Dataset

3D models related to the publication: Wild versus lab house mice: Effects of age, diet, and genetics on molar geometry and topography.

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Abstract

This contribution contains 3D models of upper molar rows of house mice (*Mus musculus domesticus*). The erupted parts of the right row and of the first upper molar are presented for specimens belonging to four groups: wild-trapped mice, wild-derived lab offspring, a typical laboratory strain (Swiss) and hybrids between wild-derived and Swiss mice. These models are analyzed in the following publication: Savriama et al 2021: Wild versus lab house mice: Effects of age, diet, and genetics on molar geometry and topography. https://doi.org/10.1111/joa.13529

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INTRODUCTION

This contribution presents 3D models of molars for 30 specimens of Western European house mouse (*Mus musculus domesticus*). Four groups of mice were considered: (1) wild-trapped mice (N = 7), captured in a horse stable near Lyon (Balan, France); (2) laboratory offspring bred from mice from the same locality (N = 14); (3) Swiss mice, documenting one of the most common outbred laboratory strain (N = 5); (4) hybrids (N = 4) derived from crosses between lab offspring of wild mice and Swiss mice (Table 1). For each specimen, three models were extracted from the right upper jaw: the upper molar row with the three teeth in connection (UMR), the first molar only (UM1), and a truncated template of the first molar mimicking advanced wear (UM1tr). The root part was discarded and only the erupted part of the teeth was considered. The only exception was a young mouse at weaning. Its third molar was on the course of eruption, preventing the extraction of a continuous surface for the molar row. A geometric morphometric study was performed on these three sets of molar descriptors, using a generalized Procrustes superimposition procedure. The upper molar row was described by a set of 2186 sliding semi-landmarks, the first molar by 2199 semi-landmarks, and the truncated UM1 by 2293 semi-landmarks (Savriama et al. XXXX). This study showed that non-heritable variation due to differences in mastication and diet between wild and lab mice was of primary importance, especially when considering the whole molar row (Fig. 1). Some wild-trapped mice displayed extremely advanced wear compared to all lab animals. All wild-trapped mice, even young specimens, further displayed molar rows in which the second and especially the third molar were shifted away from the alignment of the first molar cusps. This was interpreted as related to mechanical loadings during mastication (Renaud and Ledevin 2017). The different wear trajectories along age observed between wild and lab animals indicated increased masticatory demand in the wild. These non-heritable sources of variance override the difference between wild-derived mice and the Swiss strain, corresponding to localized changes in the size and position of some cusps. Hybrids display a transgressive morphology suggestive of epistasis involved in the highly polygenic molar morphology (Pallares et al. 2017). The truncated model of the first molar, by discarding the effect of wear, allowed to focus on such heritable differences.

METHODS

The specimens were scanned at a cubic voxel resolution of 12 µm (except for SW01 and SW02 scanned at 13.5 µm) using a Phoenix Nanotom S microtomograph (µCT) on the AniRA-ImmOs platform of the SFR Biosciences (UMS 3444, ENS Lyon). The scanning parameters were as follows: 100 kV, 70µA, 3000 projections at 360° with Cu filter. For each mouse, the right upper molar row was delimited using Avizo (v. 9.1—Visualization Science Group, FEI Company). In most cases, an automatic threshold was sufficient to isolate the molar row from the surrounding bone and generate a surface including the roots; in a few cases, connections with the bone had to be manually delimited. A template isolating the erupted part of the molar row was designed for one specimen (Balan Lab 86). This template was modified to include the first upper molar only. Finally, a truncated template of the first upper molar was designed, with the top of the cusps cut to mimic an advanced degree of wear, in order to mitigate the effect of tooth abrasion on the morphological signal (Ledevin et al. 2016). These templates were used

Ind.	Population	Weight	Sex	Age	UMR	UM1	UM1tr
BW_03	Balan Wild	12.0			X	X	X
BW_04	Balan Wild	21.1.0	F		X	X	X
BW_06	Balan Wild	17.1			X	X	X
BW_07	Balan Wild	11.3			X	X	X
BW_08	Balan Wild	17.3	F		X	X	X
BW_11	Balan Wild	10.9			X	X	X
BW_12	Balan Wild	11.1			X	X	X
Blab_035	Balan Lab	14.7	F	98	X	X	X
Blab_046	Balan Lab	16.0	F	85	X	X	X
Blab_054	Balan Lab	17.4	F	73	X	X	X
Blab_056	Balan Lab	16.3	F	74	X	X	X
Blab_082	Balan Lab	25.8	M	118	X	X	X
Blab_086	Balan Lab	24.0	M	108	X	X	X
Blab_092	Balan Lab	21.0	M	112	X	X	X
Blab_319	Balan Lab	18.5	F	68	X	X	X
Blab_325	Balan Lab	22.5	M	74	X	X	X
Blab_329	Balan Lab	21.0	M	74	X	X	X
Blab_330	Balan Lab	23.6	M	74	X	X	X
Blab_F2a	Balan Lab		F	63	X	X	X
Blab_F2b	Balan Lab	16.1	F	66	X	X	X
Blab_BB3w	Balan Lab	9.0		21		X	X
hyb_BS01	Hybrids		F	96	X	X	X
hyb_BS02	Hybrids		F	96	X	X	X
hyb_SB01	Hybrids		F	95	X	X	X
hyb_SB02	Hybrids		F	95	X	X	X
SW_001	Swiss	44.3	M	87	X	X	X
SW_002	Swiss	39.9	M	118	X	X	X
SW_005	Swiss	41.6	M	99	X	X	X
SW_0ter	Swiss	34.4	M	64	X	X	X
SW_343	Swiss	37.5	M	74	X	X	X

