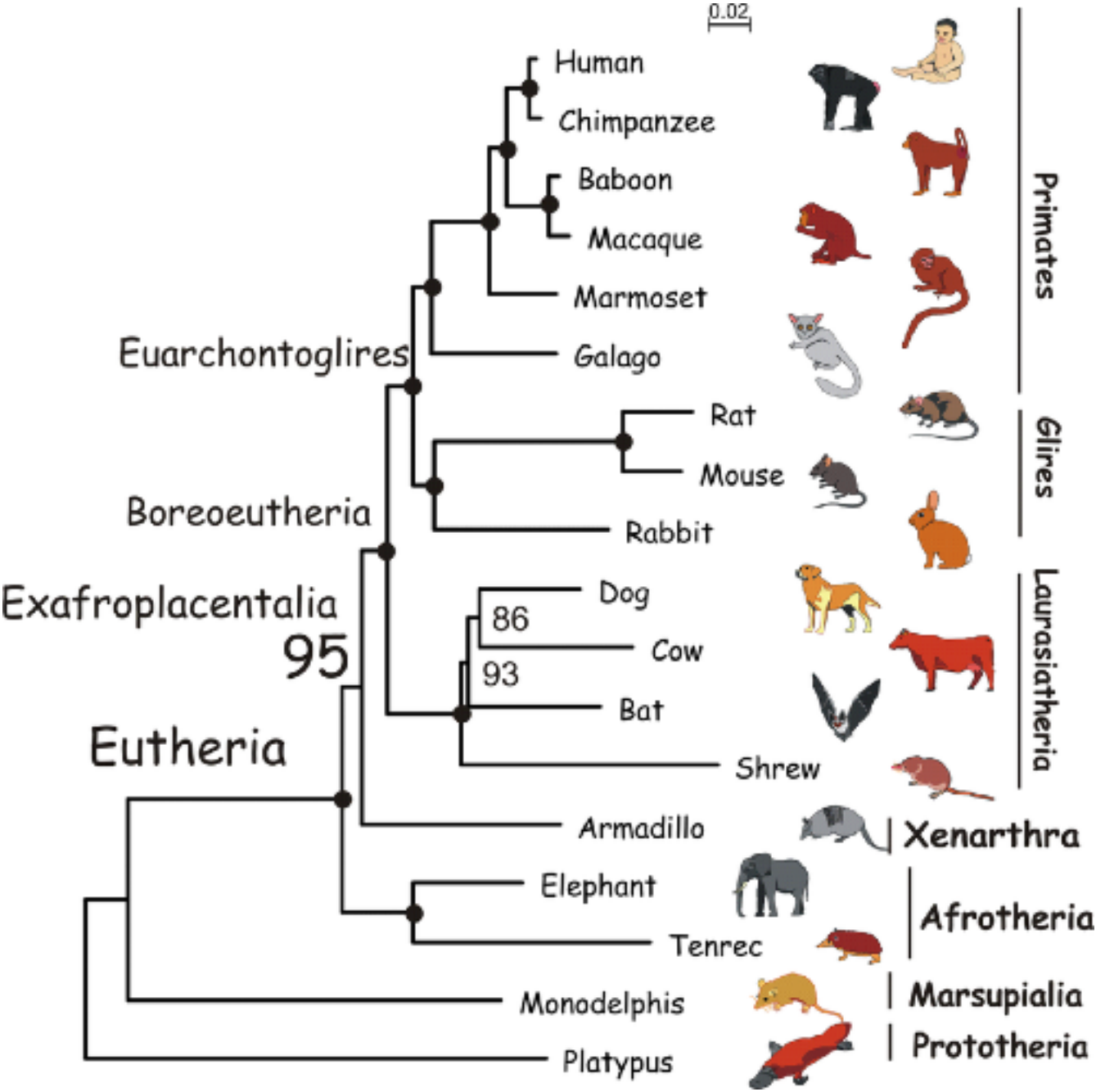
Hyperbolic Embeddings







Nickel and Nickel, 2017



Montoya-Bungos et al., 2007



$$\min_{\mathbf{u}_i, \mathbf{v}_i} \sum_{(u, v) \in \mathcal{D}} \log \frac{e^{-d(\mathbf{u}, \mathbf{v})}}{\sum_{v' \in \mathcal{N}(u)} e^{-d(\mathbf{u}, \mathbf{v}')}} \quad$$

