Deciduous Molar Morphology from the Neolithic Caves of the Meuse River Basin, Belgium

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ABSTRACT The karstic caves of the Meuse River Basin in Belgium preserve nearly 200 collective burials dating to the late Neolithic period. Among these, the cave burials of Hastière Caverne M, Sclaigneaux, Bois Madame and Maurenne Caverne de la Cave are represented by numerous individuals and radiocarbon dated to circa 4,635 to 3,830 years B.P. Dental casts from mandibular and maxillary deciduous molars are scored using multiple methods to provide a regional overview of the prevalence and expression of deciduous molar crown traits, and to compare frequencies between cave burial sites with a focus on temporal differentiation. Carabelli's trait varies from a small pit to a full cusp, the largest of which are found at Hastière Caverne M. The hypoconulid ranges from moderately large to very large. A metaconulid is absent or small. Although the results are contingent on idiosyncratic preservation, differences in the frequencies of expression of Carabelli's trait, a pronounced hypoconulid, and the presence of a metaconule and protostylid separate the earlier cave burial at Hastière Caverne M from the final/late Neolithic sites of Sclaigneaux and Bois Madame.

There are nearly 200 karstic caves of the Meuse River Basin of Belgium that preserve collective burials dating to the late Neolithic (Semal et al., 1999; Toussaint et al., 2001; Toussaint, 2007; Polet, 2011). Since habitation sites are rare, these funerary caves and rockshelters provide the principal source of information about these prehistoric farmers of the late Neolithic and the transition to the Bronze Age (Toussaint, 2007; Polet, 2011). The mortuary practices of Neolithic peoples from this region vary considerably. Some tombs contain a single burial, whereas others include two or more individuals (Toussaint et al., 2001), although the great majority are collective burials (Polet, 2011). The bones of multiple individuals are comingled in some caves. Burials are rarely found in full articulation, except in cases where single individuals are interred (Toussaint, 2007). At some caves, there is regrouping of bones into elements, such as circles of crania and bundles of long bones (Toussaint, 2007). Some individuals are completely macerated as evidenced by flint tool use (Polet, 2011), whereas others are cremated remains (Toussaint, 2007). At Bois Madame, a site in the Burnot Valley (Figure 1), it is unclear whether individuals were buried as the bones are found in an unordered manner (Dumbruch, 2003).

There may be several explanations to account for commingling within the collective burials, including the actions of burrowing and scavenging animals, geological or hydrological effects, recent human activity from grave robbers and cave explorers, or the intentional manipulation of the remains by those who deposited the deceased. Intentional manipulation may have several motivations, including burial rites, secondary reburial and creating space for additional bodies (Dumbruch, 2003; Toussaint, 2007).

About 40% of nearly 600 individuals excavated from 34 sites along the Meuse river system are subadults (Toussaint et al., 2001; Toussaint, 2007). At Bois Madame nearly a third of the individuals (33%) are identified as children (Dumbruch, 2003, 2007). More recent excavations with improved techniques are able to capture additional subadult remains, raising the proportion of children to 50% (Toussaint, 2007).

Four cave sites contain numerous subadult remains, including Hastière Caverne M, Sclaigneaux, Bois Madame and Maurenne Caverne de la Cave,

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radiocarbon dated to circa 4,635 to 3,830 years B.P. Two of the four burials are from Hastière rockshelter and include Hastière Caverne M and Maurenne Caverne de la Cave (see Figure 1). Hastière Caverne M has been radiocarbon dated to 4,345 ± 60 (AMS OxA-6558; Bronk-Ramsey et al., 2002) and can be considered early/late Neolithic.

Both Sclaigneaux and Bois Madame can be considered final/late Neolithic. The collective burial at Sclaigneaux cave is dated to 4,155 ± 35 (Paepe, 2007). Bois Madame is one of the latest sites in the sample, and the two dates obtained, 4,075 ± 38 (AMS OxA 10831) and 3,910 ± 40 (AMS OxA 10830), suggest the cave was in use during a relatively narrow time frame (Dumbruch, 2003, 2007; Toussaint, 2007).

