

Out of Africa Human expansions: When, Why, Which Way*

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ABSTRACT: There is evidence of two early human expansions “out-of-Africa” around 1.8 MaBP, one more c.1.3 Ma, and a later one between 0.7 and 0.6 Ma. Factors influencing those migrations are discussed: morpho-functional diversification of ancient human populations was a substantial condition, but the selective pressure of environmental crises, mostly increasing aridity was decisive. Facilities and intercontinental bridges were obtained with lowering sea level in most cases. In this respect, precise passages for the distinct migrations are questioned. The Suez-Near Est is assessed in the three Early Pleistocene cases and cannot be excluded in the early Mid Pleistocene one, and hypotheses of Gibraltar Straight and of Tunisia-Pantellaria-Sicily also are presented.

Key-words: *Eurasia occupation, Land-bridge, Mediterranean crossing, Paleogeography.*

ΠΕΡΙΛΗΨΗ: Υπάρχουν ενδείξεις για δύο πρώιμες μεταναστεύσεις του ανθρώπου «εκτός Αφρικής» πριν από 1,8 εκ. χρόνια περίπου, για μία πριν από 1,3 εκ. χρόνια περίπου, και για μία μεταγενέστερη που συνέβη μεταξύ 0,7 και 0,6 εκ. χρόνια πριν από σήμερα. Συζητούνται οι παράγοντες που επηρέασαν αυτές τις μεταναστεύσεις: η μορφολογική και λειτουργική διαφοροποίηση των αρχαϊκών πληθυσμών επέδρασε ουσιαστικά, αλλά η επιλεκτική πίεση περιβαλλοντικών κρίσεων και ιδιαίτερα η αυξανόμενη ξηρότητα του κλίματος διαδραμάτισε αποφασιστικό ρόλο. Εξετάζονται οι συγκεκριμένες μεταναστευτικές οδοί που ακολουθήθηκαν σε κάθε περίπτωση. Στις τρεις περιπτώσεις μεταναστεύσεων που έλαβαν χώρα στο Κάτω Πλειστόκαινο πιθανή θεωρείται η μεταναστευτική οδός Σουέζ-Εγγύς Ανατολή. Η ίδια μεταναστευτική οδός δεν αποκλείεται και για τη μετανάστευση του ανθρώπου κατά το Μέσο Πλειστόκαινο. Παρουσιάζονται επίσης και οι υποθέσεις των μετακινήσεων μέσω των Στενών του Γιβραλτάρ και δια της Τυνησίας-Παντελαρίας-Σικελίας.

Λέξεις-κλειδιά: *Κατοίκηση της Ευρασίας, χερσαία γέφυρα, διάπλους Μεσογείου, Παλαιογεωγραφία.*

INTRODUCTION

A crucial question concerning human palaeoecology and evolution, together with palaeogeography, palaeoclimate and faunal change in the circum-mediterranean region in Late Cenozoic is here proposed to revision.

This multiple question includes not just the date of the earliest human occupation of Eurasia. Evidences of a number of population movements from Africa and expanding Eastwards and Northwards, to Mediterranean are examined. Their correlations are checked to environmental crises, in quest of explanations as survival pressures, and of intercontinental bridges as ways out of the original African habitats, to new continents and higher latitudes.

WHEN

Ancient records of human presence in Eurasia are human fossils, artefacts and taphonomical traces of human activity. Their chronometric dates and environmental conditions contemporary, preceding and following must be carefully established in their context. All these records –bioanthropo-

logical, archaeological and ecological– are tested with similar contemporary ones in Africa.