Nickel and Nickel, 2017

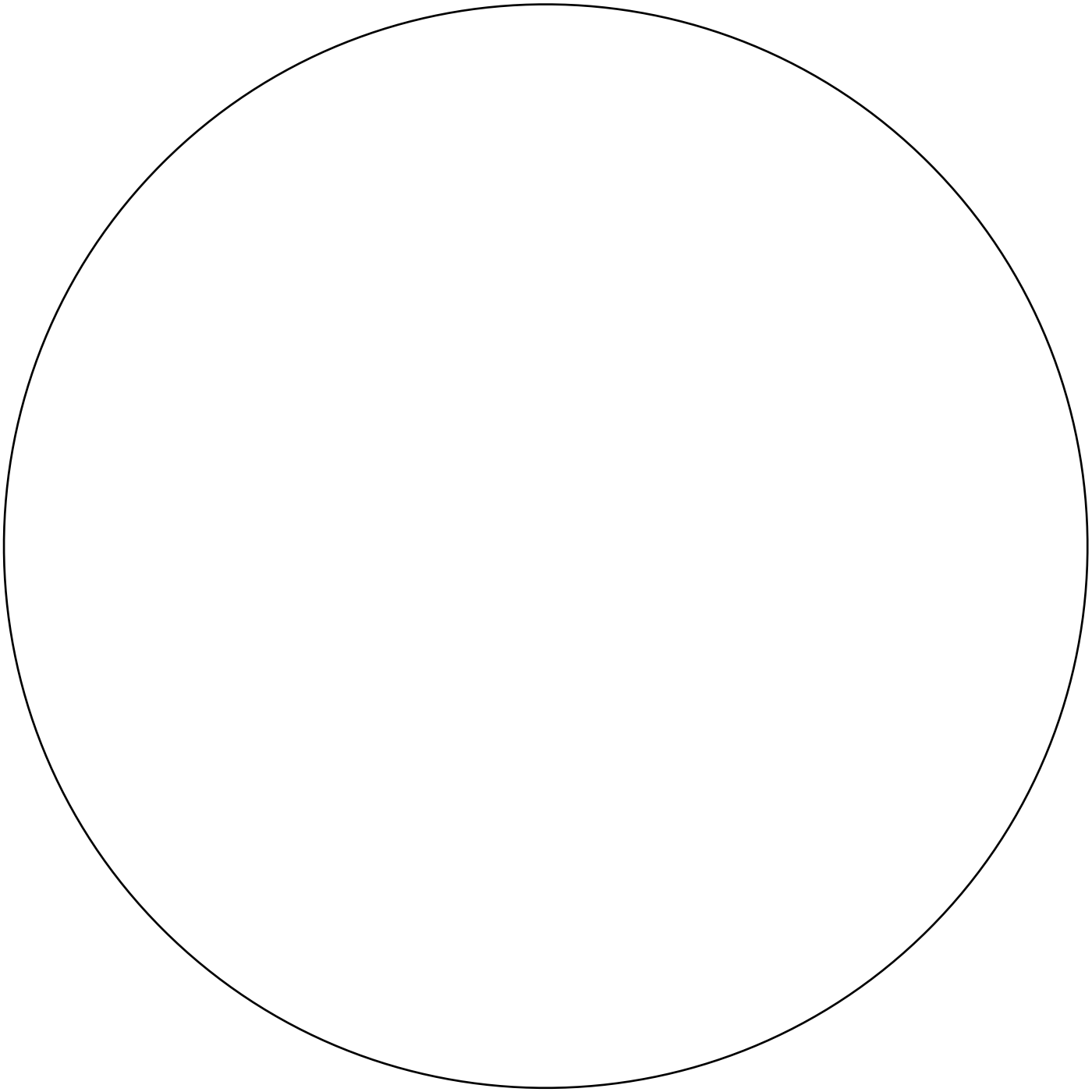
Relations: $(u, v) \in \mathcal{D}$ if u is subconcept of v

