



FIRST OCCURRENCE OF *MICROTUS (IBEROMYS) BRECCIENSIS* (RODENTIA, CRICETIDAE, ARVICOLINAE) FROM THE LATE MIDDLE PLEISTOCENE OF GROTTA ROMANELLI (CASTRO, APULIA, ITALY)

FABIO BONA¹, RAFFAELE SARDELLA^{2,3,*}

¹ Dipartimento di Scienze della Terra “A. Desio”, Università Degli Studi di Milano, Via L. Mangiagalli 34, 20133 Milan, Italy; e-mail: fabio.bona@unimi.it; fabgeo@libero.it.

² Dipartimento Di Scienze Della Terra, “Sapienza” Università Di Roma, Piazzale Aldo Moro 5, 00185 Rome, Italy; e-mail: raffaele.sardella@uniroma1.it.

³ IGAG, Consiglio Nazionale Delle Ricerche (CNR), Istituto Di Geologia Ambientale E Geoingegneria, Area della Ricerca di Roma 1, 00015 Montelibretti, Rome, Italy.

* corresponding author

Bona, F., Sardella, R. (2025): First occurrence of *Microtus (Iberomys) brecciensis* (Rodentia, Cricetidae, Arvicolinae) from the late Middle Pleistocene of Grotta Romanelli (Castro, Apulia, Italy). – Fossil Imprint, 81(1-2): 17–25, Praha. ISSN 2533-4050 (print), ISSN 2533-4069 (online).

Abstract: Thanks to a multidisciplinary project on Grotta Romanelli started in 2015 (director: R. Sardella, Sapienza, University of Rome), new dating and new stratigraphic interpretations of the deposit have allowed us to understand that the deposit is much more complex than G. A. Blanc believed, and much older.

In this context, thanks to the complete sieving of the sediment, it was possible to collect, for the first time, an abundant collection of small vertebrates. Among these, the most common are micromammals. This paper discusses the presence of a rare small mammal in the Italian stratigraphic sequences, *Microtus (I.) brecciensis*.

The occurrence of *Microtus (Iberomys) brecciensis* in the Middle Pleistocene layers of Grotta Romanelli (Lecce, Apulia) is documented here for the first time. The fossil sample is represented by three first lower molars (m1).

Microtus (I.) brecciensis lived in the Salento peninsula about 325 ky BP, in wooded environments with few open areas and significant water bodies, along with *Hippopotamus cf. amphibius*, *Palaeoloxodon antiquus* and *Stephanorhinus hundsheimensis*.

Key words: first appearance in GR deposit datum, extinct vole, taxonomy, environmental inferences, chronological inferences, southeastern Italy

Received: April 7, 2025 | Accepted: October 2, 2025 | Issued: December 18, 2025

Zoobank: <http://zoobank.org/pub:AC5AB0DA-D7C8-4099-9D42-E2070A4BB1C2>

Introduction

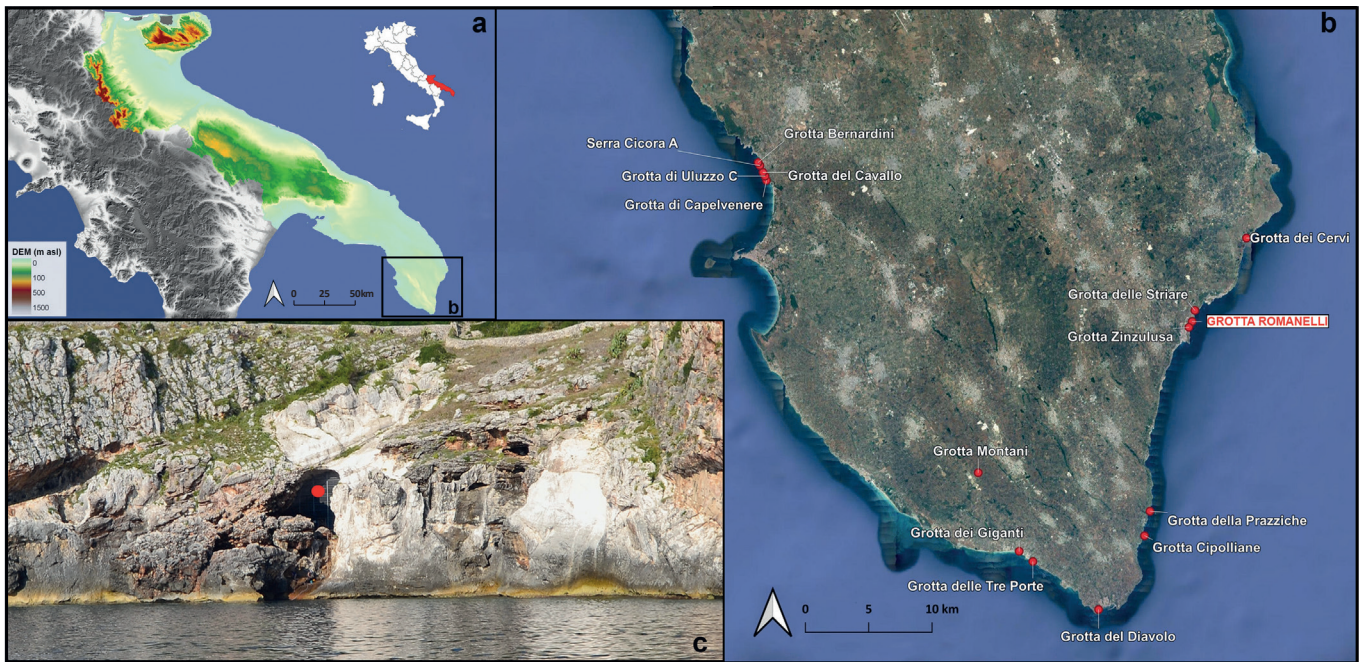
Italy is historically characterized by faunal renewals coming from the east, an example being the forms of the late Villafranchian renewal characterized by dispersals of species from east (Gliozzi et al. 1997, Sala and Masini 2007, Bona and Sala 2016, Iannucci et al. 2021, 2023, Sardella and Strani 2025). A very rare case is that represented by the scarce evidence of animal migrations coming from the west across the French Riviera. An example of such an “western” dispersal in Italy is the reindeer (*Rangifer tarandus*), which seems to reach the extreme western part of Italy during the last glaciation (Sala 2007). Among these passages of fauna from west, we have a group of very interesting and important animals from a palaeoenvironmental and chronological point of view: the *Iberomys* vole. *Iberomys* is a group of vole

rodents whose origin is debated – it also seems plausible that they originated from the Iberian Peninsula (López-García et al. 2015). The aim of this paper is to illustrate the presence of this species in the Middle Pleistocene layers of Grotta Romanelli (Lecce, Apulia), and to provide new data for understanding what kind of climatic and environmental conditions allowed dispersal from the west of these small mammals.

