A test of the lateral semicircular canal correlation to head posture, diet and other biological traits in “ungulate” mammals.

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Supplementary Figures

Figure S1. Ancestral character state reconstruction of the neutral head posture in ungulates using maximum likelihood (fastAnc) in phytools (Revell, 2013). Phylogenetic tree after Bininda-Emonds et al. [56]

Figure S2. Ancestral character state reconstruction of of the reconstructed head posture in ungulates using maximum likelihood (fastAnc) in phytools (Revell, 2013). Phylogenetic tree after Bininda-Emonds et al. [56]

Figure S3. Ancestral character state reconstruction of body mass variations in ungulates using MCMC stochastic character mapping (make.simmap) in phytools (Revell, 2013). a, continuous data; b, character discretized into a binary data (<100 kg/>100 kg). Phylogenetic tree after Bininda-Emonds et al. [56]

Figure S4. Ancestral character state reconstruction of diet variations in ungulates using MCMC stochastic character mapping (make.simmap) in phytools (Revell, 2013). Phylogenetic tree after Bininda-Emonds et al. [56]

Figure S5. Ancestral character state reconstruction of the habitats variations in ungulates using MCMC stochastic character mapping (make.simmap) in phytools (Revell, 2013). Phylogenetic tree after Bininda-Emonds et al. [56]

Figure S6. Ancestral character state reconstruction of head butting behaviour in ungulates using MCMC stochastic character mapping (make.simmap) in phytools (Revell, 2013). Phylogenetic tree after Bininda-Emonds et al. [56]

Reference list:

Revell, L.J., 2013. Two new graphical methods for mapping trait evolution on phylogenies. Methods Ecol Evol 4, 754–759. https://doi.org/10.1111/2041-210X.12066