Nodes: u

Embeddings: $\mathbf{u} \in \mathbb{R}^d$

Want: $d_{\mathbb{D}}(\mathbf{u}, \mathbf{v})$ small if $(u, v) \in \mathcal{Q}$

minimize fitting loss



Hyperbolic Embeddings

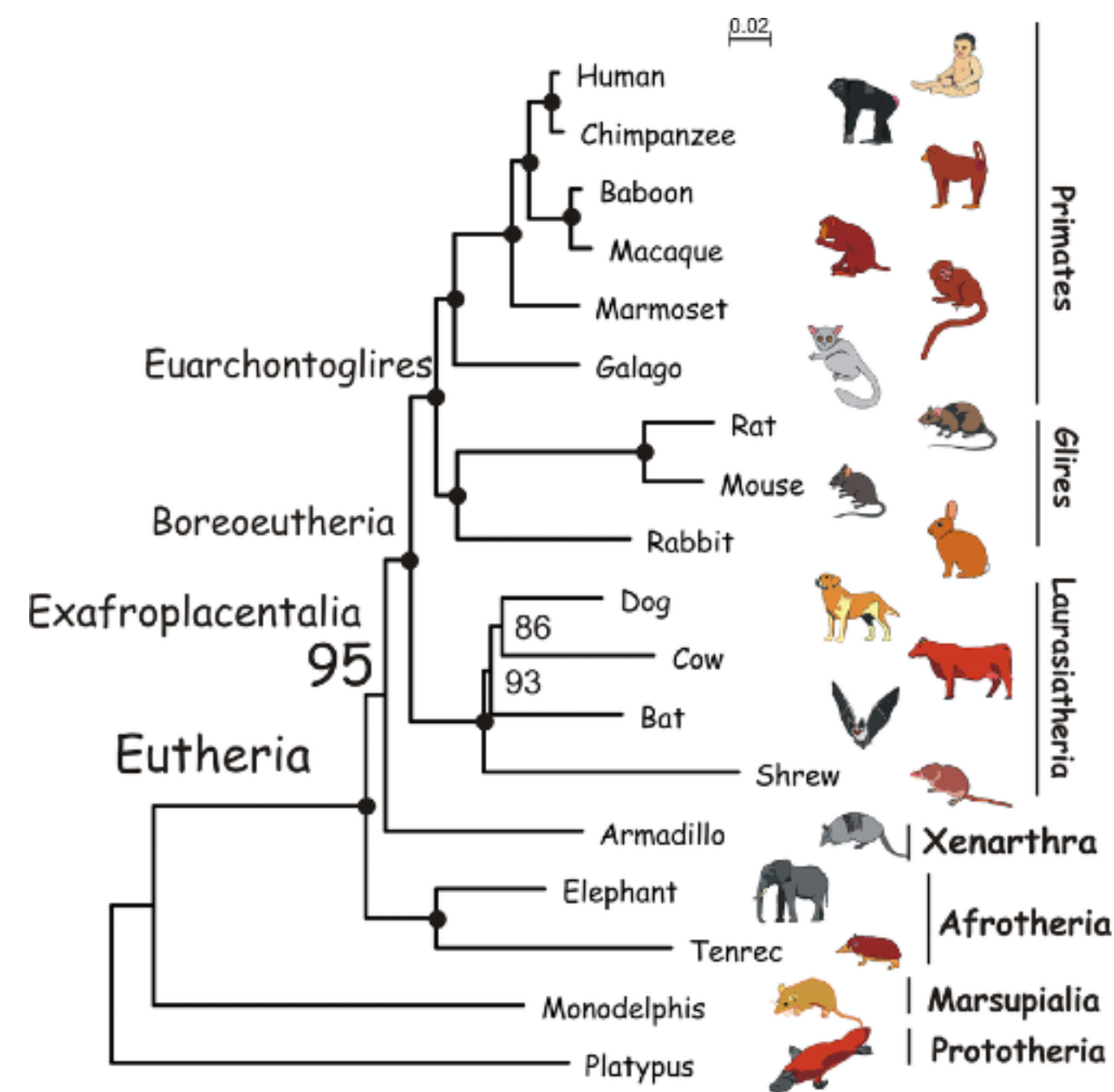
In a nutshell

Nodes: u

Relations: $(u, v) \in \mathcal{D}$ if u is subconcept of v

Embeddings: $\mathbf{u} \in \mathbb{D}^d$

