



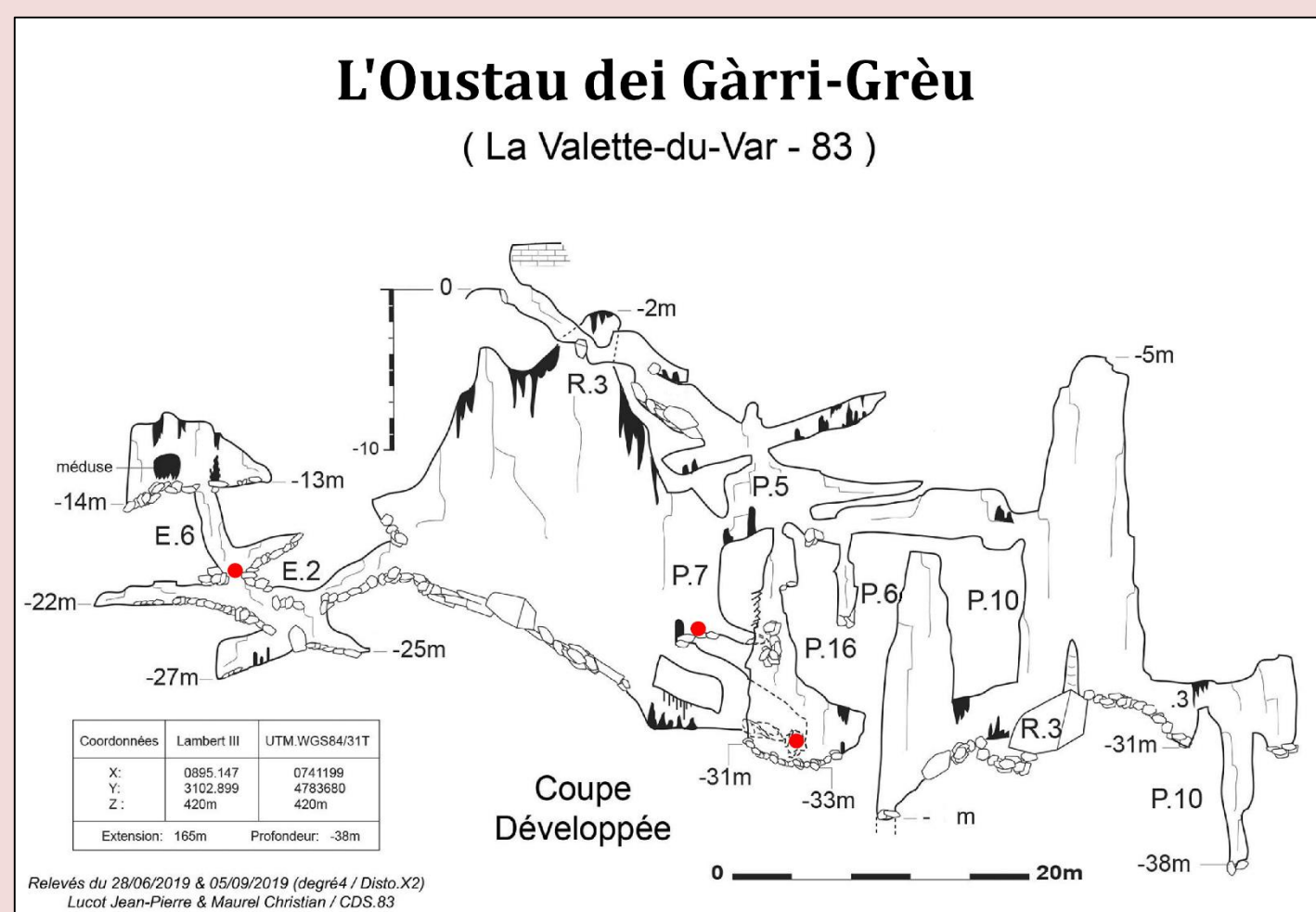
A natural trap for *Capra ibex* in Provence (SE France): the Oustau dei Gàrri-grèu hole (Var, France)

