A comparison of the taphonomic attributes of quarries VM3 and VM4 of the Early Pleistocene site of Venta Micena (Baza Basin, SE Spain)

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The site of Venta Micena (Guadix-Baza Depression, SE Spain), a rich Fossil-Lagerstätten of late Early Pleistocene age (1.6-1.5 Ma), preserves a diverse assemblage of large mammals. Up to date, >24,000 skeletal remains have been unearthed from the surface excavated (~400 m^2) in the two main quarries of the site, VM3 and VM4, which represents a density of fossils of >60/m^2. Although this density is not homogeneously recorded across the 80-120 cm thick VM stratum, which outcrops over ~2.5 km, it suggests that tens of millions of fossils were preserved in the micritic limestones of this lithological unit. VM3 has been interpreted as a den of the giant hyena *Pachycrocuta brevirostris* in the plain that surrounded the Baza paleolake. Taphonomic analyses showed that the hyenas: (i) scavenged the prey hunted by the hypercarnivores, sabertoothed felids and wild dogs; (ii) transported the remains to their communal den as whole carcasses or selected anatomical parts; and (iii) fractured the skeletal parts according to their marrow contents and mineral density, which resulted in well-defined consumption sequences. In the case of VM4, an excavation quarry ~350 m distant from VM3, preliminary taphonomic analyses of the assemblage showed several differences, including: (i) a higher frequency of elements in anatomical connection than in VM3; (ii) a lower proportion of bones tooth-marked by carnivores (5.5%) compared with their frequency in VM3 (29.4%); (iii) a lower proportion of remains with salivary and gastric alterations (0.06% in both cases) than in VM3 (0.34% and 0.15%, respectively); and (iv) a less advanced degree of weathering (90.8% of bones show weathering stage 0 in VM4 compared to 75.9% in VM3). For these reasons, it has been suggested that a carnivore other

than *P. brevirostris* could have been involved in the bone accumulation process at VM4. However, a comparative analysis with contingency tables based on a larger dataset from VM4 has shown that the bone assemblages from both quarries are broadly similar in composition, except for: (i) slight differences in the frequency of megaherbivores, carnivores and equids; and (ii) a somewhat longer time of exposure of the remains accumulated at VM3, which resulted in their more in-depth consumption by the hyenas and more advanced weathering. In Serengeti, where spotted hyenas engage in prolonged clashes with neighbouring clans, the radius of the permanent territory defended by a clan around the communal den ranges between 2.6 and 5.7 km^2. The distance between VM3 and VM4 is too short to consider that they were generated by two neighbouring hyena clans, which suggests that their bone assemblages do not represent coeval denning areas of *P. brevirostris.* Instead, the most parsimonious interpretation is that these bone assemblages were accumulated by the hyenas during the dry seasons of different years in the emerged plain that surrounded the lake surface covered by permanent waters. During the years that correspond to VM3, the rise of the water table that capped with limestone the bones was delayed compared to VM4, which explains the differences in the taphonomic attributes of both quarries.