

TWO EXQUISITELY PRESERVED NEONATE CAVE BEAR SIBLINGS FROM EQUI TERME (TUSCANY, ITALY; UPPER PLEISTOCENE)



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ABSTRACT

We report on two exquisitely preserved, extremely small *Ursus spelaeus* skeletons that were found in 2014 at the karst cavity known as “Tecchia di Equi”, in the Apuan Alps (Massa-Carrara Province, Tuscany, central Italy). The most complete specimen includes the skull, which displays an undeformed three-dimensional morphology and is still connected to the cervical vertebrae. The cervical and thoracic vertebrae and the ribs are fully articulated. The 23 mm-long scapulae and the right humerus and tibia are also preserved. The second specimen displays a fairly complete rib cage, part of the vertebral column and the 26 mm-long right scapula. The preserved forelimbs include both the 31 mm-long humeri as well as the corresponding ulnae and radii. Overall, the two studied cubs stand out for their excellent preservation state. Many features of both skeletons reveal their overly young ontogenetic age, namely: the cranium is edentulous, and displays unfused sutures and open fontanelles; the vertebrae are only partly ossified; and the long bones lack the epiphyses. By comparing the measurements of the scapulae and long bones of the studied specimens with those of very young conspecific individuals from other sites of central Europe, an age at death of less than a week is proposed for both cubs, which most likely belong to the same litter. They may have died from starvation shortly after birth, similar to what happens to many modern bear cubs due to the often critical nutritional conditions of pregnant females during hibernation.

Keywords: cub, humerus, ontogeny, scapula, skull, Tecchia, Late Pleistocene, *Ursus spelaeus*

RÉSUMÉ

DEUX OURS DES CAVERNES NÉONATAUX PARFAITEMENT PRÉSERVÉS DÉCOUVERTS À EQUI TERME (TOSCANE, ITALIE; PLÉISTOCÈNE SUPÉRIEUR)

Nous présentons deux squelettes d'*Ursus spelaeus* de très petite taille, parfaitement préservés, découverts en 2014 dans la cavité karstique connue sous le nom de « Tecchia di Equi », dans les Alpes Apuanes (Province de Massa-Carrara, Toscane, centre de l'Italie). Le spécimen le plus complet comprend le crâne, qui présente une morphologie tridimensionnelle non déformée et est toujours connecté aux vertèbres cervicales. Les vertèbres cervicales et thoraciques et les côtes sont entièrement articulées. Les omoplates de 23 mm de long ainsi que l'humérus et le tibia droits sont également préservés. Le deuxième spécimen conserve la cage thoracique assez complète, une partie de la colonne vertébrale et l'omoplate droite de 26 mm de long. Les membres antérieurs préservés comprennent les deux humérus de 31 mm de long, ainsi que les cubitus et les radius correspondants. Dans l'ensemble, les deux ours étudiés se distinguent par leur excellent état de conservation. De nombreuses caractéristiques des deux squelettes révèlent leur âge ontogénétique très jeune, à savoir: le crâne préservé est édenté et présente des sutures non fusionnées et des fontanelles ouvertes; les vertèbres ne sont que partiellement ossifiées et les os longs sont dépourvus d'épiphyses. En comparant les mesures des omoplates et des os longs des spécimens étudiés avec celles de très jeunes individus conspécifiques d'autres sites d'Europe centrale, un âge de décès de moins d'une semaine est proposé pour les deux ours, qui appartiennent très probablement à la même portée. Ils sont peut-être morts de faim peu après la naissance, comme c'est le cas de nombreux ours modernes en raison des conditions nutritionnelles souvent critiquées des femelles enceintes pendant l'hibernation.

Mots-clés : ourson, humérus, ontogénie, omoplate, crâne, Tecchia, Pléistocène supérieur, *Ursus spelaeus*

1 - INTRODUCTION

The karst complex known as “Grotte di Equi” (*i.e.*, Equi caves) takes its place in the Fagli Valley, close to the village of Equi Terme, in the Apuan Alps (Massa-Carrara Province, Tuscany, central Italy). Located above the

entrance of the main Equi cave, the NE-trending cavity known as the “Tecchia” (whose name may mean “rock protruding in the form of a roof”; Ambrosi & Feola, 1953) represents a palaeontological and archaeological site of prime importance - one that preserves a rich and diverse record of Late Pleistocene (Marine Isotopic Stage

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[=MIS] 3) terrestrial mammals (Caloi & Palombo, 1994). Discovered by Giovanni Podenzana in 1909, the Tecchia was first excavated by Carlo De Stefani, chair professor of Geology and Physical Geography at the “Regio Istituto di Studi Superiori” in Florence, between 1911 and 1920 (De Stefani, 1916a,b). Excavations continued intermittently during most of the 20th century (Blanc *et al.*, 1935; Graziosi & Guerri, 1972; Guerri, 1980) to start again in 2009 under the aegis of the Soprintendenza per i Beni Archeologici della Toscana, the Municipality of Fivizzano and the Apuan Alps Regional Park. This new excavation phase led to a renewed interest in the fossil content of the Tecchia (*e.g.*, Iardella *et al.*, 2011; Ghezzi *et al.*, 2014; Ghezzi & Rook, 2014, 2015; Bigagli *et al.*, 2017; Bona, 2021).