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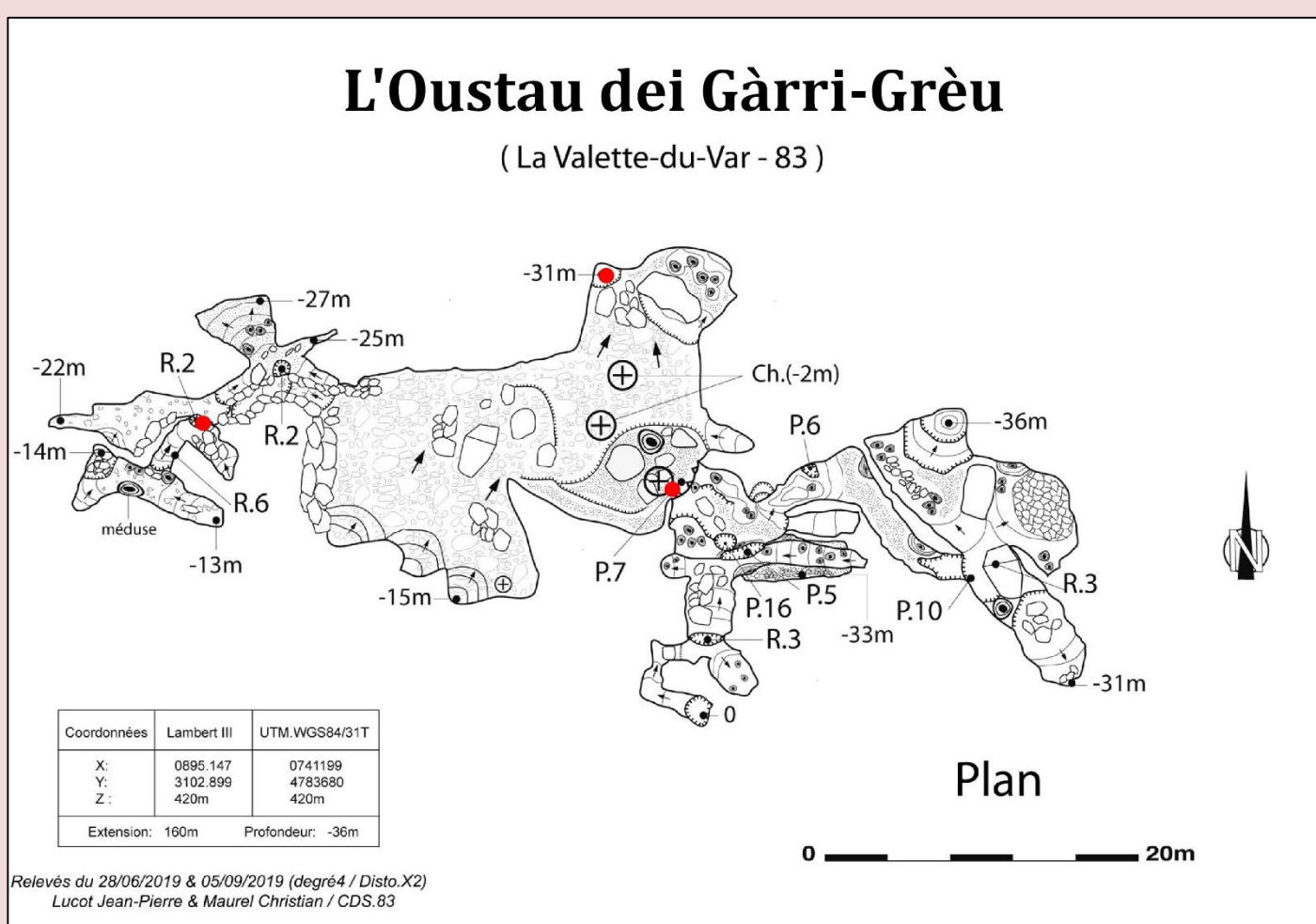
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INTRODUCTION

The Provence region, in the Southeastern of France, is a karstic area abundantly provided with caves, and natural traps in which archaeological and paleontological remains have been known for more or less 1 Ma. The Pleistocene fauna is rich, with a wide variability of species. Among caprine, *Capra ibex* has been present on the alpine arch and its slopes since the late Middle Pleistocene (MIS 7, MIS 6). This ibex is relatively common in the Alps and in the Provence area during the Late Pleistocene, becoming rare during the early Holocene (Couturier 1962; Crégut-Bonnoure 2020; Griggo *et al.* 2012). In the east and south of the Provence, it has been recognized in 20 caves/holes. The Oustau dei Gàrri-grèu, located near Toulon and recently discovered by cavers, is a new natural trap for Alpine ibex.



