

EARLY PLEISTOCENE PALEOHABITATS OF EASTERN EUROPE: EVIDENCE FROM THE OLTEȚ RIVER VALLEY OF ROMANIA

Claire E. Terhune¹, Sabrina C. Curran², David L. Fox³, Nicole D. Garrett⁴, Alexandru Petculescu⁵, Chris A. Robinson⁶, Marius Robu⁵

¹Dept of Anthropology, University of Arkansas, ²Dept of Sociology and Anthropology, Ohio University, ³Dept of Earth Sciences, University of Minnesota, ⁴Dept of Anthropology, University Of Minnesota, ⁵Dept of Geospeleology and Paleontology, “Emil Racovita” Institute Of Speleology, Bucharest; ⁶Dept of Biological Sciences, Bronx Community College, City University Of New York



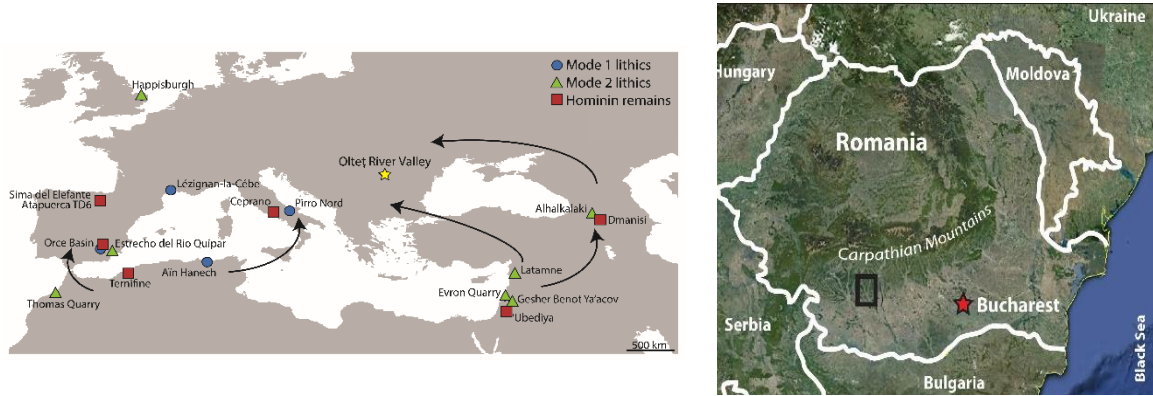
BACKGROUND

Though *Homo erectus* is known from Dmanisi, Georgia at ~1.85 Ma (Ferring et al., 2011), other well-dated European hominins have not been recovered before 1.4 Ma (Orce Basin, Spain)(Toro-Moyano et al., 2013). This suggests two potential interpretations : 1) some barrier (physiological and/or environmental) prohibited hominin dispersal into Europe until ~1.4 Ma, or 2) hominins were present but investigations have not yet uncovered convincing evidence of their presence. Current data suggest that hominin dispersals into Europe may have been facilitated by climatic changes, but few data describing the paleoenvironmental conditions in Eastern Europe, a region through which hominins are hypothesized to have dispersed, are available for the early Pleistocene.



GOALS

Over the last five years, research conducted by the Olteț River Valley (ORV) Project in Romania has sought to add to our current understanding of paleoenvironmental conditions in early Pleistocene Eastern Europe. Previously excavated sites in this region represent some of the richest paleontological localities in Eastern Europe, though these collections are little known and underutilized. Here we present preliminary paleoenvironmental data from several early Pleistocene localities from Romania, with the goal of determining whether this region may have been conducive to hominin dispersal at this time.

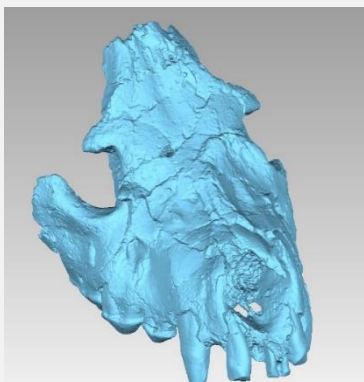


Maps showing the relevant localities in Europe (top left) and the ORV project area (top right) and relevant fossiliferous localities close to the town of Tetoiu (bottom)

