



The ungulates from the Atapuerca sequence and large mammal dispersals from Asia into Europe

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FIRST PARAGRAPH: The different localities and levels at Atapuerca range in age from late Early Pleistocene to the Holocene. There is an abundant record of fossil ungulates, recording some of the earliest appearances of ungulate species in Western Europe.

阿塔坡卡山遗址序列中的有蹄类化石和大型哺乳动物由亚洲向欧洲的扩散

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首节: 阿塔坡卡山遗址群中不同的地点层位时间分布一直从早更新世晚期延伸到全新世。该遗址群中包含大量的有蹄类动物化石, 记录了西欧地区最早的有蹄类物种的出现。

Figure 1 gives different localities with ungulates in the Trinchera del Ferrocarril (Railway Trench), but excludes Sima de los Huesos, which did not yield ungulate fossils), the late Pleistocene to Holocene cave sites, and the open air sites, which yield exclusively lithic industry. The sediments of the locality Sima del Elefante consist of a sequence of older fossiliferous units (TE7-14) and a younger one (TE18-19), the sediments in between being sterile in fossils. Similarly, Gran Dolina has a set of older fossiliferous units (TD3-8) and a younger one (TD10). The locality of Penal is at the opposite side of the Trinchera and has but few fossils of large mammals. The complex of Galeria consists of three areas with interfingering fossiliferous sediments: La Covacha de los Zarpazos (TZ), Galeria (TG8-11) and Trinchera Norte (TN3-8). The localities and levels are ordered in approximate order from old (bottom) to young (top) largely following Rodríguez [1].

The Atapuerca sequence as given in Figure 1 contains several first records of ungulate species in western Europe. *Cervus elaphus* is first recorded in Atapuerca TDW3-4 and Dorn Dürkheim (Germany) in sediments with reversed polarisation below the Brunhes-

Matuyama boundary. Similarly, the first proven record of *Sus scrofa* is in Atapuerca TD6 and Dorn Dürkheim. A small bison from TG and TD10/2 differs from *Bison schoetensacki*, shares characters with *Bison priscus*, and might be an early representative of that lineage in Western Europe. Fossil dentition and articulated limb bones of *Praeovibos cf. priscus* from TD7/3 are probably the oldest West European record of that species. Remains of other species from the Atapuerca sequence do not represent the oldest record of a species, but are close in age to the oldest record and occasionally include well preserved remains that might help establish the origins of these immigrants in Western Europe.

Figure 2 gives the dispersals of large mammals into Western Europe. The species are arranged after their tentative origin. Ideally the origin is established by the description of older material from well dated localities in other parts of Eurasia within the biogeographic context (e.g. [2]). This remains to be done for most of the species. Figure 2 does not reflect all towards western Eurasia, since some of the species dispersed from Asia to Eastern or Central Europe and did not reach Western Europe, or reached it during a later glacial

	Macaca	Dama "nestii" vallonetensis	Equus affidens	Stephanorhinus etruscus	Cervidae indet.	Homo antecessor	Mammuthus sp.	Bison cf. voigtstedtensis	Sus scrofa	Hippopotamus	Cervus elaphus cf. acronotus	Eucladoceros giulii	Praeovibos cf. priscus	Megaloceros solihacus ssp.	Bison sp. (small)	Equus ferus	Cervus elaphus priscus	Dama dama clactoniana	Homo heidelbergensis	Stephanorhinus cf. hemitoechus	Hemitragus bonali	Equus cf. hydruntinus	Capreolus priscus	Bison schoetensacki	Megaloceros giganteus
TE19a-e																	ssp	ssp							?
TE19f-g																?									cf
TD10/1																									
TD10/2																									
TD10/3																									
TG11 (GIIIb)																									
TG11 (GIIIa)																									
TZ																									
TN8 (GIIIa)																									
TG10A+TN7(GIIIa)																									
TN6da (GIIIb)																									
TG10B+TN6 (GIIIb)																									
TG10C (GIIIb)																									
TG10D (GIIIb)																									
TG10cc (GIIIb)																									cf
TN5 (GIIIb)																									cf
TG9 (GIIIa)																									
TN3/4 (GIIIa)																									
TG8 (GIIIa)																									
TP			cf	cf								?													
TD8																									
TD7/1			cf																						
TD7/2			cf																						
TD7/3																									
TD6/1			cf																						
TD6/2							cf																		
TD6/3-6																									
TD3-5			cf						cf																
TDW3-4																									
TE14			cf	cf					sp																
TE13			cf																						
TE12									sp																
TE11																									
TE10																									
TE9			cf				cf	cf	sp	sp															
TE8																									
TE7			cf	cf																					

