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Dental microwear texture analysis and diet in caviomorphs (Rodentia) from the Serra do Mar Atlantic forest (Brazil).

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6 **Dental microwear texture analysis and diet in caviomorphs (Rodentia) from the Serra**
7 **do Mar Atlantic forest (Brazil).**

8

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21 **Abstract.**

22 The Serra do Mar Atlantic forest (Brazil) shelters about 15 different species of caviomorph
23 rodents and thus represents a unique opportunity to explore resource partitioning. We studied
24 12 species with distinct diets using dental microwear texture analysis (DMTA). Our results
25 revealed differences (complexity, textural fill volume, and heterogeneity of complexity)
26 among species with different dietary preferences, and among taxa sharing the same primary
27 dietary components but not those with similar secondary dietary preferences (heterogeneity of
28 complexity). We found three main dietary tendencies characterized by distinct physical
29 properties: consumers of young leaves had low complexity; bamboo specialists, fruit and seed
30 eaters, and omnivorous species, had intermediate values for complexity; grass, leaf, and
31 aquatic vegetation consumers, had highly complex dental microwear texture. Dietary
32 preferences and body mass explained a major part of the resource partitioning that
33 presumably enables coexistence of these species. DMTA was useful in assessing what foods
34 contributed to resource partitioning in caviomorphs. Our database for extant caviomorph
35 rodents is a prerequisite for interpretation of dental microwear texture of extinct caviomorph
36 taxa, and thus for reconstructing their diets and better understanding the resource partitioning
37 in paleocommunities and its role in the successful evolutionary history of this rodent group.

38
39 Key-words: ecology, microwear, resource partitioning, rodent, Serra do Mar

40

41

42 **Resumen.**

43 La Selva Atlántica de la Serra do Mar (Brasil) contiene aproximadamente 15 especies de
44 roedores caviomorfos y por lo tanto representa un entorno único para explorar la partición de
45 recursos. Estudiamos 12 especies con dietas distintas usando análisis de textura de

46 microdesgaste dental (DMTA). Nuestros resultados revelaron diferencias (complejidad,
47 volumen de relleno de la textura, y heterogeneidad de complejidad) entre especies con
48 distintas preferencias dietarias, y entre taxones que comparten la misma preferencia dietaria
49 primaria pero no la misma preferencia dietaria secundaria (heterogeneidad de complejidad).
50 Destacaron tres tendencias dietarias principales, caracterizadas por sus distintas propiedades
51 físicas: los consumidores de brotes y hojas blandas tienen baja complejidad; los especialistas
52 en bambú, consumidores de frutos y semillas, y especies omnívoras tienen valores
53 intermedios de complejidad; los consumidores de pastos, hojas y de vegetación acuática
54 tienen texturas de microdesgaste dental sumamente complejas. Las preferencias dietarias y la
55 masa corporal explican una parte importante de la partición de los recursos que
56 presumiblemente permite la coexistencia de especies en la Mata Atlántica de la Serra do Mar.
57 El DMTA es útil para evaluar que preferencias dietarias contribuyeron en la partición de los
58 recursos en los caviomorfos. Nuestra base de datos sobre roedores caviomorfos actualmente
59 existentes es un prerrequisito para la interpretación de la textura del microdesgaste dental en
60 taxones de caviomorfos extintos y, por lo tanto para así reconstruir sus dietas y lograr una
61 mejor comprensión de la partición de recursos en las paleocomunidades y su rol en la historia
62 evolutiva exitosa de este grupo de roedores.

63

64 Palabras clave: ecología, microdesgaste, partición de recursos, roedor, Serra do Mar

INTRODUCTION

66

67

68 Rodents are the most diverse and speciose group of placental mammals (Wilson and
69 Reeder 2005; Burgin et al. 2018). A large portion of placental diversity is comprised of
70 hystricognathous rodents from South America: the caviomorphs (Caviomorpha Wood
71 1955). The fossil record for caviomorphs extends back to the late middle Eocene (Antoine et
72 al. 2012; Boivin et al. 2017) and exhibits at least 40 million years of endemic evolution on the
73 South American continent. During this period, several adaptive radiations contributed to the
74 emergence and structuration of caviomorph communities that can be observed today (e.g.,
75 Boivin et al. 2019). Caviomorphs display great taxonomic diversity (four superfamilies and
76 ten families; Lacher et al. 2016), and are found in diverse environments (Patton et al. 2015;
77 Wilson et al. 2016). The diversity of ecological conditions encountered by this group is
78 associated with a diversity of morphological adaptations. Indeed, caviomorphs vary in body
79 size from about 100g to 65kg (Patton et al. 2015; Wilson et al. 2016), display distinct activity
80 patterns and life modes (Patton et al. 2015; Wilson et al. 2016), and exhibit different
81 locomotor behaviors (Wilson and Geiger 2015). This diversity of life history traits is reflected
82 in differential exploitation of resources (see Townsend and Croft 2008, and references
83 therein). Today, the greatest species richness of caviomorphs is observed in Amazonia and the
84 Atlantic forest, where 12 to 19 species may co-occur (Upham and Patterson 2015). These
85 sympatric species provide an opportunity to explore resource partitioning among rodents
86 sharing a unique habitat.

87 Herbivory seems to be a common feeding strategy for caviomorphs, although consumption
88 of insects is important in some species (Mares and Ojeda 1982; Henry 1999). Over the past
89 four decades, dental microwear analysis has been applied to various extant mammals as a
90 means to detect dietary variation among populations (Rensberger 1973; Walker et al. 1978;

91 Ramdarshan et al. 2011). It has been used in extinct species to infer diets (Covert and Kay
92 1981; Solounias et al. 1988; Merceron et al. 2004). The objective of this approach is to
93 interpret scars produced during mastication on the enamel surface of the tooth. Abrasion of
94 the enamel depends directly on physical properties of the food consumed (Calandra and
95 Merceron 2016), although exogenous grit is another factor that may affect dental microwear
96 formation (Silcox and Teaford 2002; Scott 2012; Karme et al. 2016). Although dental
97 microwear has been shown to reflect mostly dietary habits, the degree to which the
98 environment contributes to the signal is unclear (Sanson et al. 2007; Lucas et al. 2013). In
99 rodents, differences have been found among populations from distinct environments, but
100 those differences were ultimately explained by the availability of different food items rather
101 than environmental exogenous grit (Burgman et al. 2016). While 2D microwear analysis has
102 been performed on caviomorph rodents (Townsend and Croft 2008), no analysis has been
103 performed at the community or assemblage level scale for caviomorphs as has been done for
104 platyrrhine primates (Ramdarshan et al. 2011) and ungulates (Merceron et al. 2014).

105 Dental microwear texture analysis (DMTA) is based on the automatic quantification of 3D
106 surfaces through a scale sensitive fractal analysis (Ungar et al. 2003; Scott et al. 2005, 2006).
107 It considerably reduces the intra- and inter-observer error (DeSantis et al. 2013) and has proven
108 to be effective at detecting intra- and interspecific variation in diet for both extant and extinct
109 species (Merceron et al. 2010, 2016a, 2018a; Percher et al. 2017; Berlioz et al. 2017, 2018;
110 Blondel et al. 2018), including rodents (Belmaker 2018). Studies on captive animals have
111 identified food properties producing dental microwear etiology (Ramdarshan et al. 2016,
112 2017; Merceron et al. 2016b, 2018b; Francisco et al. 2018; Teaford et al. 2018). The most
113 important properties for microwear texture formation seem to be hardness, toughness, and
114 abrasiveness (Calandra and Merceron 2016). A complex microwear texture is linked to food
115 hardness, while the anisotropy of microwear texture (i.e., its orientation) generally relates to

116 degree of toughness and abrasiveness (review by Ungar 2015). Heterogeneity of complexity
117 is related to the diversity of food items that an individual consumes on a daily basis (Scott et
118 al. 2012; Souron et al. 2015): species with a low diversity of consumed food are expected to
119 have a lower heterogeneity than opportunistic species.

120 Few DMTA studies have been conducted on rodents (murids: Burgman et al. 2016; voles:
121 Calandra et al. 2016; guinea pigs: Winkler et al. 2019). DMTA provides information about
122 food properties, but the dietary interpretations depend on the studied taxon. Thus, it is
123 important to establish a reference dataset for DMTA in caviomorphs. Here, we explore the
124 dietary preferences of several sympatric species of caviomorph rodents from the Atlantic
125 forest through DMTA. To test the dietary preferences across the 12 studied taxa, we clustered
126 them into seven dietary categories based on their primary diet components. Specifically, we
127 tested 1) whether dental microwear textures differ among diets across caviomorph species; and
128 2) whether differences in dental microwear texture appear in taxa sharing the same primary
129 diet. We focused on species sampled within the same ecoregion, hence did not analyze the
130 effect of different environments on microwear texture. Because body mass is associated with
131 ecological segregation among rodents (Bowers and Brown 1982), we analyzed resource
132 exploitation in light of this factor. We established a comparative dataset of wild caviomorphs
133 based on DMTA. Further, we explored interspecific segregation, assessed the importance of
134 dietary preferences in an assemblage of wild caviomorphs, and determined if dental
135 microwear texture can be used as a proxy for dietary preferences and food resource
136 exploitation in extinct caviomorph taxa, and thus for describing past communities.

137

138

MATERIALS AND METHODS

139

140 We studied specimens of 12 species in eight genera of wild caviomorph rodents from the
141 Serra do Mar coastal forest ecoregion (World Wildlife Fund [WWF] for Nature *sensu* IBGE
142 1993; Olson et al. 2001) housed in the collection of the Museu Nacional do Universidad
143 Federal do Rio de Janeiro (MN-UFRJ) in Brazil (Table 1; Appendix I). The Serra do Mar
144 Atlantic forest (SDMAf), within the Atlantic forest biogeographic province (Cabrera and
145 Willink 1973) on the southeastern coast of Brazil (Fig. 1), is recognized as a major
146 biodiversity and endemism hotspot in South America (Myers et al. 2000; Galindo-Leal and
147 Câmara 2003). The environment is composed mainly of moist forest with four strata of
148 vegetation and trees reaching heights of 30m (Veloso et al. 1991). The SDMAf has a
149 subtropical climate (Mantovani 1993). All specimens came from the states of Rio de Janeiro
150 and Sao Paulo (Fig. 1) and were collected between 1916 and 2013.

151 We studied the Caviidae, *Cavia aperea* and *Hydrochoerus hydrochaeris*; *Dasyprocta*
152 *leporina* (Dasyproctidae), *Coendou spinosus* (Erethizontidae); and the Echimyidae,
153 *Euryzygomatomys spinosus*, *Kannabateomys amblyonyx*, *Trinomys dimidiatus*, *T. eliasi*, *T.*
154 *gratiosus*, *T. iheringi*, *Phyllomys pattoni*, and *P. nigrispinus*. Ecological and dietary data were
155 compiled from the literature, including field observations and ethological reports, fecal
156 analyses, and stomach content of wild specimens. Some taxa, such as *Phyllomys nigrispinus*
157 and *Trinomys eliasi*, are poorly known and complete dietary data are lacking. In these cases,
158 we expected that DMTA would provide clues to the resources they consume. We recognized
159 seven dietary categories based on the primary diet component: aquatic vegetation, bamboo,
160 grass, fruit-seed, leaf, leaf-insect, and young leaf (for detailed descriptions of the dietary
161 categories see Supplementary Data SD1). Ecological data, body mass estimates, as well as
162 assigned dietary categories, and sources for each species, are summarized in Table 1.

163 We studied the first upper molar because it is diagnostic in rodents (Gomes Rodrigues
164 et al. 2009; Firmat et al. 2010; Oliver et al. 2014). After cleaning teeth with acetone-soaked

165 cotton swabs, dental impressions were made with a silicone material (polyvinyl siloxane
166 ISO 4823, President Regular Body, Coltène-Whaledent Corporation). We studied primarily
167 the mesiolingual aspect of the protocone (Fig. 2). However, if the protocone surface
168 showed signs of alteration or presence of organic matter or glue, the mesiolingual part of
169 the hypocone was studied because those facets are parallel to each other, are located on the
170 same side of the occlusal surface, and share the same function during mastication (Butler
171 1980). Scans were made directly from the silicon molds with the “TRIDENT” Leica
172 DCM8 white-light scanning confocal microscope (Leica Microsystems) with a 100× long-
173 distance lens (Numerical Aperture = 0.90; working distance = 0.9 mm), housed at the
174 PALEVOPRIM laboratory (Université de Poitiers). Scanning protocol, pre-treatment, and
175 analysis on 50x50 scans, followed procedures described in Supplementary Data (SD2; Fig.
176 2A).

