Abstract

Ain Boucherit, Ain Hanech and El Kherba are archaeological and paleontological localities in the vicinity of El-Eulma (province of Sétif, Algeria). The first two are classic localities and their faunas have been described by Arambourg (1970, 1979). Their faunal lists are discussed and updated. For the first time a faunal list for the nearby locality El Kherba is presented. The revised list for Ain Boucherit contains 24 taxa, mainly large mammals. Eight taxa are reported that are new for the locality. The faunal association is indicative of dry or open landscapes, while Hippopotamus, Crocodylia indet., Mauremys leprosa, Teleostei indet., and Ostracoda indet., suggest the presence of an important permanent water body in the vicinity.

The revised faunal list for Ain Hanech contains 22 taxa. Most of the taxa are indicative of open or dry landscapes. Hippopotamus indicates the presence of a large permanent water body not too far away. The available biochronological data support the paleomagnetic interpretation that the locality is situated in sediments belonging to the Olduvai Event. The new faunal list for the locality of El Kherba contains 20 taxa. Eleven taxa are shared with Ain Hanech. Most of the species suggest an open or dry landscape, while Hippopotamus gorgops, Crocodylia indet., and Mauremys suggest the presence of a large permanent body of water in the vicinity.

Key words: Vertebrate fauna, Plio-Pleistocene, North Africa, Algeria, Ain Boucherit, Ain Hanech, El-Kherba.

Résumé

Giday WoldeGabriel, Jan van der Made, Mohamed Sahnouni

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Potamus indique la présence permanente d’eau dans l’entourage immédiat. Les données biochronologiques corroborent l’interprétation paléomagnétique que le site appartient à l’inversion normale d’Olduvai. La nouvelle liste d’El-Kherba contient 20 taxons, dont 11 sont présents à Ain Hanech. La majorité des espèces suggèrent un paysage ouvert et sec, alors qu’Hippopotamus gorgops, Crocodylia indet., et Mauremys suggèrent la présence d’importants points d’eau.


1.0. INTRODUCTION

The first Plio-Pleistocene vertebrate faunas were collected in late 19th century from the continental deposits of eastern Algeria. Thomas (1884) collected remains of a bovid from the locality of Ain Jourdel in the Constantine area, which he named Antilope tournoueri and which currently is believed to be related to the gnu. Later, Joleaud (1912) collected other faunal occurrences from chronologically similar stratigraphic deposits in the Plateau of Mansourah near Constantine as well. Concurrently, Pomel (1893-1897) collected relevant vertebrate fossils from the deposits along the road of Beni Fouda (formerly Sillègue), including proboscideans (Anancus and Elephas), equids (Equus and Hipparion), hippo, antelopes, and camels. Pomel (1897) named Equus numidicus based on these fossils and described the species in detail. He correlated the Beni Fouda deposits and its fauna biostratigraphically to the Plio-Pleistocene.

However, the richest fossil vertebrate assemblages were collected by Arambourg (1970, 1979) from 1931 to 1947 in the course of his paleontological investigations of continental deposits around Sétif area. Arambourg’s earlier investigations focused on Ain Boucherit, where he excavated a rich fossil fauna including Anancus, Elephas, Ceratotherium, hipparion, Hippopotamus, Kollpochoerus, Giraffa, Sivatherium, Bos, Gazella,
2.0. SITES BACKGROUND

Located on the edge of the eastern Algerian High Plateau, the sites Ain Boucherit, Ain Hanech, and El-Kherba yielded key faunas for the North African Plio-Pleistocene. Ain Boucherit is located on the west side of the Ain Boucherit intermittent stream and includes two fossiliferous levels in Units Q and R. What is known as the locality Ain Boucherit is an extensive fossiliferous level in Unit Q and was discovered in 19th century in the course of road work between El-Eulma (formerly Saint Arnaud) and Beni Fouda (formerly Silègue) cutting through fluvio-lacustrine deposits around the Ain Boucherit valley. Vertebrate fossil bones were collected including specimens of biostratigraphic interest, which were initially assigned to mastodon the Mamut borsoni, elephant Elephas planifrons, and the equids Stylohipparion lybicum and Equus stenonis, but which later were assigned to Anancus osiris, Elephas africanaus, Hipparion lybicum and Equus numidicus, respectively. Based on this faunal association, Pomel (1893-1897) assigned a Villafranchian age to Ain Boucherit. In the 1930s Arambourg (1970, 1979) collected further fossils including Proboscidea, equids, suid, girafid, hippo, bovids, and carnivores. He assigned the fossils to the Lower Villafranchian. Sahnouni et al. (2002) relocated the site, collected further fossil bones and placed it in the regional stratigraphy, and Sahnouni & Van der Made (2009) estimated its age, using the presence of Equus, of which the first appearance in Eastern Africa is dated to 2.32 Ma, on the presence of Anancus and Hipparion as well as on the evolutionary level of its alcelaphines. Ain Boucherit Unit Q is a fossil-bearing stratum that extends north-south along the hill overlooking the Ain Boucherit intermittent stream. The fossil remains were collected from three main points within the level. Ain Boucherit Unit
R is a new paleontological locality discovered recently in the course of stratigraphic work carried out near the stratigraphic reference profile at Ain Boucherit. It is located 500 meters south of Ain Boucherit Unit Q. Altimetrically, it is situated 6 meters above Ain Boucherit Unit Q and 7 meters below the Ain Hanech and El-Kherba deposits.