The commonest mammal remains among those collected at the Tecchia belong to cave bears, so much so that, as early as the early 20th century, the cave bear finds from this site accounted for as many as about 600 individuals (De Stefani, 1916c,d; Bigagli *et al.*, 2017). This impressive record includes specimens of all ages and sexes (Fracassi, 1920) as well as bitten and pathological bones (Pieragnoli, 1919), and even a mother and putative foetus; the latter, whose current whereabouts are unknown, were discovered during the excavations conducted by Graziosi and Guerri in the 1970-80s (Ambrosi, 1981; Guerri & Campetti, 1995; Bigagli *et al.*, 2017). Cave bears were herbivorous ursids (though some populations may have included animal proteins in their diet; Naito *et al.*, 2020; Duñó-Iglesias *et al.*, 2024),

that inhabited central Europe and western Asia during the Middle and Late Pleistocene (*e.g.*, Kurtén, 1976; Pacher & Stuart, 2009; Terlato *et al.*, 2018). In Italy, cave bears appeared before 350 ka and lasted until about 25 ka (*e.g.*, Martini *et al.*, 2014; Petronio *et al.*, 2019). Traditionally regarded as comprising a single extinct species, namely, *Ursus spelaeus* Rosenmüller, 1794, the cave bears have recently been proposed to include different cryptic species (*e.g.*, Rabeder *et al.*, 2004; Knapp *et al.*, 2009; Barlow *et al.*, 2021).

In 2014, two extremely small, exquisitely preserved cave bear skeletons were found at the Tecchia. Here, they are briefly described, and their ontogenetic age is assessed building upon comparisons with fossil and modern bear specimens from other localities of central Europe. Based on the seasonal cycles of hibernation and reproduction of the extinct cave bear and extant brown bear, a taphonomic scenario is proposed to explain this remarkable find.

2 - GEOLOGICAL AND PALAEONTOLOGICAL SETTING

The main entrance of the Equi caves is found at the foot of the Pizzo d’Uccello, about 300 m above the mean sea level, with the Tecchia opening further 50 m above (Bigagli *et al.*, 2017) (fig. 1A-C). This karst complex develops into Jurassic carbonates, including the Lower Jurassic Metacalcari con Selce Formation (Conti *et al.*, 2019).

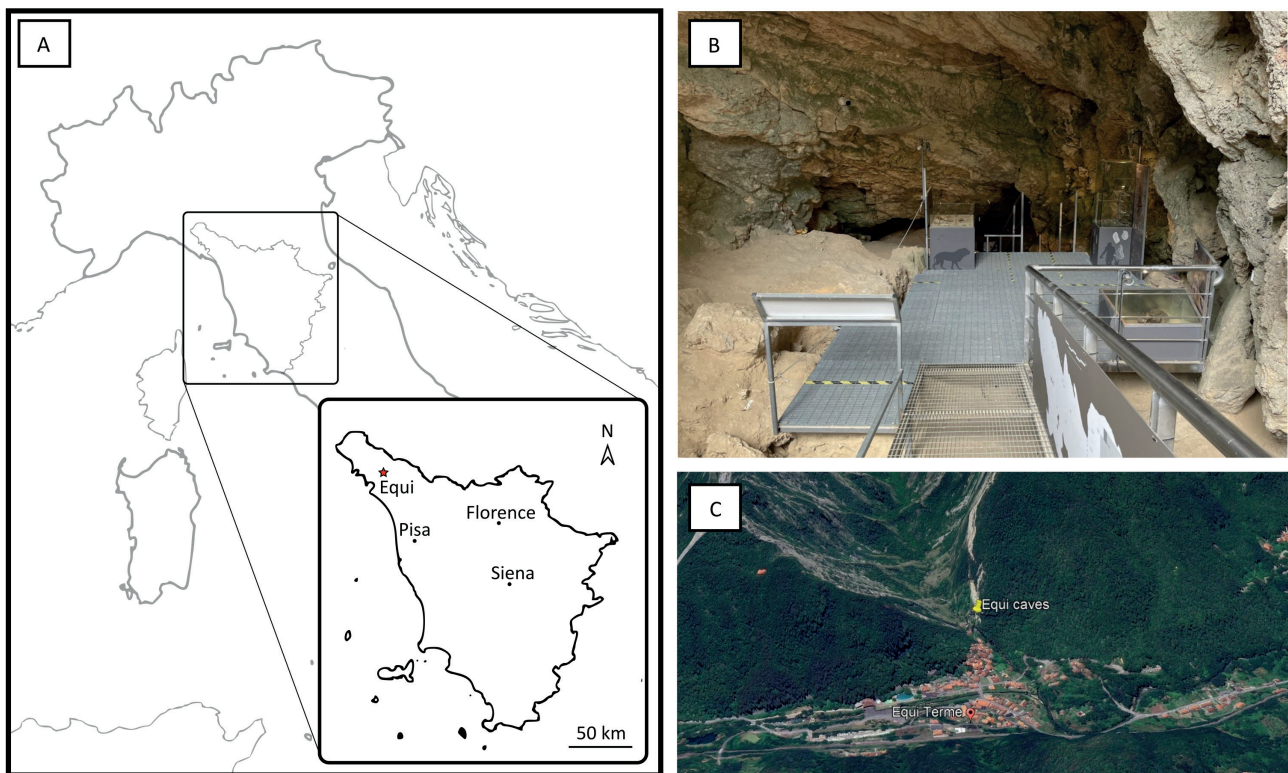


Fig. 1: Geographical context of Equi Terme and its caves.