177 Scale Sensitive Fractal Analysis (SSFA; Scott et al. 2006) was performed on the
178 selected enamel surface with the Toothfrax and Sfrax software programs (Surfract
179 Corporation, Norwich, Vermont, USA) to quantify complexity (area scale of fractal
180 complexity: $Asfc$), anisotropy (exact proportion of length scale anisotropy of relief:
181 $epLsar$), heterogeneity of complexity (heterogeneity of the area scale of fractal complexity
182 between sub-surfaces from a given surface: $HAsfc$), and textural fill volume (Tfv). $HAsfc$
183 was calculated with four ($HAsfc4$), nine ($HAsfc9$) and 16 ($HAsfc16$) sub-surfaces
184 (Supplementary Data SD3). Scott et al. (2006) described each of these variables in detail.

185 All statistical analyses were performed in R (R Development Core Team, 2018). A Box-
186 Cox transformation (Box and Cox 1964) was used to assure normality for the parametric
187 tests. Multivariate normality was evaluated with Mardia’s test statistic (package “MVN”
188 for R); univariate normality was assessed with the Shapiro-Wilk test. A MANOVA
189 (MANOVA; package “Car” for R) was used to determine if dietary categories share a

190 similar dental microwear pattern. Subsequently, a one-way ANOVA (package “Car”) was
191 used on each variable to test the hypothesis that different groups share similar dental
192 microwear texture parameters. The P -value was adjusted following the B-Y method
193 (Benjamini and Yekutieli 2001) in order to control the risk false discovery. In the first
194 analysis we compared taxa across dietary categories for all samples. Next, we compared
195 taxa within the “fruit-seed” category and taxa within the “leaf” category. If the overall
196 ANOVA was significant, we used both Tukey’s honestly significant difference test (HSD)
197 and Fisher’s least significant difference (LSD) pairwise tests to determine exactly where
198 the differences were. We used both tests in an effort to balance risks of type I and type II
199 errors (Cook and Farewell 1996). When the LSD test detected significant differences but
200 the HSD did not, we considered the results to be marginally significant (Burgman et al.
201 2016). The same MANOVA, ANOVA, and a posteriori tests were performed following a
202 Levene transformation of the data (see Plavcan and Cope 2001) to analyze the dispersion
203 of sample values within and between diet categories.

205 RESULTS

206
207 Mean, median, and standard deviation, were calculated for each dental microwear texture
208 parameter by species (Table 2). Both MANOVAs on Box-Cox transformed data ($d.f.=6$,
209 $P<0.001$) and on Levene’s transformed data ($d.f. = 6$, $P<0.005$) suggested differences in
210 dental microwear texture depending on dietary categories.

211 Means of complexity (Asfc) and textural fill volume (Tfv) differed significantly
212 between dietary groups (ANOVAs, Table 3A) but not between taxa within dietary groups
213 (ANOVAs, Table 4A). Variance of textural fill volume (Tfv) differed significantly
214 between taxa within "fruit-seed" eaters group (Table 4B). In addition, means of

215 heterogeneity (HAsfc16) differed significantly between dietary groups (Table 3A) and also
216 marginally (HAsfc9 and HAsfc16) between taxa within "fruit-seed" eaters group (Table
217 4A). The variance of heterogeneity differed significantly among dietary groups (HAsfc16;
218 Table 3B) and between taxa within "fruit-seed" eaters group (HAsfc4; Table 4B).
219 Anisotropy was not significantly different among dietary groups or taxa (Tables 2, 3, and
220 4). The results of the post-hoc tests indicate that complexity (Asfc) is the variable that
221 differs most among groups (Table 5; Fig. 3A).

222 "Young leaf" eaters were characterized by significantly low complexity and lower
223 values of textural fill volume (Figs. 3A and 3E) and were associated with significantly
224 larger variances for textural fill volume compared to "aquatic vegetation" and "leaf-insect"
225 eaters (Table 5B). "Bamboo" eaters had marginally higher complexity than "young leaf"
226 eaters and were not different from "fruit-seed" eaters (Fig. 3). "Bamboo," "fruit-seed," and
227 "leaf-insect" eaters had significantly lower complexity than those classified as "grass,"
228 "aquatic vegetation," and "leaf" eaters (Fig. 3A). "Leaf-insect" eaters had marginally
229 higher textural fill volumes than "bamboo" and "fruit-seed" eaters (Figs. 3E and 4D).
230 Among "fruit-seed" eaters, heterogeneity (HAsfc9 and HAsfc16) was marginally different
231 between *Dasyprocta leporina* and three of the four species of the genus *Trinomys* (*T.*
232 *dimidiatus*, *T. eliasi*, and *T. graciosus*; Fig. 4C). The values of heterogeneity (HAsfc4) in *D.*
233 *leporina* and *T. eliasi* samples were significantly more dispersed than those in *T.*
234 *dimidiatus*, *T. graciosus*, and *T. iheringi*. "Grass," "aquatic vegetation," and "leaf" eaters,
235 had higher complexities than taxa belonging to other dietary groups, and higher values of
236 textural fill volume than "young leaf" eaters (Figs. 3A and 3E). They displayed important
237 intragroup and intraspecific variability but did not differ among themselves (Fig. 5).
238 "Aquatic vegetation," "grass," and "leaf-insect" eaters, displayed a marginally lower
239 dispersion of textural fill volume values than "bamboo," "fruit-seed," and "young leaf"

240 eaters. “Aquatic vegetation” eaters had marginally higher textural fill volume than
241 “bamboo” and “fruit-seed” eaters (Fig. 3E). “Grass” eaters displayed marginally higher
242 textural fill volume than “bamboo” eaters (Fig. 3E). “Leaf” eaters had significantly higher
243 heterogeneity (HAsfc16) than “young leaf” and “fruit-seed” eaters (Figs. 3C and
244 3D). “Leaf” eaters displayed more dispersed values of complexity and heterogeneity
245 (HAsfc16) than other dietary groups, particularly “young leaf” eaters (Table 5B).

246

247

DISCUSSION

248

249 *Dietary habits and dental microwear texture.*—Complexity was responsible for most of the
250 significant differences among diets followed by textural fill volume. We observed a trend of
251 increasing complexity and texture fill volume from species eating young leaves or bamboo
252 shoots, to species feeding on grasses and mature leaves (Figs. 3A and 3E). The lowest
253 complexity, lowest textural fill volume, and lowest heterogeneity of complexity, were
254 observed for “young leaf” eaters represented by *Coendou spinosus* (Table 2; Fig. 3). Values
255 for this species are consistent with its extremely specialized folivorous diet with preferences
256 for young leaves of Fabaceae (Passamani 2009), dicotyledoneous plants with small amounts
257 of biosilica (Piperno 1988), and very low values in lignified tissues. Our results are consistent
258 with Ramdarshan et al. (2016) who found lower complexity for sheep fed only red clover
259 fodder (Fabaceae) compared to sheep fed a mixture of red clover and barley.

260 *Kannabateomys amblyonyx* was the only bamboo specialist in the study (Olmos et al.
261 1993). It consumes the inner soft tissues of bamboo shoots after removing the hard and spiny
262 outer sheet (Fabre et al. 2016). The soft inner part is the only portion processed by the molars,
263 which could explain the low values of complexity. Unfortunately, we could only analyze three
264 individuals of *K. amblyonyx*.

265 “Fruit-seed” consumers included five species: *Dasyprocta leporina* and the four species of
266 *Trinomys* (Table 1). This group displayed microwear textures that can be explained by the
267 diversity of elements composing typical frugivorous and granivorous diets (Fig. 4). These
268 taxa displayed higher complexity than “young leaf” eaters but lower complexity than
269 “grass,” “aquatic vegetation,” and “leaf” eaters (Fig. 3A). *Dasyprocta leporina* feeds mainly
270 on seeds and fruit pulp available on the forest floor (Henry 1999; Jorge and Peres 2005).
271 *Trinomys* and *Dasyprocta leporina* are among the main seed dispersers of palm species in the
272 Atlantic rainforest of Brazil (Galetti et al. 2006; Donatti et al. 2009). They remove the
273 exocarp using their incisors to extract the soft nutritious seeds inside (Henry 1999), which
274 explains why this species does not have the expected complex enamel surface on their cheek
275 teeth as expected for seed eating species (Scott et al. 2012; Ramdarshan et al. 2016).

276 Among “fruit-seed” eaters (Fig. 4C), the difference in heterogeneity of complexity
277 between three of the four species of *Trinomys* and *Dasyprocta* might reflect the inclusion of
278 insects in the diet of *Trinomys* (except for *T. iheringi*; Brito and Figueiredo 2003; Mello et al.
279 2015), whereas *Dasyprocta* complements its diet with leaves (Henry 1999; Jorge and Peres
280 2005). In contrast, *T. iheringi* had less heterogeneous microwear texture than the other species
281 of *Trinomys*, which is consistent with the fact that this species does not include insects in its
282 diet to the same extent as its sister species (Bergallo and Magnusson 1999).

283 Scott et al. (2012) proposed that higher heterogeneity values might reflect a more variable
284 diet. Burgman et al. (2016) also had results consistent with this interpretation. Among the
285 “fruit-seed” category in the present study, the more heterogeneous microwear textures were
286 observed when the diets were more variable, including insects as an important secondary
287 food. However, heterogeneous sampling among seasons, years, and environments, might also
288 explain these inter-specific differences. The species of *Trinomys* are parapatric as they tend to
289 have similar ecologies from one locality to another (Fabre et al. 2016). Our results confirm

290 these assertions as there were no significant differences in their dental microwear texture (Fig.
291 4A-D). In the case of *Trinomys eliasi*, for which dietary preferences are poorly known,
292 DMTA does not detect any differences with other species of *Trinomys*.

293 The microwear texture of “leaf-insect” eaters (*Euryzygomatomys spinosus*) is more
294 complex than that of “young leaf” eaters but less complex than those of “aquatic vegetation”
295 and “leaf” eaters. It differs from “bamboo” and “fruit-seed” eaters in having marginally
296 higher values of textural fill volume (Table 5). The major components of the diet of *E.*
297 *spinosus* (leaves and insects, Alho 1982; Patton et al. 2015) are secondary food for *D.*
298 *leporina* (leaves) and *Trinomys* (insects). The values of heterogeneity of complexity of *E.*
299 *spinosus* were similar to values observed for four species of *Trinomys*, but were marginally
300 higher than values of heterogeneity observed for *D. leporina* (Fig. 4C). This seems to confirm
301 a relationship between the presence of insects in the diet and a more heterogeneous microwear
302 texture.

303 Dental microwear texture of grazing ruminants or equids is characterized by medium to
304 high anisotropy and low to medium complexity due to a highly abrasive diet composed of
305 tough but not hard elements (Scott 2012; Merceron et al. 2018). However, it is not what we
306 observed for “grass” eaters among our rodent sample. Indeed, *C. aperea* displayed high
307 values of complexity comparable with that of dicotyledon foragers in our sampled
308 caviomorphs (Fig. 5A-B). *Cavia aperea* is described as a grass-eater inasmuch as it relies
309 mainly on monocotyledons (Rood 1972; Guichón and Cassini 1998). Although *C. aperea* eats
310 grass shoots and blades, it favors ears full of millimetric seeds (Lacher 2016). Ramdarshan et
311 al. (2016) showed that sheep fed on clover with or without a supplement of seeds differ in
312 dental microwear complexity, with the most complex enamel surface being recorded for sheep
313 fed clover with 25% as dry matter weight of barley. Further, a controlled-food experiment on
314 capuchin monkeys showed that even a single feeding event including hard objects has a

315 significant effect on dental microwear (Teaford et al. 2018). Thus, the inclusion of small seeds
316 in the diet of *C. aperea* likely results in high complexity on the enamel surface.

317 The diet of *H. hydrochaeris* is composed mainly of grasses and sedges (Mones and Ojasti
318 1986). It also feeds on bark and aquatic vegetation (Macdonald 1981), which may be related to
319 the highly complex microwear texture measured (Fig. 5A-B). Both in *C. aperea* and *H.*
320 *hydrochaeris*, the secondary dietary components (small seeds or bark) affect dental
321 microwear.