Both Ain Hanech and El-Kherba are situated on the east side of the Ain Boucherit stream. Discovered by Arambourg in 1949, Ain Hanech is located near a small local cemetery in a sedimentary outcrop cut by the deep ravine of the stream (Arambourg, 1970, 1979). The site yielded a Plio-Pleistocene fauna associated with polyhedrons and “facetted spheroids” categories of artifacts. Sahnouni et al. (1996, 2002, and 2004) launched systematic investigations at this major site. El-Kherba is a newly discovered Lower Pleistocene locality and is located 700 m south of Ain Hanech. Systematic excavations are carried out at Ain Hanech and El-Kherba nearly each year since 1993, yielding rich faunal assemblages associated with an Oldowan industry very similar to the one known from East African Oldowan sites, e.g. Gona, Olduvai Bed I/II (Tanzania), and Koobi Fora (Kenya). Made primarily of limestone and flint, the lithic assemblages incorporate a full range of Oldowan artifact categories such as unifacial and bifacial cores, polyhedrons, subspheroids, facetted spheroids, whole flakes, and casual retouched pieces.

3.0. THE FAUNAS

Fossils from Ain Boucherit were described as early as in the late nineteenth century and Arambourg published various papers dealing with the faunas from Ain Boucherit and Ain Hanech, but here we take his monographs from 1970 and 1979 as a starting point for discussing the faunal lists of these localities. We also checked the different chapters of Werdelin and Sanders (2010) for the latest opinions on the material from Ain Hanech and Ain Boucherit.

3.1. AIN BOUCHERIT FAUNAL LIST

The updated faunal list from Ain Boucherit comprises proboscideans, equids, rhinoceros, hippopotamus, suids, girrafids, carnivores, and a variety of bovid taxa.

3.1.1. Proboscideans

Arambourg (1970) assigned three molars and a premolar from Ain Boucherit to *Anancus osiris*. At present this species is recognized in North Africa, while a number of species is recognized in other parts of Africa (Sanders et al., 2010). At the first sight so much specific variety surprises if one considers that all the European *Anancus*, ranging from the Late Miocene till Early Pleistocene in age, are all placed in a single species: *Anancus arvernensis*.

Two molar fragments and a fragmentary metacarpal from Ain Boucherit were assigned to *Elephas africanavus* by Arambourg (1970), who in a footnote admitted that the material shows affinities to *Archidiskodon*. Following modern taxonomy, the species is placed in *Mammuthus* (= *Archidiskodon*) and the material from Ain Boucherit is listed under that species (Sanders, 2010). However, Geraads and Metz-Muller (1999) believe that the material from Ain Boucherit is too poor for a reliable determination.

3.1.2. Perissodactyls

3.1.2.1. Rhinoceros

Arambourg (1970) described a third upper molar from Ain Boucherit as *Ceratotherium simum mauritanicum*. In addition, he described and figured a basi-occipital as *Libytherium mauritanum* (Arambourg, 1979), but of which Geraads (1985) was of the opinion that it be-
longs to a rhinoceros. Previously, the early Ceratotherium praecox and later C. simum germano-africanum were recognized as the fossil forms in East Africa (e.g. Harris, 1983), while the North African Middle Pleistocene material was assigned to Ceratotherium simum (e.g. Ge-raads, 2002). In a new interpretation, Geraads (2010) recognized Diceros praecox as belonging to a different genus, and applied the name Ceratotherium mauritanicum (with type locality Ti-ghenif) to the early and later rhinos in North Africa (up to late Middle Pleistocene), while the species was supposed to have given rise to C. simum in East Africa by about 1.8 Ma.