TAXONOMY

Fauna identified from the Olteț River Valley sites		
Proboscidea <i>Mammuthus meridionalis</i> ¹⁻⁴⁺	Perissodactyla <i>Plesippus (Allohippus) athanasiu</i> ¹⁻⁴⁺ <i>Allohippus tenonis mitlanensis</i> ^{1,2+}	Carnivora cf. <i>Acinonyx</i> * <i>Lynx issiodorensis</i> ¹⁻⁴ <i>Homotherium crenatidens</i> ¹⁻⁴ <i>Megantereon megantereon/cultridens</i> ¹⁻⁴⁺ <i>Nyctereutes megamastoides</i> ¹⁻⁴ <i>Canis etruscus</i> ^{1,2} <i>Vulpes alpeccoides</i> ^{3,4} <i>Meles thoralis</i> ³ <i>Ursus etruscus</i> ¹⁻⁴ <i>Pliocrocota/Hyaena/Pachycrocota perrieri</i> ¹⁻⁴⁺ <i>Pachycrocota/Hyaena brevirostris</i> ^{1,2+}
Artiodactyla <i>Soergelia cf. elisabethae</i> ^{1,2} <i>Bison cf. schoetensacki</i> ^{1,2} <i>Pliotragus ardeus</i> ¹⁻⁴ <i>Megalovis latifrons</i> ^{1,2} <i>Leptobos cf. etruscus</i> ^{1,2} <i>Gazella sp.</i> ^{1,2} <i>Gazellospira torticornis</i> ³ <i>Cervus nestii</i> ^{1,2} <i>Eucladoceros sp.</i> ¹⁻⁴⁺ <i>Allocaenelaphus sp.</i> ^{1,2} <i>Praealces gallicus</i> ^{1,2+} <i>Praealces cf. carnutorum</i> ^{1,2+} <i>Cervidae indet.</i> ⁴ <i>Mitlanotherium inexpectatum</i> ¹⁻⁴ <i>Sus cf. strozzi</i> ^{1,2}	Insectivora <i>Beremendia cf. fissidens</i> ¹⁻³	Rodentia <i>Trogontherium boisvilletti</i> ^{1,2} <i>Trogontherium dacicum</i> ¹⁻³ <i>Hystrix refossa</i> ¹⁻³ <i>Castor plicidens</i> ¹⁻⁴
	Primates <i>Paradolichopithecus arvernensis geticus</i> ¹⁻⁴	Testudines <i>Geoemyda cf. mossoczyi</i> *
	Pholidota <i>Manis cf. hungarica</i> ¹⁻⁴	

1= Rădulescu and Samson (1990); 2= Rădulescu and Samson (1991); 3= Rădulescu et al. (1998); 4= Rădulescu et al. (2003). Note that references vary in their use of some genus names (e.g., *Pliocrocota* vs. *Hyaena* vs. *Pachycrocota*). Variation in species lists and taxonomy across citations emphasizes the need for a reassessment of the ORV faunal assemblage. * Taxonomic additions made by our team; + taxa that will need to be revised due to updated species definitions



3D model of *Pachycrocota* partial cranium; carnivore analyses are ongoing



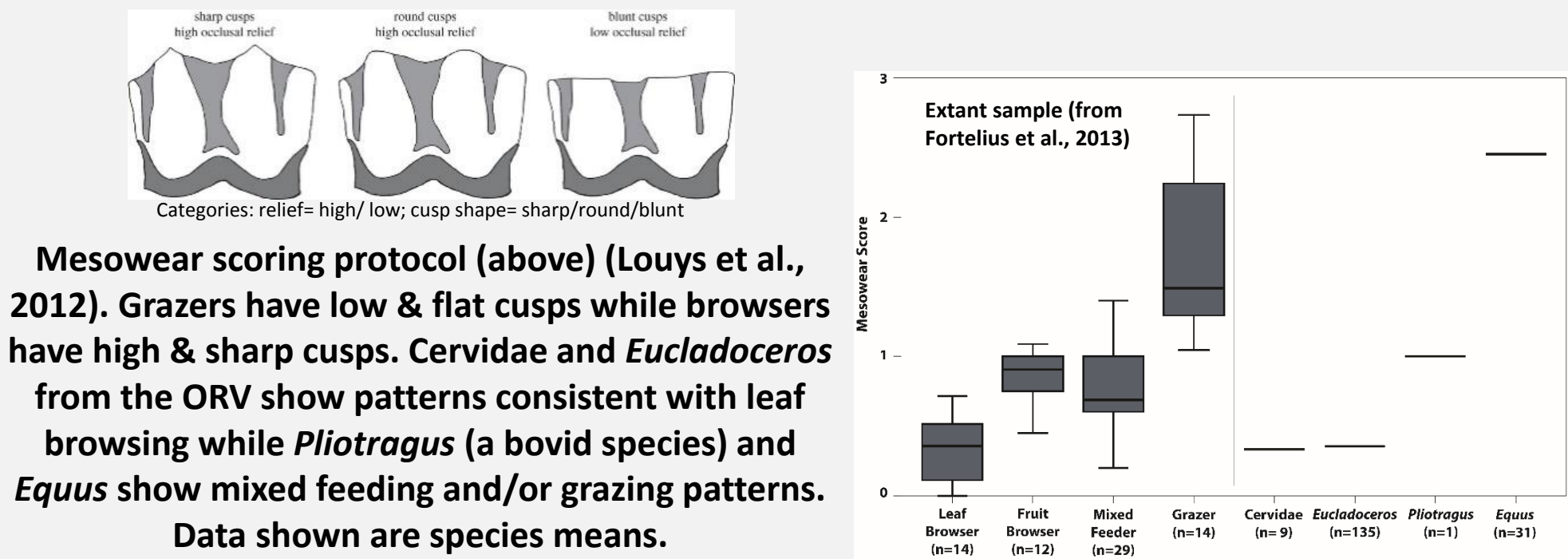
Paradolichopithecus crania; postcrania suggests a high degree of terrestriality (Delson et al., 2000)