Maurenne Caverne de la Cave from the Hastière rockshelter is associated with four dates spanning ~800 years, including 4,635 ± 45 (AMS OxA-9025), which is considered middle Neolithic (Toussaint, 2007) 4,160 ± 45 (AMS OxA-9026), 3,950 ± 70 (Lv-1483) and 3,830 ± 90 (Lv-1482), all of which are final/late Neolithic (Bronk-Ramsey et al., 2002; Toussaint, 2007). Since Maurenne Caverne de la Cave includes such a wide range of radiocarbon dates, it cannot necessarily be considered "early" or "final" late Neolithic.

Given the disparate funerary contexts that exist at Neolithic Belgian sites, the number of deciduous molars, and the high heritability of dental morphology (Turner et al., 1991; Scott and Irish, 1997, 2017; Irish, 2006; Pilloud and Larsen, 2011; Paul and Stojanowski, 2015, 2017; Pilloud et al., 2016; Scott et al., 2018), it is possible that differences in dental remains from each cave burial will parallel the chronological distinctions between sites (Bronk-Ramsey et al., 2002; Paepe, 2007; Toussaint, 2007). Previous studies of the osteological remains have concentrated on dental microwear, isotopic signatures, stature estimation, pathological conditions, and funerary ritual (Semal et al., 1999; García-Martin, 2000; Orban et al., 2000; Toussaint et al., 2001; Toussaint, 2007; Polet, 2011). The expression of nonmetric deciduous dental traits from these cave burials has not been previously explored. The aim of the study is to provide a regional review of the incidence and expression of crown traits on the maxillary and mandibular deciduous molars, and to examine the frequencies of traits across cave burials with respect to temporal variation.

On the basis of chronology, we expect the early/late Neolithic site of Hastière Caverne M to be distinct from the final/late Neolithic sites of Sclaigneaux and Bois Madame. We anticipate Maurenne Caverne de la Cave to present the most variation in dental morphology given its relatively broad time frame. Ecogeography may also explain the results; the two cave burials from Hastière rockshelter (Hastière Carverne M and Maurenne Caverne de la Cave) may resemble each other and differ from Sclaigneaux and Bois Madame (Figure 1).

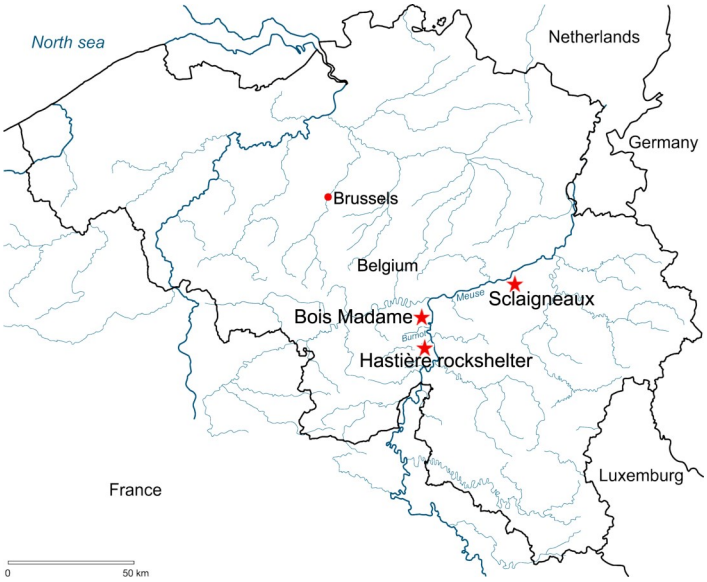

Figure 1. Map of Belgium shows the location of Hastière rockshelter (Hastière Caverne M and Maurenne Caverne de la Cave), Bois Madame and Sclaigneaux. Sclaigneaux is approximately 35 km northeast whereas Bois Madame is circa 15 km north of Hastière rockshelter (drawing: ADIA ©).