3.1.2. Equids

Arambourg (1970, 1979) assigned material from Ain Boucherit to Stylolhipparion lybicum. Bernor et al. (2010) included the name Stylolhipparion in Eurygnathohippus, treated the species as “Hipparion” lybicum, and stated that it needs revision, but did not mention the material from Ain Boucherit. Sahnouni and Van der Made (2009), and Sahnouni et al. (2011) used the name Hipparion lybicum following the traditional concept of a large genus. The new collections contain two more upper cheek teeth. Still another upper molar was found, when sampling for paleomagnetism. It was found on the surface at an altitude of about 930 m, which is far below the classic Ain Boucherit fossil level, but the slope is steep and it may have come from a considerably higher level.

Equus numidicus Pomel, 1897 is based on a tooth from Ain Boucherit. Arambourg (1979) placed it in the subgenus Dolichohippus, of which E. grevyi is the type species. This implies affinities with the living grevy zebra. Bernor et al. (2010) retained the species in that subgenus.

3.1.3. Artiodactyls

3.1.3.1. Hippopotamus

Arambourg (1979, table p. 131) listed Hippopotamus (Hexaprotodon) hipponensis with a question mark from Ain Boucherit, while from the text (page 7) it appears that the species is based on hexaprotodont material. Pomel (1896) assigned a tetraprotodont specimen to this species. Arambourg (1979, p. 8) assigned further material from Ain Boucherit to Hippopotamus (Tetraprotodon) amphibius and noted that the mandible described by Pomel might come from Ain Boucherit and might belong to the same species. We assume the presence of a single species of hippo. Arambourg indicated that in Ain Boucherit and Lac Ichkeul there were but some limb bones and canine fragments. However, the collection of the former locality includes also an upper molar, which is about the size of the second upper molar of the holotype of Hippopotamus gorgops. The living species Hippopotamus amphibius is reported from strata as old as about 2.3, while H. gorgops is recognized from about 2.5 till 0.6 Ma and differs from the living species in its larger size, greater hypsodonty, more pronounced diastemas between the premolars, and skull characters such as a more elevated orbit and occiput (Weston & Boissière, 2010). The large size of the molar from Ain Boucherit, would suggest the presence of H. gorgops.

3.1.3.2. Suid

A mandible fragment from Ain Boucherit was described and assigned to Omochoerus phacochoeroides (Arambourg, 1979). Geraads (1993) believed it belongs probably to a descendant of Kolpochoerus phacochoeroides. In contrast, Geraads (2004) was of the opinion that it belonged to the “Metridiochoerus-Phacochoerus group”.

3.1.3.3. Giraffids

Based on a basi-occipital and two scapulas, Arambourg (1979) inferred the presence of Libytherium maurosiium at Ain Boucherit. Today this species is placed in Sivatherium. Geraads (1985) stated that the cranial fragment belongs to a rhinoceros. Harris et al.
Giday WoldeGabriel, Jan van der Made, Mohamed Sahnouni (2010) believed the scapulas are too elongate for *Sivatherium* and suggested that they might belong to *Giraffa pomeli*. This would eliminate *Sivatherium maurusium* from the faunal list of Ain Boucherit. However, more recent findings at Ain Boucherit of an upper fourth premolar and a fragment of an upper molar from the same level (at the south side of the cliff) confirm the presence of this species.

Arambourg (1979) did not describe “*Giraffa pomeli*” from Ain Boucherit, even though his collections include two fragmentary molars. As mentioned above, Harris et al. (2010) suggested that two scapulas might belong to this species, rather than to *Sivatherium*.

3.1.3.4. Bovids

A cranial fragment and some other remains were used by Arambourg (1979) to define the species *Bos (Syncerus) palaethiopicus*. Gentry (2010) believes that the skull fragment has a temporal fossa like that of *Bos primigenius*, but that it is too old for that species, and that it is *Pelorovis*-like. The teeth from Ain Boucherit are more low crowned than those of *Bos* and differ also in other characters.

