**METHODS**

**Study animals**

Morphometric and ecological data (**Supp1**) were collected from 62 leporid skulls (**Supp2**) spanning 19 species within all extant genera of Leporidae housed in the American Museum of Natural History (AMNH), the Los Angeles County Museum of Natural History (LACM) PLUS a bunch of other museums! Information is on Veras computers, not mine! I think I removed Museum info from my files but I have no idea why – there’s a note I’ve made from summer semester mentioning all the other museums my samples were from. NEED TO MAKE TABLE OF ALL INFORMATION I CAN FIND FOR EACH SPECIMEN, could just be a text file for supplementary information!). The samples aimed to reflect the phylogenetic coverage in the Kraatz and Sherratt (2016) study, based off the Matthee et al. (2004) leporid phylogeny. Adult specimens were used, characterised by fully fused occipital sutures (Hoffmeister & Zimmerman 1967).

**Ecological data**

A range of ecological variables were compiled into the leporid dataset (Supp). Leporids were divided into two broad activity cycle and burrowing trait categories based on life history studies: nocturnal and crepuscular activity cycles, and whether the species burrowed (Kraatz et al. 2015). Leporids were further divided into three locomotor strategies: generalised, saltatorial, and cursorial locomoters (Kraatz et al. 2015). Pantheria (Jones et al. 2009) was used to source the following variables: adult body mass (grams); diet breadth (defined as the number of host plants used); gestation length (days); home range (km2); litter size (individuals); and geographic range (total extent of species range with a global equal-area projection). Average temperature and precipitation seasonality were compiled for each leporid species within its range (SUPP?). For species with contiguous geographic distributions, at least 10 years of data for monthly temperature and precipitation were sampled from KNMI Climate Explorer database (climexp.knmi.nl) using every available weather station within minimum and maximum latitudes and longitudes within each species geographic range. For species with discontiguous ranges or low/no weather stations in the KNMI Climate Explorer database, monthly temperature and precipitation were sampled manually from weather stations within the species geographic range from Weatherbase (www.weatherbase.com). The average annual seasonality for combined years and all sampled weather stations for both temperature and precipitation within a given species range was defined as:

Where within the geographic range of a given species, *S* is the annual seasonality of temperature or precipitation, *SD* is the standard deviation of mean monthly temperature (oC) or precipitation (mm), and *M* is the mean monthly temperature (oC) or precipitation (mm).

**3D reconstruction of endocasts**

Virtual reconstructions of endocasts from [name types of scans here i.e. μct scans] from skulls of the leporid sample (REF) were prepared in Mimics (version number+ref) – check that this is how Brian did the scans! Brain endocasts were prepared through “flood-filling” the cranial cavities of scanned specimens in Mimics and 3Matic (Version number) – again double check that this is true.

**Endocranial volume measurements**

Three metrics of brain volume were used for analyses: Total brain volume; olfactory bulb volume; and total minus olfactory bulb volume. To compartmentalise the brain into olfactory bulb and total minus olfactory bulb volumes, brain endocasts were virtually segmented using the software Mimics (version number - REF). First, the brain stem was digitally removed by placing an arbitrary line along the axial plane from the dorsal cerebellum to the point which removed most of the brain stem without cutting any other brain compartments. This was done to standardise brain stem sizes between endocasts, which may have otherwise confounded volumetric analyses. Olfactory bulbs were digitally separated by the placement of a coronal plane immediately after the proximal point of the olfactory bulb. Partition volume for the olfactory bulb and the rest of the brain endocast were calculated using Mimics (version number REF).

**Statistical analyses**

All analyses were conducted in the R statistical environment (R Core team 2019).

- PGLS

* Matthee et al. 2004 for tree used in Kraatz and Sherratt (2016) – pruned to include only 16 taxa in Mesquite (Maddison & Maddison 2015) retaining information on branch lengths
* Imputation details?

- pANOVA

- ANC?

**References**