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Paleobiogeography of early human dispersal in western Eurasia: Preliminary results

Paléogéographie de la dispersion initiale de l'Homme dans l'Ouest de l'Eurasie : résultats préliminaires

Roman Croitor

Aix-Marseille University, CNRS, UMR 7269, Maison méditerranéenne des sciences de l'homme, BP674, 5, rue du Château-de-l'Horloge, 13094 Aix-en-Provence, France

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ABSTRACT

A multivariate cluster analysis of western Eurasian regional herbivorous mammalian faunas is applied in order to reveal the paleobiogeographic context of early human dispersal in the area under study. During the early Pleistocene, the North Mediterranean area and Caucasian Land acted as refugia for warm-loving Pliocene faunal holdovers. The Italian Peninsula was biogeographically partially isolated during most of the early Pleistocene due to the forested Dinaric Alps zoogeographic filter, which possibly caused the late arrival of hominines on the Italian Peninsula. A multivariate analysis confirms a firm paleobiogeographic border between the Iberian Peninsula and northwestern Africa. The Pannonian–western European path is proposed here as the most plausible dispersal route for early hominines. The article gives a brief discussion of paleobiogeographic significance of the Alpine-Himalayan Mountain Belt and the Movius Line in western Eurasia.

Mots clés :
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RÉSUMÉ

L'analyse multivariée des faunes régionales de mammifères herbivores d'Eurasie occidentale est appliquée pour révéler le contexte paléobiogéographique de la dispersion initiale de l'Homme dans la zone étudiée. Au début du Pléistocène, la zone nord-méditerranéenne et le Caucase agissaient comme des refuges pour les animaux du Pliocène de climat chaud. La péninsule Italienne a été biogéographiquement partiellement isolée pendant la majeure partie du Pléistocène inférieur, à cause du filtre zoogéographique créé par les Alpes dinariques forestières, ce qui a peut-être été la cause de l'arrivée tardive d'hominidés dans celle-ci. L'analyse multivariée a confirmé une frontière paléobiogéographique ferme entre la péninsule Ibérique et le Nord-Ouest africain. L'itinéraire Pannonien – Europe de l'Ouest est ici proposé comme la voie de dispersion la plus plausible pour les premiers hominidés. L'article propose une brève discussion sur la signification paléobiogéographique de la ceinture alpine et de la ligne de Movius en Eurasie occidentale.

E-mail address: romancroitor@europe.com

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1. Introduction

The paleobiogeographic and ecological contexts of the "Out of Africa" early human dispersals into western Eurasia have been intensively discussed; nevertheless, the driving and limiting factors of hominin dispersal are still poorly understood (Moncel, 2010). The initial human dispersal from Africa is often regarded in the context of archaic *Homo* ecologically belonging to the carnivore guild (as a scavenger) and of the assumed commensalism relationship of *Homo* with early Pleistocene large predators, such as the sabertoothed large cats *Megantereon* and *Homotherium* (Arribas and Palmquist, 1999; Blumenschine, 1987; Martinez-Navarro and Palmqvist, 1995). This hypothesis seems to be in accordance with the general zoogeographic context: with a few exceptions, the majority of mammals that dispersed from Africa to Eurasia during the last 2.6 million years were carnivores (Van der Made, 2013). However, the geographic origin of some Villafranchian carnivores is not clear, since their earliest remains are recorded almost simultaneously in the paleontological record of different continents (Bonifay, 1996; Turner, 1990), suggesting rather high ecological polyvalence and ubiquitous distribution including entire continents. Unlike true carnivores, the geographic distribution of hominines during the early Pleistocene was rather limited, suggesting the ecological sensitivity of archaic *Homo* and the existence of certain environmental factors that limited the hominine dispersal. Therefore, the assumed ecological relationship between hominines and large carnivores remains biogeographically elusive. Bar-Yosef and Belmaker (2011) did not find a clear correlation between early hominine and large mammal dispersals from Africa into Eurasia. Similar conclusions are made at a regional paleobiogeographic scale. According to Mussi and Palombo (2001), there is no relationship between hominid dispersal and the dynamics of the carnivore guild in the Italian peninsula.