*Gazella setifensis* Pomel 1894 is possibly the oldest name for an African gazelle of that age. It is based on a horn core from Ain Boucherit (Figure 1), which was known as “the road to Beni-Fouda”. When naming this species of *gazella*, Pomel indicated the occurrence of a site along the road from St. Arnaud (=El Eulma) to Beni-Fouda (=Silègue), briefly described the lithology and general position in the sedimentary sequence of the basin, gave a short faunal list (including *Antilope tournoueri*), and proceeded with the sentence “une cheville osseuse de corne de gazelle recueillie par moi dans ce même gisement”. This specimen was figured (Pl. 10, figures. 14-15). The figures are lithographs and the specimen is figured as if it were a left one. A specimen in the Muséum National d’Histoire Naturelle of Paris (MNHN) is accompanied by two labels written in ballpoint. The first label reads “*Gazella setifensis* Pomel Type”, to which is added with a different ballpoint “B1315”. The second label reads “*Gazella pomeli*, Pl 42 – ” to which is added in a different type of ballpoint “Ain Hanech”. Arambourg (1979, Pl. 42) figured *Gazella* from Ain Hanech, but these are different specimens. Something is written on the base of the horn core itself, but it is illegible. The specimen is a right one, but is identical to the one of Pomel’s figures. Probably the horn core was drawn directly on the stone and appeared printed in mirror image. The specimen was found together with “*Antilope* tournoueri” and this species is only reported from Ain Boucherit and Ain Jourdell. The fossilization of the holotype is different from that of the fossils from Ain Jourdell and more similar to those from Ain Boucherit. It seems thus fairly certain that the horn core in the MNHN is the holotype and comes from Ain Boucherit, but that later someone was confused about the provenance. However, Arambourg (1979) indicated neotypes for the species, but did not indicate why. Neotypes are type specimens that are chosen when the original type material is lost. Arambourg (1979) compared his material to the holotype and found it similar and of similar size (!), but this comparison may have been based on Pomel’s (1894) publication. Geraads (1981) noted that the holotype is larger than any of the other *Gazella* horn cores from Ain Boucherit and suggested that the horn cores from Ain Boucherit might come from different horizons representing different species. He recommended the name *G. setifensis* should be abandoned. Apparently Vrba (1996) did not recognize the species, but Gentry (2010) did. It is true that the holotype is clearly larger than the other specimens from Ain Boucherit (Figure 1). In any sample one specimen has to be the biggest one. Maybe this is the explanation; otherwise it has to be assumed that all horn cores found after the holotype belong to a second species.
Ain Boucherit is the type locality of *Parantidorcas latifrons*. The species is also known from Ain Brimba in Tunisia. It is also represented in the newly bearing-fossils stratigraphic Unit (R) at Ain Boucherit.

Arambourg (1979) named the species *Redunca eulmensis* on the basis of a horn core from Ain Boucherit and assigned a metacarpal from that locality to the same species. Geraads (1981) believed it to be similar to *Parmularius altidens* and placed it, with some reservation, in the same genus as *Parmularius? eulmensis*, while Gentry (2010) placed it without reservation in that genus.

The presence of *Cephalophus leporinus* was based on two fragments of mandibles and several limb bones, some of which were figured and indicated by collection numbers (Arambourg, 1979, pl. 45, figures 4-8). One of the latter specimens is a mandible (1954-22: 167), of which Gentry (2010) believed that it belongs to *Parantidorcas*. Another of those (1954-13:41) is a carnivore tibia that probably belongs to *Vulpes* (Sahnouni et al., 2011). A first phalanx was figured (1954-3: 55) and is kept in the collection with three other specimens (1954-8: 56; 1954-8: 58, “1”) and a note “*Cephalophus leporinus*”. These are similar to numerous other specimens in the same collection attributed to *Gazella* or *Parantidorcas*. The same is the case with five second phalanges. *Cephalophus* sp. was based on a fragment of mandible (1954-8: 244) and some limb bones. Of some of the limb bones, measurements were given, but no collection numbers. In the collections, these specimens are identified with notes saying they are “*Cephalophus* sp.” and their measurements are close to those given by Arambourg. These specimens tend to be similar to their homologues in *Gazella* or *Parantidorcas*, save for a tibia. This tibia is fused to the distal fibula, unlike in Bovidae, and it has been suggested to belong to a lagomorph (Sahnouni et al., 2011). *Cephalophus* is not included in the updated faunal list.

Arambourg (1979) used a horn core and some molars to name the species *Damalis cus cuiculi*, to which he also assigned more horn core fragments and foot bones. Vrba (1977, as cited by Geraads, 1981) included it in *Parmularius braini*, while Geraads (1981) retained it as *Damalis cus? cuiculi*, and Gentry (2010) in *Damalis cus cuiculi*.
Thomas (1884) named *Antilope tournoueri* on the basis of material from Ain Jourdel, while Pomel (1894) assigned material from Ain Boucherit to the species and created a subgenus for it: *Antilope (Oreonagor) tournoueri*. Arambourg (1979) described a rich collection from Ain Boucherit under the name *Oreonagor tournoueri*. This assignment seems to have been accepted by most posterior workers, who generally consider the species to be close to *Connochaetes* (e.g. Vrba, 1977). This opinion is also endorsed by Gentry (2010), who included the species in that genus. However, some workers consider that the material from Ain Jourdel and Ain Boucherit reflects different stages of evolution, while Brink (2005) believed the material from Ain Jourdel to be close to *Connochaetes*, and that of Ain Boucherit close to *Megalotragus*, referring to it as “Species A” and “underived *Megalotragus*-like alcelaphine”. Gentry (2010) included the material from Ain Boucherit in *Connochaetes tournoueri*.