322 The dental microwear texture for “leaf” eaters was complex (Fig. 5A-B). Moreover, the
323 complexity and heterogeneity of complexity were variable between specimens. Both species
324 of *Phyllomys* have a dicotyledon based folivorous diet (Emmons and Feer 1997). However,
325 such highly complex and variable microwear texture clearly indicates that these two species
326 do not feed only on leaves, but that their diet maybe more opportunistic and include
327 significant amounts of hard food items such as hard seeds, insects or bark. Unfortunately,
328 species of *Phyllomys* are difficult to observe, limiting our knowledge of their dietary habits
329 (Leite 2003). *Phyllomys nigrispinus* does not display a microwear texture distinct from that
330 recorded for *P. pattoni* (Fig. 5A-D) and it might be expected that *P. nigrispinus* has the same
331 dietary preferences as *P. pattoni*, which could explain their tightly parapatric ranges (Leite
332 and Loss 2015).

333
334 *Resource partitioning and interspecific segregation.*— The differential exploitation of
335 resources facilitates the coexistence of species (Schoener 1974). For caviomorph rodents from
336 the SDMAf, dietary preferences seem to play an important role in the ecological segregation,
337 given the diversity of diets among the studied species (Table 1). DMTA detected differences
338 in dietary habits among most caviomorph rodents except “aquatic vegetation,” “grass,” and

339 “leaf,” consumers, and between “fruit-seed” and “bamboo” consumers, which have diet
340 differences that are not reflected by their microwear textures.

341 Because body mass also is related to ecological segregation (Bowers and Brown 1982;
342 Robinson and Redford 1986; Morales and Giannini 2010), we consider sympatric
343 caviomorphs of the SDMAf taking that factor into account. The “aquatic vegetation”
344 consumer *H. hydrochaeris* (35-60kg), the “grass” eater *C. aperea* (400-700g) and the two
345 species of “leaf” consumers of the genus *Phyllomys* (200-300g) have distinct diets that are not
346 reflected by different microwear textures. However they occupy different body mass ranges
347 and have different lifestyles (Table 1). The “fruit-seed” consumers and the “bamboo”
348 consumer *K. amblyonyx* (400g) have similar microwear textures that do not reflect their
349 different diets. They also differ in body mass (*K. amblyonyx* weighs about 400g; *D. leporina*
350 weighs about 1.5kg; the four species of *Trinomys* weigh about 160 to 240g and display
351 segregation in terms of habits (Table 1).

352 There is neither segregation by diet nor segregation by body mass between both species of
353 *Phyllomys*, and among the parapatric species of *Trinomys*. In these cases, ecological
354 segregation involves differences in microhabitat preferences (Vieira 2003). *Phyllomys pattoni*
355 occupies a wider range of microhabitats than *P. nigrispinus* (Fabre et al. 2016). The four
356 species of *Trinomys* are parapatric, which means that they show very similar ecological traits
357 but do not occupy identical habitats. Indeed, *T. gratiosus* and *T. iheringi* are found above
358 600m in Rio de Janeiro and Sao Paulo states, respectively. *Trinomys dimidiatus* prefers
359 relatively open interior climax lowland forests, while *T. eliasi* prefers coastal forests (Fabre et
360 al. 2016).

361

362 *Considerations of microwear in caviomorph rodents.*—With 2D low-magnification
363 microwear analyses, Townsend and Croft (2008: 738) concluded that differences in

364 microwear patterns among caviomorph rodents were more subtle than those for ungulates
365 (Solounias and Semperebon 2002) and primates (Godfrey et al. 2004). Our DMTA analysis of
366 a geographically restricted sample performed at the species level showed that differences in
367 dental microwear textures among caviomorph rodents (Figs. 3-5; Table 5) have similar ranges
368 as those observed for ungulates (Scott 2012) or primates (Scott et al. 2012; Ungar et al. 2017).

369 The intraspecific microwear texture variation exhibited by caviomorphs makes the analysis
370 and understanding of the interspecific variability more difficult. However, intraspecific
371 variation was expected. Although caviomorphs are mainly leaf or fruit eaters, many of them
372 include animal matter, bark, or seeds, in their diets and are more opportunistic than ruminants.
373 Ramdarshan et al. (2016) showed that small hard objects scar the enamel surface to a greater
374 extent than large ones. Thus, even a moderate percentage of insects or hard small seeds may
375 generate variation in dental microwear, as we observed in *C. aperea* (Fig. 5) and *Trinomys*
376 within the “fruit-seed” category (Fig. 4). As dental microwear records the last days or weeks
377 of wear (Teaford and Oyen 1989; Schultz et al. 2013), it is sensitive to any change in diet.
378 Thus, opportunistic behavior increases inter- and intra- taxon variability in microwear
379 textures. Furthermore, the functional importance of incisors in food processing among rodents
380 (e.g., in *Dasyprocta* and *Kannabateomys*) can modulate the role of cheek teeth in the
381 fragmentation of food elements. Finally, a recent experimental study showed that the same
382 plant may leave different microwear textures, depending on whether it is wet or dry (Winkler
383 et al. 2019). A portion of the intraspecific variability of microwear texture complexity of both
384 species of *Phyllomys* might be explained by such variations (Fig. 5). The exploration of intra-
385 taxa seasonal variability among the genera *Coendou* and *Trinomys* of the SdMAf did not shed
386 light on any significant differences (Supplementary Data SD4). However, as dental microwear
387 texture is linked to the physical properties of the food, it means only that, in both cases, those

388 physical properties remain the same throughout the year. Whether it is because the items
389 consumed remain the same or because different items have analogous properties is unknown.

390 Part of the high apparent intraspecific variability may be artificial. The scanned surface
391 was small due to the tooth and body size of the mammals studied here. Thus, the effect of a
392 small hard or abrasive element affects a higher portion of this scanned area ($50\ \mu\text{m} \times 50\ \mu\text{m}$)
393 compared to larger surfaces usually considered for studies on primates or ungulates ($200\ \mu\text{m}$
394 $\times 200\ \mu\text{m}$; Martin et al. 2018; Merceron et al. 2018). This means that analysis on small
395 surfaces for rodents or any other small mammal favors intra-specific variability (Ramdarshan
396 et al. 2017). Furthermore, our geographically restricted and species-specific level study
397 resulted in small sample sizes for some taxa, which may have resulted in some bias.
398 Nonetheless, interspecific and inter-dietary group differences were more important than
399 intraspecific variations in our sample (Table 5).

400 One limiting factor for interpreting DMTA results for caviomorphs is the lack of detailed
401 published ethological and ecological data for members of the group. There are few detailed
402 ethological analyses of caviomorphs compared to primates or ungulates (for primates see
403 Napier and Napier 1967; Percher et al. 2017; for ungulates see Field 1972; Gebert and
404 Verheyden-Tixier 2001). The detailed lists of consumed items that can be found for some
405 species of ungulates or primates allow for a better interpretation of their dental microwear
406 textures. Experimental settings (Ramdarshan et al. 2016; Teaford et al. 2018) and applied
407 studies (Berlioz et al. 2018) have shown that secondary foods may affect dental microwear
408 textures to a considerable extent, suggesting that poor dietary records for some South
409 American rodents may explain the apparent discrepancy with tooth wear.

410 This study represents a first step in the use of the DMTA to generate proxies for studying
411 the ecology of caviomorph rodents. Our data covers the main dietary preferences among
412 extant caviomorph rodents, and is therefore a prerequisite for interpretation of dental

413 microwear textures of extinct caviomorph taxa as a means of reconstructing and estimating
414 their diets, and further our understanding of the resource partitioning in paleocommunities and
415 its role in the successful evolutionary history of this rodent group.

416

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418

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434

435 **SUPPLEMENTARY DATA**

436

437 *Supplementary Data SD1*.—Dietary preferences of each studied species from the Serra do
438 Mar Atlantic forest (Brazil) compiled from the literature, and description of the seven
439 dietary categories used in this study.

440 *Supplementary Data SD2*.— Details of the scanning, pre-treatment and analysis of 50 x 50
441 scan procedures used to acquire the dental microwear surfaces studied in this work.

442 *Supplementary Data SD3*.—Studied specimens and their individual dental microwear
443 textural parameters (seasons indicated as followed: dry season or winter time = d, wet
444 season = w).

445 *Supplementary Data SD4*.—Summary of results and discussion of the impact of
446 seasonality (wet season *versus* winter time) on the dental microwear texture of the
447 specimens of the genera *Coendou* and *Trinomys* from the Serra do Mar Atlantic forest
448 (Brazil).

449

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FIGURE LEGENDS

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784

785 Figure 1.—Geographic location of the Serra do Mar coastal forest (as delineated by Olson et
 786 al. 2001 *sensu* IBGE 1993) situated in the Atlantic forest (eastern Brazil). Simplified
 787 distribution of the Brazilian Atlantic forest inspired by Pinto and Grelle (2012). Brazilian states
 788 abbreviations: CE, Ceará; RN, Rio Grande do Norte; PB, Paraíba; PE, Pernambuco; AL,
 789 Alagoas; SE, Sergipe; PI, Piauí; BA, Bahia; GO, Goiás; MG, Minas Gerais; ES, Espírito
 790 Santo; RJ, Rio de Janeiro; MS, Mato Grosso do Sul; SP, São Paulo; PR, Paraná; SC, Santa
 791 Catarina and RS, Rio Grande do Sul.

792

793 Figure 2.—Graphical representation of the acquisition process and measurement position of
 794 the chewing facet of the right upper first molar (M1) of *Coendou spinosus* (MN19327) and
 795 corresponding photosimulation and 3D representation of the studied surface
 796 (A). Photosimulations of obtained 3D surfaces for each dental morphotype (B). Drawings and
 797 photosimulations of (from left to right): *Cavia aperea* (MN24372), *Dasyprocta leporina*
 798 (MN6694), *Euryzomatomys spinosus* (MN70164), *Phyllomys pattoni* (MN31566),
 799 *Hydrochoerus hydrochaeris* (MN73284), and *Kannabateomys amblyonyx* (MN6239). The
 800 light gray filling indicates the enamel layer. Arrows indicate mesio-lingual direction. Scale
 801 bar = 1 mm.

802

803 Figure 3.—Boxplots of microwear texture variables by dietary preferences. A, complexity
 804 (Asfc); B, anisotropy (epLsar); C, heterogeneity of complexity (HASfc9); D, heterogeneity of
 805 complexity (HASfc16); E, textural fill volume (Tfv). Dietary categories: Aq, “aquatic
 806 vegetation;” Ba, “bamboo;” FS, “fruit-seed;” Gr, “grass;” Le, “leaf;” LI, “leaf-insect;” YL,
 807 “young leaf.”

808

809 Figure 4.—Boxplots of microwear texture variables for “fruit-seed”(black) and “leaf-insect”
810 (grey) eating species. A, complexity (Asfc); B, anisotropy (epLsar); C, heterogeneity of
811 complexity (HAsfc16); D, textural fill volume (Tfv).When pairwise comparison showed
812 significant differences between taxa, different letters indicates significant differences
813 (Fisher’s LSD, $p<0.05$).

814

815 Figure 5. —Boxplots of microwear texture variables for “grass”(Gr), “aquatic vegetation”(Aq)
816 and “leaf” eating (Le) species. A, complexity (Asfc); B, anisotropy (epLsar); C, heterogeneity
817 of complexity (HAsfc9); D, textural fill volume (Tfv).

TABLES

818

819

820 Table 1.—Classification, ecology and sample size of caviomorph rodents used in this study. Life-styles: arboreal (A), semi-aquatic (SA), semi-
 821 fossorial (SF), and terrestrial (T). Body mass is expressed in grams. Asterisks indicate that body masses were not available in the catalog of the
 822 MN-UFRJ for the sampled specimens and were derived from Alvarez et al. (2017; supplementary material). Double asterisks indicate when body
 823 mass was available for only one specimen.