图1 阿塔坡卡地区的有蹄类和灵长类。阿塔坡卡地区的不同遗址和沉积层按照左边的大致的地层和时间顺序从下(老)至上(新)排列。埃勒芬特裂谷遗址(TE); 格兰多林遗址(TD); 佩纳尔遗址(TP); 画廊大型遗址群(TG), 科瓦查爪子遗址(TZ), 津查拉北部遗址(TN)。Fig.1. The ungulates and primates from Atapuerca. The different localities and sedimentary units and subunits at Atapuerca on the left in very approximate stratigraphic and chronologic order from lower/older at the bottom to upper/later at the top. Sima del Elefante = TE; Gran Dolina = TD; Penal = TP; complex of Galería = TG, la Covacha de los Zarpazos = TZ, and Trinchera Norte = TN.

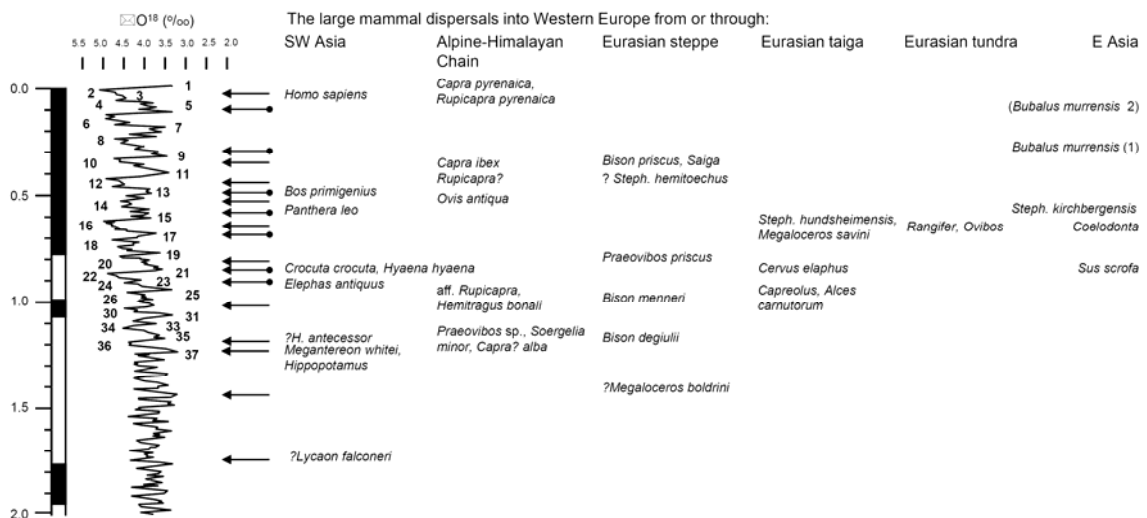


图2 大型哺乳类向西欧的扩散(德国和意大利东边界的西部地区)。本图基于文章[3]中的图3所绘, 但根据不同的假定地点和环境增加了其出处。Fig.2. Dispersals of large mammals into western Europe (west of the eastern borders of Germany and Italy). Based on Figure 3 of ref. [3], but with the provenance indicated according to different tentative areas or environments.

cycle. For instance, *Eucladoceros* aff. *boulei* was described from Greece and seems to point to a relationship with China [4].