### 3.1.4. Carnivores

The carnivores include *Vulpes*, *Canis*, and *Panthera*. Arambourg (1979) described a mandible with two teeth from Ain Boucherit under the name *Vulpes atlantica*. The same author described and figured a tibia as *Cephalophus leporinus*, which in fact seems to belong to *Vulpes* (Sahnouni et al., 2011). Nowadays, the living subspecies “*Canis vulpes atlantica* Wagner, 1841” is included in *Vulpes vulpes* (Kowalski & Rzebik-Kowalska, 1991; Wilson & Reeder, 1993). Werdelin and Peigné (2010) listed *Vulpes vulpes* for Ain Hanech, but no *Vulpes* for Ain Boucherit. There does not seem to be *Vulpes* in Ain Hanech, and maybe Ain Boucherit was meant. But then, *Vulpes vulpes* appeared during the Middle Pleistocene in Europe (Cregut-Bonnoure, 1996), where it is a common species. It is likely that the material from Ain Boucherit belongs to a different species. For the time being, the material from Ain Boucherit is best assigned to *Vulpes* sp.

Arambourg (1979) described the material from Ain Boucherit as “*Canis (Thos) anthus primaevus* nov. ssp.”. Today, *Thos* is simply included in *Canis* (McKenna & Bell, 1997) and *Canis anthus* is included in *Canis aureus* (Kowalski & Rzebik-Kowalska, 1991; Wilson & Reeder, 1993). Werdelin and Peigné (2010) listed the latter species for Ain Boucherit, as well as for a number of latest Middle Pleistocene and younger localities and a *Canis cf. aureus* from Asbole (Ethiopia). The species is known from Eurasia, but from localities that are younger than Asbole. The material from Ain Boucherit is much older and might belong to a different species. *Canis adustus* and *Canis mesomelas* are living African species of a size close to that of *Canis aureus*. Werdelin and Peigné (2010) listed *Canis adustus* from the Middle Pleistocene sites of Kabwe (Zambia) and Lainyamok (Kenya); *Canis mesomelas* from a number of Middle and Upper Pleistocene localities; and *Canis cf. mesomelas* from Ol-Duwait Bed I (Tanzania), Sterkfontein Mbs 4 and 5, Swartkrans 2 and 3, Kromdraai A (South Africa) Koobi Fora Fm. KBS Mb. (Kenya), and Awash 7 (Ethiopia). Apparently, *Canis* of this size is relatively common in Lower Pleistocene deposits, but the material is too poor to be sure that it represents *Canis mesomelas*. The name “*primaevus*”, based on material from Ain Boucherit, is available for the small African Early Pleistocene *Canis*. Provisionally we use it here at the species level until the material is revised.

A proximal carnivore metapodial of the Arambourg collections might belong to a not too big *Panthera* or another carnivore of similar size.
Arambourg (1979) did not cite a hyaenid from Ain Boucherit, but Werdelin and Peigné (2010) listed *cf. Pliocrocuta perrieri*. Possibly this is based on two coprolites in the collections of the MNHN.

### 3.1.5. Lagomorpha

A tibia assigned by Arambourg (1979) to *Cephalophus* was suggested to belong to Lagomorpha (see section on Bovidae). Some other bones in the Arambourg collection belong to the Lagomorpha.

### 3.1.6. Reptiles, birds, rodent, fish, and invertebrates

Arambourg (1979) must have overlooked the reptile remains from Ain Boucherit. There are some remains of a crocodile (Figure 2: 1a-1e) and a humerus fragment of *Chelonia*. Lapparent de Broin (2000) cited *Mauremys leprosa* from Ain Boucherit. A number of plates from the more recent collections, that did not include diagnostic specimens, were assigned to *Mauremys* sp. by X. Murelaga Bereikua (personal communication, 26-3-2006) on the basis of photographs and drawings by one of us.

Arambourg (1979) named the species *Struthio barbarus* on the basis of three bones from Ain Boucherit. The species is treated as valid in the recent literature (Boev & Spassov, 2009).

Screen washing of a few sediment samples has led to the recovery of remains of ostracods, molluscs, fish (including vertebrae), and a lower third molar of a murid or gerbillid rodent. The latter is not a very diagnostic tooth, but shows the potential of the recovery of rodent remains.
Table 1: The faunal list of Ain Boucherit after Arambourg (1970, 1979), selected later modifications, opinions and additions, and the references to these later modifications.