Taxa	Habitat	Lifestyle	Activity	Mean mass (sd)	Diet	Dietary group	References ^a
Caviidae							
<i>Cavia apera</i> Brazilian guinea pig	gallery forest, also found near cultivated areas	T	diurnal	552.2*	mainly grasses, including inflorescences and seeds	grass	1, 2, 3, 4, 5, 6, 7, 8
<i>Hydrochoerus hydrochaeris</i> Capybara	open area, close to water, along rivers and streams	SA	diurnal or nocturnal	51899*	grasses, sedges, aquatic vegetation, occasionally browse on shrubs	aquatic vegetation	3, 5, 7, 8, 9, 10, 11, 12
Dasyproctidae							
<i>Dasyprocta leporina</i> Red-rumped agouti	open forest, usually distant from both water and dense vegetation	T	diurnal	4136.7 (784)	primarily fruits and seeds, and nuts (scatter hoarder), and leaves as a fallback food	fruit-seed	7, 8, 13, 14, 15, 16
Erethizontidae							

<i>Coendou spinosus</i> Paraguayan hairy dwarf porcupine	humid tropical and subtropical forest, prefers primary forest	A	nocturnal	1435 (351)	young leaves of Fabaceae, Sapotaceae and Dilleniaceae, sprouts and flowers, ant pupae	youngleaf	2, 7, 8, 11, 17, 18, 19
Echimyidae							
<i>Trinomys dimidiatus</i> Rio de Janeiro spiny rat	relatively open interior climax evergreen rainforest	T	nocturnal	223.4 (12)	fruits, seeds, maybe insects	fruit-seed	7, 8, 20
<i>Trinomys eliasi</i> Elia's spiny rat	evergreen moist forest, dry land forest, most common in dense undergrowth	T	nocturnal	211.4 (32)	fruits, seeds, maybe insects	fruit-seed	7, 8, 21, 22
<i>Trinomys graciosus</i> Gracile Atlantic spiny rat	evergreen forest with a lot of humidity and a dense overstory, above 600m	T	nocturnal	241.7 (46)	fruits, seeds, maybe insects	fruit-seed	7, 8, 23
<i>Trinomys iheringi</i> São Paulo spiny rat	evergreen forest with a lot of humidity, above 600m	T	nocturnal	162.4 (22)	fruits, seeds (scatter hoarder, Arecaceae), maybe insects	fruit-seed	7, 8, 24, 25, 26, 27
<i>Euryzygomatomys spinosus</i> Guaira	habitat generalist	SF	nocturnal	241.2 (17)	leaves and insects, sometimes bark, omnivorous	leaf-insect	2, 5, 7, 8, 28, 29, 30
<i>Kannabateomys amblyonyx</i> Atlantic bamboo rat	inland rainforest, wet gallery forest and bamboo patches	A	nocturnal or crepuscular	414.4 (43)	inner tissues of shoots of bamboo, after removal of outer hard and spiny sheet	bamboo	3, 5, 7, 8, 11, 31, 32, 33

<i>Phyllomys pattoni</i> Patton's Atlantic tree rat	evergreen rainforest, prefers primary forest and dense vegetation	A	nocturnal	226.9 (5)	folivorous diet, maybe more diverse than other arboreal Echimyidae	leaf	5, 6, 7, 8, 31
<i>Phyllomys nigrispinus</i> Black-spined Atlantic tree rat	coastal evergreen rainforest	A	nocturnal	325**	folivorous diet	leaf	5, 6, 7, 8, 31

824

825 *References: 1) Rood 1972; 2) Redford and Eisenberg 1992; 3) Eisenberg and Redford 1999; 4) Guichón and Cassini 1998; 5) Woods and Kilpatrick 2005; 6) Canevari and Vaccaro 2007; 7)
 826 Patton et al. 2015; 8) Wilson et al. 2016; 9) Macdonald 1981; 10) Mones and Ojasti 1986; 11) Emmons and Feer 1997; 12) Quintana et al. 1998; 13) Smythe 1986; 14) Dubost 1988; 15) Henry
 827 1999; 16) Jorge and Peres 2005; 17) Wilson and Reeder 2005; 18) Passamani 2009; 19) Caldara and Leite 2012; 20) Mello et al. 2015; 21) Brito and Figueiredo 2003; 22) Roach and Naylor
 828 2016; 23) Patterson 2016; 24) Bergallo 1994; 25) Bergallo 1995; 26) Bergallo and Magnusson 1999; 27) Donatti et al. 2009; 28) Alho 1982; 29) Gonçalves et al. 2007; 30) Catzeflis et al. 2008;
 829 31) Emmons 1990; 32) Olmos 1992; 33) Olmos et al. 1993.

831 Table 2.—Descriptive statistics of dental microwear texture parameters for each taxon of the Serra do Mar Atlantic Forest ecoregion. Number of
 832 individuals per sample = n; \bar{X} = mean; med = median; sd = standard deviation.

Taxa	Asfc			epLsar (x10 ⁻³)			HAsfc4			HAsfc9			HAsfc16			Tfv			
	n	\bar{X}	med	sd	\bar{X}	med	sd	\bar{X}	med	sd	\bar{X}	med	sd	\bar{X}	med	sd	\bar{X}	med	sd
<i>Cavia aperea</i>	4	3.12	2.80	1.27	2.47	2.51	0.82	0.34	0.29	0.12	0.39	0.41	0.12	0.48	0.47	0.16	1334.38	1097.80	564.61
<i>Coendou spinosus</i>	18	0.37	0.33	0.17	4.12	3.62	2.25	0.29	0.30	0.12	0.35	0.37	0.12	0.37	0.34	0.11	100.76	22.83	172.70
<i>Dasyprocta leporina</i>	7	1.18	1.21	0.52	3.12	2.79	1.84	0.25	0.16	0.15	0.25	0.22	0.13	0.29	0.26	0.13	655.18	456.55	633.84
<i>Euryzygomatomys spinosus</i>	6	0.95	0.88	0.47	4.71	4.77	1.47	0.38	0.37	0.18	0.48	0.49	0.14	0.46	0.44	0.11	1736.28	1709.99	601.46
<i>Hydrochoerus hydrochaeris</i>	5	4.91	3.79	2.52	2.77	2.12	2.30	0.32	0.35	0.14	0.49	0.54	0.23	0.50	0.48	0.11	1801.30	1797.15	345.80
<i>Kannabateomys amblyonyx</i>	3	0.68	0.61	0.24	3.06	3.01	2.50	0.44	0.34	0.28	0.55	0.65	0.32	0.55	0.58	0.32	401.21	37.35	662.83
<i>Phyllomys nigrispinus</i>	5	5.04	5.91	2.53	2.68	2.61	0.57	0.54	0.45	0.26	1.02	0.66	0.83	1.28	1.51	0.70	2055.31	2689.50	1085.74
<i>Phyllomys pattoni</i>	6	4.04	3.92	2.81	3.31	3.52	1.76	0.41	0.36	0.23	0.53	0.47	0.29	0.53	0.48	0.24	697.97	317.51	1149.61
<i>Trinomys dimidiatus</i>	10	1.41	0.98	1.33	3.39	3.34	1.97	0.35	0.34	0.10	0.38	0.37	0.09	0.44	0.42	0.15	316.68	302.98	256.85
<i>Trinomys eliasi</i>	4	1.33	1.16	0.94	4.14	4.03	3.10	0.44	0.45	0.02	0.54	0.56	0.05	0.53	0.52	0.11	617.38	460.70	738.06
<i>Trinomys graciosus</i>	8	0.88	0.83	0.39	4.91	5.39	2.44	0.34	0.30	0.16	0.46	0.40	0.25	0.52	0.38	0.34	849.81	747.08	788.58
<i>Trinomys iheringi</i>	7	1.10	1.06	0.62	3.48	3.40	2.12	0.29	0.28	0.08	0.36	0.34	0.10	0.37	0.35	0.09	499.84	149.42	706.34

833

834 Asfc: complexity; epLsar: anisotropy; HAsfc: heterogeneity of complexity calculated from 4, 9 and 16 subsurfaces respectively; Tfv: textural fill
 835 volume.

836 Table 3. —Results of the ANOVAs for dietary categories. A, on Box-Cox transformed data; B,
 837 on Levene transformed data. Adjusted *P*-values follow B-Y method (Benjamini and Yekutieli
 838 2001).

Variables	Effect	df	SS	MS	<i>F</i>	<i>P</i>
(A)						
Asfc	Diet	6	54.02	9.00	25.78	<0.001
	Residuals	76	26.55	0.35		
epLsar (x10 ⁻³)	Diet	6	9.82	1.64	1.01	0.427
	Residuals	76	123.58	1.63		
HAsfc4	Diet	6	0.77	0.13	1.57	0.493
	Residuals	76	6.18	0.08		
HAsfc9	Diet	6	3.97	0.66	2.57	0.093
	Residuals	76	19.57	0.26		
HAsfc16	Diet	6	5.91	0.99	3.08	0.046
	Residuals	76	24.29	0.32		
Tfv	Diet	6	2064.70	344.12	9.92	<0.001
	Residuals	76	2636.60	34.69		
(B)						
Asfc	Diet	6	0.94	0.16	3.61	0.033
	Residuals	76	3.30	0.04		
epLsar (x10 ⁻³)	Diet	6	0.62	0.10	1.27	0.831
	Residuals	76	6.24	0.08		
HAsfc4	Diet	6	0.02	0.00	0.62	0.715
	Residuals	76	0.36	0.00		
HAsfc9	Diet	6	0.11	0.02	1.81	0.398
	Residuals	76	0.77	0.01		
HAsfc16	Diet	6	0.22	0.04	3.07	0.047
	Residuals	76	0.90	0.01		
Tfv	Diet	6	38.63	6.44	3.46	0.033
	Residuals	76	141.51	1.86		

840 Table 4. —Results of the ANOVAs for species within dietary categories. A, on Box-Cox transformed data; B, on Levene transformed data.

Subset	Effect	df	Asfc		epLsar (x10 ⁻³)		HAsfc4		HAsfc9		HAsfc16		Tfv		
			F	P	F	P	F	P	F	P	F	P	F	P	
(A)															
“fruit-seed”	Taxa	4	0.25	0.91	0.65	0.63	2.56	0.06	3.74	<0.05	2.90	<0.05	0.46	0.76	
“leaf”	Taxa	1	1.24	0.30	3.80	0.09	0.71	0.42	1.53	0.25	4.50	0.07	4.55	0.07	
(B)															
“fruit-seed”	Taxa	4	0.75	0.57	0.40	0.81	7.60	<0.05	2.62	0.06	1.50	0.23	2.81	<0.05	
“leaf”	Taxa	1	0.03	0.87	1.38	0.27	0.19	0.68	0.27	0.62	0.64	0.45	4.31	0.07	

841

842 Table 5. —Posthoc pairwise comparisons between dietary categories. A, on Box-Cox transformed data; B, on Levene transformed data.
 843 Significance at $p < 0.05$ is indicated in regular font when both Tukey’s HSD and Fisher’s LSD tests are significant and in bold associated to an
 844 asterisk when only Fischer’s LSD test is significant (marginal).

(A)	aquatic vegetation	bamboo	fruit-seed	grass	leaf	leaf-insect
bamboo	Asfc, Tfv					
fruit-seed	Asfc, Tfv					
grass		Asfc, Tfv*	Asfc, Tfv*			
leaf		Asfc, Tfv*	Asfc, HAsfc16			
leaf-insect	Asfc	Tfv*	Tfv	Asfc*	Asfc	
young leaf	Asfc, Tfv	Asfc*	Asfc, Tfv	Asfc, Tfv	Asfc, HAsfc16, Tfv	Asfc, Tfv
(B)	aquatic vegetation	bamboo	fruit-seed	grass	leaf	leaf-insect
bamboo	Tfv*					
fruit-seed	Tfv*					
grass		Tfv*	Tfv*			
leaf	HAsfc16*	Asfc*	Asfc* , HAsfc16	Asfc* , HAsfc16		
leaf-insect		Tfv*	Tfv*		Asfc* , HAsfc16*	
young leaf	Tfv			Tfv*	Asfc, HAsfc16	Tfv