A) Geographic location of Equi Terme in Italy and Tuscany (geographic coordinates: 44.150° N, 10.167° E; after Ghezzi & Rook, 2015). (B) The Tecchia as it appears now, hosting the permanent exhibition “Ma non il solo orso abitò la caverna”. (C) Panoramic view of the Equi village (along the E-W-oriented Lucido Valley) and Equi caves (along the SW-NE-oriented Fagli Valley) as seen from South (Google Earth Pro).

Fig. 1 : Contexte géographique d’Equi Terme et de ses grottes. (A) Localisation géographique d’Equi Terme en Italie et en Toscane (coordonnées géographiques : 44.150° N, 10.167° E; d’après Ghezzi & Rook, 2015). (B) La Tecchia telle qu’elle apparaît aujourd’hui, abritant l’exposition permanente «Ma non il solo orso abitò la caverna». (C) Vue panoramique du village d’Equi (le long de la vallée du Lucido, orientée E-W) et des Grottes d’Equi (le long de la vallée de Fagli, orientée SW/NE) vues du sud (Google Earth Pro).

The Tecchia consists of two parts, namely, the outer “Riparo” (*i.e.*, shelter) and the inner “Grotta” (*i.e.*, cave), the latter being more than 20 m long and comprised of two rooms, one of which is still not completely excavated. The sedimentary filling of these rooms, consisting primarily of loess and rock fall deposits, entombs a Late Pleistocene vertebrate assemblage (Bigagli *et al.*, 2017). For over a century, this filling has been removed with different methodologies (*e.g.*, Dainelli, 1913; De Stefani, 1916a,b,c,d; Ambrosi & Feola, 1953; Guerri, 1980), which has led to the partial or complete loss of the stratigraphic whereabouts of most finds.

The fossil fauna of the Tecchia consists of amphibians, fishes, birds, reptiles and - above all - mammals. Among the latter group, the following species have been identified: *Ursus spelaeus*, *Canis lupus*, *Cuon alpinus*, *Vulpes vulpes*, *Panthera spelaea*, *Panthera pardus*, *Lynx cf. lynx*, *Cervus elaphus*, *Sus scrofa*, *Rupicapra rupicapra*, *Capra ibex*, *Capra hircus*, *Marmota marmota*, *Castor fiber*, *Lepus sp.*, *Mustela nivalis*, *Mustela foina*, *Mustela putorius*, *Martes martes*, *Glis glis*, *Eliomys quercinus*, *Arvicola amphibius* and *Microtus nivalis* (Ghezzi *et al.*, 2014; Ghezzi & Rook, 2014). Furthermore, Mousterian artefacts were also found along with the Pleistocene vertebrates (*e.g.*, Bigagli *et al.*, 2017).

The fossil record of the Tecchia saw a first wave of research in the early and mid-20th century (*e.g.*, Regalia, 1911; Pieragnoli, 1919; Fracassi, 1920; Del Campana, 1923, 1924, 1954). Since 2009, various studies have reappraised these historic finds (Bigagli *et al.*, 2017), though not without difficulties due to the widespread lack of stratigraphic data. Most notably, Bartolini *et al.* (2014) analysed the herpetofauna of the Tecchia; Ghezzi *et al.* (2014) focused on the excavations conducted by De Stefani, and specifically on carnivorans, attempting also to reconstruct their stratigraphic distribution; Ghezzi & Rook (2014, 2015) scrutinized the anatomy and palaeoecology of *Cuon alpinus* and *Panthera pardus*; and Bona (2021) described new remains of the latter species rediscovered in the Manori collection (Reggio Emilia, Northern Italy).

Caloi & Palombo (1994) referred the fossil fauna from the Tecchia to the MIS 3 (Late Pleistocene), corresponding approximately to the 24-56 ka time span (Siddall *et al.*, 2008). Some recent radiometric datings on charcoal and vertebrate remains are in the range of 44-27 ka, and as such, broadly consistent with this biochronological interpretation (Bigagli *et al.*, 2013; Ghezzi & Rook, 2015; Bigagli *et al.*, 2017). That said, it is as-yet unclear how and how long the Tecchia was inhabited or frequented by cave bears, leopards, lions, wolves, humans, and the many other mammal species whose remains have been found inside this cavity. That the fossil fauna is not strictly coeval is suggested by different radiocarbon ages (Bigagli *et al.*, 2013; Ghezzi & Rook, 2015), as well as by the co-occurrence of fossils of mountain-dwelling taxa (including the chamois, steinbock, white hare and marmot) and wood-related forms (including the wild boar, red deer and wildcat), which suggests contrasting palaeoenvironmental and palaeoclimatic scenarios (*e.g.*, Caloi & Palombo, 1994).