<table>
<thead>
<tr>
<th>Arambourg (1970, 1979)</th>
<th>Later</th>
<th>Reference</th>
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<tbody>
<tr>
<td>Anancus osiris</td>
<td>Anancus osiris</td>
<td>Sanders et al. 2010</td>
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<tr>
<td>Elephas africanavus</td>
<td>Elephantidae indet.</td>
<td>Geraads &amp; Metz-Muller, 1999 Sanders et al. 2010</td>
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<td>Ceratotherium simum mauritanicum</td>
<td>Ceratotherium mauritanicum</td>
<td>Geraads 2010</td>
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<tr>
<td>Stylolophus lybicus</td>
<td>Hippopotamus lybicus</td>
<td>Sanders et al. 2010</td>
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<tr>
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<td>Equus numidicus</td>
<td>Eisenmann, 1980</td>
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<td>Hippopotamus amphibi</td>
<td>Hippopotamus cf. gorgops</td>
<td>Sahnouni &amp; Van der Made 2009; this paper</td>
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<td>Omnochoerus phacochoeroides</td>
<td>Kolpochoerus phacochoeroides</td>
<td>Geraads, 1993 Geraads 2004</td>
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<td>Lihytherium maurusium</td>
<td>rhinoceros (the basioccipital)</td>
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<td>&quot;Giraffa&quot; pameli (2 scapulas)</td>
<td>Harris et al. 2010</td>
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<td>Stivatherium mauniaum (inedited)</td>
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<td>Parmularius altidens</td>
<td>Geraads 2004; Gentry 2010</td>
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<td>Gazella or Parantidorcas and Lagomorpha</td>
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<td>Sahnouni &amp; Van der Made 2009 Werdelin &amp; Peigné 2010</td>
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<td>Teleostei indet.</td>
<td>this paper</td>
</tr>
<tr>
<td></td>
<td>Ostracoda indet.</td>
<td>this paper</td>
</tr>
<tr>
<td></td>
<td>Gasteropoda indet.</td>
<td>this paper</td>
</tr>
</tbody>
</table>
3.2. AIN HANECH FAUNAL LIST

The updated Ain Hanech faunal list includes the following species:

3.2.1. Proboscideans

Arambourg (1970) assigned a fragmentary molar from Ain Hanech to *Anancus osiris*, but expressed some doubts on the stratigraphic provenance, indicating that it was found on the plough land and that in the same area also the Ain Boucherit level crops out. If the specimen would indeed derive from Ain Boucherit levels, it must have moved a considerable distance uphill by ploughing (considering the slope of the surface of the plough field). The recent excavations yielded a tooth *in situ*, and thus this species is confirmed at Ain Hanech.

Arambourg (1979) listed *Elephas africanaus* as rare and with a question mark for Ain Hanech, but did not mention material of this species from this locality in his earlier monograph of 1970. As a consequence, it is not known on what material this was based.

Arambourg (1970) used eight cheek teeth from Ain Hanech to establish the species *Elephas mogrebiensis*. Geraads and Metz-Muller (1999) suggested that this species might be synonymous with *Elephas recki*, particularly with the chrono-subspecies *E. r. ileretensis*. However, Sanders *et al.* (2010) favored to include the material from Ain Hanech in *Mammuthus meridionalis*.

3.2.2. Perissodactyls

3.2.2.1. Rhinoceros

Arambourg (1970) described a skull and some limb bones as *Ceratotherium simum mauritanicum*. Presently this taxon is given species status (see discussion above under Ain Boucherit).

The rhinoceros *Dicerorhinus africanus* was named by Arambourg (1979) on the basis of some teeth from Lac Ichkeul. Though some more African material was assigned to *Dicerorhinus*, the species remains poorly known and its affinities are possibly with *Stephanorhinus* (Geraads, 2010). It has very low crowned teeth. A tooth fragment from Ain Hanech suggests the presence of a low crowned rhinoceros (Sahnouni & Van der Made, 2009; Sahnouni *et al.*, 2010).

3.2.2.2. Equids

Arambourg (1970) indicated the presence of *Stylohipparion lybicum* in Ain Hanech with a question mark and stated that the specimens probably derived from a lower horizon (i.e., Ain Boucherit) and were re-deposited. The specimens are weathered, but not rolled. The strata in the vicinity are flat and there is no indication of channels that cut to a depth as to reach Ain Boucherit levels. A handwritten note with the fossils indicates that they are surface finds. Fossils on the surface are likely to move down slope, but not up slope. Elsewhere in Africa, *Hipparion* survived much later than the age of Ain Hanech. Sahnouni and Van der Made (2009) and Sahnouni *et al.* (2011) accepted the fossils as from the fossil association of Ain Hanech.