Grotta Romanelli

The site is a coastal cave located in the territory of the Castro municipality, at the southeastern edge of Apulia (Salento) (Lecce, southern Italy), facing the Adriatic Sea, with the entrance at about 7 m a. s. l. (Text-fig. 1).

The cave was discovered in 1874 by Ulderico Botti, who described an unconsolidated deposit that almost completely



Text-fig. 1. a: Geographic position of Apulia. b: Satellite image view of Salentine Peninsula (south-eastern Apulia) with Middle and Late Pleistocene main cave deposits. c: Entrance to Grotta Romanelli opening into limestone cliff (red dot). Maps elaboration and photo by L. Forti (from Pieruccini et al. 2022).

filled the entrance of Grotta Romanelli, reporting only the presence of several vertebrate fossils in a breccia outside the cavity (Botti 1874).

In 1900, Paolo Emilio Stasi directed the first excavation activity in the cave, collecting a rich paleontological and archaeological record (Stasi and Regalia 1904).

In 1914, Gian Alberto Blanc coordinated new fieldwork activities with a multidisciplinary approach. Thanks to the rigorous method applied by G. A. Blanc, Grotta Romanelli became a reference site for the archaeological and paleontological study of the European Quaternary (Sardella et al. 2018, 2019).

In the 1960s the excavation activities were directed by L. Cardini, with the support of the Istituto Italiano di Paleontologia Umana (IsIPU; Blanc et al. 1962, Cardini 1963, Cardini and Biddittu 1967).

The last excavation campaign coordinated by the Istituto Italiano di Paleontologia Umana took place in 1970, under the coordination of Pier Francesco Cassoli and Marcello Piperno (Piperno 1974).

In 2015, a new multidisciplinary project on Grotta Romanelli started under the coordination of Raffaele Sardella of Sapienza Università di Roma and with the permission of the Soprintendenza Archeologia Belle Arti e Paesaggio di Brindisi e Lecce (Conti et al. 2017, Giustini et al. 2018, Sardella et al. 2018, 2019, Calcagnile et al. 2019, Mecozzi et al. 2021a, 2022, 2024, Sigari et al. 2021, 2024, Pieruccini et al. 2022, Russo Ermolli et al. 2022, Muttillio et al. 2025).

The stratigraphy of the cave has recently been revised, after new excavation campaigns. Based on a recent litho-, morpho- and chrono-stratigraphical reassessment, supported by new U/Th dates, the chronology of the lowermost part of the deposit is now known to be significantly older than previously surmised (Pieruccini et al. 2022). From bottom to top, the following stratigraphic units inside the cave (named

ISU) were recognized (Pieruccini et al. 2022; Text-fig. 2):

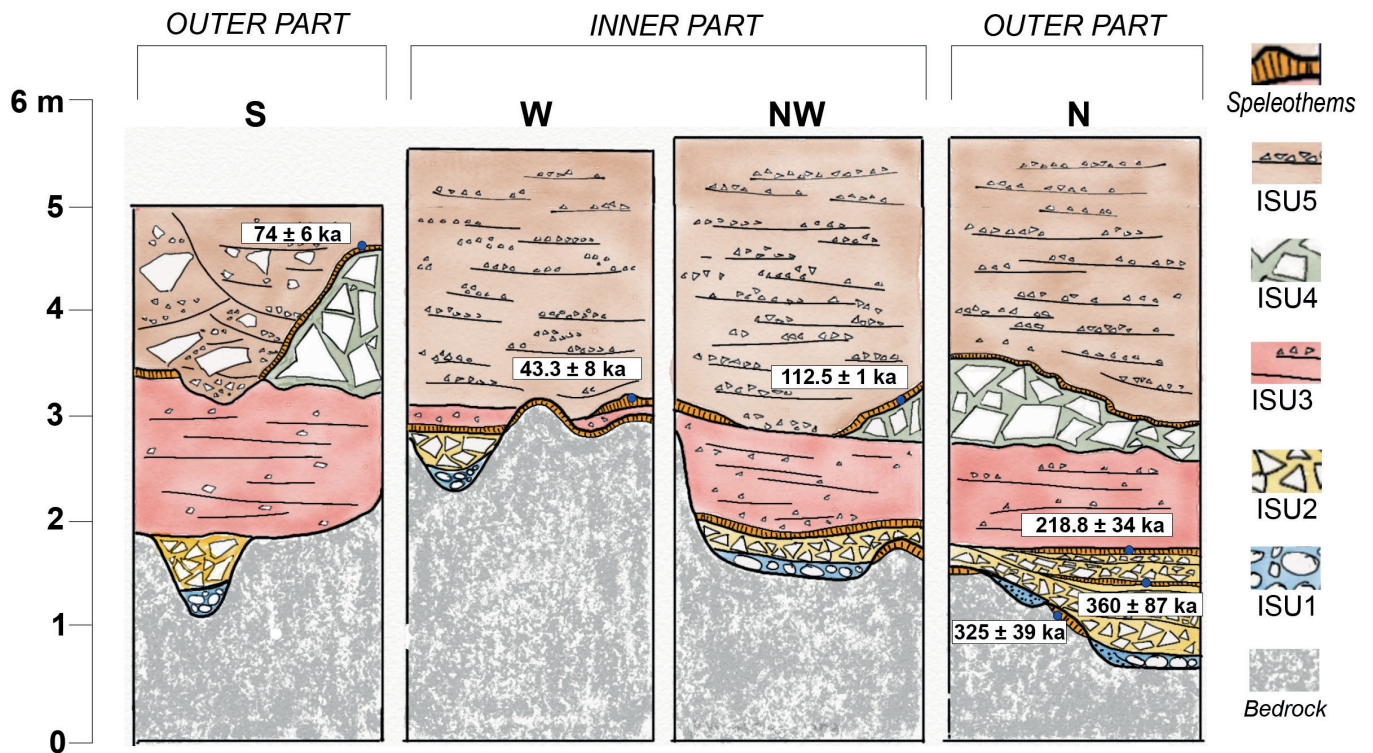
- ISU1 (formerly layer K, sensu Blanc 1920), made of marine rounded and subrounded polygenic limestone gravels, pebbles and boulders, with variable amounts of sandy-silty matrix, resting over the bedrock and related to a marine high stand. In this unit, limestone artefacts were recovered, associated with fire features and scarce faunal remains. Previously attributed to the Last Interglacial (MIS 5e) (Blanc 1920, 1928), this unit is now ascribed to MIS 9 (Pieruccini et al. 2022).