Topographical settings according to Jean-Pierre Lucot and Philippe Maurel. Cross section and plane. Red circle: location of the ibex remains.



Topographical settings according to Jean-Pierre Lucot and Philippe Maurel. Cross section and plane. Red circle: location of the ibex remains.

THE OUSTAU DEI GÀRRI-GRÈU HOLE

The hole opens 700 m to the east of the Aven de la Ripelle which is an important karstic cavity that could be the ancient outlet of the karst spring of Ragas de Dardennes before it disconnected from the network by a geological accident.

The site begins by a small opening leading to a descending gallery followed by a severe narrowing that gives access to a small concretized chamber and an inter-stratum giving access to a small hole and a gallery. On the north-west side, there is a chamber of about twenty meters in diameter. Its surface is covered by large scree reaching to the depth of -31 m. A network of galleries is accessible from the top of the scree cone. On the eastern side a hole of about ten meters in depth allows access to a heavily concreted room at the depth of -36 m. Screes and speleothems are numerous.

Remains of *Capra ibex* were collected in the first chamber and in a lateral extension. The original access is unknown, but the morphology of the cave system does not allow the incursion and the trapping of ibexes through it: trapping of the animals in the cave must have occurred by openings in the ceiling, now obstructed.



The 7m hole (a) and the top of the chamber covered by a large scree (b). Photo Ch. Maurel (a) and Ch. Ligori (b)