Fig. S1

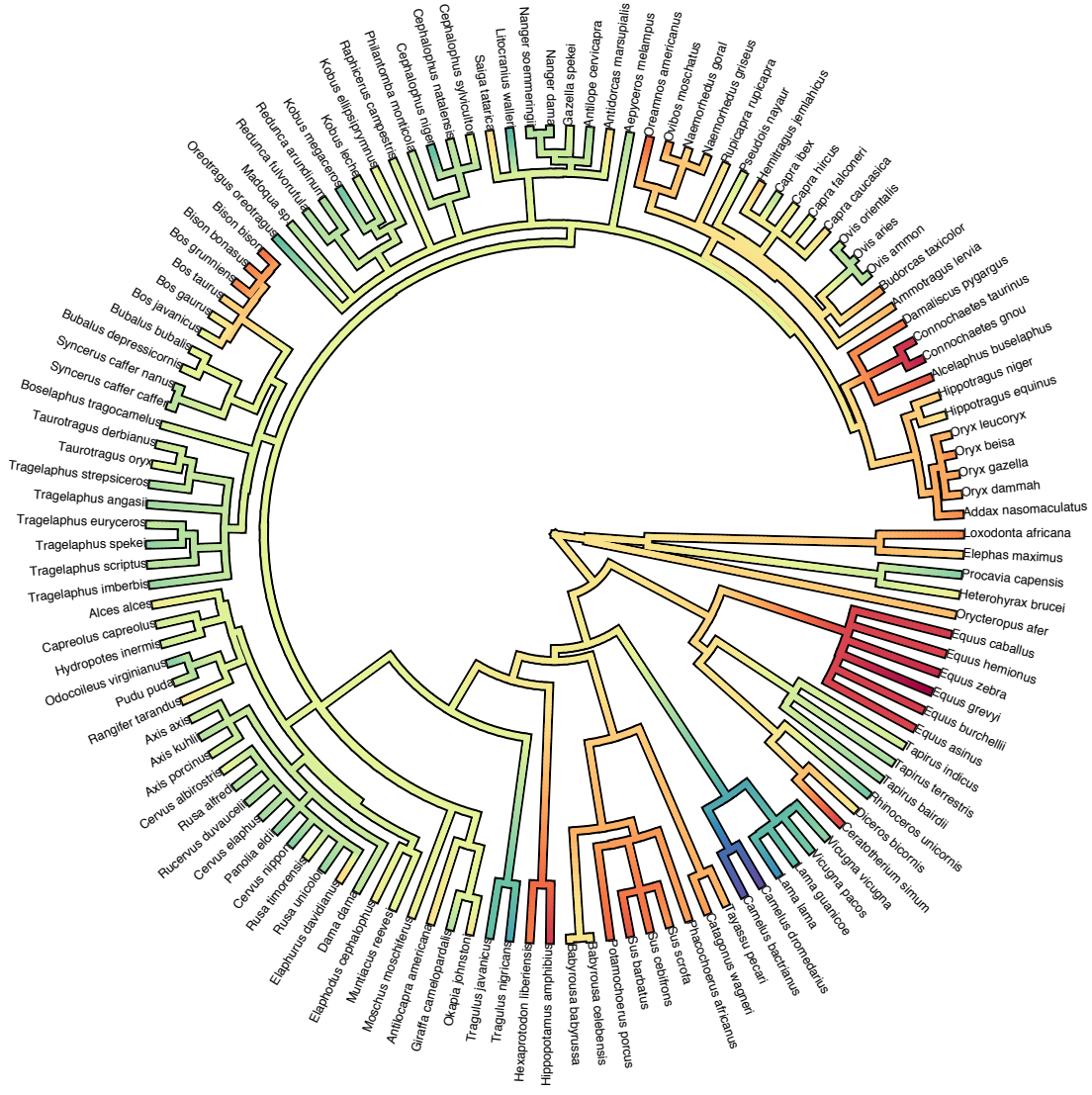
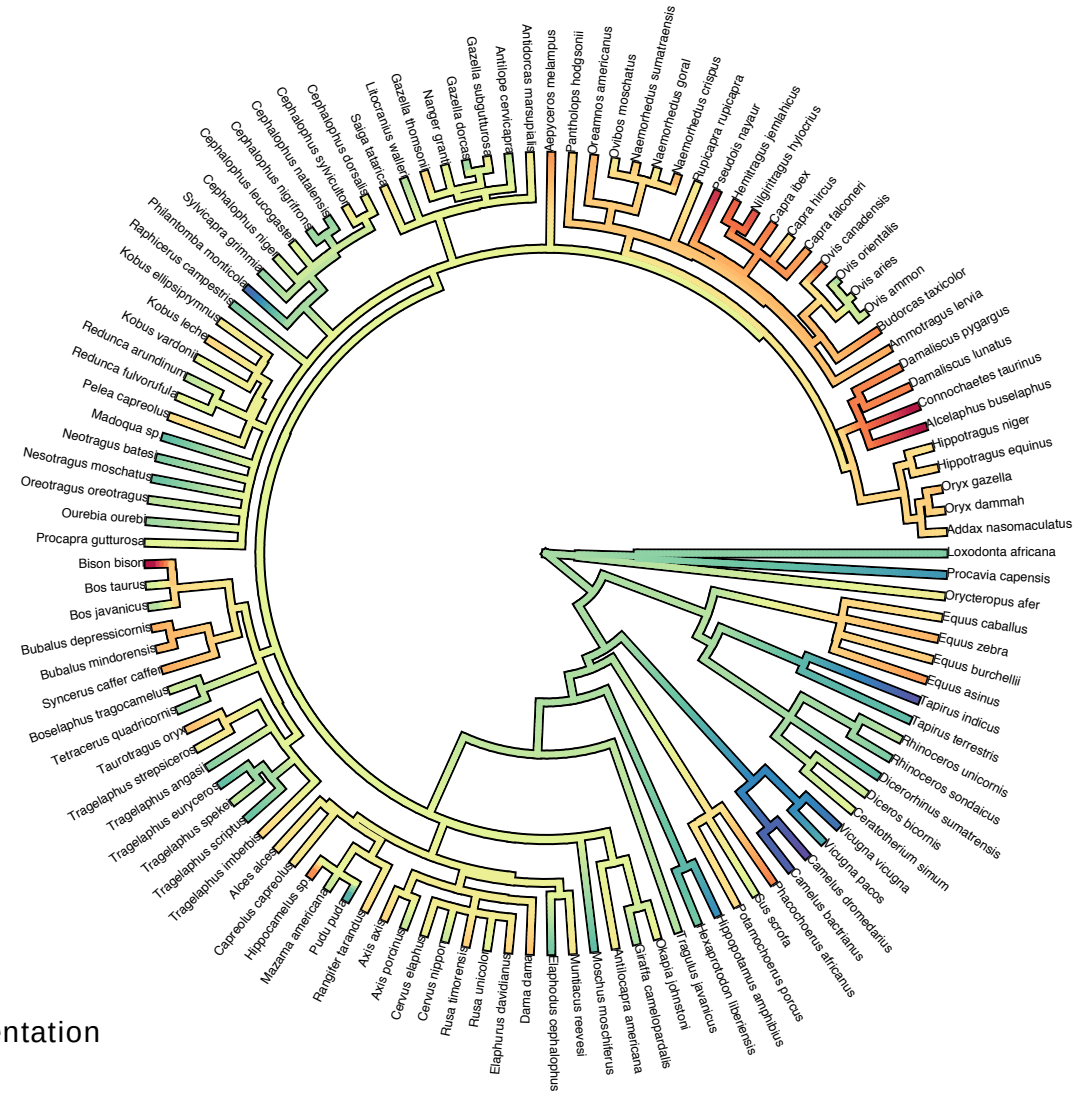