Eucladoceros phalanges; ecomorphology of hindlimb morphology in this species indicates adaptation to open conditions and hard, dry ground with topographic relief (Curran, 2015)



MESOWEAR

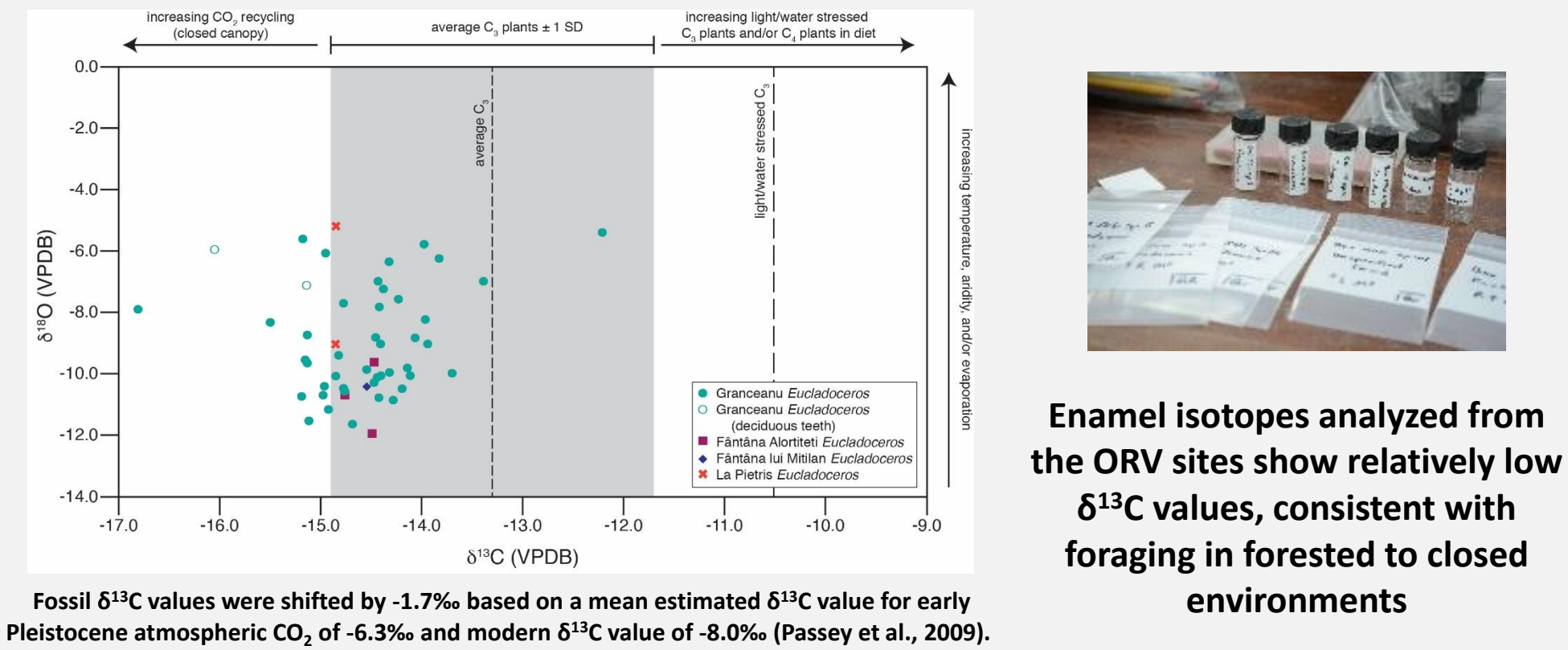


Mesowear scoring protocol (above) (Louys et al., 2012). Grazers have low & flat cusps while browsers have high & sharp cusps. Cervidae and *Eucladoceros* from the ORV show patterns consistent with leaf browsing while *Pliotragus* (a bovid species) and *Equus* show mixed feeding and/or grazing patterns. Data shown are species means.



Photographs of the original Grăunceanu site excavations (left three images) and a photograph showing an illustration of a proposed stone tool recovered in the ORV during work in the 1960s (right)

ISOTOPES



Fossil $\delta^{13}\text{C}$ values were shifted by -1.7‰ based on a mean estimated $\delta^{13}\text{C}$ value for early Pleistocene atmospheric CO_2 of -6.3‰ and modern $\delta^{13}\text{C}$ value of -8.0‰ (Passey et al., 2009).



Enamel isotopes analyzed from the ORV sites show relatively low $\delta^{13}\text{C}$ values, consistent with foraging in forested to closed environments

TAPHONOMY

A pilot taphonomic study of ORV specimens was conducted in 2017 (n=191). In general, the ORV materials are in very good condition, with little carnivore ravaging, but frequent modifications from insects and roots, and with specimens ranging from having only ephemeral traces to being completely covered in these modifications. There is little evidence of weathering or transport, and multiple specimens were excavated in articulation with other bones from the same individual (e.g., entire hock joints).



CONCLUSIONS

Over the past five years our team has reinventoried and reanalyzed over 2700 fossils (out of ~5000) from excavations conducted in the 1960s, identifying several taxa not previously recognized from these assemblages. Mesowear and stable isotope analyses of ungulate dentition suggest a predominantly