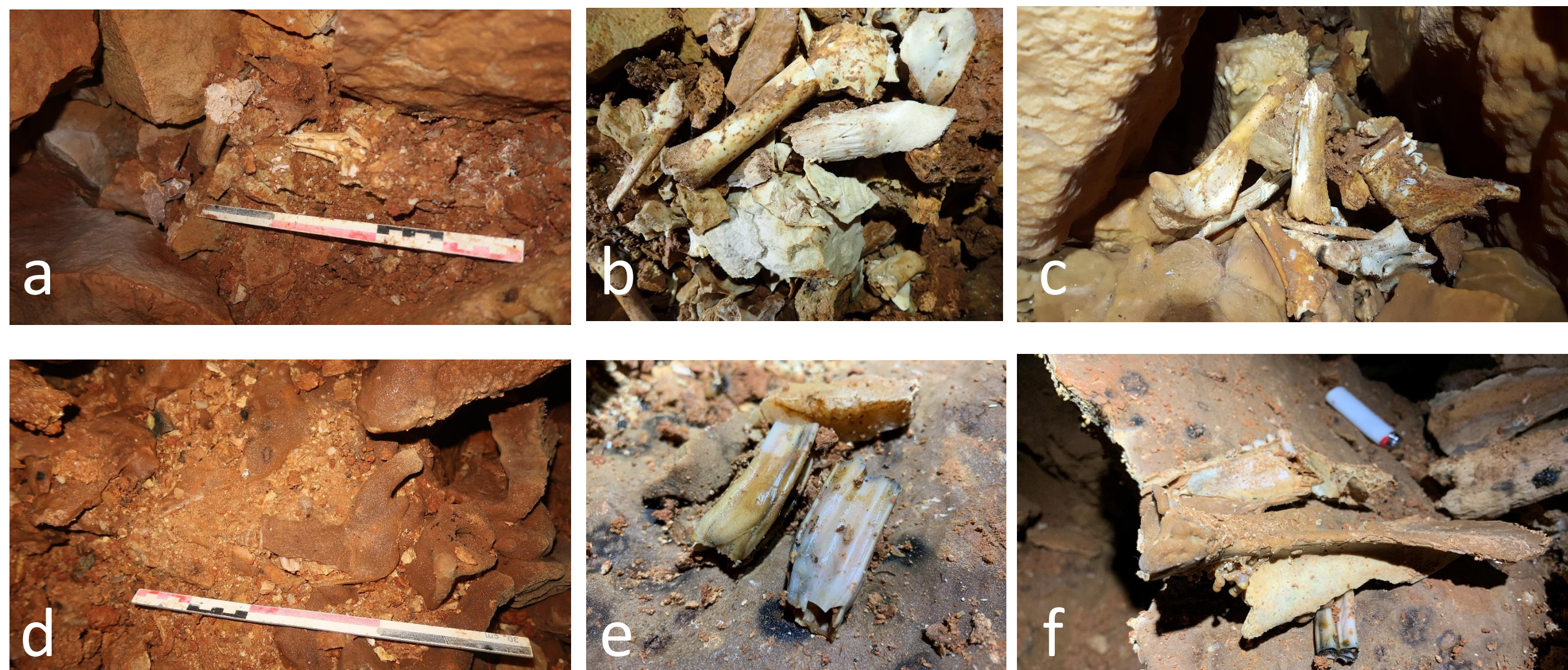
THE ALPINE IBEX FROM OUSTAU DEI GÀRRI-GRÈU

The skeletons are disarticulated and the majority of the bones are isolated, broken and trapped between the stone blocks of the scree. This material is altered by current water circulation and some of bones are concreted. The paleontological survey conducted in 2020 allows us to extract some bone and dental remains which could be destroyed due to their position on the surface of the scree cone. Seven individuals were identified: three juveniles, two sub-adults males, an adult female and an adult male.

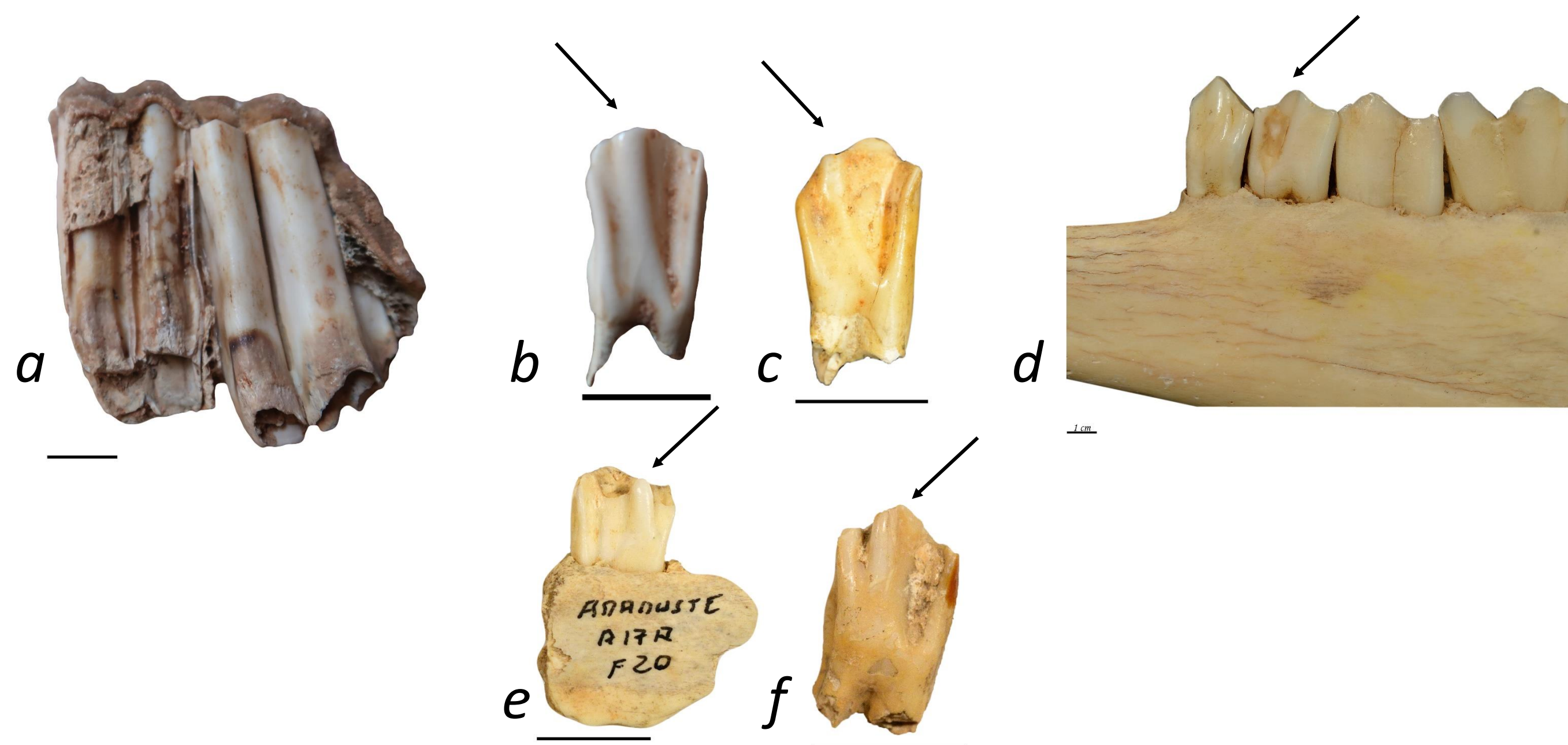
The morphology of the cranium, the horn cores, the third upper molar (M3), the third lower premolar (p3) and the metapodials are the best criteria for identification and for taxonomy in Caprinae, especially to distinguish the Pleistocene Caprini *Hemitragus* and *Capra* that are the two cliff-dwelling species which evolve and coexist in Provence during the Pleistocene times (Crégut-Bonnoure 2020). The main morphological characteristics of the remains from Oustau dei Gàrri-grèu permit to identify the ibex.