Materials

Deciduous molars were examined from Hastière Caverne M, Sclaigneaux, Bois Madame and Maurenne Caverne de la Cave for a total of 27 individuals (Table 1). These gnathic remains are isolated such that each fragmentary molar and adjoining alveolus can be considered the sole remains from a given individual. Although there are hundreds of isolated teeth, only *in situ* deciduous molars were considered. The stages (1-8) created by Smith (1983, 1984) were used to characterize the wear on the deciduous molars (Tables 2-5).

Table 1. Neolithic samples

Cave burial	Maxillae	Mandibles	Individuals
Hastière Caverne M	3	2	5
Sclaigneaux	8	1	9
Bois Madame	2	4	6
Maurenne Caverne de la Cave	5	2	7
Total	18	9	27

Table 2. Preservation and wear at Hastière Caverne M, an early/late Neolithic cave burial

Identifier	Preservation	Dental wear (Smith, 1984)
Hastière 38	Nearly complete maxilla extending from the left unerupted crown of M^1 to the empty M^1 crypt on the right	dm^1 = stage 4; dm^2 = stage 3
Hastière 38[1]	Right maxillary alveolar fragment with dm^1 and dm^2	dm^1 = stage 4; dm^2 = stage 3
Hastière 39	Small maxillary alveolar fragment with dm^1 and dm^2	dm^1 = stage 3; dm^2 = stage 2
Hastière 18	Mandibular corpus extending from the left ramus base to the right dm_1; only the left dm_1 and dm_2 are preserved	dm_1 and dm_2 = stage 2
Hastière 19	Partial mandibular corpus extending from the left dm_2 to the right damaged dm_1	dm_2 = stage 3

Table 3. Preservation and wear at Sclaigneaux, a final/late Neolithic cave burial

Identifier	Preservation	Dental wear (Smith, 1984)
Sclaigneaux 115	Relatively complete lower maxilla and dental arcade holding dm^1 and dm^2 on both sides	dm^1 = stage 5; dm^2 = stage 4
Sclaigneaux 116	Relatively complete lower maxilla with dm^1 and dm^2 preserved on both sides	dm^1 and dm^2 = stage 3
Sclaigneaux 117	Left maxillary fragment with dm^1 and dm^2	dm^1 and dm^2 = stage 3
Sclaigneaux 118	Left maxillary fragment, preserving dm^2 and M^1	dm^2 = stage 5
Sclaigneaux 119	Left maxillary fragment and palate, preserving dm^1, dm^2 and M^1	dm^1 = stage 6; dm^2 = stage 4
Sclaigneaux 122	Left maxillary fragment with the deciduous molars preserved; dm^1 is slightly chipped	dm^1 = stage 7; dm^2 = stage 4
Sclaigneaux 124	Small right maxillary fragment holding dm^1, dm^2 and M^1	dm^1 = stage 5; dm^2 = stage 3
Sclaigneaux 125	Well-preserved right maxilla, with dm^1 and dm^2	dm^1 = stage 5; dm^2 = stage 4
Sclaigneaux 82	Small left corpus fragment holding dm_1 and dm_2	dm_1 = stage 5; dm_2 = stage 4

Table 4. Preservation and wear at Bois Madame, a final/late Neolithic cave burial

Identifier	Preservation	Dental wear (Smith, 1984)
BM mx 26	Left fragmentary maxilla, preserving dm^1 and dm^2	dm^1 and dm^2 = stage 4
BM mx 27	Left partial maxilla including most of the palate and alveolus, along with dm^1, dm^2 and M^1	dm^1 = stage 5; dm^2 = stage 4
BM Md 27	Right mandibular corpus fragment with a partial ramus including dm_1, dm_2 and M_1	dm_1 = stage 5; dm_2 = stage 4
BM Md 28	Right mandibular fragment with a complete ramus, and dm_1 and dm_2	dm_1 = stage 5; dm_2 = stage 4
BM Md 32	Left corpus and ascending ramus holding dm_2 and M_1	dm_2 = stage 4
BM Md 37	Right corpus fragment with dm_1 and dm_2	dm_1 = stage 4; dm_2 = stage 3