Table 1. Label, population, weight, sex and age of the specimens. Specimens are stored at the LBBE (University Lyon 1, France). UMR, UM1, UM1tr: indication of the corresponding surface in the dataset.

to extract a similar surface from the other tooth rows, leading to three series of surfaces: upper molar row (UMR), first upper molar (UM1) and truncated first upper molar (UM1tr). The 3D surfaces are provided in .ply format, and can therefore be opened with a wide range of freeware.

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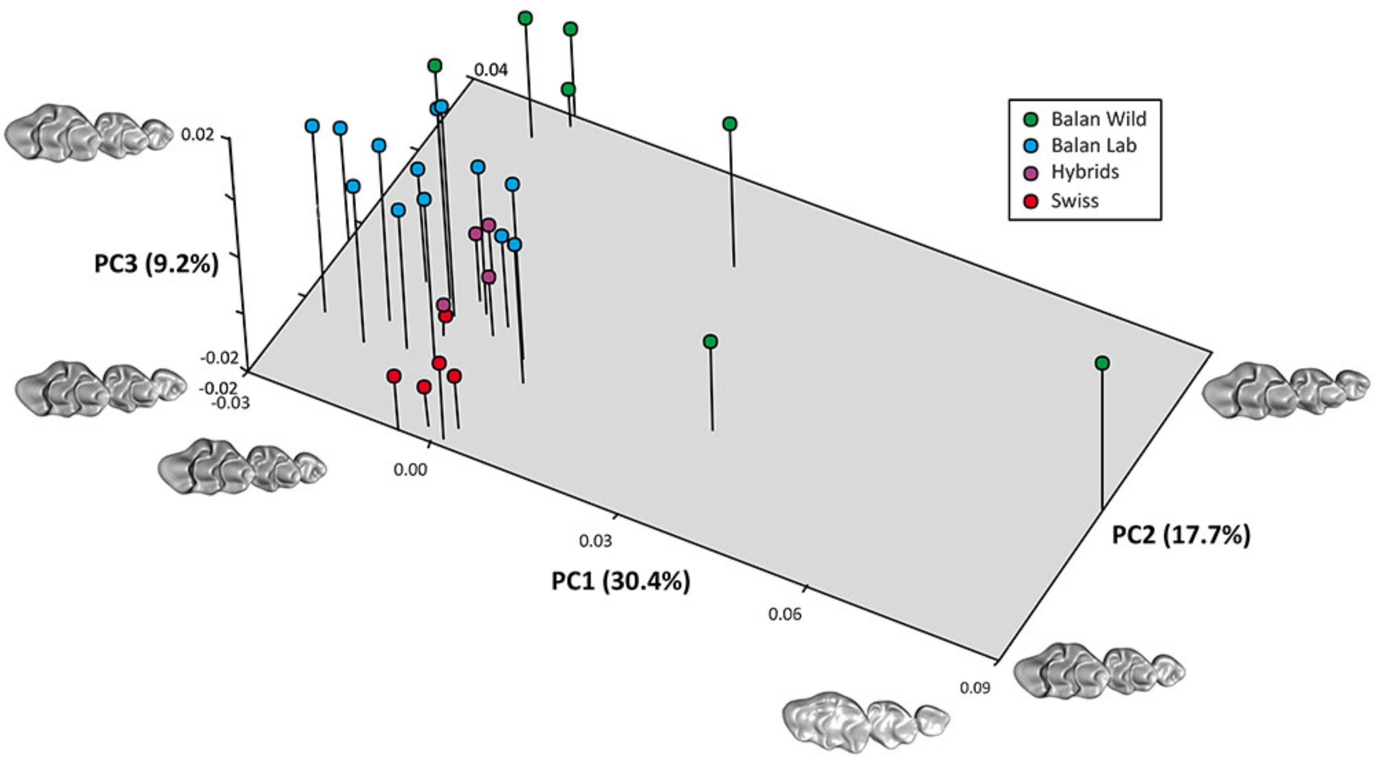

Figure 1. Shape differentiation of the upper molar row between wild mice, their lab offspring, Swiss strain and hybrids. First, second and third axes of a PCA on the aligned coordinates are represented, with shapes corresponding to extreme scores along the axes.

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