Human fossils in Eurasia are rare in Early Pleistocene: The Dmanisi sample is dated more than 1.7 Ma (GABUNIA *et al.*, 2000), that is close to the base of the Pleistocene (AGUIRRE & PASINI, 1985) with related artefacts Mode 1-2 (that is to say evolved Mode 1 or early Mode 2, a nominal question, see below). The Ubeidiyah fossils are confidently dated c.1.3 Ma (see BAR-YOSEF, 1994), not far from the age of the uncertain Orce cranial fragment (OMS *et al.*, 2000) and that of the faunal complex to which the Cueva Victoria human phallanx is assigned, found in a derived position (AGUSTE, 2003). Many human fossils found in Java in high Pucangan Formation to lower Kabu Fn, are reliably dated over a time span between 1.2 and 0.8 Ma (HYODO *et al.*, 1993; SEMAH, 1997). The fossils from Qu Yuan, Yuanmou and Gongwangling in China have dates between nearly 1 Ma and no much less than 0.8 Ma (WU & POIRIER, 1995; ZHU *et al.*, 2001). Late in this same interval are dated the skull from Ceprano, Italy (ASCENZI *et al.*, 1996; MANZI *et al.*, 2001) and the large collection of Atapuerca TD6 (Gran Dolina) (PARÉS & PÉREZ GONZÁLEZ, 1995).

* Οι μεταναστεύσεις του Ανθρώπου εκτός Αφρικής: πότε, γιατί, με ποιον τρόπο.

Archaeological record with an age similar to that of Dmanisi is reported from South-Asia in Riwat (DENNELL, 1998); also Longgupo, and with dates of 1.36 Ma and c.1 Ma respectively at sites Xiaochangliang and Donggutuo, in China (SHICK & TOTH, 2000; HOU, 2004). In Spain, the assemblages of Barranco Le¹/₂n 5 and Fuente Nueva 3 are indirectly dated as older than the Jaramillo (AGUIRRE *et al.*, 2004), as are lower beds of Sima del Elefante, Atapuerca (ROSAS *et al.*, 2004), Monte Poggiolo in Italy (PERETTO, 1987).

In higher latitudes, the sites of Kärlich, Korolevo VII-VIII, and Kuldara Tadjikistan, also contain artefact assemblages of ages between 1 and 0.8 Ma (RANOV *et al.*, 1995).

Human fossil sites of early Middle Pleistocene (between 780 Ka and 500 Ka) are scarce globally. May we mention: OH12, OH28 in Olduvai Mb.IV; Kapthurin, Ternifine, Bodo (600 KaBP) in Africa; Chenjawa (c 600 Ka) and Zhukudian 11 (c 550 Ka) in China; G. Benot Yaiakov (c 700 Ka) in the Near East. Archaeological occupation sites also occur: may we mention La Pineta, Italy, with four successive floors within that time span (PERETTO *et al.* 2004).

Continued occupation in the Far East is recorded with human fossils in successive deposits of the main Zhukudian locality, ZKD 10-8, between 500-400 KaBP, with Hexian site added. In the same span, a number of sites in Europe attest a demographic expansion with similar trends of dentition and maxillar reduction, and brain volume increasing, in a number of sites: Mauer, Boxgrove, Fontana Ranuccio, Visogliano, Cava Pompei, Tautavel, Bilzingsleben, Vertes-zöllös. But differences are in lesser bone tissue thinning, brain case shape, prognathism and frontal position of the whole dental arch, resembling the features of the Bodo skull, and African mandibles of the preceding time (AGUIRRE & LUMLEY, 1977; RIGTHMIRE, 1996; AGUIRRE, 2000). Those European samples are classified as "*H. heidelbergensis*", and suggest a phyletic relationship with an African population, not with known earlier Eurasian demes. Many sites occur with archaeological evidences.

The ground is firm therefore to distinguishing two initial out-of-Africa's in Early Pleistocene, or, more likely, in Latest Pliocene.

One of those is represented by the Dmanisi population, dated ca. 1.8 MaBP (GABUNIA *et al.*, 2000), which is close to the event. Another was that of the ancestors of Javanese "pithecanthropines" or "*Homo erectus*", the oldest, dated most probably less than 1.2 Ma, upper Pucangam Fn (HYODO *et al.* 1993). Nevertheless, this branch left Africa earlier than the Dmanisi group. Evidence in favour of this assessment is the absence in *H. erectus* of Java of apomorphic traits that are typical of later *H. sapiens*, already present in Dmanisi and in African *H. ergaster*, and presence in the Javanese sample of traits shared in common with australopithecines, that are not seen in Dmanisi (AGUIRRE 2001; AGUIRRE & CARBONELL, 2001), such as multiple roots in first lower premolar (P₃). Size reduction in molars is one of the "modern" traits present in Dmanisi, as in several *H. er-*

gaster fossils, and absent in Java. On the other hand, time and a number of generations was needed for a population –or "deme"– to extend from lands west of the Indic Ocean to the Malaysian Peninsula, across the lands of South Asia, or their shores at that time. Research is starting in India, with initial success in the archaeological site of Riwat, about that age; but difficulties for excavating in most countries of South Asia are extreme.

