



## Relations between the *H. heidelbergensis* from the Arago Cave in Tautavel and the *H. erectus* from Asia (Indonesia, China and India)

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**FIRST PARAGRAPH:** Thanks to the yearly excavation managed in the Arago Cave (South of France) for more than four decades, 127 human remains were discovered in a well studied context in terms of chrono-stratigraphy, cultures and paleo-environments.

## 陶塔沃的阿拉果洞海德堡人和亚洲(印度尼西亚、中国和印度)直立人的联系

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**首节:** 通过最近 40 多年以来每年对法国南部的阿拉果洞的发掘, 共发现了 127 具人类遗骸, 它们具有用年代地层学、文化以及古环境学进行详细研究的条件。

The best preserved human remains are: 1 skull with its face (Arago 21), 4 mandibles, 2 hip bones, post-cranial remains from the lower limb (femur, tibia, fibula), some from the upper limb (clavicle, humerus, radius, ulna), and more than 80 isolated teeth. From this material, twenty individuals of different age and sex were counted which represent above all children and young adults.

The Arago 21 specimen is the more complete and the best preserved fossils in Europe between 1,8 My and 0,4 My. It is an opportunity to have information about the first inhabitants which settled Europe, just after the *Homo georgicus* discovered in Dmanissi, in the Caucasus, dated by 1,8 My, which are very closed to the *H. habilis* – *rudolfensis*.

Because human remains are rare, Arago 21 with its preserved face is unique. It is attributed to the *Homo heidelbergensis* species (or an evolved *Homo erectus*) so that it questioned the scenario on the first settlements in Europe which were first attributed to Neanderthals. Considering the Arago stage is necessary to assess the different grades in human evolution and suggest a radiation step which biodiversity is well argued between 0,7 and 0,3 My and particularly in the level dated

by 0,45 My in the Arago cave which has yielded most of the fossil hominid remains.

It is difficult to highlight a continuity between *H. georgicus* and the Arago stage, in the one hand, and the Arago stage and the too fragmentary *H. antecessor* in the other hand. On the contrary, the fossil hominids from the Arago cave (i.e. *H. heidelbergensis*) belongs to the Asian *Homo erectus* range variation. A comparative study was done considering the oldest human remains from eastern Asia (China, Java) and, particularly, fossils with a preserved face which includes the Yunxian I et II specimens (dated by 0,936 My) and the Sangiran 17 skull (0,7-1 My). Results show common characteristics, variability and specific features among these fossils.

Moreover it have to be mentioned that features described as derived or evolved on these one million-year fossils (mastoid process developed, posterior orientation of the petro-tympanic, orthognatic face with a depressed maxillary orbital area and curved infra-malar region, on the Yunxian and Dmanissi fossils for example) suggest that the modern cranio-facial pattern was first developed in Asia. With fossil record increases, this trend will probably be confirmed.

If it is clear that the Neanderthal lineage in occidental Europe is rooted in the Arago Cave fossils, the origin of the latter is less evident. The Arago cave hominid came probably from a second wave of settlements from Africa to Eurasia dated by 0,8 My argued on the basis of the development of the Acheulean technology. The Arago fossils could be further evidence of this new population coming from Africa including probably a gene flow from Asia.

保存最好的人类遗骸包括：1 个带面部的颅骨(阿拉果 21)、4 个下颌骨、2 个髌骨、下肢的部分(股骨、胫骨和腓骨)、上肢的部分(锁骨、肱骨、桡骨、尺骨)，以及 80 多个零散的牙齿。这些材料共计 20 个不同年龄和性别的个体，尤其以儿童和青年为主。

阿拉果 21 号标本是欧洲 180 万到 40 万年前之间保存最完整和良好的化石。这是一个研究欧洲最早定居者的好机会，其时间正好在 180 万年前的非常接近能人(*Homo habilis*)和鲁道夫人(*H. rudolfensis*)的在高加索的德曼尼西(Dmanissi)发现的格鲁吉亚人(*H. georgicus*)之后。

因为人类遗骸十分稀少，阿拉果 21 是唯一一个保存有面部的。它被归于海德堡人(*H. heidelbergensis*)或者是比较进化的直立人)，因此这质疑了尼安德特人是在欧洲首先定居的人类的理论。考虑到阿拉果时期，有必要

估计人类演化的不同阶段，并估计辐射步骤，在 70 到 30 万年前的生物多样性，尤其是 45 万年前，即阿拉果洞产生了最多人科遗迹化石的年代。

我们很难确认格鲁吉亚人和阿拉果时期之间的连续性，也很难确定阿拉果时期和过于零碎的先驱人(*H. antecessor*)之间的关系。相反，阿拉果洞的人类化石(即海德堡人)在亚洲直立人的变异范围之内。一个研究比较了它和东亚(中国、爪哇)最早的人类化石的关系，尤其是郟县 I 号和 II 号标本(93.6 万年前)以及三吉岭 17 号的颅骨保存下的面部。结果显示这些化石具有共同的特征、变异，以及各自的特点。

此外需要强调的是，这些上百万年的化石中，被描述为衍生或者进化的特征(例如在郟县或德曼尼西化石中的乳突发育、石-鼓室后向、具有下沉的颞骨-眼窝区的颌位的面部以及弧形的颧骨内区)表明现代的头面部特征首先在亚洲发展出来。随着化石记录的增加，这个趋势可能会被证实。

现在已经清楚，欧洲西部的尼安德特人起源于阿拉果洞的化石，而后的源头还不清楚。阿拉果洞人可能来源于第二波从非洲到欧亚大陆的定居者，年代为 80 万年，通过阿舍利技术的发展推定。阿拉果的化石可能成为从非洲，也可能是从亚洲来的新一批人类基因流动的进一步证据。(严实 译)