3 - MATERIAL AND METHODS

During the 2014 excavation campaign, which was conducted by three of us (A.P., C.B. and S.R.), two exquisitely preserved cave bear cubs were discovered inside the Grotta, in-between the two aforementioned rooms (Palchetti, 2015) (fig. 2A-C). These specimens were collected by extracting two blocks, each including one skeleton and some of the underlying sediment. A plaster support was applied at the base of each block in anticipation of exhibiting the cubs. After being provisionally kept at the Museo di Storia Naturale dell' Università di Pisa (Calci, Pisa Province), the two specimens in question are currently on display in the permanent exhibition housed in the Museo delle Grotte di Equi (Equi Terme, Massa-Carrara Province). The accession numbers of the two specimens are 25.S122-1.40 and 25.S122-1.41.

Measurements of the bones were taken with an analogical caliper as per the methodologies proposed by Fosse & Cregut-Bonnoure (2014). The following measurements were taken: maximum length (HS) and maximum width (W) for the scapula; greatest length (GL), transverse proximal diameter (Bp) and transverse distal diameter (Bd) for the long bones. As the long bones of the two studied specimens lack both epiphyses, GL corresponds to the maximum length of the diaphysis, whereas Bp and Bd represent the transverse diameters of the proximal and distal extremities of the diaphysis, respectively.

Photographs were taken using a Nikon D5200 camera and plates were drawn with Inkscape 1.2. Textured 3D models were obtained with photogrammetry using the Agisoft Metashape Standard (64 bit) software. They were scaled in Blender 3.6.1 to their natural size. The 3D models of 25.S122-1.40 and 25.S122-1.41 are freely available via figshare at <https://doi.org/10.6084/m9.figshare.28327121> and <https://doi.org/10.6084/m9.figshare.28327133>, respectively.

4 - RESULTS

Specimen 25.S122-1.40 (fig. 3A-B) lies on its left side. The cranium is anatomically connected with the vertebral column, preserving an undeformed three-dimensional morphology. All the cranial bones are discernible, well-preserved, and almost perfectly articulated, except for the nasal bones, which are missing. The sutures between the skull bones are still unfused, and the bregmatic (*i.e.*, anterior) fontanelle opens in-between the frontal and parietal bones (fig. 3C-D). The skeleton also features a well-preserved vertebral column consisting of what appear to be partially ossified vertebrae. The pectoral girdle includes both the disarticulated scapulae. The ribs are still articulated with the thoracic vertebrae and lie parallel to each other. As regards the limbs, only the 33 mm-long right humerus and tibia are preserved, both of which lack the epiphyses.

Specimen 25.S122-1.41 (fig. 4A-B) is less complete and articulated than 25.S122-1.40. It lies dorsal side-up and includes a well-preserved, partially disarticulated vertebral column. Like in 25.S122-1.40, the vertebrae are not fully ossified. The pectoral girdle is completely disarticulated, and the 25 mm-long right scapula is exposed dorsal side-up above the rib cage. The latter is well-preserved, with the ribs being still anatomically connected with the vertebral column. As regards the forelimbs, the two 31 mm-long humeri as well as both the ulnae and radii are preserved, all of which are slightly disarticulated and lack the epiphyses.

Both specimens are identified as bears by means of comparisons with the morphological features of young specimens reported by Germonpré & Sablin (2001), Fosse & Cregut-Bonnoure (2014) and Li & Smith (2020). Since all the Late Pleistocene bear fossils from the Tecchia have been referred to *Ursus spelaeus*, and given that the existing literature on cave and brown bear newborns does not provide sufficient data for comparisons, it is assumed that both specimens described herein are representative of cave bear cubs.

The dimensions of some selected bone elements of 25.S122-1.40 and 25.S122-1.41 are reported in Tab. 1.

5 - DISCUSSION

Several morphological characters of the excellently preserved cave bear skeletons from the Tecchia are suggestive of a very young ontogenetic age. The cranial sutures of 25.S122-1.40 are not closed, and the anterior fontanelle is clearly open. Furthermore, this specimen does not display any teeth. Cave bears young were born toothless, and teeth usually appeared as gems after the third week of life (Koby, 1952; Radulesco & Samson, 1959; Debeljak, 1996; Fosse & Cregut-Bonnoure, 2014), as also observed in the present-day brown bear (a close relative of the cave bear; Bon *et al.*, 2008). In both specimens, the vertebrae are not yet fully ossified, being rather made up of small bony elements that probably correspond to different centres of ossification (as observed in early juvenile modern bears; Sarasa *et al.*, 2024). In addition, the long bones lack the epiphyses and look very similar to the corresponding skeletal elements of bear cubs as illustrated by Fosse & Cregut-Bonnoure (2014) (fig. 3). In modern brown bears, the epiphyseal fusion of long bones is only achieved during the fifth year of life (Weinstock, 2008).

