

### **Guipert et al., "Virtual Restoration of the Fossil Arago 21-47 and Phyletic Position"**

A fragment of human skull (Arago 21) was discovered in 1971 in the Arago cave, Tautavel, France, in an archeostratigraphic layer dating from around 450,000 years ago. It corresponds mainly to a face that was fractured and distorted postmortem. A right parietal bone (Arago 47) and some small fragments of parietal and occipital bones were discovered afterwards. An previous reconstruction of the face and the biparietal vault was carried out in 1981 using mouldings. The missing bones, i.e., the temporal and occipital bones, were replaced by some casts of other hominid fossils. The authors have used three-dimensional virtual reconstruction techniques on the X-ray CT scans of this fossil: i) to propose a brand new virtual restoration of it; ii) to study the phyletic position of Arago 21-47 by mean of a three-dimensional morphometric analysis. The different fragments of the skull were isolated. Distortions were analysed and compensated. The parts that were missing, like the left parietal bone, or too distorted were obtained by mirroring. All fragments were articulated virtually to reshape the skull. The shape of this Arago 21-47 reconstruction is different from the previous, particularly the biparietal vault. A 3D modelisation was made using a group of landmarks that we called the "Inter-Point Segmentary Complexes." Thanks to a 3D analysis using Procuste and PCA methods, we have compared this reconstruction to Middle Pleistocene hominid fossils of Europe, Asia and Africa. The virtual reconstruction of the Arago 21-47 fossil and its 3D morphometric analysis give informations about the phyletic relations between the Middle Pleistocene hominids and the Neandertals in Europe.

### **Haile-Selassie et al., "The Mille-Chifra-Kasagita Triangle: A New Hominid-bearing Early Pliocene Site in the Central Afar Region of Ethiopia"**

The Afar Region of Ethiopia is known for its paleontological sites ranging in age from the Holocene to the late Miocene. Some of the sites in this region known for their hominid fossil yield include Hadar, Gona, Middle Awash, and Busidima-Dikika. However, there are still numerous exposures that have not been explored yet for their paleontological potential. The Woranso-Mille project has been conducting paleontological survey and exploration in previously unexplored areas of the Afar region of Ethiopia and has been able to locate new paleontological sites, particularly in the central part of the Afar Rift. The Mille-Chifra-Kasagita Triangle is located in the Zone 1 and Zone 4 administrative areas of the Afar Regional State. The Woranso-Mille Project concentrated its paleontological survey and exploration efforts in this area since 2004. Fourteen vertebrate paleontological localities of early Pliocene age have been designated and 1,000 vertebrate fossil specimens, representing 25 mammalian taxa, have been collected thus far. The fossil specimens include 24 hominid specimens composed of isolated teeth, partial jaws, postcranial elements, and a partial skeleton found in 2005. The faunal assemblage was biochronologically estimated to between 3.8 and 4 million years. Preliminary radiometric dates have now confirmed a minimum age of 3.8 million years for the hominids and the associated vertebrate taxa. Therefore, this new paleontological area has opened up new venues to acquire new data related to vertebrate evolution in general, and human origins and evolution in particular, by sampling a time frame previously known poorly in the African fossil record. Taxonomic affinity of the hominid remains from the Woranso-Mille area remains to be determined after a detailed study is conducted. However, given their age, and the number of body elements represented in the partial skeleton, new data is more likely to be generated to understand what early hominids from ca. 3.6 - 4 million years ago looked like in terms of their overall morphology, body proportions, stature, etc. Moreover, this new hominid collection, once fully curated and studied, is ideal to address questions related to early hominid diversity and test the proposed hypothesis of anagenetic evolution from *Australopithecus anamensis* to *Australopithecus afarensis*.

### **Hardy, "Not by Meat Alone: The Potential Role of Underground Storage Organs in Neandertal Diet"**

Neandertals are increasingly being viewed as top carnivores who derived the vast majority of their diet from meat. Much of the support for this hypothesis comes from stable isotope analysis of bone collagen, a technique which tracks the protein portion of the diet only. Diets high in lean meat largely fulfill micronutrient needs but can pose a problem at the macronutrient level. Lean meat can compose no more than 35% of the energy in the diet before a protein ceiling is reached. Diets that exceed this amount of protein can have detrimental physiological effects on the individual. Neandertals would have needed energy from alternative sources, particularly in late fall and winter when fat reserves in animals are depleted lean meat intake is proportionately high. Underground storage organs (USOs) of plants offer one such alternative energy source, concentrating carbohydrates and providing fiber which would be otherwise lacking in the Neandertal diet. USOs could also provide an important seasonal energy source since they are at their maximum energy storage in late fall/winter. Although Paleolithic sites are increasingly yielding plant remains, their presence is rare and they are often given only passing mention in Neandertal dietary reconstructions. The complexity and number of potential wild plant foods, however, defies easy discussion. A review of native European wild edible plants to determine the potential Neandertal plant menu demonstrates that high energy starchy USOs would have been potentially available throughout the Neandertal range, even during the coldest periods of the Middle Paleolithic. Important potential food species include *Typha latifolia* (cattail), *Polygonum bistorta* (mountain bistort), *Arctium lappa* (greater burdock), *Sagittaria*