Neutral head posture
1
trait value
66
length=49.25
Addax nasomaculatus
Oryx dammah
Oryx gazella
Oryx beisa
Oryx leucoryx
Hippotragus equinus
Hippotragus niger
Alcelaphus buselaphus
Connochaetes gnou
Connochaetes taurinus
Damaliscus pygargus
Ammotragus lervia
Budorcas taxicolor
Ovis ammon
Ovis aries
Ovis orientalis
Capra caucasica
Capra caloneri
Capra hircus
Capra ibex
Hemitragus jemlahicus
Pseudois nayaur
Rupicapra rupicapra
Naemorhedus goral
Naemorhedus griseus
Ovibos moschatus
Ovreamnos americanus
Oreamnos melampus
Aepyceros melampus
Antidorcas marsupialis
Antilope cervicapra
Gazella spekei
Nanger granti
Nanger soemmerringii
Litocranius walleri
Saiga tatarica
Cephalophus sylvicultor
Cephalophus natalensis
Cephalophus niger
Philantomba monticola
Raphicerus campestris
Kobus ellipsiprymnus
Kobus leche
Kobus megaceros
Redunca arundinum
Redunca fulvorufula
Madoqua sp.
Oreotragus oreotragus
Bison bison
Bison bonasus
Bos grunniens
Bos taurus
Bos gaurus
Bos javanicus
Bubalus bubalis
Bubalus depressicornis
Syncerus caffer nanus
Syncerus caffer caffer
Boselaphus tragocamelus
Taurotragus derbianus
Taurotragus oryx
Tragelaphus strepsiceros
Tragelaphus angasii
Tragelaphus euryceros
Tragelaphus spekei
Tragelaphus scriptus
Tragelaphus imberbis
Alces alces
Capreolus capreolus
Hydropotes inermis
Odocoileus virginianus
Pudu pudu
Rangifer tarandus
Axis axis
Axis kuhlii
Axis porcinus
Cervus albirostris
Rusa alfredi
Rucervus duvaucelii
Cervus elaphus
Pandia eldii
Cervus nippon
Rusa timorensis
Rusa unicolor
Elaphurus davidianus
Dama dama
Elaphodus cephalophus
Muntiacus reevesi
Moschus moschiferus
Antilocapra americana
Giraffa camelopardalis
Okapia johnstoni
Tragulus javanicus
Tragulus nigricans
Hexaprotodon liberiensis
Hippopotamus amphibius
Babyrousa babyrussa
Babyrousa celebensis
Potamochoerus porcus
Sus barbatus
Sus cebifrons
Sus scrofa
Phacochoerus africanus
Pecari tajacu
Tayassu pecari
Camelus bactrianus
Camelus dromedarius
Lama lama
Lama guanicoe
Vicugna vicugna
Vicugna pacos
Ceratotherium simum
Diceros bicornis
Rhinoceros unicornis
Tapirus terrestris
Tapirus bairdii
Tapirus indicus
Equus asinus
Equus burchellii
Equus grevyi
Equus zebra
Equus hemionus
Equus caballus
Orycteropus afer
Heterohyrax brucei
Procavia capensis
Elephas maximus
Loxodonta africana