A third exit is known to occur, with finds of human fossils, Mode 2 heavy duty tools and faunal remains, in Tell Ubeidiya, Israel, aged c1.3 Ma (BAR-YOSEF & GOREN-INBAR, eds., 1993), that is half a million years later than Dmanisi. Almost contemporary are the sites Fuente Nueva 3 and Barranco Le¹/₂n 5, with stone tools in Spain (OMS *et al.*, 2000).

A number of archaeological sites testify the successful expansion of human populations in Eurasia, still in Early Pleistocene, less than 1 MaBP, some with fossil humans: Qu Yuan, Gongwangling, Yuanmou in China; many in Java; Ceprano, Atapuerca TD6, in Europe, plus the higher latitude archaeological sites mentioned above. More to the North extension in Siberia occurs less than 600 Ka BP (LAUKHIN, 2004).

WHY

Search of factors influencing the early migrations out of Africa of ancient human populations is doubtless an exciting but also an unavoidable task. Some authors give consideration to only one or another factor, others admit more than one, with preferences (HUGUET, 2004).

Behaviour and evolution are not question of an isolated system, but of interactions between systems of various orders, with a panel of solutions before quizzing situations.

Abandonment of a land occupied by hundreds and thousands of generations, moreover of a continent, is but a solution for surviving face to mortal dangers or catastrophic events, with only two alternatives: to evolve, or perish. Or, adventuring into new biogeographical niches, or higher latitude as a result of morphological and cultural advancements (HUBLIN, 2004). Or, discriminating exclusion in case of over population (CARBONELL & VAN DER MADE, 1999).

That was the quiz to be reconstructed for the cases we are instructing: either it was an exigence, biological or social, of human evolving populations, or a forcing of hard climatic and/or environmental events. More likely, all these interacted. May we try to reconstruct the hypothetic scenarios, that deserve further research. It will be not enough recognizing that the factors forcing the exodus are plural. We shall try to establish, when possible, the chronologic succession of facts and changes allowing to identify which one excites or influences on the other.

A suggestion is that, when the result is a simple, total extinction, the external agent, or agents causing it, do not meet a potential diversity of responses among which a way out could be found. When one, or more populations of a living

species do survive a natural catastrophic event, an amount of latent possibilities must be recognized among which, one or more succeed. Therefore:

In the case of the two oldest out-of-Africa events, there was a variability in early human populations, maybe of *Homo habilis*, of genetic order, as those remembered by HUBLIN (o.c.). Second, environmental crises pressed on those populations. The aridity increasing near 1.7 Ma mentioned by DEMENOCAL (2004) may have been sufficient for a constraining and selective factor affecting those populations, and forcing either a change of location or a change in diet and food procurement. The aridity trend was repeated in Africa c. 1.9 Ma and between 1.8-1.7 Ma BP.

Resulting changes in mammal faunas are recorded in Africa and in regions of other continents c.1.8 Ma and c.1.7 Ma and in between (various aa., in VRBA *et al.*, eds., 1996; LEE-THORP & CLIFT, eds., 1999). After a thermal increase around 1.9 Ma -OIS episodes 73-69-, the maxima decrease from OIS 67 to OIS 61 -c.1.7 Ma-.

On the other hand, the dates for the earliest human fossils classified as *H. ergaster* (or African *H. erectus*) are more than 1.7 Ma for KNM-ER 3733 and more than 1.8 Ma KNM-ER 1811 (MCDUGALL, 1985; WOOD, 1991). And the earliest assemblages of stone artefacts classified as “evolved Mode 1”, that is with multiple extraction techniques, option between direct or secondary configuration, carrying tools far from the quarry and reworking, tools diversity, was identified as “evolved Olduvian” by MARY LEAKEY (1971) and dated c.1.7 Ma. Posterior dates point to near 1.8 Ma.