The third upper molars are efficient elements to discriminate Ibex's species and sub-species (Crégut-Bonnoure 2020). In the alpine ibex lineage the interstyler surfaces are asymmetrical especially at the base, the posterior being the longest, and the metastylar wing is well developed at the base of the crown. One of the two M3 from Oustau dei Gàrri-grèu belongs to an old individual and its interstyler surfaces are slightly asymmetrical. The second one belongs to the sub-adult male whose cranium is unfortunately fragmented and whose skeleton is concreted. This M3 is still included in the left maxillary fragment but the lingual side is visible (Fig. 3a). The metastylar wing is well developed at its base. The interstyler asymmetry is not very important. These two teeth are quite similar. They differ from M3 dating from MIS 2 (Last Glacial) which are characterized by significant asymmetry.

There are three p3s. The p3 belonging to the previous sub-adult is slightly worn. The metaconid dilates from the top to the base of the crown but does not constitute a column at its top. The dilation of the metaconid is observed in Provence from MIS 3 to MIS 2 (Crégut-Bonnoure, 2020). During MIS 3 it is restricted to the top of the crown, constituting a small column (Fig. 3e, f). The dilation of the p3 from Oustau dei Gàrri-grèu is distinct. Some similarities exist with a female specimen from Coulet des Roches dating from 22,250-21,870 Cal BP (MIS 2) (Crégut-Bonnoure *et al.* 2014) (Fig. 3d). There are too similarities with the ibexes from Valescure (=Valescure) cave dating from MIS 4 (Fig. 3c).



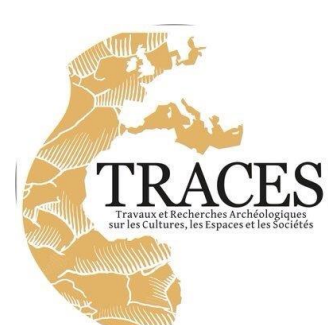
Capra ibex remains in situ. Photos H. Tainton (b, c), E. Crégut-Bonnoure (a, d), Th. Lamarque (e, f)



Capra ibex. M2, M3 (a) and p3 (b) from Oustau dei Gàrri-grèu (sub-adult male). c: p3 from Valescure/Vallescure, p3 (MIS 4). d: Coulet des Roches, mandible of the female dating from 22,250-21,870 Cal BP (MIS 2). e: p3 from Adaouste (MIS 2). f: p3 from Roquefure (MIS 2). Arrow: metaconid. Lingual views. Scale: 1 cm. Photos E. Crégut-Bonnoure (a, b), C. Triat (c, d).

CONCLUSION

The Oustau dei Gàrri-grèu brings new data on the geographical distribution of the Alpine ibex in Provence area. The contemporaneity of the seven individuals is not proven, the fall in this trap cave having been staggered over time. The teeth morphology permits to exclude the late Last Glacial Maximum. Despite analogies with MIS 4 populations, the limited number of M3 and p3 cannot produce robust data. Radiocarbon dating is now required to specify the chronology of this accumulation as well as geomorphological analysis to specify the origin of the trapping.



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