Table 5. Preservation and wear at Maurenne Caverne de la Cave, a cave burial with one middle and three final/late Neolithic dates

Identifier	Preservation	Dental wear (Smith, 1984)
Maurenne 22	Right maxillary fragment holding dm^1, dm^2 and the unerupted crown of M^1	dm^1 = stage 3; dm^2 = stage 2
Maurenne 23	Right maxillary fragment from the mesial margin of the M^1 crypt to di^1	dm^2 = stage 7; dm^2 = stage 4
Maurenne 24	Right maxillary fragment extending from the crypt of the M^1 crown to di^1 with only dm^1 (obscured by matrix) and dm^2	dm^2 = stage 2
Maurenne 25	Maxillary alveolus extending from a fully formed M^2 crown to the canine crypt, with dm^1, dm^2 and M^1	dm^1 = stage 6; dm^2 = stage 4
Maurenne 26	Maxillary alveolus, from the unerupted crown of M^1 to di^1, preserving dm^1 and dm^2	dm^1 = stage 4; dm^2 = stage 2
Maurenne 82	Nearly complete mandible holding dm_1 and dm_2 on both sides	dm_1 = stage 4; dm_2 = stage 3
Maurenne 85	Corpus fragment extending from the base of the left ascending ramus to right dm_1 crypt holding the left dm_1, dm_2 and M_1	dm_1 and dm_2 = stage 4

Methods

Dental impressions were created by the first author using a thin layer of polyvinylsiloxane (President Jet Plus Regular Body, Coltène-Whaledent) applied to the occlusal surface of *in situ* molars curated at the Royal Belgian Institute of Natural Sciences. Dental casts were created at Georgia State University using centrifuged epoxy resin and hardener (Beuhler), which was poured on the dental molds nestled within putty crucibles affixed beforehand with hardener (Beuhler). The casts dried for 24 hours before extraction.

Dental casts were scored by the second author using Hanihara (1961) and supplemented with scores for the hypoconulid (Cusp 5) on dm_2 and the metaconule (Cusp 5) on dm^2 from the ASUDAS (Turner et al., 1991; Scott and Irish, 2017), following Paul and Stojanowski (2015). The maxillary deciduous molars were scored for crown pattern of dm^1 and dm^2, Carabelli's trait on dm^2, and the presence of a metaconule (Cusp 5) on dm^2. For the mandibular deciduous molars, only dm_2 is considered following Hanihara (1961) and the traits scored included the protostylid, hypoconulid (Cusp 5), metaconulid (Cusp 7), the central ridge of the metaconid (CRM), and the distal trigonid crest (DTC). To validate the scores, photographs of the original material were consulted.

Results

Maxillary Traits

Crown pattern for dm^1 is noted in two individuals and varies considerably (Table 6). Specifically, at Sclaigneaux, one individual exhibits a large protocone and paracone, and is classified as a score of 2. In contrast, an individual from Maurenne Caverne de la Cave presents all four cusps but the hypocone and metacone are relatively modest in size corresponding to a score of 4- (Hanihara, 1961). The crown pattern for dm^2 is uniformly classified as a score of 4 (Hanihara, 1961). Carabelli's trait varies from a small pit in some individuals from Sclaigneaux to a large independent cusp on the dm^2 of Hastière Caverne M 39 (Figure 2). It is present at all sites except Bois Madame. A metacon-

Figure 2. The only metaconule observed is a small cuspule on the right dm^2 of Hastèire Caverne M 39 (a); this individual also exhibits a prominent Carabelli's cusp (b). Scale bar = 1 cm.