Fig. S2

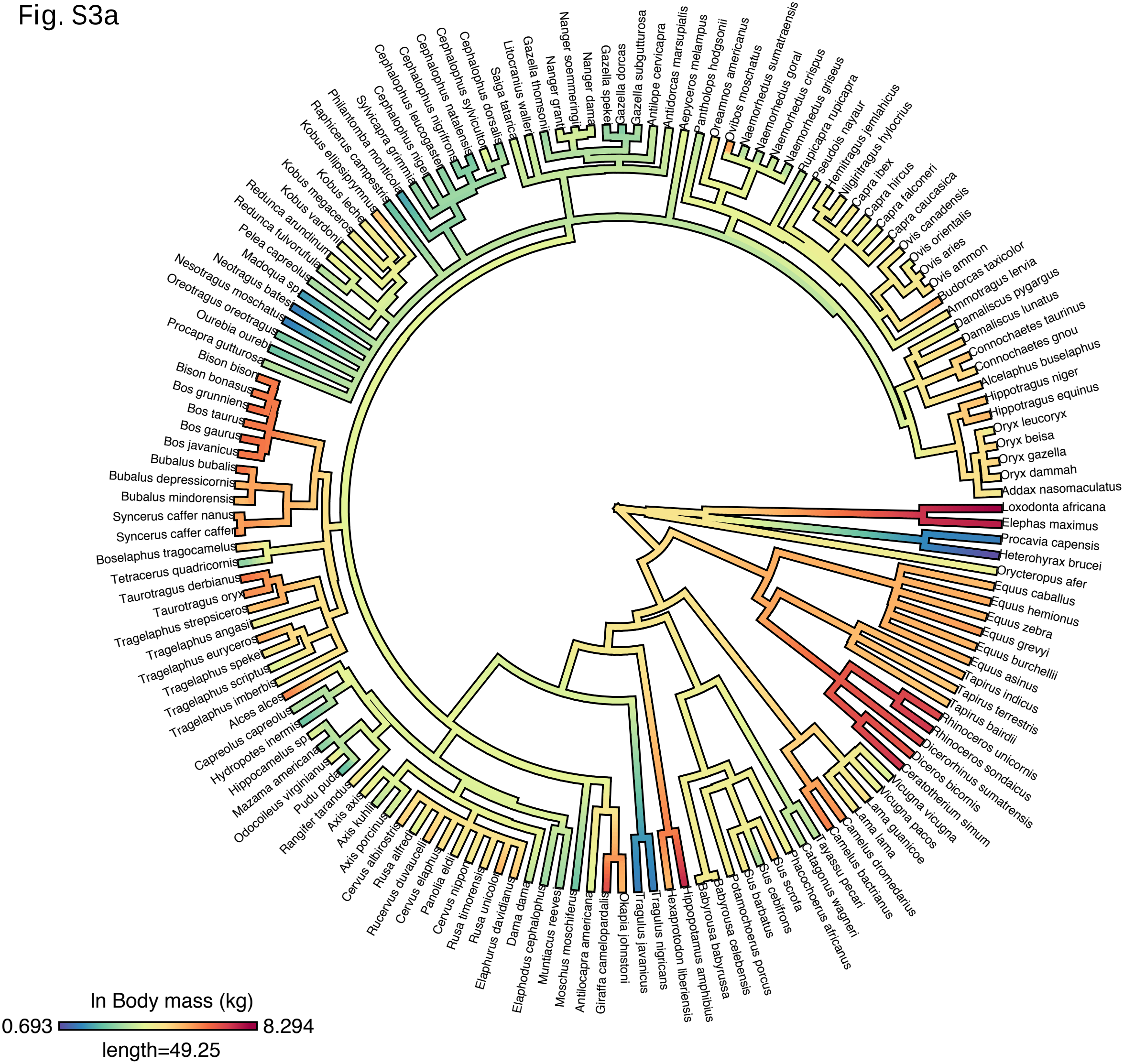


Reconstructed cranial orientation

13 trait value 70

length=49.25

Fig. S3a



Loxodonta africana
Elephas maximus
Procavia capensis
Heterohyrax brucei
Orycteropus afer
Equus caballus
Equus hemionus
Equus zebra
Equus grevyi
Equus burchellii
Equus asinus
Tapirus indicus
Tapirus terrestris
Tapirus bairdii
Rhinoceros unicornis
Rhinoceros sondaicus
Dicerorhinus sumatrensis
Diceros bicornis
Ceratotherium simum
Vicugna vicugna
Vicugna pacos
Lama guanicoe
Lama lama
Camelus dromedarius
Camelus bactrianus
Tayassu pecari
Catagonus wagneri
Phacochoerus africanus
Sus scrofa
Sus cebifrons
Sus barbatus
Potamochoerus porcus
Babyrousa celebensis
Babyrousa babyrussa
Hippopotamus amphibius
Hexaprotodon liberiensis
Tragulus nigricans
Tragulus javanicus
Okapia johnstoni
Giraffa camelopardalis
Antilocapra americana
Moschus moschiferus
Muntiacus reevesi
Elaphodus cephalophus
Dama dama
Elaphurus davidianus
Rusa unicolor
Rusa timorensis
Cervus nippon
Panolia eldii
Cervus elaphus
Rucervus duvaucelii
Rusa alfredi
Cervus albirostris
Axis porcinus
Axis kuhlii
Axis axis
Rangifer tarandus
Pudu puda
Odocoileus virginianus
Mazama americana
Hippocamelus sp
Hydropotes inermis
Capreolus capreolus
Alces alces
Tragelaphus imberbis
Tragelaphus scriptus
Tragelaphus spekei
Tragelaphus euryceros
Tragelaphus angasi
Tragelaphus strepsiceros
Taurotragus oryx
Taurotragus derbianus
Tetracerus quadricornis