The paleontological record of western Eurasia is a very promising source of information on environmental and paleobiogeographic limiting factors that controlled the early dispersals of hominines. The dispersal of *Homo* into Europe took place significantly later than in southern and southeastern Asia: the earliest recorded fossil remains of humans in Europe are unearthed from Sima Del Elefante (Spain) dated back to 1.1-1.2 Ma (Carbonell et al., 2008). Archaeological evidence suggests a somewhat earlier dispersal of *Homo* into Europe at ca. 1.4 Ma (de Lumley et al., 2009), while the well-documented paleontological and archaeological evidence reveals a still earlier presence of *Homo* in the Transcaucasian region, dated back to ca. 1.8 Ma (de Lumley et al., 2002). Regional paleobiogeographic evolution may provide some answers on the limiting factors and biogeographic context of early hominine dispersals. Obviously, ubiquitous carnivores are poor biogeographic indicators, unlike herbivorous mammals (Bonifay, 1996), which are proposed as a paleobiogeographic proxy in the present study.

The present paper proposes a multivariate analysis of early Pleistocene faunas from various geographically well-defined areas of western Eurasia compared with coeval faunas from northwestern Africa and eastern Africa in order to reveal the paleobiogeographic context of early human dispersals. The obtained results have a rather preliminary character, since some areas of western Eurasia (such as Near East and newly discovered Anatolian hominin sites) are not considered in the present study. Besides that, taxonomy, synonymy and phylogenetic relationships of some herbivore species still need precision and need to be clarified.

2. Research methods

The research method is based on the multivariate cluster analysis of the West Eurasian regional faunal lists. The applied method is in accordance with the approach used by Palombo et al. (2006) in order to obtain compatible results: the hierarchical clustering paired group algorithm UPGMA was computed using Jaccard Similarity Index for presence-absence data (PAST-3 application: Hammer et al., 2001). The cophenetic correlation coefficient is computed in order to estimate how faithfully a dendrogram preserves the pairwise distances among the original, unmodeled data points (Farris, 1969).

The chosen chronological frame of the paleobiogeographic analysis corresponds to the important middle–late Villafranchian faunal turnovers (Azzaroli, 1983). The database is mostly based on well-dated, species-rich faunal assemblages; however, in some cases sites with poor geochronological control are included (for instance, Salcia, Moldova) in order to estimate the paleobiogeographic affinity of disputable faunas. The analysis is restricted to hoofed mammals and primates, as these are considered ecologically and biogeographically more sensitive than the ecologically polyvalent and biogeographically ubiquitous carnivores. Moreover, carnivore remains are relatively rare in the paleontological record, increasing the risk of data bias.

Western Eurasia was divided into paleobiogeographic areas corresponding to the geographically delimited zones that yielded characteristic and taxonomically rich herbivores faunas (Fig. 1). Coeval faunas of Tajikistan ("Central Asia") and of Northwest and Northeast Africa are included in the study in order to estimate the importance of Asian or African biogeographic components in the paleobiogeographic areas of European Subcontinent. The analysed faunal lists are built using conservative taxonomic criteria: only species and groups of closely related species are considered (subspecies and local mammal forms are not taken into account). A group of species or morphological forms are regarded as a single faunal element if they are proved to have a direct phylogenetic relationship or if they are distinguished only by body size or minor morphological variants of exosomatic structures (horn-cores, antlers, ossicones).

3. Description

3.1. "Saint-Vallier Age" (ca. 2.5 Ma)

This stage of paleobiogeographic evolution is named after the important and well-dated middle Villafranchian reference site of Saint-Vallier, France (Guérin et al., 2004).

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