Table 6. Maxillary deciduous molar traits

Neolithic time period	Site	ID No.	Crown Pattern dm^1	Crown Pattern dm^2	Carabelli's trait dm^2	Metaconule (Cusp 5) dm^2
early/late	Hastière	38		4	5	0
	Hastière	38[1]		4		
	Hastière	39		4	7	1
final/late	Sclaigneaux	124	2	4	1	0
	Sclaigneaux	115		4	1	
	Sclaigneaux	122		4		
	Sclaigneaux	118		4		
	Sclaigneaux	117		4	6	0
	Sclaigneaux	116		4	3	0
	Sclaigneaux	119		4		
	Sclaigneaux	125		4	1	0
	Bois Madame	26		4		
	Bois Madame	27		4		
middle and final/late	Maurenne	24		4	2	0
	Maurenne	25		4		
	Maurenne	23		4		
	Maurenne	22	4-	4	5	0
	Maurenne	26		4	4	

ule is expressed only on Hastière Caverne M 39 (Figure 2) and is absent at Sclaigneaux and Maurenne Caverne de la Cave. In the Bois Madame sample, it could not be observed (see Table 6).

Mandibular Traits

A protostylid is present only on the dm_2 of a single individual from Hastière Caverne M (Figure 3). The metaconulid expression varies from a larger feature in Sclaigneaux (Hanihara score 3) and Maurenne Caverne de la Cave (Hanihara score 2) to its absence or low expression at Hastière Caverne M and Bois Madame (Table 7). A central ridge of the metaconid (CRM), or Cusp 7, is noted at all cave burials except Bois Madame, and a distal trigonid crest (DTC) is absent at Hastière Caverne M and Maurenne Caverne de la Cave, but present at Bois Madame (Figure 4). Where it could be examined, the hypoconulid (Cusp 5) was scored as either prominent (ASUDAS grade 5) such as at Hastière Caverne M and Sclaigneaux, or large (ASUDAS grade 4) as at Maurenne Caverne de la Cave, or both as is the case at Bois Madame (Figure 5).

Figure 3. The expression of a protostylid (white arrow) is visible on the left dm_2 of Hastière Caverne M 19. Scale bar = 1 cm.

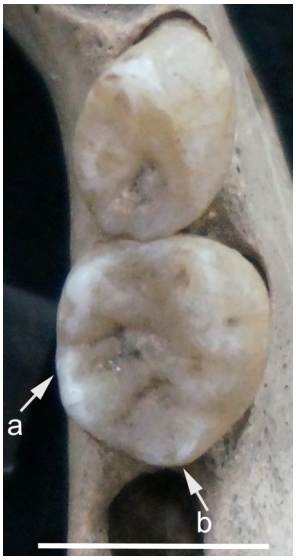

Figure 4. A small metaconulid (a) and a large hypoconulid (b) can be observed on the right dm_2 of Maurenne 82. Scale bar = 1 cm.

Figure 5. The largest and most distinctive hypoconulid (cusp 5) is visible on the right dm_2 of Hastière Caverne M 18, identified by a white arrow. Scale bar = 1 cm.

Table 7. Mandibular deciduous molar traits

Neolithic time period	Site	ID No.	Protostylid dm_2	Metaconulid (Cusp 7) dm_2	CRM dm_2	DTC dm_2	Hypoconulid (Cusp 5) dm_2
early/late	Hastière	19	1	1		0	
	Hastière	18		0	2	0	5+
final/late	Sclaigneaux	82		3	2		5
	Bois Madame	37		0			5
	Bois Madame	32		1			
	Bois Madame	28					4
	Bois Madame	27				1	
middle and final/late	Maurenne	82		2	2	0	4
	Maurenne	85		0			

Frequencies of traits per Neolithic cave site

For dm^2, the crown pattern of Hastière Caverne M did not differ from the other collective burials. However, Hastière Caverne M was partially distinct from the other sites for Carabelli's trait, which was strongly expressed where it was demonstrably visible (Table 8). Furthermore, there is more variation in the expression of a metaconule on dm^2 at Hastière Caverne M, and this is the only site known to express a protostylid (Figure 3). Hastière Caverne M also differs in the expression of the metaconulid (Figure 4) when compared to the ones from the final/late collective burial of Sclaigneaux, and to a lesser extent Maurenne Caverne de la Cave (see Table 8). The final/late Neolithic cave burial of Bois Madame differs from Hastière Caverne M in exhibiting a distal trigonid crest (DTC), albeit of a low expression. Bois Madame is also distinct from the early/late Neolithic site of Hastière Caverne M for exhibiting greater variation in the expression of the hypoconulid (Cusp 5) on dm_2 (see Table 8).