845

APPENDIX I

846

847

848 Appendix I.—List of all studied specimens with catalog numbers and locality of capture.

Collection	Catalog number	Taxon	Locality
MN-UFRJ	2236	<i>Cavia aperea</i>	Rio de Janeiro, Teresópolis
MN-UFRJ	6741	<i>Cavia aperea</i>	Rio de Janeiro, Teresópolis, Fazenda Guinle
MN-UFRJ	24369	<i>Cavia aperea</i>	Rio de Janeiro, Angra dos Reis, Praia Vermelha, Ilha Grande
MN-UFRJ	24372	<i>Cavia aperea</i>	Rio de Janeiro, Angra dos Reis, Praia Vermelha, Ilha Grande
MN-UFRJ	46517	<i>Coendou spinosus</i>	Rio de Janeiro, Paraty, Pedra Branca
MN-UFRJ	46518	<i>Coendou spinosus</i>	Rio de Janeiro, Paraty, Pedra Branca
MN-UFRJ	5514	<i>Coendou spinosus</i>	Rio de Janeiro, Mangaratiba, Fazenda da Lapa
MN-UFRJ	7260	<i>Coendou spinosus</i>	Rio de Janeiro, Teresópolis, Fazenda Carlos Guinle
MN-UFRJ	8239	<i>Coendou spinosus</i>	Rio de Janeiro, Paraty, Pedra Branca
MN-UFRJ	8240	<i>Coendou spinosus</i>	Rio de Janeiro, Paraty, Pedra Branca
MN-UFRJ	19327	<i>Coendou spinosus</i>	Rio de Janeiro, Paraty, Pedra Branca
MN-UFRJ	59613	<i>Coendou spinosus</i>	Rio de Janeiro, Carmo, Fazenda Providência
MN-UFRJ	69896	<i>Coendou spinosus</i>	Rio de Janeiro, Petrópolis, Rodovia BR 040, km 66
MN-UFRJ	75317	<i>Coendou spinosus</i>	Rio de Janeiro, Pirai, Ribeirão das Lajes
MN-UFRJ	75961	<i>Coendou spinosus</i>	Rio de Janeiro, Sumidouro, Vale do Encanto
MN-UFRJ	30494	<i>Coendou spinosus</i>	Rio de Janeiro, Angra dos Reis, Enseada de Palmas, Ilha Grande
MN-UFRJ	74408	<i>Coendou spinosus</i>	Rio de Janeiro, Rio de Janeiro, Reserva do Grajaú
MN-UFRJ	79251	<i>Coendou spinosus</i>	Rio de Janeiro, Areal, Rodovia BR040, Km 37
MN-UFRJ	79284	<i>Coendou spinosus</i>	Rio de Janeiro, Areal, Rodovia BR040, Km 31
MN-UFRJ	79385	<i>Coendou spinosus</i>	Rio de Janeiro, Duque de Caxias, Rodovia BR 040, Km 93
MN-UFRJ	79561	<i>Coendou spinosus</i>	Rio de Janeiro, Petropolis, Rodovia BR040, Km 84
MN-UFRJ	79574	<i>Coendou spinosus</i>	Rio de Janeiro, Petropolis, Rodovia BR040, Km 80
MN-UFRJ	5652	<i>Dasyprocta leporina</i>	Rio de Janeiro, Paraty, Pedra Branca

MN-UFRJ	6694	<i>Dasyprocta leporina</i>	Rio de Janeiro, Paraty, Pedra Branca
MN-UFRJ	6698	<i>Dasyprocta leporina</i>	Rio de Janeiro, Sahy
MN-UFRJ	7310	<i>Dasyprocta leporina</i>	Rio de Janeiro, Duque de Caxias
MN-UFRJ	7719	<i>Dasyprocta leporina</i>	Rio de Janeiro, Paraty, Pedra Branca
MN-UFRJ	8481	<i>Dasyprocta leporina</i>	Rio de Janeiro, Serra dos Órgãos, Mantiqueira
MN-UFRJ	43195	<i>Dasyprocta leporina</i>	Rio de Janeiro, Colônia São Bento
MN-UFRJ	6779	<i>Euryzomatomys spinosus</i>	Rio de Janeiro, Teresópolis, Fazenda Boa Fé
MN-UFRJ	24153	<i>Euryzomatomys spinosus</i>	São Paulo, Salesópolis, Casa Grande
MN-UFRJ	24154	<i>Euryzomatomys spinosus</i>	São Paulo, Salesópolis, Casa Grande
MN-UFRJ	70164	<i>Euryzomatomys spinosus</i>	Rio de Janeiro, Comendador Levy Gasparian
MN-UFRJ	71933	<i>Euryzomatomys spinosus</i>	Rio de Janeiro, Santa Maria Madalena, Parque Estadual do Desengano
MN-UFRJ	76464	<i>Euryzomatomys spinosus</i>	Rio de Janeiro, Cachoeiras de Macacu, Fragmento 19
MN-UFRJ	7663	<i>Hydrochoerus hydrochaeris</i>	Rio de Janeiro, Paraty, Pedra Branca
MN-UFRJ	73284	<i>Hydrochoerus hydrochaeris</i>	Rio de Janeiro, Rio de Janeiro, Condomínio Alphaville, Barra da Tijuca
MN-UFRJ	73634	<i>Hydrochoerus hydrochaeris</i>	Rio de Janeiro, Cabo Frio, Praia Rasa, Área da Marinha
MN-UFRJ	75761	<i>Hydrochoerus hydrochaeris</i>	Rio de Janeiro, Rio de Janeiro, Restinga de Grumari, Recreio dos Bandeirantes
MN-UFRJ	79156	<i>Hydrochoerus hydrochaeris</i>	Rio de Janeiro, Três Rios, Rodovia BR040, km 13 sentido Juiz de Fora
MN-UFRJ	1956	<i>Kannabateomys amblyonyx</i>	Rio de Janeiro, Teresópolis, Varzea de Teresópolis
MN-UFRJ	6239	<i>Kannabateomys amblyonyx</i>	Rio de Janeiro, Teresópolis, Varzea de Teresópolis
MN-UFRJ	81356	<i>Kannabateomys amblyonyx</i>	Rio de Janeiro, Duque de Caxias, Rodovia BR040, km 102 sentido Juiz de Fora
MN-UFRJ	6440	<i>Phyllomys nigrispinus</i>	Rio de Janeiro, Teresópolis
MN-UFRJ	6441	<i>Phyllomys nigrispinus</i>	Rio de Janeiro, Teresópolis
MN-UFRJ	6442	<i>Phyllomys nigrispinus</i>	Rio de Janeiro, Teresópolis
MN-UFRJ	6443	<i>Phyllomys nigrispinus</i>	Rio de Janeiro, Teresópolis
MN-UFRJ	31562	<i>Phyllomys nigrispinus</i>	Rio de Janeiro, Angra dos Reis, Ilha Grande
MN-UFRJ	2239	<i>Phyllomys pattoni</i>	Rio de Janeiro, Casimiro de Abreu, Fazenda União
MN-UFRJ	2240	<i>Phyllomys pattoni</i>	Rio de Janeiro, Casimiro de Abreu, Fazenda União
MN-UFRJ	6449	<i>Phyllomys pattoni</i>	Rio de Janeiro, Niterói, São Francisco
MN-UFRJ	21508	<i>Phyllomys pattoni</i>	Rio de Janeiro, Santa Cruz, Estrada Rio-Petrópolis
MN-UFRJ	31566	<i>Phyllomys pattoni</i>	Rio de Janeiro, Angra dos Reis, Ilha Grande
MN-UFRJ	70175	<i>Phyllomys pattoni</i>	Rio de Janeiro, Casimiro de Abreu, Fazenda União

MN-UFRJ	1949	<i>Trinomys dimidiatus</i>	Rio de Janeiro, Angra dos Reis
MN-UFRJ	4944	<i>Trinomys dimidiatus</i>	Rio de Janeiro, Duque de Caxias, Barro Branco
MN-UFRJ	4946	<i>Trinomys dimidiatus</i>	Rio de Janeiro, Duque de Caxias, Barro Branco
MN-UFRJ	4947	<i>Trinomys dimidiatus</i>	Rio de Janeiro, Duque de Caxias, Barro Branco
MN-UFRJ	4948	<i>Trinomys dimidiatus</i>	Rio de Janeiro, Duque de Caxias, Barro Branco, Estrada União Indústria km 51
MN-UFRJ	4950	<i>Trinomys dimidiatus</i>	Rio de Janeiro, Duque de Caxias, Barro Branco
MN-UFRJ	60209	<i>Trinomys dimidiatus</i>	Rio de Janeiro, Itaguaí, Morro da Mazomba, próximo à sede
MN-UFRJ	67512	<i>Trinomys dimidiatus</i>	Rio de Janeiro, Guapimirim, Parque Nacional da Serra dos Órgãos - Vale do Rio Soberbo
MN-UFRJ	67513	<i>Trinomys dimidiatus</i>	Rio de Janeiro, Guapimirim, Parque Nacional da Serra dos Órgãos - Vale do Rio Soberbo
MN-UFRJ	81652	<i>Trinomys dimidiatus</i>	Rio de Janeiro, Rio de Janeiro, Parque Nacional da Tijuca
MN-UFRJ	26811	<i>Trinomys eliasi</i>	Rio de Janeiro, Maricá, Restinga de Maricá
MN-UFRJ	28806	<i>Trinomys eliasi</i>	Rio de Janeiro, Maricá, Restinga de Maricá
MN-UFRJ	28815	<i>Trinomys eliasi</i>	Rio de Janeiro, Maricá, Restinga de Maricá
MN-UFRJ	28932	<i>Trinomys eliasi</i>	Rio de Janeiro, Maricá, Restinga de Maricá
MN-UFRJ	31370	<i>Trinomys graciosus</i>	Rio de Janeiro, Sumidouro, Fazenda São José da Serra, Serra do Paquequer
MN-UFRJ	33517	<i>Trinomys graciosus</i>	Rio de Janeiro, Sumidouro
MN-UFRJ	43807	<i>Trinomys graciosus</i>	Rio de Janeiro, Teresópolis, Fazenda Boa Fé
MN-UFRJ	61806	<i>Trinomys graciosus</i>	Rio de Janeiro, Sumidouro, Porteira Verde
MN-UFRJ	75821	<i>Trinomys graciosus</i>	Rio de Janeiro, Teresópolis, Waldemar
MN-UFRJ	75826	<i>Trinomys graciosus</i>	Rio de Janeiro, Teresópolis, Fragmento 12
MN-UFRJ	75827	<i>Trinomys graciosus</i>	Rio de Janeiro, Teresópolis, Fragmento 6
MN-UFRJ	75828	<i>Trinomys graciosus</i>	Rio de Janeiro, Teresópolis, Fragmento 6
MN-UFRJ	6451	<i>Trinomys iheringi</i>	São Paulo, Ilha de São Sebastião
MN-UFRJ	24433	<i>Trinomys iheringi</i>	São Paulo, Ubatuba, Rio Praia Dura, Serra d'Água
MN-UFRJ	28800	<i>Trinomys iheringi</i>	São Paulo, Ubatuba, Rio Praia Dura, Serra d'Água
MN-UFRJ	43821	<i>Trinomys iheringi</i>	Rio de Janeiro, Teresópolis, Rio das Bengalas
MN-UFRJ	43829	<i>Trinomys iheringi</i>	São Paulo, Juréia
MN-UFRJ	54153	<i>Trinomys iheringi</i>	Rio de Janeiro, Teresópolis, Rio das Bengalas
MN-UFRJ	6453	<i>Trinomys iheringi</i>	São Paulo, Ilha de São Sebastião

Supplementary data 1: Detailed description of the seven dietary categories

We recognized seven dietary categories based on the primary diet component: aquatic vegetation, bamboo, grass, fruit-seed, leaf, leaf-insect, and young leaf (Table 1).

Because dental microwear texture reflects the physical and biomechanical properties of consumed items, we took the silica content of plants (when known) and the dietary specialization (when extreme) into account to better depict the spectrum of dietary habits of the sampled species. The broad dietary categories used in previous works that did not focus on microwear (e.g., Nowak 1991; Ojeda et al. 2015) were not adequate for the objectives of this study. The same is true for the categories used in Townsend and Croft (2008). Townsend and Croft (2008) worked at the generic level, including several data from individuals fed in captivity.

Our sample included some strictly folivorous taxa (*Phyllomys*) that feed on dicotyledons (Emmons and Feer 1997; Leite 2003; Wilson et al. 2016) that generally have lower silica content than monocotyledons (Hodson et al. 2005). Thus, we assigned these folivorous taxa to the category “leaf.” Townsend and Croft (2008) included both *Cavia aperea* and *Hydrochoerus hydrochaeris* into the “grass-leaf” category. Furthermore, *C. aperea* prefers grasses that have high silica content (Rood 1972; Guichón and Cassini 1998) while *H. hydrochaeris* consumes a high proportion of sedges (Quintana et al. 1998) and sometimes browses on shrubs (Macdonald 1981; Mones and Ojasti 1986; Wilson et al. 2016) that differ in biosilica content (Piperno 1988; Prychid et al. 2004). We therefore separated these species in two dietary categories: “grass” (*C. aperea*) and “aquatic vegetation” (*H. hydrochaeris*). According to Townsend and Croft (2008), the genus *Coendou* is a fruit-leaf eater.