Boselaphus tragocamelus
Syncerus caffer caffer
Syncerus caffer nanus
Bubalus mindorensis
Bubalus depressicornis
Bubalus bubalis
Bos javanicus
Bos gaurus
Bos taurus
Bos grunniens
Bison bonasus
Bison bison
Procapra gutturosa
Ourebia ourebi
Oreotragus oreotragus
Nesotragus moschatus
Neotragus batesi
Madoqua sp
Pelea capreolus
Redunca fulvorufula
Redunca arundinum
Kobus vardonii
Kobus megaceros
Kobus leche
Kobus ellipsiprymnus
Raphicerus campestris
Philantomba monticola
Sylvicapra grimmia
Cephalophus niger
Cephalophus leucogaster
Cephalophus nigrifrons
Cephalophus natalensis
Cephalophus sylvicultor
Cephalophus dorsalis
Saiga tatarica
Litocranius walleri
Gazella thomsonii
Nanger soemmeringii
Nanger granti
Nanger dama
Gazella dorcas
Gazella spekei
Gazella subgutturosa
Antilope cervicapra
Antidorcas marsupialis
Aepyceros melampus
Pantholops hodgsonii
Oreamnos americanus
Ovibos moschatus
Naemorhedus sumatraensis
Naemorhedus goral
Naemorhedus crispus
Naemorhedus griseus
Rupicapra rupicapra
Pseudois nayaur
Hemitragus jemlahicus
Nilgiritragus hylocrius
Capra ibex
Capra hircus
Capra falconeri
Capra caucasica
Ovis canadensis
Ovis orientalis
Ovis aries
Ovis ammon
Budorcas taxicolor
Ammotragus lervia
Damaliscus pygargus
Damaliscus lunatus
Connochaetes taurinus
Connochaetes gnou
Alcelaphus buselaphus
Hippotragus niger
Hippotragus equinus
Oryx leucoryx
Oryx beisa
Oryx gazella
Oryx dammah
Addax nasomaculatus
ln Body mass (kg)
0.693
8.294
length=49.25