Discussion

The morphology of the deciduous teeth has been examined in studies of modern humans (Hanihara, 1961; Edgar and Lease, 2007; Pilloud and Larsen, 2011), Pleistocene *Homo* (Smith and Tillier, 1989; Bailey and Hublin, 2006; Martinón-Torres et al., 2012; Hershkovitz et al., 2016; Zubova et al., 2016) and the African apes (Hardin and Legge, 2013). Because primary crown formation time is shorter, environmental pressures are reduced, resulting in a tendency of the deciduous dentition to preserve the ancestral condition more often than permanent successors (Paul and Stojanowski, 2017; Scott et al., 2018). Indeed, deciduous teeth have

Table 8. Pooled frequencies

			Grade								
Site	***N***	**Trait**	**0**	**1**	**2**	**3**	**4**	**4-**	**5**	**6**	**7**
Sclaigneaux[b]	1	Crown Pattern (dm^1)			1.00						
Maurenne[c]	1							1.00			
Hastière[a]	3	Crown Pattern (dm^2)					1.00				
Sclaigneaux[b]	8						1.00				
Bois Madame[b]	2						1.00				
Maurenne[c]	5						1.00				
Hastière[a]	2	Carabelli's (dm^2)							0.50		0.50
Sclaigneaux[b]	5			0.60		0.20				0.20	
Maurenne[c]	3				0.33		0.33		0.33		
Hastière[a]	2	Metaconule Cusp 5 (dm^2)	0.50	0.50							
Sclaigneaux[b]	4		1.00								
Maurenne[c]	2		1.00								
Hastière[a]	1	Protostylid (dm_2)		1.00							
Hastière[a]	2	Metaconulid Cusp 7 (dm_2)	0.50	0.50							
Sclaigneaux[b]	1					1.00					
Bois Madame[b]	2		0.50	0.50							
Maurenne[c]	2		0.50		0.50						
Hastière[a]	1	CRM (dm_2)			1.00						
Sclaigneaux[b]	1				1.00						
Maurenne[c]	1				1.00						
Hastière[a]	2	DTC (dm_2)	1.00								
Bois Madame[b]	1			1.00							
Maurenne[c]	1		1.00								
Hastière[a]	1	Hypoconulid Cusp 5 (dm_2)							1.00		
Sclaigneaux[b]	1								1.00		
Bois Madame[b]	2						0.50		0.50		
Maurenne[c]	1						1.00				

[a] early/late Neolithic; [b] final/late Neolithic; [c] middle and final/late Neolithic

been shown to exhibit greater efficacy in indicating relatedness than the permanent dentition (Kitagawa et al., 1995; Paul and Stojanowski, 2017), and are better at distinguishing groups than metric traits (Sciulli, 1977). Although deciduous and permanent teeth may not differ in proxies of environmental stability, such as fluctuating asymmetry (Guatelli-Steinberg et al., 2006), the primary dentition has fewer cases of agenesis or supernumerary teeth compared to adult successors (Scott et al., 2018).

The entire primary molar row (including the deciduous and permanent teeth) may reflect an underlying unified mechanism of expression. At the same time, the deciduous dentition appears to be governed by partially distinct genetic and developmental processes than the permanent teeth, such that the presence of a protostylid on dm_2 (see Figure 4) does not necessarily imply that this trait will appear on any of the permanent molars (Scott et al., 2018). Furthermore, Carabelli's trait tends to be more prevalent and more strongly expressed in dm^2 compared to M^1 (Kaul and Prakash, 1981; Bermúdez de Castro, 1989; Edgar and Lease, 2007; Scott et al., 2018). To the degree to which Carabelli's trait and the protostylid are informative about biological relationships, it would suggest that Hastière Caverne M does indeed differ from the other cave burials. In a study of early Neolithic Çatalhöyük, Pilloud (2009) found that for the deciduous dentition, Carabelli's trait of dm^2 and the presence of a protostylid on dm_2 significantly separated groups, and this appears to be true among the late Neolithic cave burials from Belgium.