Arambourg (1970) named the species *Equus (Asinus) tabeti* on the basis of an abundant material from Ain Hanech and at present the species is widely recognized (Bernor *et al.*, 2010). A second species was reported from Ain Hanech as *Equus numidicus* (Sahnouni *et al.*, 2002; 2004). Geraads *et al.* (2004) agreed on the presence of a second species, but called it *Equus cf. mauritanicus*.

3.2.3. Artiodactyls

3.2.3.1. Hippopotamus

Arambourg (1979) described two skulls, teeth and limb bones from Ain Hanech as *Hippopotamus amphibius* and noted that the material is morphologically similar to that
of the living species, but larger and with relatively elevated orbits. At that time *Hippopotamus amphibius gorgops* was considered to be a subspecies of the living species and Arambourg was of the opinion that the degree of elevation of the orbits was variable. Today the prevalent opinion is that *Hippopotamus gorgops* is not a subspecies, but a different species, with larger size and elevated orbits (Weston & Boissiere, 2010). Considering this, the material from Ain Hanech should be attributed to *Hippopotamus gorgops*.

### 3.2.3.2. Suids

Arambourg (1979) reported *Omochoerus phacochoeroides* fragments of one or several upper third molars from Ain Hanech, but he described only one of these and an upper canine. In fact, there is some more material, and the recent excavations yielded some more specimens. Geraads (1993) briefly compared the material from Ain Hanech with that from Ahl al Oughlam, which he attributed to *Kolpochoerus phacochoeroides*. He noted that the canine from Ain Hanech has a ribbed enamel band (Figure 3), while the ones from Ahl al Oughlam have just vestiges of enamel. He suggested that enamel might have re-appeared in evolution. Geraads (2004) studied an increased sample from Ahl al Oughlam and again noted that in the upper canines enamel is normally absent, but thin anteroventral and posteroventral ribbons are present near the tip of juvenile specimens, and in his data matrix (table 12) coded enamel as absent, while it was coded as present in the other species of *Kolpochoerus*. Despite giving so much importance the presence or absence of an enamel band, Geraads et al. (2004) insisted in that the *Kolpochoerus* from Ain Hanech belongs to an endemic North African lineage or clade of *Kolpochoerus*. Sahnouni et al. (2002, 2004) and Sahnouni and Van der Made (2009) assigned the material from Ain Hanech to *K. heseloni*, the same species as in East Africa.

![Figure 3: Kolpochoerus heseloni right upper male canine from Ain Hanech (MNHN-1948-1-159):](image)

- a) lingual or ventral,
- b) anterior,
- c) buccal or dorsal and
d) posterior views and
e) section.

---

5 cm
3.2.3.3. Giraffids

Arambourg (1979) described several cranial appendages, some teeth and bones, including a metacarpal, as *Libytherium maurusium*, though earlier he seemed to have considered *Libytherium* to be a junior synonym of *Sivatherium* (Arambourg, 1960). Harris (1991) and Harris et al. (2010) placed the species in *Sivatherium* and indicated the holotype to be from the “Upper Villafranchian” of Aïn Hanech. This genus and species were named by Pomel (1893) on the basis of a mandible from a quarry near Oran. More information on the locality is given by Arambourg (1970), who also gave the faunal list that includes two species: *L. maurusium* and *Stylohipparion libycum*.

*Giraffa pomeli* was described on the basis of four teeth from Ain Hanech, as well as a milk tooth and a phalanx from Ain Brimba (Arambourg, 1970). Geraads (1981) expressed also doubts as to the generic affinities, mentioning particularly the short metatarsal from Tighenif he assigned to this species. Harris et al. (2010) suggested that the species might be palaeotragine and belongs to the genus *Mitilanotherium*.

3.2.3.4. Bovids

Arambourg (1979) described the two species *Bos (Bibos) bubaloides* and *Bos praefricanus* from Ain Hanech based on a horn core and a posterior skull fragment. Geraads (1981) noted that: 1) the two fossils fit and belong to the same individual, 2) the name *Bos? bubaloides* has priority, and 3) a metacarpal assigned to one of the species belongs to *Sivatherium*. He suggested that the species might be related to *Leptobos*. Geraads and Amani (1998) noted that the name *Bos bubaloides* De Stefano, 1913 is a senior homonym of *Bos bubaloides* Arambourg, 1979, so that they favored the specific name “praefricanus”. In addition, with some reservation, these authors transferred the species to *Pelorovis* applying the name *Pelorovis praefricanus*. Sahnouni and Van der Made (2009) noted that metacarpal proportions would fit *Pelorovis* better than *Bos*, but refrained from a taxonomical decision applying the name “*Bos praefricanus*”. Gentry (2010) placed the species without reservation in *Pelorovis* *Pelorovis praefricanus*. A discussion of the affinities of this species is beyond the scope of this paper, but it should be noted that if the species is transferred to a different genus, there is no homonymy anymore. So if the species is placed in *Pelorovis*, its proper name is *Pelorovis bubaloide* and if it is placed in *Bos*, its proper name is *Bos praefricanus*.