Fig. S3b

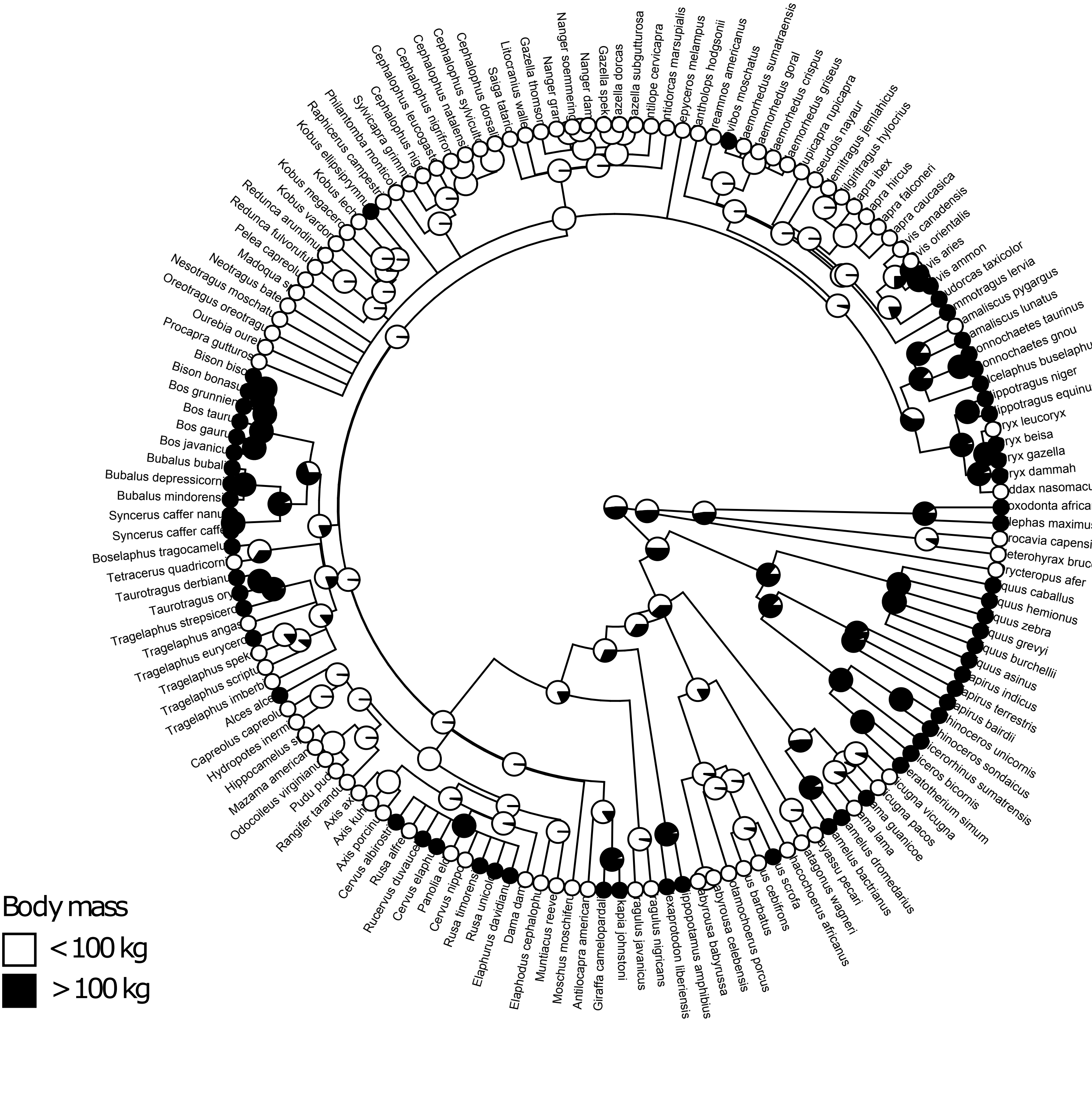


Fig. S4