browsing signal, though ecomorphological analyses reveal that these ungulates were open-adapted. This mosaic pattern has been noted for other Pleistocene European sites and may indicate a habitat type with no modern equivalent. Ongoing geological assessments of previously excavated and newly identified ORV sites will further allow us to pinpoint the age of the ORV sites beyond the current biochronological estimate of ~2.0-1.8 Ma (i.e., Late Villafranchian MN17/MNQ1). Coupled with continued analysis of previously excavated materials, comparisons to other pencontemporaneous paleontological localities in Europe, and new survey and recovery of fossils from sites in the Olteț River Valley by our team, these data have the potential to further shed light on paleoenvironmental conditions during this critical time period in hominin evolution.

REFERENCES

Curran SC. 2015. Anat Rec 298:291-313.
Delson et al. 2000. Am Mus Nat Hist, Anthropol Papers, No 83.
Ferring et al. 2011. PNAS 108, 10432-10436.
Fortellus et al. 2013. Personal communication to S. Curran
Louys J et al. 2012. Proc Roy Soc B 279:4441-4446.
Passey et al. 2009. Earth Plan Sci Let 277, 443-452.
Rădulescu and Samson. 1990. Quartärpaläontologie, 8, 225-232.
Rădulescu and Samson. 1991. In E. Bonifay, and B. Vandermeersch (Eds.), Les Premiers Européens. Actes du 114e. Congrès National des Sociétés Savantes (Paris, 3-9 avril 1989) (pp. 203-208). Paris: Editions du Comité des Travaux Historiques et Scientifiques.
Rădulescu et al. 1998. Quaternaire, 9, 283-290.
Rădulescu C, Samson P, Petculescu A, Stiuță E. 2003. Coloquios de Paleontologia 53:549-558.
Toro-Moyano I et al. 2013. J Hum Evol 65:1-9.

THANKS

• Kieran McNulty, Eric Delson, Virgil Dragusin, Samantha Gogol, Ashly Romero, Caitlin Yoakum, Eric Mazelis
• Josiah Charles Trent Foundation, Duke University
• University of Arkansas
• NSF BCS-0824607 (Fox); NSF-BCS-1636686 (Terhune, Curran, Robinson, Petculescu, Robu)



CONTACT



cterhune@uark.edu
Terhunelab.uark.edu