An age estimate is proposed herein for the two studied specimens based on the works by Germonpré & Sablin (2001) and Fosse & Cregut-Bonnoure (2014), where the measurements of some bone elements of *U. spelaeus*



Fig. 2: Some phases of the excavation of the two cave bear cubs.

(A) The cave bear cub specimen 25.S122-1.41 during the removal of the sediment overlying the specimen inside the Tecchia. (B) Application of consolidant on the cave bear cub specimen 25.S122-1.40. (C) Field view of the two cave bear skeletons lying on the same stratigraphic horizon.

Fig. 2: Quelques phases de la fouille des deux ours des cavernes. (A) Le squelette d'ourson des cavernes 25.S122-1.41 pendant l'enlèvement du sédiment recouvrant le spécimen à l'intérieur de la Tecchia. (B) Application du consolidant sur le squelette d'ourson des cavernes 25.S122-1.40. (C) Vue de terrain des deux squelettes d'ours des cavernes se trouvant sur le même horizon stratigraphique.

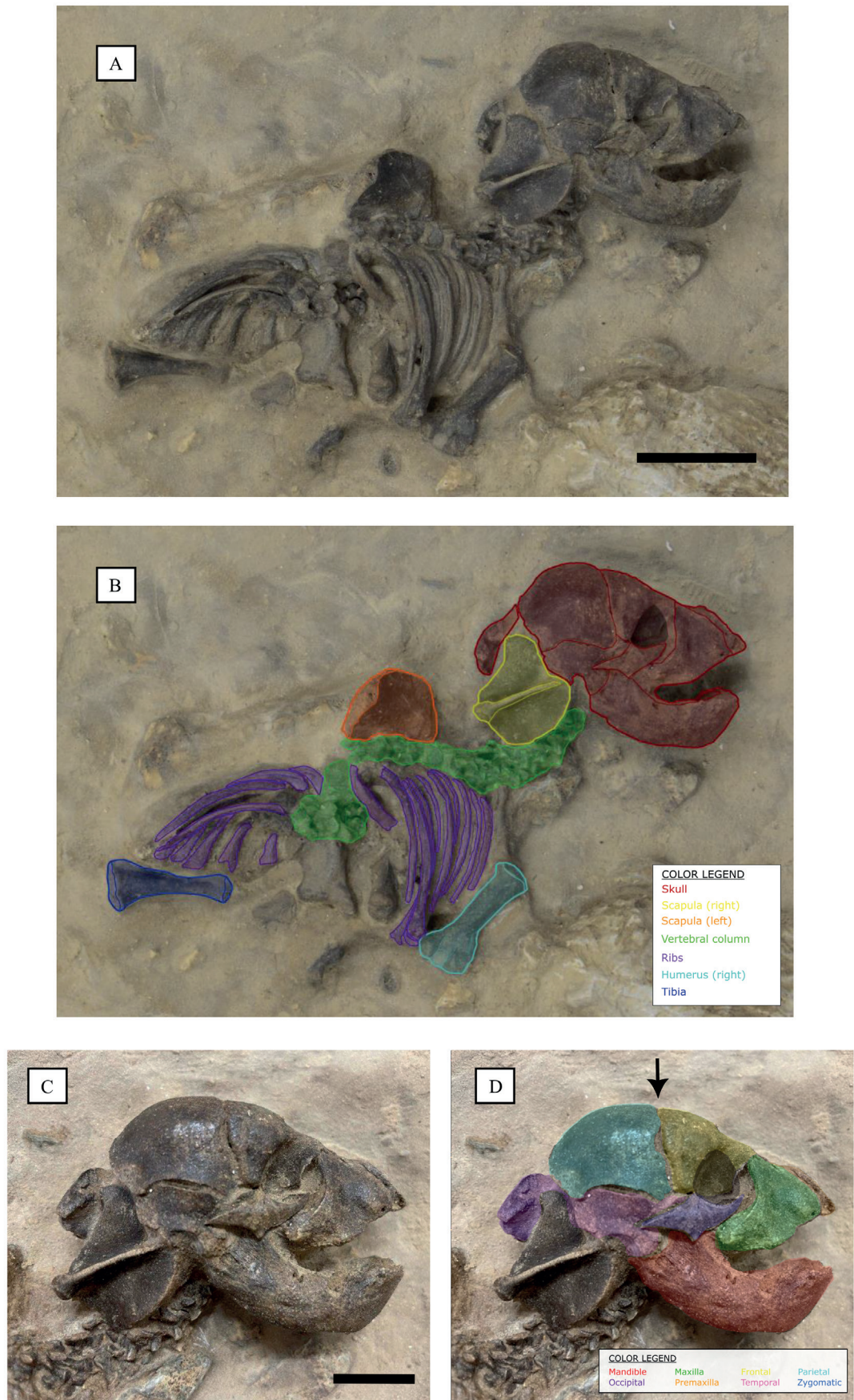


Fig. 3: The cave bear cub specimen 25.S122-1.40 from the Tecchia (skeleton preserved right side-up).