Prehistoric deciduous teeth have been scarcely examined given a historical preference for the permanent dentition (Scott et al., 2018). An informative study by Scuilli (1977) described the deciduous dental morphology of prehistoric Amerindian hunter/gatherer/fishers and early Mississippian cultivators of the Ohio Valley. The crown form on dm^1 in the prehistoric Amerindian remains is most frequently four cusps (paracone, protocone, metacone and hypocone) like at Maurenne Caverne de la Cave (see Table 6). The crown form on dm^1 of an individual from Sclaigneaux including only the two mesial cusps was rarely found in 58 individuals from 12 sites (Sciulli, 1997). The dm^2 presents four cusps in both prehistoric Amerindian and Neolithic Belgian cave sites (Sciulli, 1977; see Table 8). However, Carabelli's trait is extremely rare among prehistoric Amerindians, whereas it is present and expressed strongly in three of the four Neolithic cave sites from Belgium, only being absent from Bois Madame (see Table 6). In comparison to Sciulli (1977) a metaconulid (Cusp 7) on dm_2 was found at lower frequencies compared to the results from this study, although the constraints of the small sample sizes must be taken into consideration (see Table 8). Each of the Neolithic cave burials exhibits a hypoconulid (Cusp 5) which compares to 97% of the prehistoric Amerindians who exhibit five or more cusps on dm2 (Sciulli, 1977).

Conclusions

The deciduous molars from the Neolithic caves of Belgium present considerable variation in the expression of traits. Crown pattern varies where it can be observed. Carabelli's trait is found at Hastière Caverne M, as well as the final/late Neolithic cave site of Sclaigneaux and at Maurenne Caverne de la Cave, although its expression varies. The individuals preserving dm_2 generally exhibit a large or very large hypoconulid (Cusp 5).

Given the wide range of radiometric dates from Maurenne Caverne de la Cave, it was expected to exhibit the greatest variability. Like Sclaigneaux, Maurenne Caverne de la Cave does present substantial variation in the expression of Carabelli's cusp and in the metaconulid (Cusp 7) compared to Hastière Caverne M. The resemblance of the two collective burials from Hastière rockshelter (Hastière Caverne M and Maurenne Caverne de la Cave) is not particularly strong although the number of individuals involved is severely constrained.

We expected to observe differences between the early/late collective burial of Hastière Caverne M and the final/late Neolithic sites of Sclaigneaux and Bois Madame. Hastière Caverne M does exhibit the most pronounced expression of Carabelli's cusp on dm^2, and this trait is found nearly universally in the sample (see Figure 2). Hastière Caverne M also has the largest hypoconulid (see Figure 5), and this cave burial is the only assemblage to express a protostylid on dm_2 (see Figure 3) and a metaconule on dm^2 (see Figure 2). Since no other site presents these distinctions, it appears that the deciduous dental morphology of the early/late Neolithic cave assemblage of Hastière Caverne M does indeed differ from the final/late Neolithic collective burials of Sclaigneaux and Bois Madame.

Population movement or displacement and/or secular changes may explain some of the differences in the frequencies of traits if the cave burials represent a single group of closely related peoples. Alternatively, these populations may have had only a limited amount of regional gene flow during the late Neolithic period. Previous studies indicate that deciduous dental morphology approximates, to a greater extent than the secondary dentition, the ge-

netic relationships among individuals (Kitagawa et al., 1995; Paul and Stojanowski, 2017). To the degree to which this is also true of these Neolithic cave burials, it can be assumed the people represented at Hastière Caverne M were relatively isolated several centuries prior to a partial restructuring of the regional population associated with the Bronze Age.

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