However, the species studied here, *Coendou spinosus*, does not consume fruit and has been observed feeding on young leaves of six species of trees, mainly Fabaceae (Passamani 2009) with low silica content (Piperno 2006), and possibly some flowers and ant pupae (Redford and Eisenberg 1992). We assigned *C. spinosus* to the category “young leaf.” Finally, *Dasyproctaleporina* is often categorized as a fruit-leaf consumer. Because it feeds on >80% fruit pulp and seeds (Dubost 1988; Henry 1999; Bongers et al. 2013), we considered this species as a “fruit-seed” eater, like the four species of *Trinomys* that also consume mainly fruit and seeds (Bergallo and Magnusson 1999; Brito and Figueiredo 2003; Mello et al. 2015; Patterson 2016; Roach and Naylor 2016). *Kannabateomys amblyonyx* is a bamboo specialist (Olmos et al. 1993) that consumes inner tissues of bamboo shoots after removing the outer hard sheath (Emmons 1990; Olmos 1992; Fabre et al. 2016). Because its diet is extremely specialized (a single genus of plant), we assigned this species to the “bamboo” category. *Euryzomatomys spinosus* is omnivorous (Alho 1982) and includes a significant proportion of insects in its diet (Gonçalves et al. 2007; Catzefflis et al. 2008; Fabre et al. 2016). We assigned this species to a category of “leaf-insect” corresponding to its mixed diet including leaves as well as fruit, seeds, grasses, and insects. Ecological data, assigned dietary categories and sources for each species are summarized in Table 1 of the main text.

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Supplementary data 2: Detail of the scanning, pre-treatment and analysis procedures for 50x50 scans used to acquire the dental microwear surfaces studied in this work.

The scanning process generated 1360×1024 point clouds with a vertical sampling of less than $0.002 \mu\text{m}$ and a lateral sampling (x, y) of $0.129 \mu\text{m}$ ($175 \times 132 \mu\text{m}$). These scans were saved as “.plu” files by the LeicaScan software (Leica Microsystems). They were then pre-treated using Leica Map software (Mountain Technology, Leica Microsystems). After removing aberrant peaks with automatic operators including morphological filters (see Merceron et al. 2016 for details) and vertical inversion, a $50 \times 50 \mu\text{m}$ area (the largest size of the studied surface for all species) was extracted. The 2nd order polynomial surface was subtracted to calculate the textural parameter on the microwear surface without the effects of the dental facet shape (Francisco et al. 2018). The surface was leveled and saved as a Digital Elevation Model (“.sur”) for Scale Sensitive Fractal Analysis(SSFA).

Because of the variety of patterns of enamel layers and sizes among the species (Fig.2B), the available enamel surface that could be compared across taxa was limited. Teeth of *Cavia aperea* have a narrow enamel layer; Winkler et al. (2019) selected a maximum $60 \times 60 \mu\text{m}$ surface on that layer (“enamel band” *sensu* Winkler et al. 2019). However, *Kannabateomys amblyonyx* displays a narrower enamel layer than *C. aperea*. Therefore, the size of the largest area captured for *Kannabateomys amblyonyx* (i.e., $50 \mu\text{m} \times 50 \mu\text{m}$) defined the maximum size for all other species.

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For Review Only

Collection number	Taxon	Habitat	Diet	Season	Asfc	epLsar	HAsfc4	HAsfc9	HAsfc16	TFV
MN-2236	<i>Cavia aperea</i>	terrestrial	grass		2.87	0.0020	0.51	0.49	0.57	971.21
MN-24.372	<i>Cavia aperea</i>	terrestrial	grass		2.72	0.0016	0.26	0.25	0.33	1016.87
MN-24369	<i>Cavia aperea</i>	terrestrial	grass		1.97	0.0030	0.25	0.33	0.36	1178.73
MN-6741	<i>Cavia aperea</i>	terrestrial	grass		4.92	0.0033	0.32	0.49	0.65	2170.70
MN-19327	<i>Coendou spinosus</i>	arboreal	young leaf		0.12	0.0042	0.28	0.41	0.31	0
MN-30494	<i>Coendou spinosus</i>	arboreal	young leaf	w	0.47	0.0059	0.16	0.19	0.21	161.87
MN-46517	<i>Coendou spinosus</i>	arboreal	young leaf		0.20	0.0058	0.11	0.29	0.31	0
MN-46518	<i>Coendou spinosus</i>	arboreal	young leaf		0.33	0.0059	0.49	0.51	0.43	8.30
MN-5514	<i>Coendou spinosus</i>	arboreal	young leaf		0.42	0.0009	0.23	0.38	0.56	49.81
MN-59613	<i>Coendou spinosus</i>	arboreal	young leaf	w	0.25	0.0089	0.33	0.53	0.32	0
MN-69896	<i>Coendou spinosus</i>	arboreal	young leaf	d	0.15	0.0042	0.09	0.21	0.30	0
MN-7260	<i>Coendou spinosus</i>	arboreal	young leaf	d	0.26	0.0025	0.35	0.47	0.32	0
MN-74408	<i>Coendou spinosus</i>	arboreal	young leaf	d	0.56	0.0070	0.22	0.16	0.26	506.36
MN-75317	<i>Coendou spinosus</i>	arboreal	young leaf	w	0.33	0.0067	0.49	0.54	0.60	556.16
MN-75961	<i>Coendou spinosus</i>	arboreal	young leaf	d	0.54	0.0054	0.40	0.33	0.39	49.81
MN-79251	<i>Coendou spinosus</i>	arboreal	young leaf	d	0.32	0.0030	0.42	0.38	0.35	95.46
MN-79284	<i>Coendou spinosus</i>	arboreal	young leaf	w	0.17	0.0018	0.23	0.37	0.30	0
MN-79385	<i>Coendou spinosus</i>	arboreal	young leaf	d	0.43	0.0031	0.21	0.28	0.40	37.35
MN-79561	<i>Coendou spinosus</i>	arboreal	young leaf	d	0.66	0.0027	0.19	0.21	0.20	278.08
MN-79574	<i>Coendou spinosus</i>	arboreal	young leaf	w	0.70	0.0016	0.31	0.19	0.43	0
MN-8239	<i>Coendou spinosus</i>	arboreal	young leaf		0.30	0.0017	0.40	0.36	0.43	0
MN-8240	<i>Coendou spinosus</i>	arboreal	young leaf		0.51	0.0028	0.34	0.39	0.49	70.56
MN-43195	<i>Dasyprocta leporina</i>	terrestrial	fruit-seed		0.97	0.0032	0.16	0.11	0.16	24.90
MN-5652	<i>Dasyprocta leporina</i>	terrestrial	fruit-seed		0.73	0.0019	0.16	0.26	0.28	1303.25
MN-6694	<i>Dasyprocta leporina</i>	terrestrial	fruit-seed		1.21	0.0045	0.14	0.33	0.43	726.33
MN-6698	<i>Dasyprocta leporina</i>	terrestrial	fruit-seed		1.34	0.0027	0.15	0.15	0.15	332.04
MN-7310	<i>Dasyprocta leporina</i>	terrestrial	fruit-seed		2.08	0.0005	0.25	0.21	0.26	456.55
MN-7719	<i>Dasyprocta leporina</i>	terrestrial	fruit-seed		1.45	0.0062	0.30	0.22	0.22	1693.39
MN-8481	<i>Dasyprocta leporina</i>	terrestrial	fruit-seed		0.49	0.0028	0.56	0.50	0.50	49.81
MN-24153	<i>Euryzomatomys spinosus</i>	semifossorial	leaf-insect		0.46	0.0044	0.57	0.60	0.64	1830.36
MN-24154	<i>Euryzomatomys spinosus</i>	semifossorial	leaf-insect		0.65	0.0052	0.23	0.67	0.38	1589.63
MN-6779	<i>Euryzomatomys spinosus</i>	semifossorial	leaf-insect		0.96	0.0023	0.48	0.46	0.47	1195.34
MN-70164	<i>Euryzomatomys spinosus</i>	semifossorial	leaf-insect		0.87	0.0062	0.26	0.29	0.34	987.81

MN-71933	<i>Euryzomatomys spinosus</i>	semifossorial	leaf-insect		1.83	0.0042	0.18	0.35	0.51	2295.21
MN-76464	<i>Euryzomatomys spinosus</i>	semifossorial	leaf-insect		0.89	0.0061	0.55	0.51	0.41	2519.34
MN-73284	<i>Hydrochoerus hydrochaeris</i>	semi-aquatic	aquatic plant		3.15	0.0008	0.10	0.25	0.48	2361.62
MN-73634	<i>Hydrochoerus hydrochaeris</i>	semi-aquatic	aquatic plant		2.83	0.0005	0.38	0.54	0.69	1519.07
MN-75761	<i>Hydrochoerus hydrochaeris</i>	semi-aquatic	aquatic plant		8.87	0.0021	0.29	0.59	0.42	1510.77
MN-7663	<i>Hydrochoerus hydrochaeris</i>	semi-aquatic	aquatic plant		5.91	0.0050	0.35	0.28	0.42	1797.15
MN-79156	<i>Hydrochoerus hydrochaeris</i>	semi-aquatic	aquatic plant		3.79	0.0054	0.49	0.80	0.49	1817.91
MN-1956	<i>Kannabateomys amblyonyx</i>	arboreal	bamboo		0.61	0.0056	0.22	0.19	0.22	37.35
MN-6239	<i>Kannabateomys amblyonyx</i>	arboreal	bamboo		0.95	0.0030	0.76	0.80	0.85	1166.28
MN-81356	<i>Kannabateomys amblyonyx</i>	arboreal	bamboo		0.49	0.0006	0.34	0.65	0.58	0
MN-31562	<i>Phyllomys nigrispinus</i>	arboreal	leaf		1.44	0.0021	0.45	0.42	0.51	572.76
MN-6440	<i>Phyllomys nigrispinus</i>	arboreal	leaf		5.91	0.0022	0.48	0.99	1.51	2917.78
MN-6441	<i>Phyllomys nigrispinus</i>	arboreal	leaf		8.02	0.0032	0.33	0.58	1.65	2876.28
MN-6442	<i>Phyllomys nigrispinus</i>	arboreal	leaf		6.14	0.0034	1.00	2.45	2.13	2689.50
MN-6443	<i>Phyllomys nigrispinus</i>	arboreal	leaf		3.66	0.0026	0.44	0.66	0.61	1220.24
MN-21508	<i>Phyllomys pattoni</i>	arboreal	leaf		1.30	0.0050	0.35	0.30	0.37	327.89
MN-2239	<i>Phyllomys pattoni</i>	arboreal	leaf		3.52	0.0051	0.83	1.02	0.94	3029.84
MN-2240	<i>Phyllomys pattoni</i>	arboreal	leaf		6.15	0.0039	0.41	0.63	0.59	307.13
MN-31566	<i>Phyllomys pattoni</i>	arboreal	leaf		4.32	0.0031	0.16	0.29	0.33	340.34
MN-6449	<i>Phyllomys pattoni</i>	arboreal	leaf		0.79	0.0022	0.37	0.66	0.60	182.62
MN-70175	<i>Phyllomys pattoni</i>	arboreal	leaf		8.13	0.0005	0.33	0.31	0.33	0
MN-1949	<i>Trinomys dimidiatus</i>	terrestrial	fruit-seed		0.85	0.0015	0.50	0.46	0.45	390.14
MN-4944	<i>Trinomys dimidiatus</i>	terrestrial	fruit-seed	w	0.49	0.0038	0.25	0.35	0.34	83.01
MN-4946	<i>Trinomys dimidiatus</i>	terrestrial	fruit-seed	w	0.66	0.0034	0.43	0.31	0.42	444.10
MN-4947	<i>Trinomys dimidiatus</i>	terrestrial	fruit-seed	w	1.10	0.0004	0.36	0.55	0.78	307.13
MN-4948	<i>Trinomys dimidiatus</i>	terrestrial	fruit-seed	w	4.91	0.0019	0.31	0.27	0.26	95.46
MN-4950	<i>Trinomys dimidiatus</i>	terrestrial	fruit-seed	w	1.49	0.0055	0.32	0.33	0.31	796.89
MN-60209	<i>Trinomys dimidiatus</i>	terrestrial	fruit-seed	d	1.94	0.0032	0.37	0.43	0.39	298.83
MN-67512	<i>Trinomys dimidiatus</i>	terrestrial	fruit-seed	d	0.30	0.0021	0.21	0.28	0.42	0
MN-67513	<i>Trinomys dimidiatus</i>	terrestrial	fruit-seed	d	0.87	0.0063	0.22	0.39	0.44	120.36
MN-81652	<i>Trinomys dimidiatus</i>	terrestrial	fruit-seed		1.49	0.0057	0.48	0.43	0.58	630.87
MN-26811	<i>Trinomys eliasi</i>	terrestrial	fruit-seed	d	1.26	0.0026	0.44	0.47	0.41	49.81
MN-28806	<i>Trinomys eliasi</i>	terrestrial	fruit-seed	w	0.38	0.0077	0.42	0.56	0.66	0
MN-28815	<i>Trinomys eliasi</i>	terrestrial	fruit-seed	w	1.06	0.0055	0.46	0.57	0.48	871.60
MN-28932	<i>Trinomys eliasi</i>	terrestrial	fruit-seed	w	2.62	0.0007	0.45	0.56	0.57	1548.13