Faunal dispersal is often studied in relation to human dispersal. There are two possible ways how faunal and human dispersal could be related: 1) faunal dispersal increases the possibilities for human dispersal; 2) both faunal and human dispersal are allowed for by the same or contemporaneous climatic or environmental changes. Even if faunal and human dispersal are related, they need not occur in the same area. They might occur in opposite directions, or altogether in different places (e.g. climatic amelioration allowing for northward dispersal in Eastern and in Western Eurasia). Different scenarios of human and faunal dispersal will be discussed.

图1显示了铁路壕沟线路上包含有蹄类化石的遗址位置(其中去除了胡瑟裂谷, 因为该地点并没有发现有蹄类化石); 从晚更新世到全新世时期的洞穴遗址; 以及仅出土石器的旷野类型遗址。埃勒芬特裂谷遗址的沉积物层包含一个古老的连续化石层序列(TE7-14)和一个较新的化石层序列(TE18-1), 但这两者之间的化石层却不存在。与之类似的是, 格兰多林遗址也包含一个老的(TD3-8)和新的(TD10)化石连续层。佩纳尔遗址位于津查拉的对面, 但却仅包含少量的大型哺乳动物化石。画廊大型遗址群包含三个具有交叉忽视沉积层的地区: 科瓦查瓜子 (TZ), 画廊 (TG8-11) 以及 津查拉北部 (TN3-8)。遗址的地点和层位按照Rodríguez的总结大致从老到新排列(顺序由下至上)[1]。

图1中显示的阿塔坡卡遗址序列中包含了西欧地区最早的有蹄类物种化石证据。马鹿 (*Cervus elaphus*) 是首次在阿塔坡卡 TDW3-4遗址和德国帝柯海姆隆起遗址中松山-布容地磁极性倒转层之下发现的。同样, 最早的猪化石证据也出现在阿塔坡卡TD6和帝柯海姆隆起遗址中。野牛化石也出现在该遗址中。但与欧洲野牛(*Bison schoetensacki*)不同, 画廊大型遗址群(TG)和格兰多林

(TD)10/2遗址中出土的野牛化石与西伯利亚野牛(*Bison riscus*)具有相似的性质, 可能是代表了野牛在西欧地区的早期类型。出现在格兰多林(TD)7/3遗址的原麝牛(*Praeovibos* cf. *priscus*)的牙齿和肢骨关节化石也可能是这个物种在西欧最古老的记录。阿塔坡卡遗址序列中其它物种的化石遗存可能并不是其最古老的记录, 但在年代上却与最老的记录相近并且偶尔还包含了保存完好的能够帮助确立西欧这些移民物种根源的化石遗存。

图2显示了大型哺乳动物进入西欧地区的扩散。这些物种按照其大概来源排列。在最理想情况下, 在生物地理大背景下, 由欧亚大陆其他地区已经较好定年的遗址中更古老的材料描述来确定物种来源[2]。然而, 对于很多物种这种工作还没有完成。由于一些物种从亚洲扩散到了东欧或中欧而没到达西欧, 或者在更晚冰期周期中才到达西欧, 图二并没有反映出向西欧所有扩散过程。例如布氏真枝角鹿(*Eucladoceros* aff. *boulei*)被认为来自于希腊并似乎与中国有一定的联系[4]。

动物区系分布研究经常与人类的扩散有关。有两个原因使动物区系和人类扩散可能关联起来1)动物区系扩散增加了人类群体扩散的可能性; 2)动物区系和人类的扩散都受限于同一个或者一段时期的气候或环境变化。他们可能扩散的方向可能完全相反或者在不同的地方同时进行(例如气候的改善可能同时使欧亚大陆东部和西部群体的北向扩散得以进行)。我将会对人类和动物不同的扩散过程进行讨论。(覃振东 译)

References

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