TRACING THE ROUTES

Alternative ways connecting Africa to Europe are the Levant corridor and other proximities of Moroccan region to the Iberian Peninsula at the extreme West, and also between Tunisia and Sicily across the Pantellaria Island, near the center.

Human presence in Indonesia in Early Pleistocene, excluding the model of double origin or double mankind, Asiatic and African, was reinforced with the Dmanisi discovery of basal Pleistocene humans, to ensure at least one, likely two very early exits out-of-Africa through the Sinai Peninsula and Levant or Near/Middle East-lands. The same way is obvious for the early occupations attested by the Ubeidiya and other sites in the Levant corridor, as well as for Later expansions to Central and Western Europe in Middle, and in Late Pleistocene (AGUIRRE & CARBONELL, 2001; AGUIRRE, 2004).

Strong streams make difficult travelling across the Gibraltar Strait, although the mountains and lands of one side are wonderfully conspicuous from the other. One would say tempting, more than attractive, if the mind of our ancestors could be psychanalized to that point. Distance between Ceuta and Tarifa is presently short, 15 Km. Somewhat shorter, 10 Km was in very cold phases with sea level down up to -200 m. The expressed difficulty of

streams and waves makes impossible any attempt of crossing with only floating bodies, without powerful propulsive implements.

The presence in Early Pleistocene Spanish sites of mammal species known in Africa is not conclusive since these are also known in sites of Greece, the Caucasus regions and/or in localities of Southern Asia (see MARTENEZ-NAVARRO *et al.*, 1997; OMS *et al.*, 2000).

Prejudice discarding archaeological evidences of human occupation in north-west Africa, Marocco, prior than 1 Ma is grounded on the gratuitous exclusion (RAYNAL *et al.*, 2001) of older, well dated and well excavated sites (BIBERSON, 1976), even so with derived artefacts, not in the original occupation floor. Human presence at 1.9-1.7 Ma, is confirmed in Aïn-Hanech, Algeria (SAHNOUNI *et al.* 2002). In early Middle Pleistocene, crossing the Gibraltar straight was easier, at a time with extreme cold —the OIS episode 16— and low sea level, to then more developed people.

A suggestion in favor of this way at that time can be the number of sites in Spain —not so in Central Europe— with typical assemblages including trihedral picks and cleavers associated to amigdaloid bifaces. Such assemblages are known in Northern Africa, Ternifine and in Marocco in lower Middle Pleistocene, but not in East Africa after Kesen Kebena, 1 Ma BP (AGUIRRE, 2001), nor in the Levant sites with Mode 2. It must be added that, this inference is not conclusive, taking into account the possibility of independent invention and the multiple resource and adaptive choice capability of lithic industry at that time.

Similarities between pre-neandertalians of Atapuerca SH, Petralona, Arago widely extended on Europe about 500 Ka ago, on one side, and, on the other, Bodo skull and other African fossils (RIGHTMIRE, 1996) are compatible with those alternative routes between the two continents. The Levant way is not excluded at this or a near time.

The passage between Tunisia and Sicily has also been suggested, with feeble support (VILLA, 2001; HUGUET, 2004). The present distance is about 170 Km, with the Pantellaria I. near the middle, a little more than between Melilla and Adra (155 Km) with the Alborán island. But around Pantellaria, with lowering sea-level less than -200 m, the distances are diminished up to 10+10 Km, nearly that of Gibraltar Strait under same conditions. There is a difference: in the Pantellaria trajectory the danger of strong streams was minimal.

Hypothesis is not excluded at that time of 700 to 600 Ka, of a multiple pass between Africa and Europe, across the Gibraltar Strait, across Pantellaria, and, of course, across the Near-East lands and straights, for different population groups. There is still much to look for and find fossiliferous and archaeological sites, and much to study over the eventual, predictable finds, before giving a reliable scenario on this matter. Hope this question will be proposed soon for an international Round Table.

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