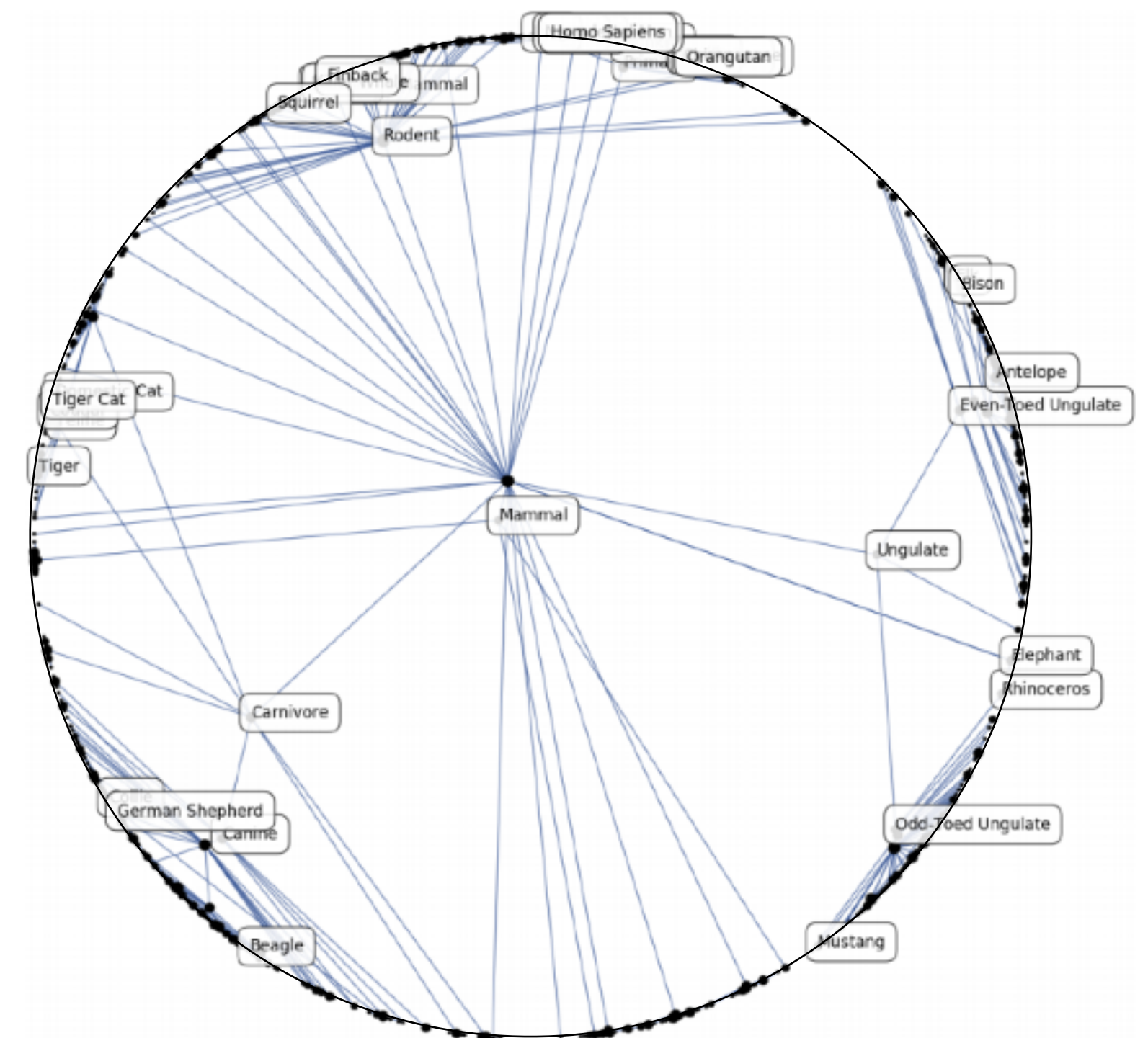
Want: $d_{\mathbb{D}}(\mathbf{u}, \mathbf{v})$ small if $(u, v) \in \mathcal{D}$



minimize fitting loss

$$\min_{\mathbf{u}, \mathbf{v}} \sum_{(u, v) \in \mathcal{D}} \log \frac{e^{-d(\mathbf{u}, \mathbf{v})}}{\sum_{v' \in \mathcal{N}(u)} e^{-d(\mathbf{u}, \mathbf{v}')}} \rightarrow$$