(A) Photograph and (B) corresponding line drawing of the different bones of the skeleton. The black color in panels (B) and (D) approximate the position of the right orbit. The black arrow indicates the position of the open anterior (or bregmatic) fontanelle. Scale bar for (A) and (B): 30 mm. Scale bar for (C) and (D): 10 mm.

Fig. 3 : Spécimen d'ourson des cavernes 25.S122-1.40 de la Tecchia (squelette conservé en vue latérale gauche). (A) Photographie et (B) dessin au trait des différents os du squelette. (C) Photographie et (D) dessin au trait des différents os du crâne. La couleur noire dans les panneaux (B) et (D) indiquent la position de l'orbite droite. La flèche noire indique la position de la fontanelle antérieure (ou bregmatique) ouverte. Barre d'échelle pour (A) et (B) : 30 mm. Barre d'échelle pour (C) et (D) : 10 mm.

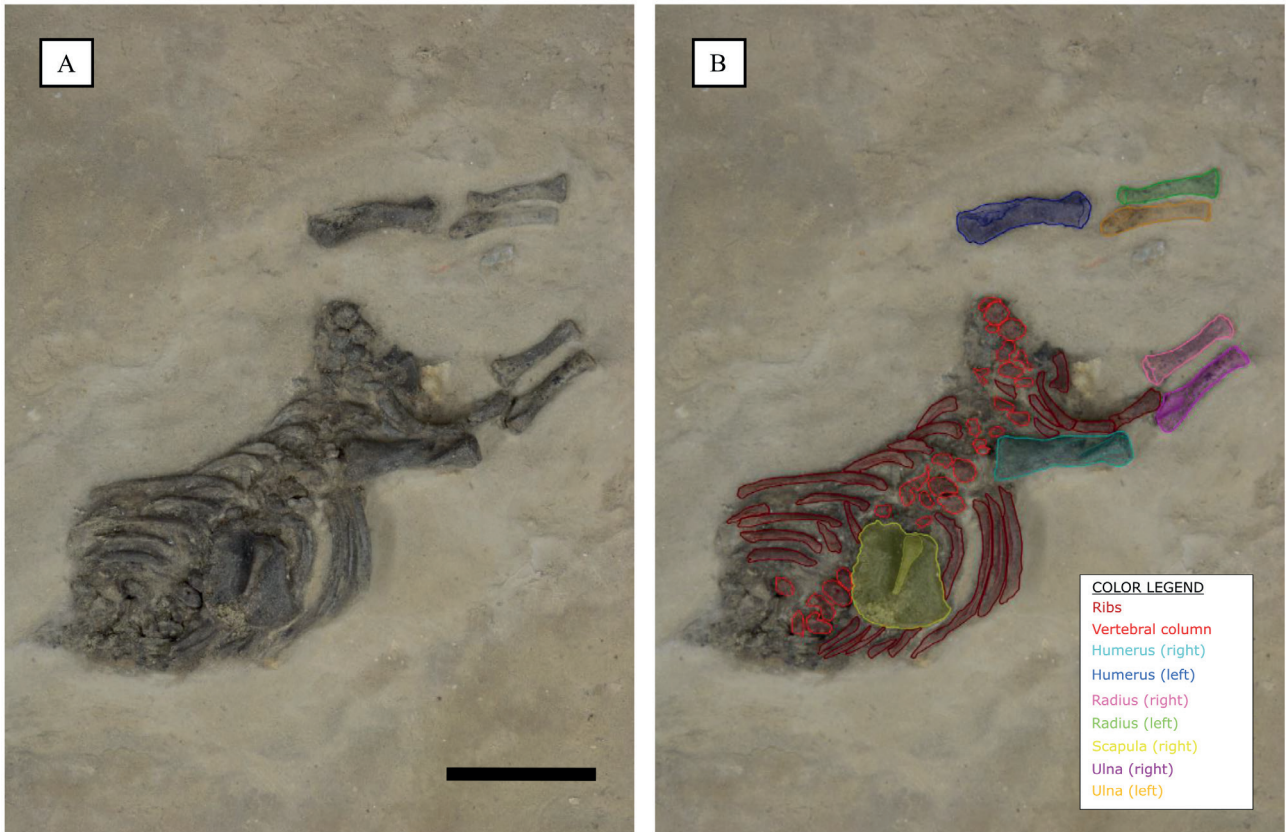


Fig. 4: The cave bear cub specimen 25.S122-1.41 from the Tecchia (skeleton preserved dorsal side-up).

(A) Photograph and (B) corresponding line drawing of the entire skeleton. Scale bar: 30 mm.