- ISU2 (formerly layers H and I, sensu Blanc 1920), consisting of layers of angular to subrounded coarse-grained monogenic cemented limestone gravels, pebbles and boulders, with a sandy-silty matrix, covered by irregular flowstones. In this unit, lithics and faunal remains were recovered. According to the new U/Th ages, assessed as between 360 ± 87 ka and 218.8 ± 34 ka, ISU2 provided the oldest geochronological constraint for the whole succession, bracketed between MIS 9 and MIS 7 (Pieruccini et al. 2022).

- ISU3 (formerly layer G called “terre rosse” or “bolo”, sensu Blanc 1920), composed of clays and silts with variable amounts of fine to coarse-grained quartz sands. The sedimentary facies are typical of alternating and recurrent sheet-floods, and a lack of significant features associated with weathering or soil formation processes, such as cracks or other features related to biological activity. This unit yielded a consistent Mousterian limestone industry (Piperno 1974, Spinapolice 2018) associated with a diversified vertebrate fauna (Mecozzi et al. 2024).

- ISU4 (formerly layer F, sensu Blanc 1920) is a roofspall made of monogenic limestone boulders and gravels, which is covered by a flowstone dated starting from 112.5 ± 1 ka (Pieruccini et al. 2022).

- ISU5 (layers A–E, called “terre brune”, sensu Blanc 1920), consisting of thin to medium layered sands, silts and



Text-fig. 2. Summary of succession filling Grotta Romanelli and U/Th dates. Locations of sections (from Pieruccini et al. 2022: text-fig. 2b).

clays, rich in Upper Palaeolithic tools and faunal remains. According to recent ^{14}C dating, this unit was dated between 13.6 cal ka BP and 11.4 cal ka BP (Calcagnile et al. 2019, Sigari et al. 2021).

Material and methods

Interest in new research activities was started in 2015 (Sardella et al. 2018) by the discovery of three complete m1, attributed to *Microtus (Iberomys) brecciansis*, from two different areas and stratigraphic levels of the Romanelli cave areas.

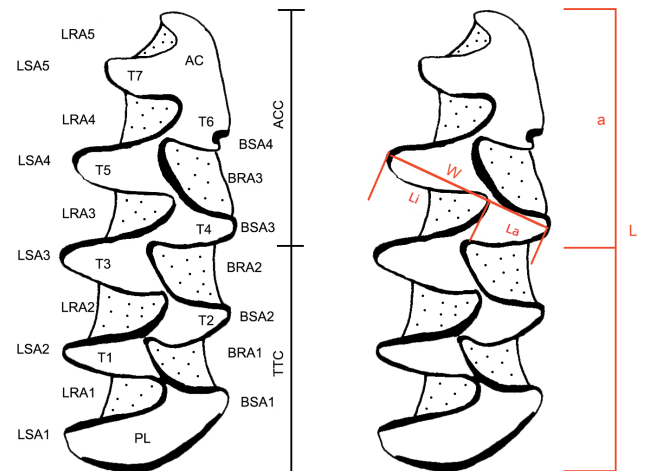
According to new stratigraphic analysis of the site (Pieruccini et al. 2022), the teeth could be attributed to Stratigraphical Units ISU1 (US2991) and ISU2 (US2983C and US1024) (Text-fig. 2), which date from around 325 ky BP.

The method used to collect these small remains was accurate sieving of the sediment with 1 mm mesh sieves.

The remains have been identified using a binocular microscope – the “Leica MZ 6” model – with a magnification from $6.3\times$ to $40\times$. The measures and nomenclature used in the document are those proposed by Sala et al. (1994; Text-fig. 3). The first lower molars were identified following Chaline (1972).

The distribution of the subgenus *Iberomys* in Europe and in Italy

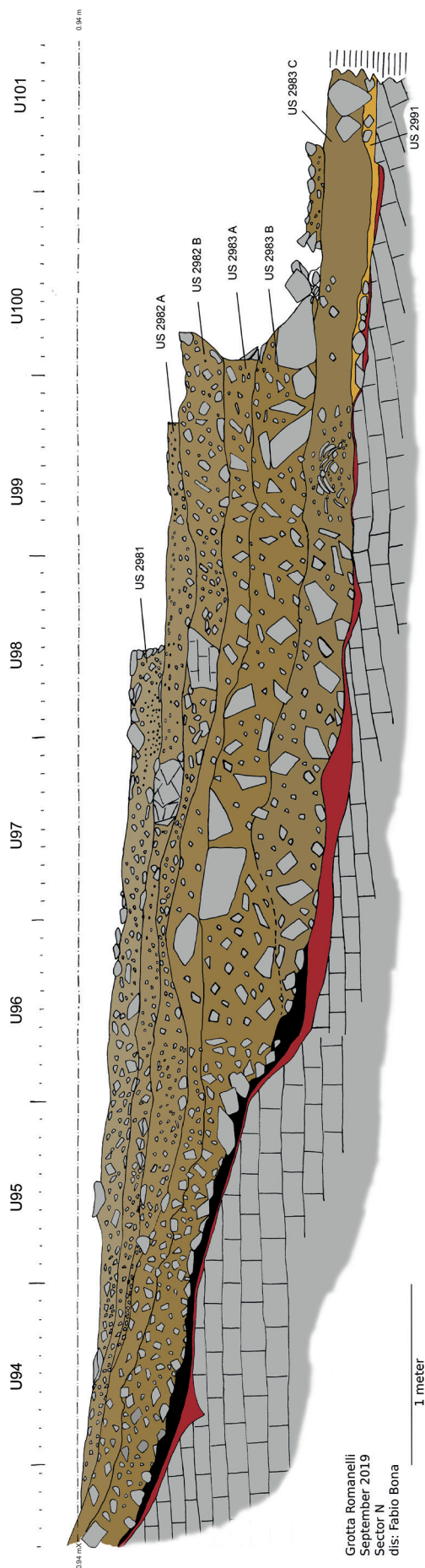
Cuenca-Bescós and Laplana Conesa (1995, Cuenca-Bescós et al. 1999, 2014) proposed to rise the subgenus *Iberomys* CHALINE, 1972 to the rank of genus, an interpretation also followed by López-García et al. (2015),