MN-31370	<i>Trinomys graciosus</i>	terrestrial	fruit-seed	d	0.46	0.0062	0.22	0.20	0.21	0
MN-33517	<i>Trinomys graciosus</i>	terrestrial	fruit-seed		0.92	0.0071	0.21	0.22	0.27	2191.45
MN-43807	<i>Trinomys graciosus</i>	terrestrial	fruit-seed	w	1.52	0.0053	0.32	0.58	0.37	821.79
MN-61806	<i>Trinomys graciosus</i>	terrestrial	fruit-seed	d	0.74	0.0055	0.69	0.87	0.96	1834.51
MN-75821	<i>Trinomys graciosus</i>	terrestrial	fruit-seed	w	1.01	0.0032	0.43	0.42	0.52	58.11
MN-75826	<i>Trinomys graciosus</i>	terrestrial	fruit-seed		0.55	0.0028	0.25	0.25	0.40	680.68
MN-75827	<i>Trinomys graciosus</i>	terrestrial	fruit-seed		0.54	0.0082	0.28	0.39	0.34	398.45
MN-75828	<i>Trinomys graciosus</i>	terrestrial	fruit-seed		1.33	0.0009	0.36	0.76	1.12	813.49
MN-24433	<i>Trinomys iheringi</i>	terrestrial	fruit-seed	d	0.48	0.0031	0.28	0.25	0.30	49.81
MN-28800	<i>Trinomys iheringi</i>	terrestrial	fruit-seed	d	2.27	0.0036	0.26	0.34	0.30	224.13
MN-43821	<i>Trinomys iheringi</i>	terrestrial	fruit-seed		0.43	0.0017	0.25	0.42	0.39	4.15
MN-43829	<i>Trinomys iheringi</i>	terrestrial	fruit-seed	w	1.18	0.0052	0.15	0.28	0.35	16.60
MN-54153	<i>Trinomys iheringi</i>	terrestrial	fruit-seed	d	1.06	0.0069	0.34	0.40	0.44	149.42
MN-6451	<i>Trinomys iheringi</i>	terrestrial	fruit-seed	w	1.31	0.0005	0.35	0.29	0.29	1552.28
MN-6453	<i>Trinomys iheringi</i>	terrestrial	fruit-seed	w	0.93	0.0034	0.39	0.52	0.54	1502.47

1 Supplementary data 4: Intrageneric effect of seasonality on dental microwear texture

2

3 Material - The Serra do Mar Atlantic forest (SDMAf) is subjected to a subtropical climate
4 with annual rainfall ranging from 1400 mm to 4000 mm (Mantovani 1993). During winter,
5 rainfall is regular but less abundant than during other seasons thereby generating some
6 seasonality although winter is not a dry period. No data were available for the effect of
7 rainfall variation on the flora of the SDMAf. Date of capture, when available, was used to test
8 whether microwear textures showed seasonal intrageneric differences.

9

10 Statistics - We followed the same protocol as the main work to compare dental microwear
11 textures between rainy and dry “seasons” within taxa. Only *Coendou spinosus* and the
12 species within the genus *Trinomys* had sufficient numbers in both seasons to allow
13 analysis. Thus, in each case (*Coendou* and *Trinomys* separately), MANOVAs were
14 performed to assess differences across seasons both on Box-Cox transformed data and
15 Levene’s transformed data.

16

17 Results - Mean, median, and standard deviation of the mean were calculated for each
18 dental microwear texture parameter by genus and season (Table SD4.1). The MANOVAs
19 on Box-Cox transformed data (*Coendou*, $df= 1$, p value= 0.97; *Trinomys*, $df= 1$, p value=
20 0.92) and the MANOVAs on Levene’s transformed data (*Coendou*, $df= 1$, p value= 0.46;
21 *Trinomys*, $df= 1$, p value= 0.76) detected no significant differences among species captured
22 in the wet season and those captured in winter (Fig. SD4.1).

23

24 Interpretation - Our assessment of the possible effects of “seasonality” on microwear
25 texture of *Coendou* and *Trinomys* did not show significant differences, indicating that

26 variations in diet throughout the year were not sufficient to generate differences in dental
27 microwear textures (Table SD4.1; Fig. SD4.1). Dental microwear records short term (days
28 or weeks) wear (Teaford and Oyen 1989; Schultz et al. 2013). Thus, significant differences
29 in microwear textures would indicate clear differences in seasonal diets. However, the
30 absence of significant differences in dental microwear does not mean the consumed items
31 remain the same throughout the year. It suggests instead that the physical properties of the
32 consumed items do not change from one season to another. There may be year-round
33 availability of analogous items and selection by these species for items displaying the same
34 physical properties. Besides, seasonality in the states of Rio de Janeiro and Sao Paulo is
35 not strongly marked (Mantovani 1993) and its effect on the flora is unknown. In this
36 context, it is not surprising that the seasonality did not heavily affect the studied species.

37

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50

51 Figures captions

52 Figure SD4.1. Boxplots of microwear texture variables for *Coendou* and *Trinomys* by season
53 of capture (wet season in black and winter in grey). A, complexity (Asfc); B, anisotropy
54 (epLsar); C, heterogeneity of complexity (HAsfc9); D, textural fill volume (Tfv).

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55 Table SD4.1.—Descriptive statistics of dental microwear texture parameters for specimens of the genera *Coendou* and *Trinomys* captured in wet
 56 season and winter time (when data available). Number of individuals per sample = n; \bar{X} = mean; med = median; sd = standard deviation.

Taxa	Season	n	Asfc			epLsar ($\times 10^{-3}$)			HAsfc4			HAsfc9			HAsfc16			Tfv		
			\bar{X}	med	sd	\bar{X}	med	sd	\bar{X}	med	sd	\bar{X}	med	sd	\bar{X}	med	sd	\bar{X}	med	sd
<i>Coendou</i>	wet	5	0.38	0.33	0.21	4.97	5.85	3.23	0.30	0.31	0.13	0.37	0.37	0.17	0.37	0.32	0.15	143.61	0	241.04
	winter time	7	0.42	0.43	0.18	3.99	3.07	1.67	0.27	0.22	0.13	0.29	0.28	0.11	0.32	0.32	0.07	138.15	49.81	188.47
<i>Trinomys</i>	wet	13	1.44	1.10	1.19	3.59	3.44	2.25	0.36	0.36	0.09	0.43	0.42	0.13	0.45	0.42	0.16	622.89	444.10	605.60
	winter time	9	1.04	0.87	0.68	4.39	3.63	1.83	0.34	0.28	0.15	0.40	0.39	0.20	0.43	0.41	0.21	302.98	120.36	583.15

57 Asfc: complexity; epLsar: anisotropy; HAsfc: heterogeneity of complexity calculated from 4, 9 and 16 subsurfaces, respectively; Tfv: textural fill
 58 volume.