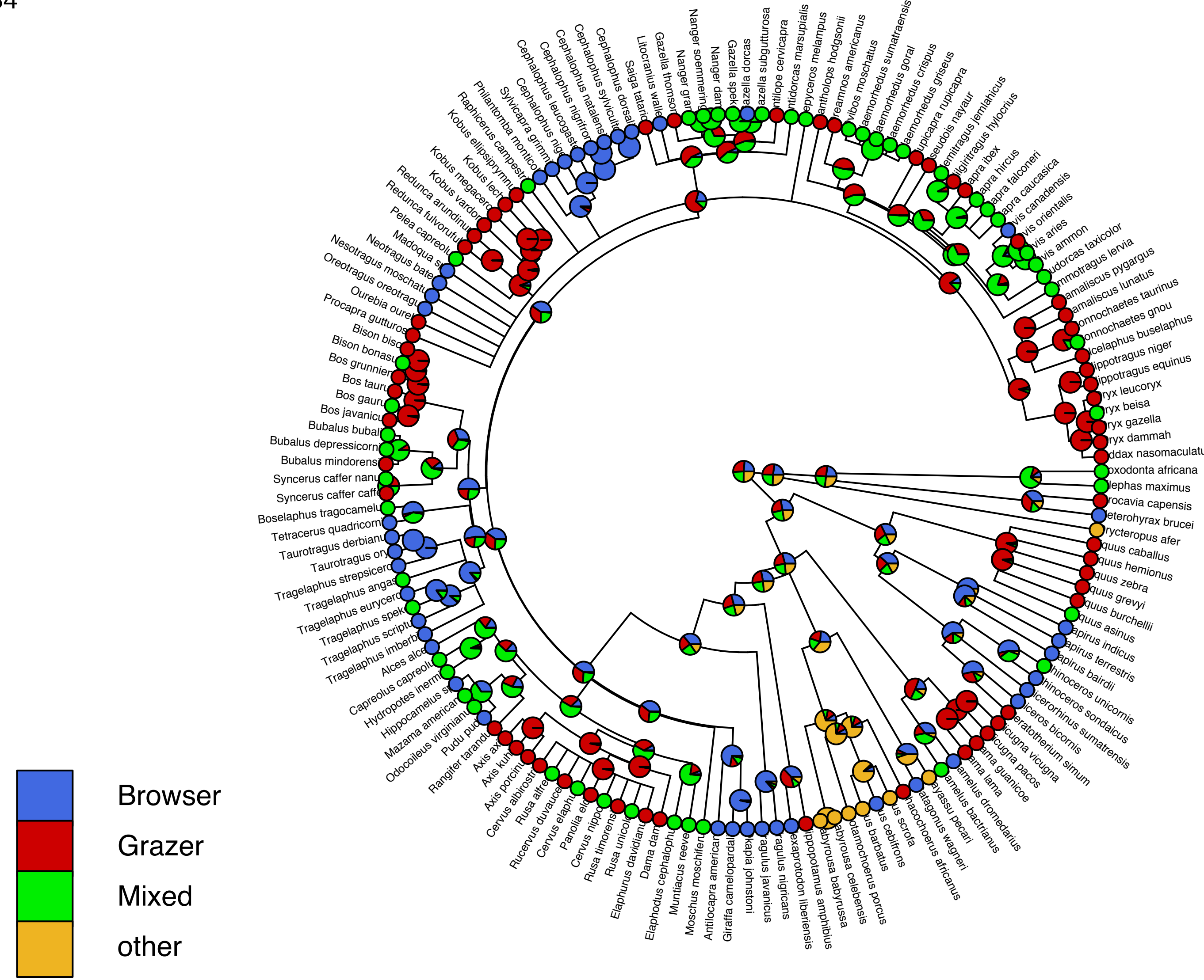
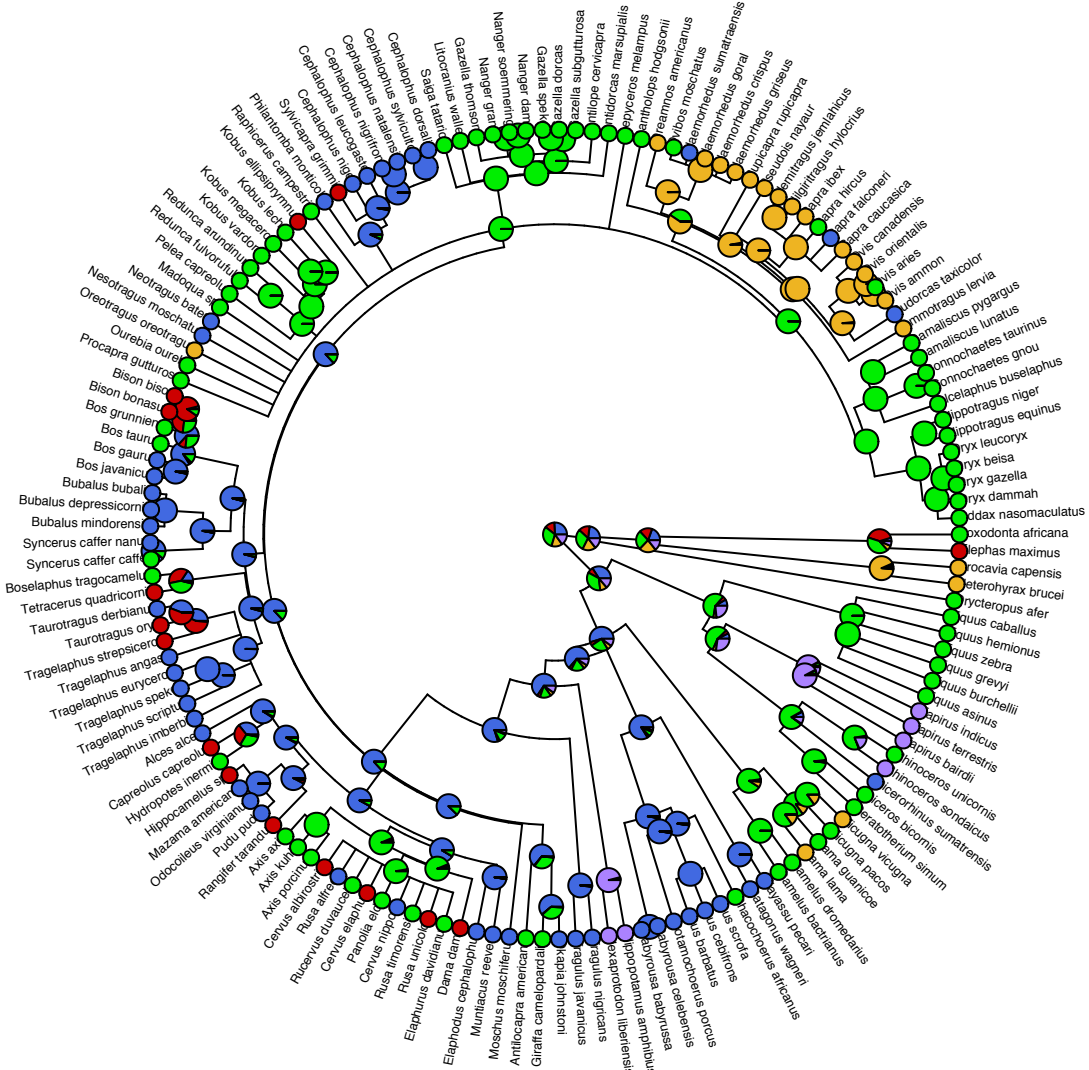