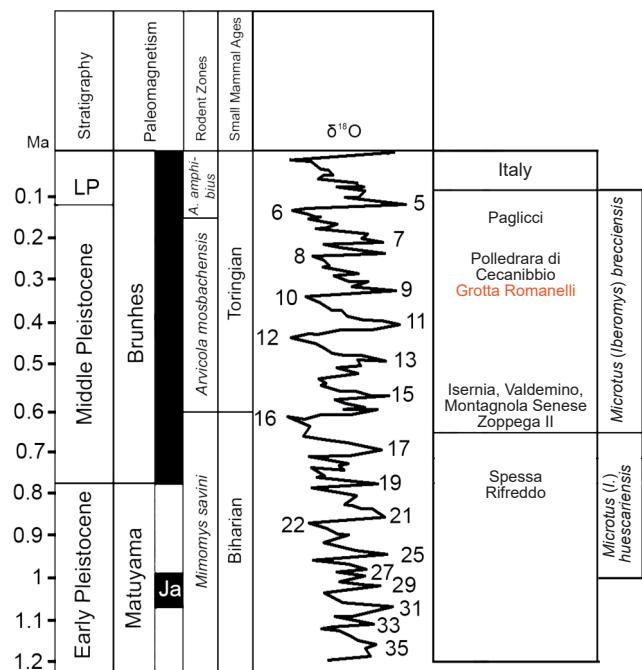
Text-fig. 3. Nomenclature and measuring methods used for first lower molars: ACC – anteroconid complex, AC – anterior cap, BRA – buccal reentrant angle, BSA – buccal salient angle, LRA – lingual re-entrant angle, LSA – lingual salient angle, PL – posterior lobe, TTC – trigonid-talonid complex T1–T7; a – length of anteroconid complex, c – width of opening of triangles T4–T5, L – length, La – mean width of T4, Li – mean width of T5, W – width.

but not accepted by all zoologists (e.g., Fernandes et al. 2019). In this paper, we prefer to use the original approach, considering *Iberomys* as a subgenus of the genus *Microtus* SCHRANK, 1798, because it seems to us to be the solution accepted by most zoologists, and the most conservative for the evolutionary development of the genus.

The subgenus *Iberomys* includes three species – two fossil (*M. (Iberomys) huescarensis* RUIZ BUSTOS, 1988



Text-fig. 4. Stratigraphic sketch of north sector of Lower complex (ISU1 and 2 sensu Pieruccini et al. 2022) of Grotta Romanelli (drawing F. Bona).



Text-fig. 5. Biochronological framework of *Microtus (Iberomys) brecciensis* in Italy (modified from López-García et al. 2015).

(Ruiz Bustos 1988) and *M. (I.) brecciensis* (GIEBEL, 1847)) and one living (*M. (I.) cabreræ* THOMAS, 1906). According to López-García et al. (2015), the subgenus *Iberomys* has evolved separately from other lineages of voles since its origins in the Early Pleistocene. The evolution of this rodent has a mediterranean origin, and especially in the Iberian Peninsula. The living *M. (I.) cabreræ* is an endemism of the Iberian Peninsula (López-García et al. 2015).

M. (Iberomys) in Italy is rare, if compared to the data from Iberian Peninsula, and only the two extinct species were present and chronologically distributed from the late Biharian to the Toringian (Text-fig. 5).

Chronological distribution of *Microtus (I.) brecciensis*

The First occurrence of *Microtus (I.) brecciensis* is documented in Spain at Gran Dolina (TD8–9 = TD8b), around 608 ky BP, during the beginning of the Middle Pleistocene (Cuenca-Bescós et al. 2014). The most accurate first Italian occurrence is the fossil remains from Isernia La Pineta, and dated around 610 ky BP (Sala and Masini 2007). In Italy, Zoppega 2 (Verona, northern Italy) (López-García et al. 2015) seems to be older than the Gran Dolina (TD8–9 = TD8b) and Isernia La Pineta sites, but the unclear stratigraphic situation does not allow us to be certain. Therefore, an origin close or a little older than 600 ky seems to currently be the most accredited.

The last occurrence of the taxon appears to be uniform throughout its distribution range, and occurs between the end of MIS 6 and the beginning of MIS 5e. In Italy, the last occurrence is reported in Grotta Paglicci (Foggia, Apulia), at the transition between MIS 6 and MIS 5 (Berto et al. 2013). In Spain and France, the species also disappears at that same time (Cuenca-Bescós et al. 2014).

Systematic palaeontology

Order Rodentia BOWDICH, 1821
 Family Cricetidae FISCHER, 1817
 Subfamily Arvicolinae GRAY, 1821

Genus *Microtus* SCHRANK, 1798
 Subgenus *Iberomys* CHALINE, 1972

Microtus (Iberomys) brecciensis (GIEBEL, 1847)

1967 *Microtus mediterraneus* n. sp.; Chaline, p. 900.
 2014 *Iberomys mediterraneus* (CHALINE, 1967); Cuenca-Bescós et al., p. 489.

Material. ISU1: m1 dex. US2991 Q.V100 – GR19-493 (Text-fig. 6c). ISU2: 2 m1 dex. US2983C Q.U99 – GR21-501 (Text-figs 3, 6b) and US1024 Q.T89 – GR23-667 (Text-fig. 6a), see Table 1 for measurements.

Description. The first lower molar of *Microtus (I.) brecciensis* consists of a posterior loop, five alternate triangles and an asymmetrical AC2. AC2 is buccally flattened, with T6 largely confluent with the anterior loop. The T4 and T5 are alternate. The salient lingual angles are more acute and longer than labial ones (Chaline 1967). The three teeth from Grotta Romanelli present all the typical morphological characteristics of the subgenus *Iberomys* described above. GR19-493 and GR21-501 show an incipient BRA4 not visible in GR23-667 (Text-fig. 6). Abundant cement is present in the re-entrant angles. The enamel shows a positive differentiation. All the teeth belong to adult individuals.

The overall morphology of the tooth is “labio-lingual asymmetric”, as defined by Cuenca-Bescós and Laplana Conesa (1995). The T4 and T5 alternating allowed us to distinguish *Microtus (I.) brecciensis* from *Microtus (I.) huescarensis* (López-García et al. 2015) (Text-fig. 6), and to exclude for Grotta Romanelli teeth the attribution to *Microtus (I.) huescarensis*. The separation between *Microtus (I.) brecciensis* and *Microtus (I.) cabreræ* is not easy, but the Grotta Romanelli teeth seem to have salient and re-entrant angles that are less acute and developed than those described as typical for *Microtus (I.) cabreræ* (Cuenca-Bescós et al. 2014). Therefore, according to the morphology and the old

Table 1. Measurements of three m1s of *Microtus (Iberomys) brecciensis* from Grotta Romanelli (in mm). See Text-fig. 3 for the meaning of abbreviations.