Fig. 4 : Spécimen d'ourson des cavernes 25.S122-1.41 de la Tecchia (squelette conservé en vue dorsale). (A) Photographie et (B) dessin au trait du squelette entier. Barre d'échelle: 30 mm.

a. Cave bear cub 25.S122-1.40					
Bone element	Greatest length (HS)	Greatest length (GL)	Width (W)	Trasverse proximal diameter (Bp)	Trasverse distal diameter (Bd)
Right scapula	23		27		
Right humerus		33		11	13
Tibia		30			14
b. Cave bear cub 25.S122-1.41					
Bone element	Greatest length (HS)	Greatest length (GL)	Width (W)	Trasverse proximal diameter (Bp)	Trasverse distal diameter (Bd)
Right scapula	26		23		
Right humerus		31		7	14
Left humerus		31		9	
Right radius		24		7	9
Left radius		25		4	8
Right ulna		27		6	7
Left ulna		25		5	6

Tab. 1 Measurements of some skeletal elements of 25.S122-1.40 and 25.S122-1.41. All measurements are given in millimeters.

Tab. 1 : Mesures de quelques éléments squelettiques de 25.S122-1.40 et 25.S122-1.41. Toutes les mesures sont données en millimètres.

were compared with those of fossil and modern brown bears from various sites of central Europe. Specifically, the dimensions of the right scapula, right humerus and tibia of 25.S122-1.40 as well as those of the right scapula and forelimb long bones of 25.S122-1.41 were plotted in the diagrams provided by Fosse & Cregut-Bonnoure (2004; figs. 5-7). These authors identified three distinct age groups of juvenile cave bears remains, each corresponding to a mortality peak: neonates (age at death between 0-1 month), cubs (3-6 months), and slightly older specimens between 11-14 months. The skeletal measurements available for 25.S122-1.40 and 25.S122-1.41 fall into the youngest age class, which indicates that they are newborns (fig. 5). Plotting the length values of the humeri and radii of the studied specimens on the graphs provided by Germonpré & Sablin (2001) invariably reveals an ontogenetic age of less than one week. Thus, an age at death of a few days at most is reconstructed for both the studied specimens.

The life and death of the two cave bear cubs from the Tecchia are closely related to the cycles of hibernation and reproduction of *U. spelaeus*, which several lines of evidence indicate to have been similar to those of modern *Ursus* species (e.g., Lidén & Angerbjörn, 1999; Germonpré & Sablin, 2001; Pérez-Rama *et al.*, 2011; Kovačič *et al.*, 2024). As mentioned above, the three mortality peaks observed in juvenile subadult bears have also been recognised in *U. spelaeus* populations from central Europe (Fosse & Cregut-Bonnoure, 2014). The mating period of extant bears extends between late spring

and early summer. Bears hibernate in sheltered dens alone, except for cubs younger than two years, which hibernate with the mother from early autumn to early spring (hibernation represents an adaptation for survival through cold periods of food scarcity). During dormancy periods, pregnant females give birth, as we hypothesise to have happened at the Tecchia in Late Pleistocene times. The nutritional conditions and body mass of the mother affect the duration of gestation and nursing as well as the number and body mass of the cubs (e.g., Robbins *et al.*, 2012; López-Alfaro *et al.*, 2013). During the first weeks after giving birth, the mother remains almost completely inactive (Robbins *et al.*, 2012). In extant brown bear populations, the infant mortality rate is extremely high (i.e., around 30-40% within the first year; Bunnell & Tait, 1985), due to malnutrition, diseases, accidents and other causes. Mortality is especially high just after birth and, even more so, during the early weeks of the cubs' first spring, when the mother periodically leaves the cave for feeding (a behaviour that results in a heightened predation risk for the cubs). Subsequently, she starts bringing the cubs along during her feeding excursions to teach them how to forage for food. Bear cubs spend their first summer out of the den and their second hibernation season again with the mother (Germonpré & Sablin, 2001; Fosse & Cregut-Bonnoure, 2014).

Since the two studied skeletons were found next to each other as well as along the same stratigraphic horizon, and considering also their very similar bone measurements, they are regarded herein as belonging to