Fig. S5



Habitat

- closed
- mixed
- open
- rocky
- semi-aquatic

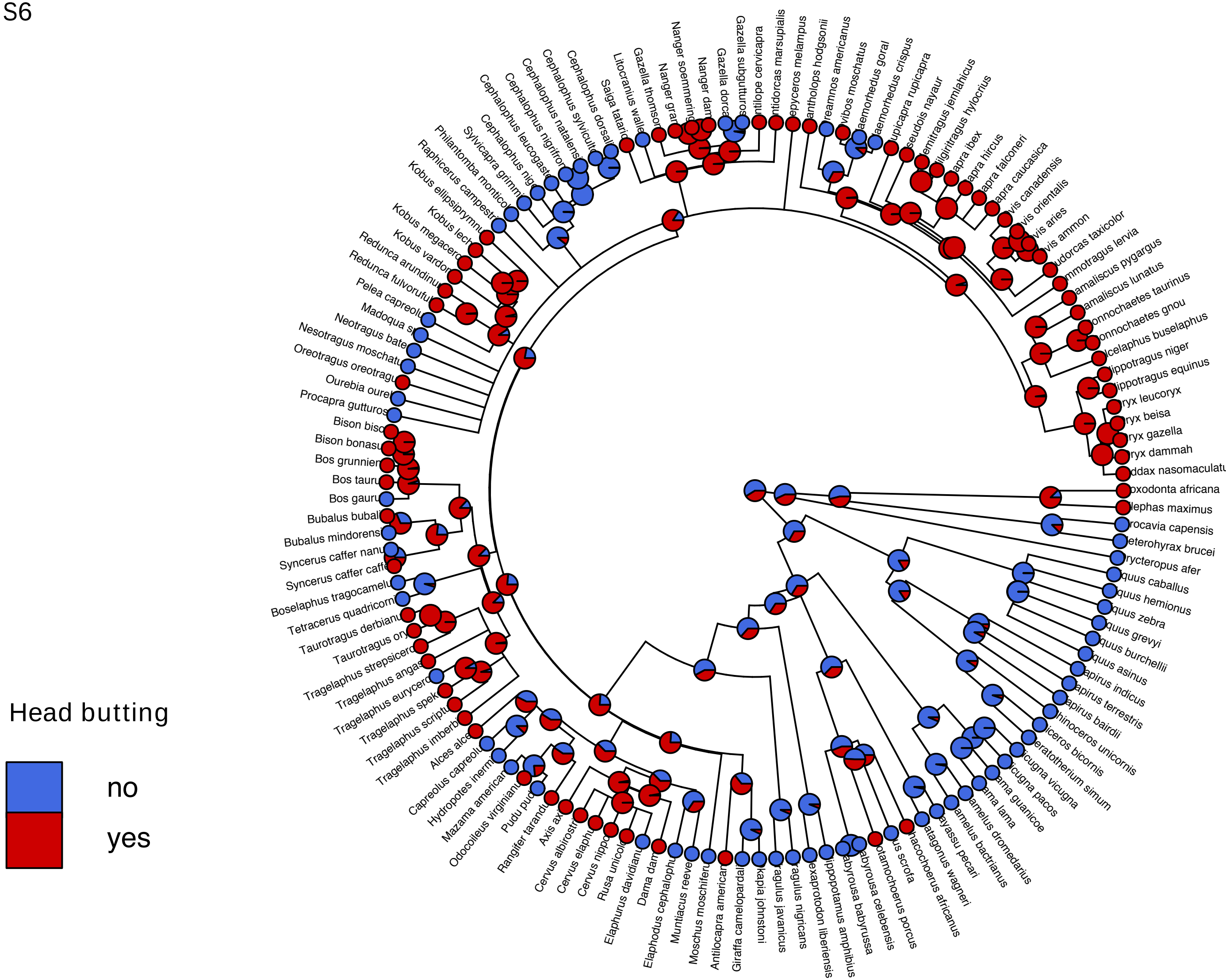



Fig. S6