Measurements	Grotta Romanelli		
	GR23-667	GR21-501	GR19 -493
L	2.82	2.78	2.74*
a	1.20	1.48	1.33
W	1.08	1.09	1.06
Li	0.65	0.66	0.67
La	0.40	0.39	0.36
A/L	42.70	53.27	48.61
La/Li	61.35	59.30	54.29

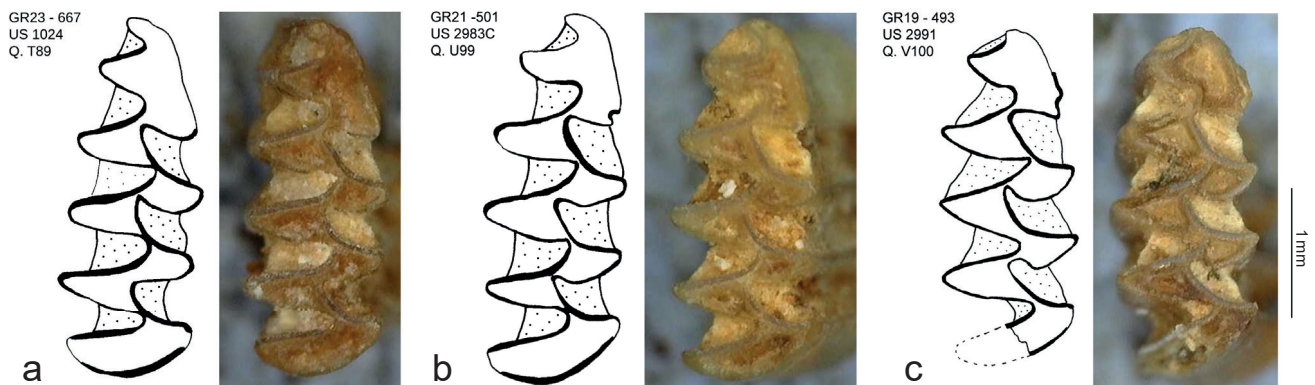
*tooth damaged

age stratigraphic levels (Pieruccini et al. 2022), it seems possible to attribute the Grotta Romanelli finds to *Microtus (I.) brecciensis* with good confidence.

Text-fig. 7 shows a dimensional comparison, for some metric parameters, between the finds attributed to *Microtus (I.) brecciensis* from Grotta Romanelli and Grotta Paglicci (Apulia), and the Spanish and French ones. The Apulian finds display distinctive characteristics that will need to be carefully evaluated in conjunction with any new finds discovered in the coming years of excavation. At this stage of the research, based on only four teeth, three from Grotta Romanelli and one from Grotta Paglicci, it is difficult to propose hypotheses for this possible differentiation.

Results and discussion

The new excavations of Grotta Romanelli started in 2015 (Sardella et al. 2018) have allowed us to investigate in a modern way, both stratigraphic (Calcagnile et al. 2019, Pieruccini et al. 2022) and paleontological, the latter through a review of the historical collections (Mecozzi et al. 2021a, b, 2024) and work on the new finds discovered during the new research campaigns. Among the new work strategies introduced is the sieving of all the excavated sediment with



Text-fig. 6. First lower molars of *Microtus (Iberomys) brecciensis* from ISU1–2 of Grotta Romanelli. a: US1024 Q.T89 – GR23-667 (ISU2), b: US2983C Q.U99 – GR21-501 (ISU2), c: US2991 Q.V100 – GR19-493 (ISU1). Drawings and photos F. Bona.

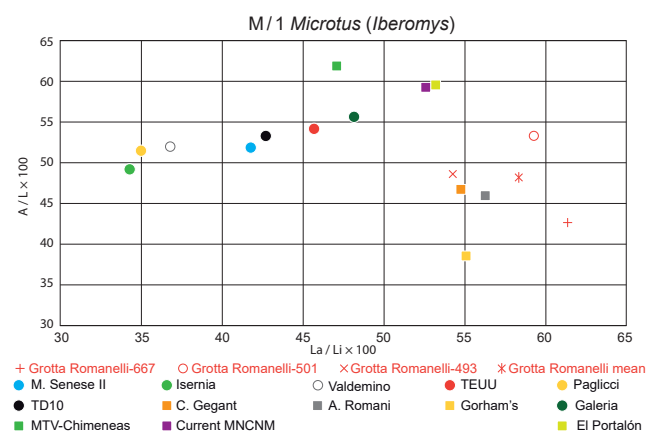
a 1 mm mesh. Sieving of the ground allowed us to recover thousands of microvertebrate remains and invertebrate faunal remains. Among these thousands of finds, from ISU1–2 (Pieruccini et al. 2022) come three lower first molar teeth attributed to *Microtus (I.) brecciensis*.

In Italy, *Microtus (I.) brecciensis*, according to the faunal associations of the sites from which it comes, seems to have lived in mild climates associated with landscapes composed of open forest environments and waterways (López-García et al. 2015).

For example, at Isernia La Pineta, the environment where the *Iberomys* vole lived was characterized by the presence of wide-open spaces, where large herbivores found pasture, with grassy plants represented mainly by grasses and a few trees. There were also more humid areas where the vegetation thickened (Sala 1996, Di Nucci et al. 2005, Thun Hohenstein et al. 2019). At La Polledrara di Cecanibbio (Rome) the environment was driven by the presence of a fluvio-lacustrine system with marshes well developed (Anzidei et al. 2012).

At Grotta Romanelli, the presence in the ISU1–2 (Pieruccini et al. 2022) of the large mammals like *Palaeoloxodon antiquus*, *Stephanorhinus hudsheimensis*, *Hippopotamus amphibius*, *Bos primigenius* and *Dama* sp. (Mecozzi et al. 2024) allows us to confirm the predilection of this arvicolid for warm environments, generally open but with humid areas – conditions that must have characterized the area in front of Grotta Romanelli around 325 ky BP.

On the other hand, the chronological distribution of *Iberomys* voles in Italy support a middle Middle Pleistocene age for the Lower deposits of Grotta Romanelli, as pointed out by Pieruccini et al. 2022 (Text-fig. 2).



Text-fig. 7. Scatter diagram comparing A/L and La/Li indices for different fossil populations of *M. (Iberomys) brecciensis* (circle) and extant and fossil *M. (Iberomys) cabreriae* (square) (comparison data from López-García et al. 2015).

Conclusions

Recent excavations coordinated by Sapienza University of Rome, thanks to the most careful investigation methodologies, which include fine mesh sieving of the sediment, have led to the discovery of small vertebrates, previously completely unknown, from a site of great importance for southern Mediterranean Europe – the

Romanelli Cave. This first work on small mammal faunas of Grotta Romanelli describes a rare member of the Italian microtheriofauna, *Microtus (I.) brecciensis*, providing new information on the distribution and ecological preferences of the taxon.