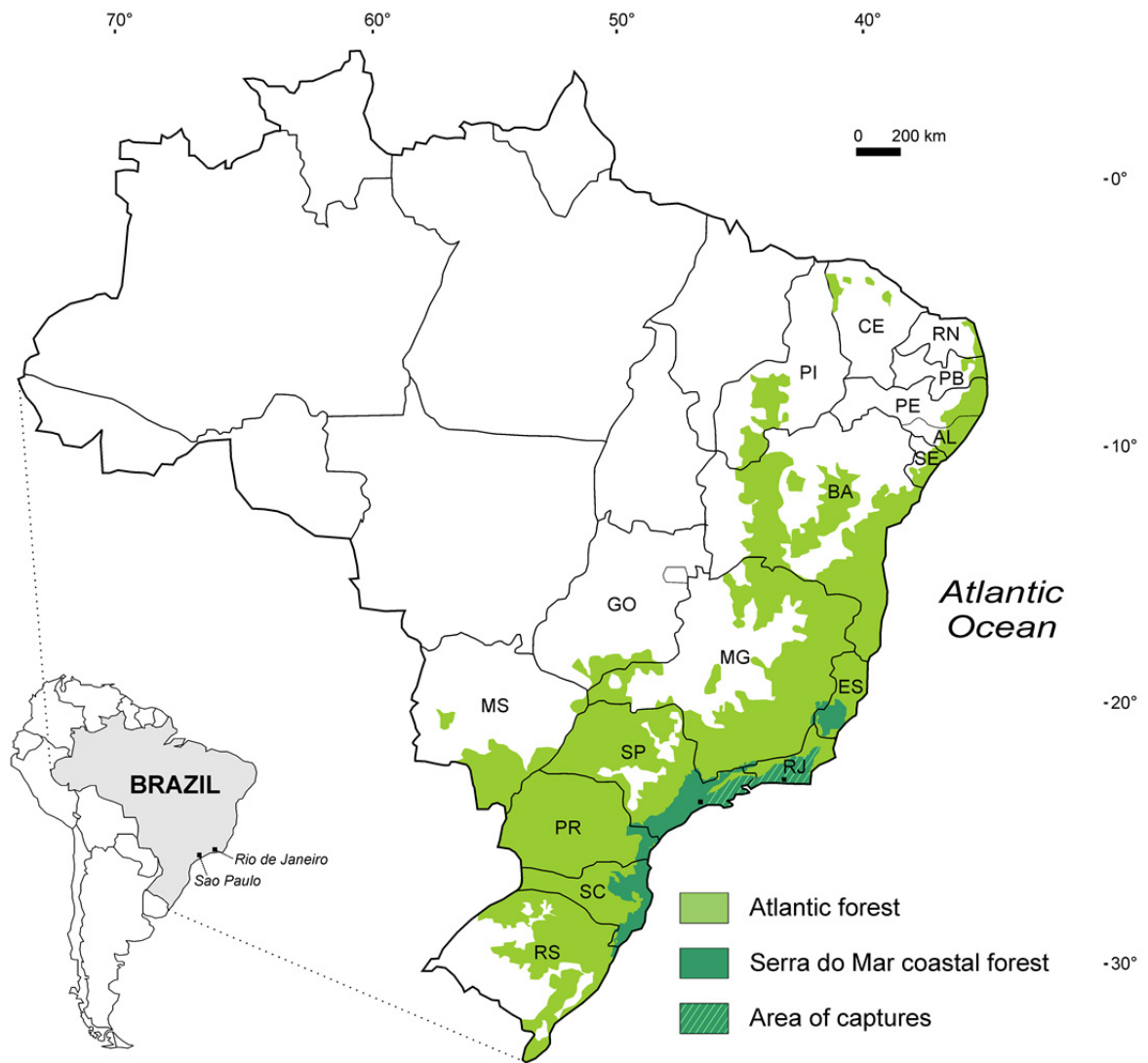


Figure 1

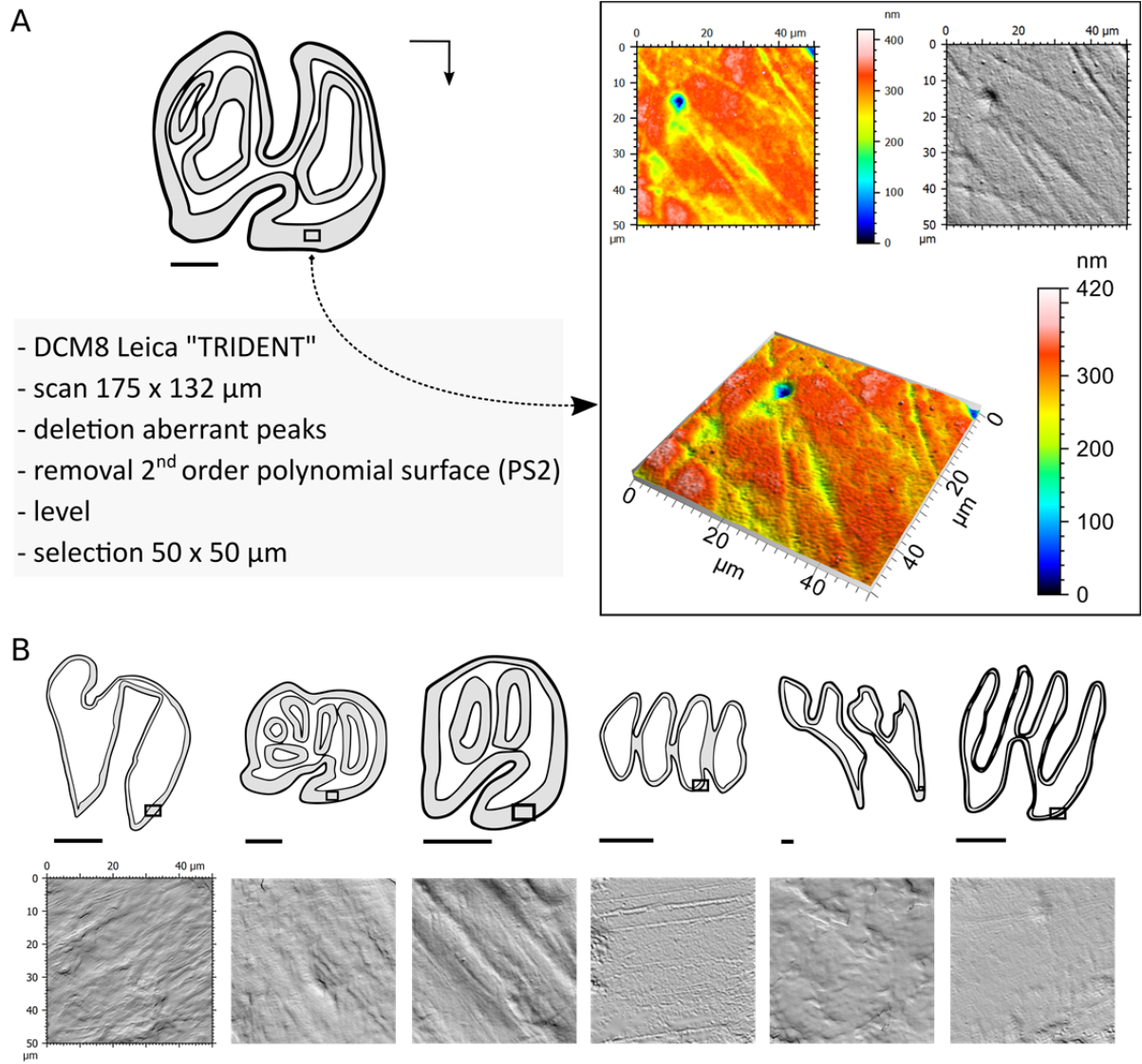


Figure 2

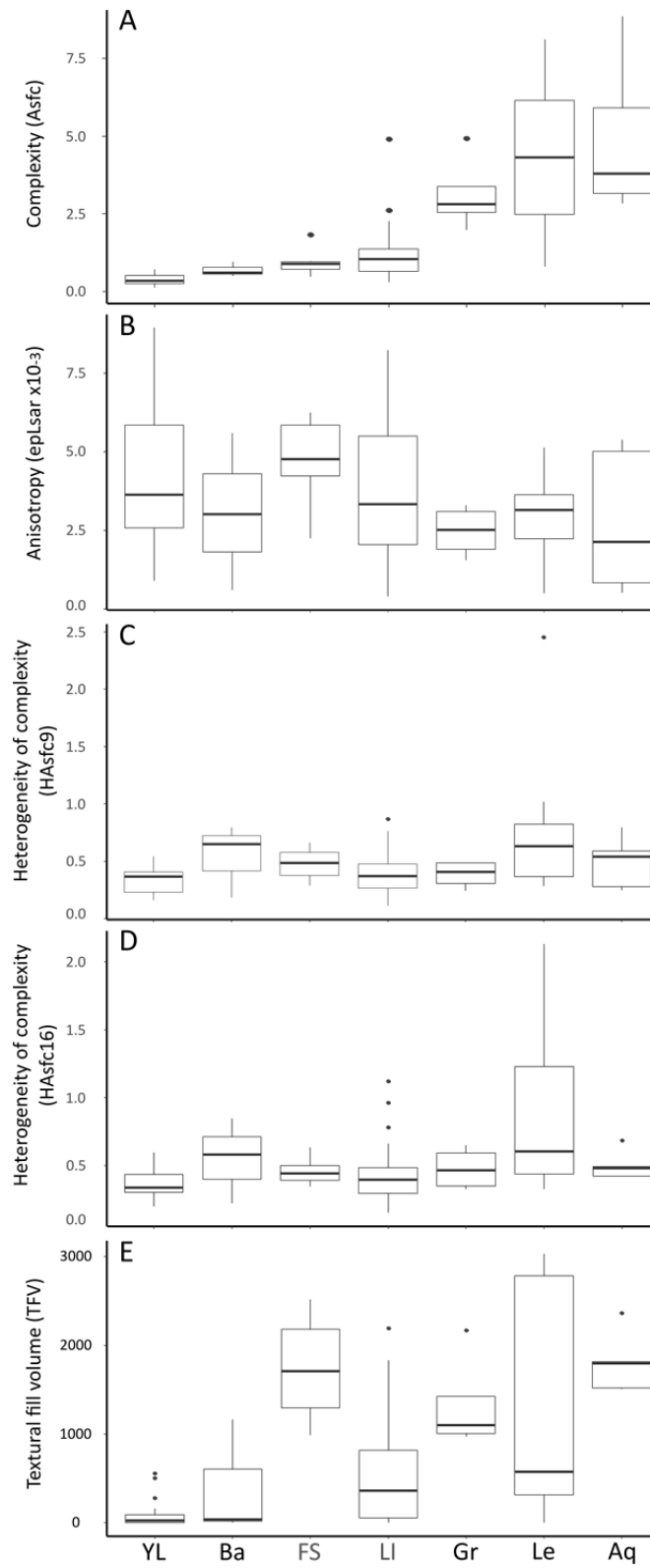


Figure 3

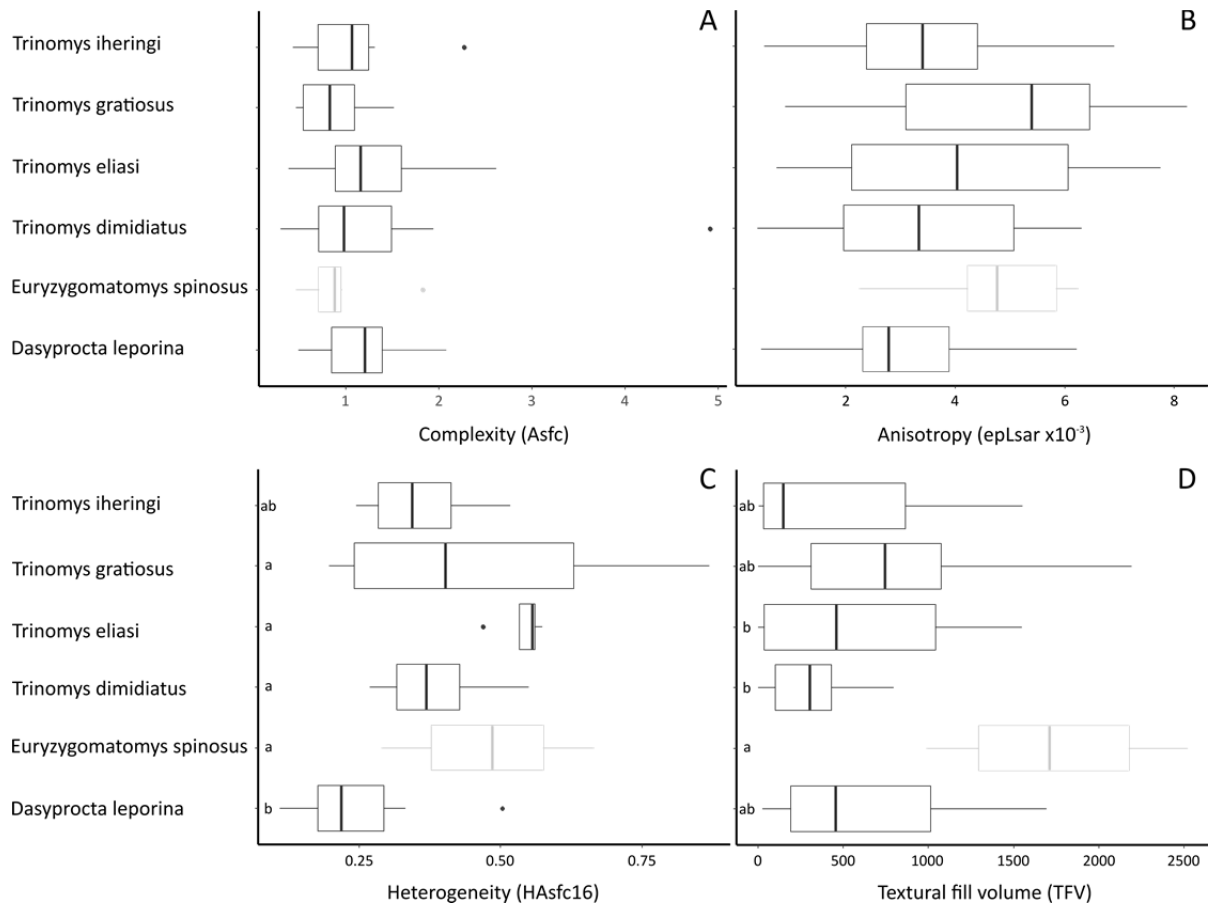


Figure 4

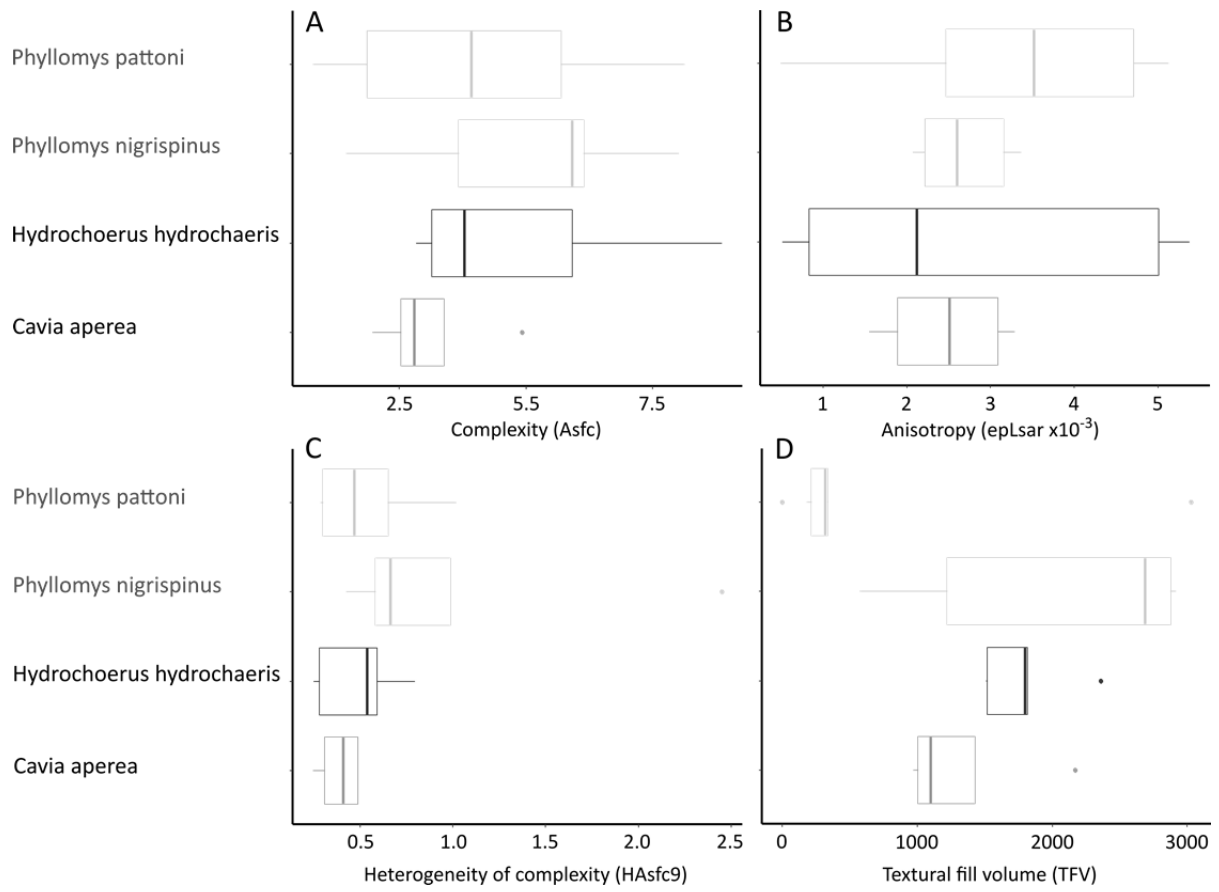


Figure 5