Nickel and Kiela, 2017

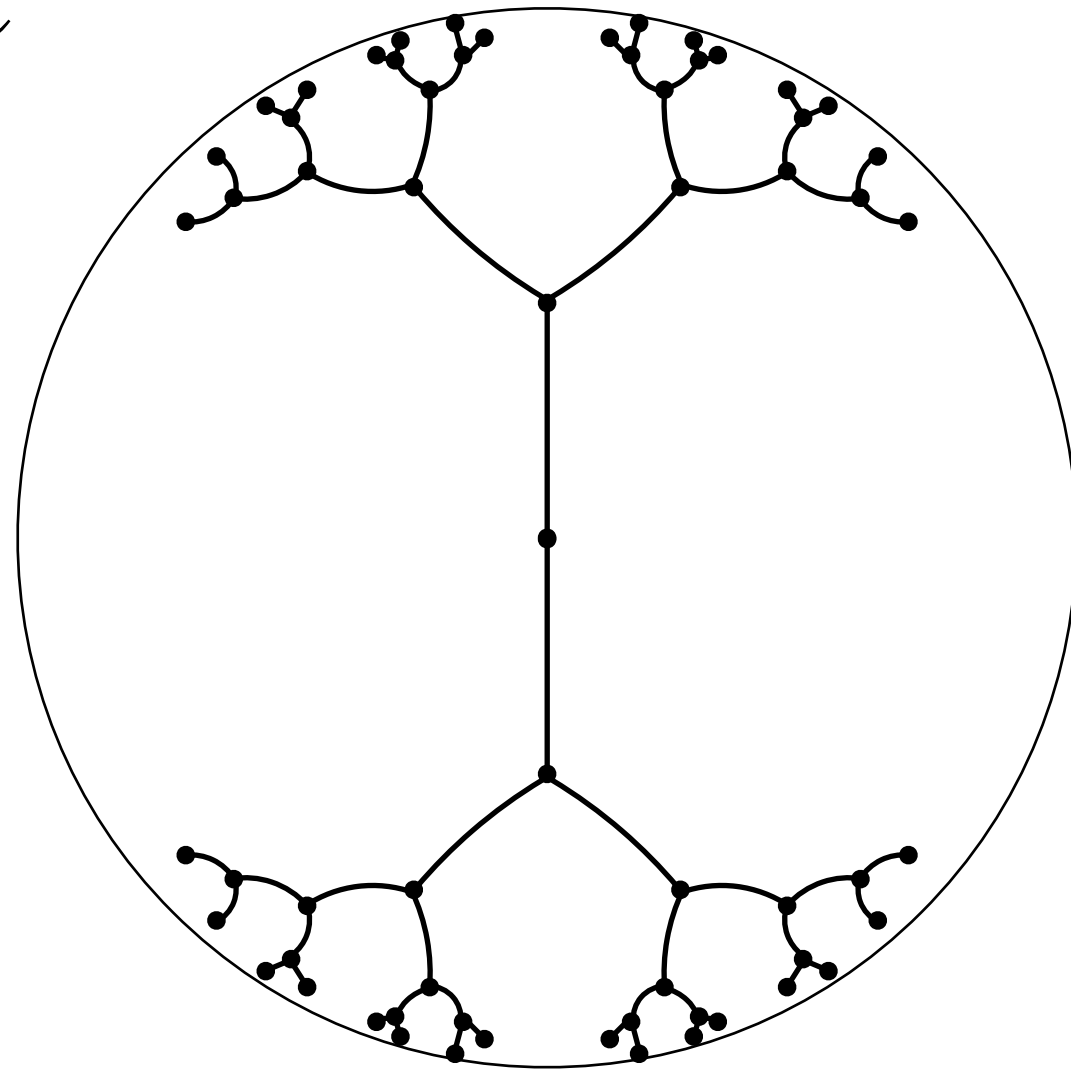


Aligning Hyperbolic Spaces

putting it all together

- Given two related hierarchies embedded in the Poincare Disk, can we match them?

\mathcal{X}



\mathcal{Y}