– The first description of *M. (I.) brecciensis* from the Middle Pleistocene levels of Romanelli Cave is an important finding that provides information on the mobility of this rodent, and adds new data on the geographic distribution of this taxon during the second half of the Middle Pleistocene. Although the Romanelli Cave sample is rare, as the Italian sample in general is quite scarce, this finding allows us to extend its distribution range to the extreme south of the Salento peninsula, whereas previous knowledge of its distribution was limited to the Gargano Peninsula (northern Puglia, Paglicci Cave).

– The remains of large mammals associated with *Microtus (I.) brecciensis* such as *Hippopotamus* cf. *amphibius*, *Palaeoloxodon antiquus* and *Stephanorhinus hudsheimensis* (Mecozzi et al. 2024) allow us to understand how this rodent was linked, at least locally, to wooded environments with few open areas and significant water bodies.

– Chronologically, the presence of *Microtus (I.) brecciensis* in the Romanelli cave sediments before 300 ky BP highlights how the species, after its appearance around 600 ky BP, spread over a large territory, which includes Spain, France and a large part of the Italian peninsula, up to the extreme south of Salento.

Acknowledgements

This research is dedicated to the memory of Oldřich Fejfar.

We wish to thank the Editor and the referees for their valuable suggestions.

RS acknowledges Sapienza Università di Roma grants with Finanziamento Ricerche di Ateneo 2015, Grandi Scavi 2016 (Grant no: SA116154CD9592F3); Grandi Scavi 2017 (Grant no: SA11715C81468801); Grandi Scavi 2018 (Grant no: SA1181642D3B3C58); Grandi Scavi 2019 (Grant no: SA11916B513E7C4B); Grandi Scavi 2020 (Grant no: SA120172B2C05E68); Grandi Scavi 2021 (Grant no: SA12117A87BC3F0A); Grandi Scavi 2022 (Grant no: SA1221816893E2AB); Grandi Scavi 2023 (Grant no: SA1231888AE771CD); Grandi Scavi 2024 (Grant no: SA12419011BD11EF), and the Italian Ministry of University and Research, PRIN 2022 –Prot. 2022JWFEEKE “The evolution of mammals in changing ecosystems of the Middle Pleistocene of Italy”.

We would like to acknowledge the Soprintendenza Archeologia, Belle Arti e Paesaggio per le province di Brindisi e Lecce for granting permission for the research and field activities (2015–2024, resp. Raffaele Sardella). We wish to thank the Castro municipality, Capitanerie di Porto di Castro e di Otranto, Parco Naturale Regionale Costa Otranto S.M. di Leuca-Bosco di Tricase, Nini Ciccarese and Toto De Santis, Michele Rizzo and the Red Coral team, Don Piero Frisullo and Genesareth for their logistical support. We also wish to thank all members of the Romanelli team and

many students for their valuable work during 2015–2024 fieldwork activities.



References

- Anzidei, A. P., Bulgarelli, G. M., Catalano, P., Cerilli, E., Gallotti, R., Lemorini, C., Milli, S., Palombo, M. R., Pantano, W., Santucci, E. (2012): Ongoing research at the late Middle Pleistocene site of La Polledrara di Cecanibbio (central Italy), with emphasis on human-elf elephant relationships. – *Quaternary International*, 255: 171–187.
<https://doi.org/10.1016/j.quaint.2011.06.005>
- Berto, C. (2013): Distribuzione ed evoluzione delle associazioni a piccoli mammiferi nella penisola italiana durante il Pleistocene Superiore [Distribution and evolution of small mammal assemblages on the Italian Peninsula during the Late Pleistocene]; Ph.D. Thesis. – MS, Università degli Studi di Ferrara, Ferrara, 157 pp. (in Italian) (copy in University of Ferrara library)
- Blanc, G. A. (1920): Grotta Romanelli I. Stratigrafia dei depositi e natura e origine di essi [Grotta Romanelli Cave I. Stratigraphy, character and origin of the sedimentary deposits]. – *Archivio per l'antropologia e la etnologia*, 50: 1–39. (in Italian)
- Blanc, G. A. (1928): Grotta Romanelli II. Dati ecologici e paleontologici [Grotta Romanelli II. Ecological and paleontological data]. – *Archivio per l'antropologia e la etnologia*, 58: 1–49. (in Italian)
- Blanc, A. C., Cardini, L., Cassoli, P. (1962): Campagna di scavo nella Grotta Romanelli (Lecce) [Excavation campaign in the Grotta Romanelli Cave (Lecce)]. – *Quaternaria*, 5: 305. (in Italian)
- Bona, F., Sala, B. (2016): Villafranchian-Galerian mammal faunas transition in South-Western Europe. The case of the late Early Pleistocene mammal fauna of the Frantoio locality, Arda River (Castell'Arquato, Piacenza, Northern Italy). – *Geobios*, 49: 329–347.
<https://doi.org/10.1016/j.geobios.2016.06.002>
- Botti, U. (1874): Sulla scoperta di ossa fossili in Terra d'Otranto [On the discovery of fossil bones in Terra d'Otranto]. – *Bollettino del R. Comitato geologico d'Italia*, 1: 7–8. (in Italian)
- Calcagnile, L., Sardella, R., Mazzini, I., Giustini, F., Brilli, M., D'Elia, M., Braione, E., Conti, J., Mecozzi, B., Bona, F., Iurino, D. A., Lembo, G., Muttillio, B., Quarta G. (2019): New radiocarbon dating results from the Upper Paleolithic Mesolithic levels in Grotta Romanelli (Apulia Southern Italy). – *Radiocarbon*, 61: 1211–1220.
<https://doi.org/10.1017/RDC.2019.8>
- Cardini, L. (1963): Presentazione delle industrie musteriane su calcare dei livelli a terre rossa di Grotta Romanelli [Presentation of the Mousterian industries on limestone of the red earth levels of Grotta Romanelli]. – *Atti dell'VIII riunione dell'istituto di Preistoria e Protostoria, Trieste*, 43 pp. (in Italian)
- Cardini, L., Biddittu, I. (1967): Attività scientifica dell'Istituto Italiano di Paleontologia Umana della sua fondazione [Scientific activity of the Italian Institute of Human Paleontology since its foundation]. – *Quaternaria*, 9: 385–408. (in Italian)
- Chaline, J. (1967): *Microtus mediterraneus* n. sp., nouvel Arvicolidé (Rodentia) du Pléistocène moyen de France. – *Comptes Rendues de la Academie des Sciences, Sér. D*, 265: 900–903.
- Chaline, J. (1972): Les rongeurs du Pleistocène moyen et supérieur de France (Cahiers de Paléontologie). – CNRS Editions, Paris, 410 pp.
- Conti, J., Tucci, S., Bellucci, L., Bona, F., Brilli, M., Giustini, F., Iurino, D. A., Lembo, G., Massussi, M., Mazzini, I., Mecozzi, B., Muttillio, B., Sigari, D., Strani, F., Voltaggio, M., Sardella, R. (2017): Toward the virtual reconstruction of Grotta Romanelli, Apulia (Southern Italy). – In: IMEKO International Conference on Metrology for Archaeology and Cultural Heritage, Lecce, Italy, October 23–25, 2017, pp. 577–582.
- Cuenca-Bescós, G., Laplana Conesa, C. (1995): Evolución de *Iberomys* (Arvicolidae, Rodentia, Mammalia) durante el Cuaternario español [Evolution of *Iberomys* during the Quaternary in Spain]. – In: López, G., Obrador, A., Vicens, E. (eds), XI Jornadas de Paleontología. Sociedad Española de Paleontología, Tremp, Lérida, pp. 69–72. (in Spanish)
- Cuenca-Bescós, G., Laplana, C., Canudo, J. I. (1999): Biochronological implications of the Arvicolidae (Rodentia, Mammalia) from the Lower Pleistocene hominid-bearing level of Trinchera Dolina 6 (TD6, Atapuerca, Spain). – *Journal of Human Evolution*, 37: 353–373.
<https://doi.org/10.1006/jhev.1999.0306>
- Cuenca-Bescós, G., López-García, J. M., Galindo-Pellicena, M. A., Garcia-Perea, R., Gisbert, J., Rofes, J., Ventura, J. (2014): Pleistocene history of *Iberomys*, an endangered endemic rodent from southwestern Europe. – *Integrative Zoology*, 9: 481–497.
<https://doi.org/10.1111/1749-4877.12053>
- Di Nucci, A., Lembo, G., Minelli, A., Peretto, C., Terzani, C., Thun Hohenstein, U. (2005): Accampamenti di cacciatori preistorici a Isernia La Pineta [Prehistoric hunters camps in Isernia La Pineta]. – *FOLD&R (Fasti On Line Documents & Research)*, No. 34: 1–2. (in Italian)
- Fernandes, M., Pita, R., Mira, A. (2019): *Microtus cabreræ*. – The IUCN Red List of Threatened Species 2019: e.T13418A90931498.
<https://doi.org/10.2305/IUCN.UK.2019-1.RLTS.T13418A90931498.en>
- Giustini, F., Bona, F., Brilli, M., Conti, J., D'Agostino, A., Lembo, G., Mazzini, I., Mecozzi, B., Muttillio, B., Sardella, R. (2018): An introduction to the Early Holocene eolian deposits of Grotta Romanelli, Apulia, Southern Italy. – *Alpine and Mediterranean Quaternary*, 31: 135–139.
- Gliozzi, E., Abbazzi, L., Argenti, P., Azzaroli, A., Caloi, L., Capasso Barbato, L., Di Stefano, G., Esu, D., Ficcarelli, G., Girotti, O., Kotsakis, T., Masini, F., Mazza, P., Mezzabotta, C., Palombo, M. R., Petronio, C., Rook, L., Sala, B., Sardella, R., Zanalda, E., Torre, D. (1997): Biochronology of selected mammals, molluscs and ostracods