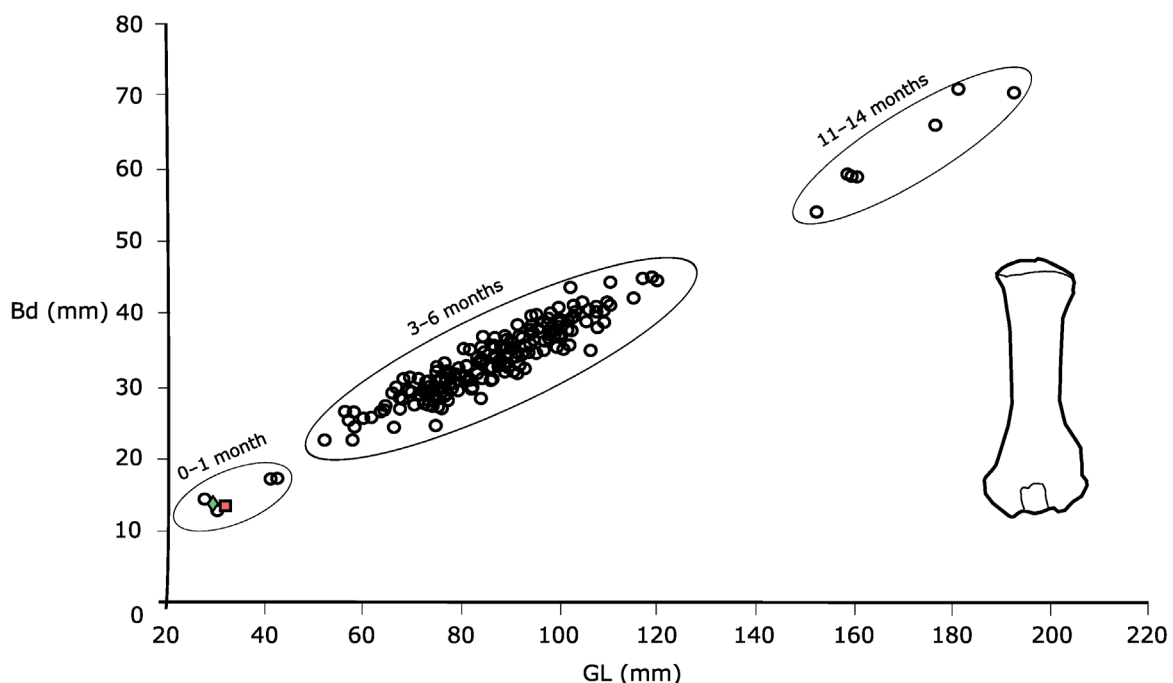


Fig. 5: Growing rate of humeri of Holocene and modern brown bears with indication of the three main mortality peaks for cubs younger than or around one-year-old (data after Fosse & Cregut-Bonnoure, 2014).

The measurements of the humeri of 25.S122-1.40 (red square) and 25.S122-1.41 (green lozenge) are also plotted in the diagrams. Note that both these specimens are recognised herein as neonates.

Fig. 5: Taux de croissance des humérus des ours bruns holocènes et modernes avec indication des trois principaux pics de mortalité chez les oursons de moins d'un an ou autour de cet âge (données d'après Fosse & Cregut-Bonnoure, 2014). Les mesures des humérus de 25.S122-1.40 (carré rouge) et 25.S122-1.41 (losange vert) sont également représentées dans les diagrammes. Notez que ces deux spécimens sont reconnus ici comme des nouveau-nés.

the same litter, *i.e.*, as siblings. As for the reasons beneath their premature death, predation can be ruled out as it is at odds with the excellent degree of preservation and articulation of the skeletons, both of which lack bite marks. A more parsimonious hypothesis is that both the cubs in question died from starvation, which represents a common cause of death among modern bear cubs, due to the critical nutritional conditions and the low content of adipose tissue of the mother. That said, the proposed reconstruction remains largely tentative.

As already highlighted, the preservation state of the two studied specimens, and especially their high degree of articulation and completeness, is remarkable. After death, the skeletons should have gone through relatively little taphonomic changes, including the decay of soft tissues and slight disarticulation. Burial likely occurred quickly, as also hypothesized by Germonpré & Sablin (2001) for the preservation of fairly complete and articulated cub skeletons at Goyet (Belgium).

The discovery of cave bear specimens younger than one week as well as the identification of fossil siblings are by all means uncommon. More generally, scientific literature about cave bear cubs is limited overall (*e.g.*, Kavcik-Graumann *et al.*, 2022). A cub less than one month old was found between its mother's legs inside the Geissbachhöhle cave in Switzerland (Castel *et al.*, 2011). Fosse & Cregut-Bonnoure (2014), reported and discussed some previous discoveries of very young cave bears from Europe, among which are one-week-old individuals from Bärenhöhle, Mixnitz and Salzofen in Austria (Ehrenberg, 1935a,b, 1964, 1973), and Goyet in Belgium (sample n°2726; Dupont 1873; Germonpré & Sablin, 2001). Considering that a few previous studies have reported on the discovery of a cave bear mother and her foetus in the Tecchia (*e.g.*, Ambrosi, 1981; Guerri & Campetti, 1995; Bigagli *et al.*, 2017), a comprehensive revision of the fossil vertebrate collections from this site may provide precious insights on the fossil history of cave bear newborns.

6 - CONCLUSIONS

In 2014, two extremely small cave bear skeletons were found inside the “Tecchia di Equi”, a historic palaeontological and archaeological locality preserving a diverse terrestrial vertebrate assemblage of Late Pleistocene (*i.e.*, MIS 3) age. Both skeletons display an excellent state of preservation. Many anatomical traits suggest a very young ontogenetic age, including the unfused skull sutures and open anterior fontanelle, the absence of teeth, the incompletely ossified vertebrae and the lack of long bone epiphyses. By comparing the measurements of the scapulae and long bones of both specimens with those reported for fossil and modern bears from central Europe, an age at death of less than a week is reconstructed for the two cave bear cubs from the Tecchia. Since these specimens were found next to each other as well as along the same stratigraphic horizon, and given that their dimensions are very similar, an origin

from the same litter is proposed herein. Although various hypotheses may explain the premature death of the Equi cubs, it seems reasonable to suppose that they died from starvation. These very young cave bears are remarkable among the published fossils of *Ursus spelaeus* cubs due to their high degree of articulation and completeness.

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