- from the Middle Pliocene to the Late Pleistocene in Italy. The state of the art. – *Rivista Italiana di Paleontologia e Stratigrafia*, 103(3): 369–388.
- Iannucci, A., Mecozzi, B., Sardella, R. (2023): Beware of the “Wolf event” – remarks on large mammal dispersals in Europe and the Late Villafranchian faunal turnover. – *Alpine and Mediterranean Quaternary*, 36(1): 75–90. <https://doi.org/10.26382/AMQ.2023.03>
- Iannucci, A., Mecozzi, B., Sardella, R., Iurino, D. A. (2021): The extinction of the giant hyena *Pachycrocuta brevirostris* and a reappraisal of the Epivillafranchian and Galerian Hyaenidae in Europe: Faunal turnover during the Early–Middle Pleistocene Transition. – *Quaternary Science Reviews*, 271: 107240 (22 pp.). <https://doi.org/10.1016/j.quascirev.2021.107240>
- López-García, J. M., Berto, C., Luzi, E., Dalla Valle, C., Bañuls-Cardona, S., Sala, B. (2015): The genus *Iberomys* (Chaline, 1972) (Rodentia, Arvicolinae, Mammalia) in the Pleistocene of Italy. – *Italian Journal of Geosciences*, 134(1): 162–169. <https://doi.org/10.3301/IJG.2014.48>
- Mecozzi, B., Bellucci, L., Giustini, F., Iannucci, A., Iurino, D. A., Mazzini, I., Strani, F., Sardella, R. (2021a): A reappraisal of the Pleistocene mammals from the karst infilling deposits of the Maglie Area (Lecce, Apulia, Southern Italy). – *Rivista Italiana di Paleontologia e Stratigrafia*, 127(2): 355–382. <https://doi.org/10.13130/2039-4942/15776>
- Mecozzi, B., Bona, F., Conti, J., Lembo, G., Mariani, G. S., Mazzini, I., Muttillio, B., Pieruccini, P., Sardella, R. (2024): Large mammal faunas and ecosystem dynamics during the late Middle to early Late Pleistocene at Grotta Romanelli (southern Italy). – *Quaternary Science Advances*, 16: 100237 (21 pp.). <https://doi.org/10.1016/j.qsa.2024.100237>
- Mecozzi, B., Buzi, C., Iannucci, A., Micarelli, I., Bona, F., Forti, L., Lembo, G., Manzi, G., Mazzini, I., Muttillio, B., Pieruccini, P., Ranaldo, F., Sigari, D., Sardella, R. (2022): New human fossil from the latest Pleistocene levels of Grotta Romanelli (Apulia, southern Italy). – *Archaeological and Anthropological Sciences*, 14: 27 (4 pp.). <https://doi.org/10.1007/s12520-021-01491-1>
- Mecozzi, B., Iannucci, A., Bona, F., Mazzini, I., Pieruccini, P., Sardella, R., (2021b): Rediscovering *Lutra lutra* from Grotta Romanelli (southern Italy) in the framework of the puzzling evolutionary history of Eurasian otter. – *PalZ*, 96: 161–174. <https://doi.org/10.1007/s12542-021-00553-y>
- Muttillio, B., Gallotti, R., Forti, L., Lembo, G., Mazzini, I., Pieruccini, P., Sardella, R. (2025): Reassessing the Middle Palaeolithic lithic technology of Grotta Romanelli (Lecce, southern Italy). – *Quaternary International*, 721: 109686 (18 pp.). <https://doi.org/10.1016/j.quaint.2025.109686>
- Pieruccini, P., Forti, L., Mecozzi, B., Iannucci, A., Yu, T. L., Shen, C.-C., Bona, F., Lembo, G., Muttillio, B., Sardella, R., Mazzini, I. (2022): Stratigraphic reassessment of Grotta Romanelli sheds light on Middle-Late Pleistocene palaeoenvironments and human settling in the Mediterranean. – *Scientific reports*, 12: 13530 (14 pp.). <https://doi.org/10.1038/s41598-022-16906-9>
- Piperno, M. (1974): L’Industria Musteriana su calcare di Grotta Romanelli (Otranto) [The Mousterian limestone lithic industry from Grotta Romanelli (Otranto)]. – *Memorie Dell’Istituto Italiano di Paleontologia Umana*, 2: 69–90. (in Italian)
- Ruiz Bustos, A. (1988): Estudio sobre los arvicolidos cuaternarios [Study on quaternary arvicolides]. – *Paleomammalia*, 2: 1–89. (in Spanish)
- Russo Ermolli, E., Masi, A., Vignola, C., Di Lorenzo, H., Masci, L., Bona, F., Forti, L., Lembo, G., Mazzini, I., Mecozzi, B., Muttillio, B., Pieruccini, P., Sardella, R., Sadori, L. (2022): The pollen record from Grotta Romanelli (Apulia, Italy): New insight for the Late Pleistocene Mediterranean vegetation and plant use. – *Review of Palaeobotany and Palynology*, 297: 104577 (16 pp.). <https://doi.org/10.1016/j.revpalbo.2021.104577>
- Sala, B., Masini, F., Torre, D. (1994): Villanyian arvicolids from Rivoli Veronese, a karst fissure in the Adige Valley, Northeastern Italy. – *Bollettino della Società Paleontologica Italiana*, 33(1): 3–11.
- Sala, B. (1996): Gli animali del giacimento di Isernia La Pineta [Mammals from Isernia La Pineta site]. – In: Peretto, C. (ed.), *I reperti paleontologici del giacimento paleolitico di Isernia La Pineta, l’uomo e l’ambiente*. Istituto Regionale per gli Studi Storici del Molise “V. Cuoco”, Isernia, pp. 25–49. (in Italian)
- Sala, B. (2007): Mammalofaune Tardiglaciali dell’Italia continentale [Late Glacial Mammal Faunas of Continental Italy]. – In: Martini, F. (ed.), *L’Italia tra 15.000 e 10.000 anni fa. Cosmopolitismo e regionalità nel Tardiglaciale. Millenni, studi di archeologia preistorica*. Museo Fiorentino di Preistoria “Paolo Graziosi”, Firenze, pp. 21–38. (in Italian)
- Sala, B., Masini, F. (2007): Late Pliocene and small mammal chronology in the Italian peninsula. – *Quaternary International*, 160: 4–16. <https://doi.org/10.1016/j.quaint.2006.10.002>
- Sardella, R., Mazzini, I., Giustini, F., Mecozzi, B., Brilli, M., Iurino, D. A., Lembo, G., Muttillio, B., Massussi, M., Sigari, D., Tucci, S., Voltaggio, M. (2018): Grotta Romanelli (Southern Italy, Apulia): Legacies and issues in excavating a key site for the Pleistocene of the Mediterranean. – *Rivista Italiana di Paleontologia e Stratigrafia*, 124(2): 247–264. <https://doi.org/10.13130/2039-4942/9983>
- Sardella, R., Iurino, D. A., Mecozzi, B., Sigari, D., Bona, F., Bellucci, L., Coltorti, M., Conti, J., Lembo, G., Muttillio, B., Mazzini, I. (2019): Grotta Romanelli (Lecce, Southern Italy) between past and future: New studies and perspectives for an archaeo-geosite symbol of the Palaeolithic in Europe. – *Geoheritage*, 11(4): 1413–1432. <https://doi.org/10.1007/s12371-019-00376-z>
- Sardella, R., Strani, F. (2025): Mid-Pleistocene of Europe. – In: Woodroffe, S., Jones, A., O’Rourke, D. (eds), *Encyclopedia of Quaternary Science (Third Edition)*, Vol. 6. Elsevier, Amsterdam, pp. 387–396. <https://doi.org/10.1016/B978-0-323-99931-1.00035-0>
- Sigari, D., Bourdier, C., Conti, C., Conti, J., Forti, L., García-Diez, M., Lai, G., Mazzini, I., Pieruccini, P., Sardella, R. (2024): The last cave lion of the late Upper Palaeolithic: The engraved feline of Grotta Romanelli (southern Italy).

- Quaternary Science Reviews, 334: 108670 (15 pp.).
<https://doi.org/10.1016/j.quascirev.2024.108670>
- Sigari, D., Mazzini, I., Conti, J., Forti, L., Lembo, G., Mezzozzi, B., Muttullo, B., Sardella, R. (2021): New parietal engravings in the Romanelli cave (Apulia, southern Italy). Towards a systematic review. – *Antiquity*, 95: 1387–1404.
<https://doi.org/10.15184/aqy.2021.128>
- Spinapolice, E. (2018): Les Néandertaliens du talon. Technologie lithique et mobilité au Paléolithique moyen dans le Salento (Pouilles, Italie méridionale). – *Archaeopress, Oxford*, 242 pp.
<https://doi.org/10.2307/j.ctv1pdrqrh>
- Stasi, P. E., Regàlia, E. (1904): Grotta Romanelli (Castro, Terra d’Ontranto). Stazione con faune interglaciali calde e di steppa. Nota preventiva [Grotta Romanelli (Castro, Terra d’Ontranto). Locality with interglacial and steppe fauna. Preliminary note]. – *Archivio per l’Antropologia e la Etnologia*, 34: 17–81. (in Italian)
- Thun Hohenstein, U., Channarayapatna, S., D’Argenio, F., Grandi, F., Peretto C. (2019): Nuovi dati archeozoologici dal sito di Isernia La Pineta (Molise, Italia) [New archaeozoological data from Isernia La Pineta (Molise, Italy)]. – In: De Grossi Mazzorin, J., Fiore, I., Minniti, C. (eds), *Atti dell’8° Convegno Nazionale di Archeozoologia*, Lecce, 11–14 novembre 2015. Università del Salento, Lecce, pp. 3–11. (in Italian)