Arambourg (1949) named *Numidocapra crassicornis* based on a skull fragment from Ain Hanech and believed it to belong to the Caprinae. Geraads (1981) suggested that it might be an alcelaphine, a suggestion endorsed by Vrba (1997). Arambourg (1970) also named *Gorgon? mediterraneus* based on teeth and postcranial elements from Ain Hanech. Geraads (1981) raised the question of whether these might be the teeth and bones of *Numidocapra*, which was confirmed by Gentry (2010) and by Sahnouni et al. (2011).

Arambourg (1970) named the species *Gazella pomeli* on the basis of material from Ain Hanech. He indicated as differences with *G. setifiensis* the less flattened horncores (with a longer transverse diameter compared to the antero-posterior diameter) that are more curved and with smoother surfaces. All horn cores have a flattened lateral side, while some of them have a flattened and others a more rounded medial side. The latter morphology does not occur in Ain Boucherit. The supposed lesser degree of flattening is not that clear in a bivariate plot comparing larger numbers of specimens (Figure 1): two large specimens of Ain Hanech are indeed more flattened,
while the larger specimens from Ain Boucherite are not flattened, probably reflecting the variability in the morphology of the medial side of the horn core, which was noted above. Also, of Arambourg’s characters of curvature and smoothness, it is questionable whether they are constant. The size of the two species seems to be the same, which holds even for the male and female horn cores. Nevertheless, *Gazella pomelii* is widely recognized as valid (Geraads, 1981; Vrba, 1996; Gentry, 2010).

The species *Oryx eleuelmensis* was named by Arambourg (1979). The name is not strictly binominal and was used in the same way by Arambourg (1970, p. 22). Geraads (1981) used the name as *Oryx eleuelmensis* and considered the species probably a synonym of the living species *Oryx gazella*. Geraads et al. (2004) believed that the compression of the horn cores in the *Oryx* from Ain Hanech approached it to the living species, but Sahnouni et al. (2004) showed that its compression is intermediate between older *Oryx* from the Turkana basin (Kenya) and the living species. Gentry (2010) treated *Oryx eleuelmensis* as a distinct species, though he noted similarities to *Oryx gazella*.

Two lower third molars and some horn core fragments were assigned by Arambourg (1979) to *Alcelaphus* sp. However, considering current models of evolution and temporal distribution of the Alcelaphini (Vrba, 1996, 1997; Gentry, 2010), this material is too old to belong to that genus.

Two upper molars were assigned to *Taurotragus gaudryi* (Arambourg, 1979). Geraads (1981) pointed out the opinion of H. Thomas, and agreed that these teeth do not belong to a tragelaphine. These teeth are relatively large, not very high crowned, do not have a lingual pillar (at least in one, in the other this area is damaged), and the fossas have smooth internal surfaces without important enamel folds or crests. The other large bovids are the Bovini. Those figured by Arambourg (1979) as *Bos bubaloides* have more marked buccal styles and a relatively well developed lingual pillar. The lower molars figured as *Bos praeaficanus* have interlobular columns that are not very massive, but they are relatively high. The molars from Ain Boucherit assigned to *Bos palaethiopicus* have much lower interlobular columns and less marked buccal styles/lingual stylids and are in general lower crowned. In these features they are closer to the two molars, which Arambourg assigned to *T. gaudryi* and they are also close in size. However, these remains are from different localities. At present the correct assignment is difficult to solve.

### 3.2.4. Carnivores

Arambourg (1979) described and figured a maxilla and a metatarsal from Ain Hanech as *Canis cfr. atrox*. Martínez Navarro and Rook (2003) assigned this material to *Lycaon lycaonoides*, while Werdelin and Peigné (2010) assigned it to *Lycaon cf. falconeri*.

Arambourg (1979, pp. 112-115) described material from Ain Hanech as *Crocuta crocuta*, but omitted the species from the list (p. 131). This assignation is still accepted in the recent literature (Werdelin & Peigné, 2010).

### 3.2.5. Birds

Arambourg (1979, table p. 131) listed the ostrich *Struthio barbarus* from Ain Hanech, but in the description of the species on pages 129-130 only material from Ain Boucherit is mentioned. Probably there is an error on page 131.
Table 2: The faunal list of Ain Hanech after Arambourg (1970, 1979), selected later modifications, opinions and additions, and the references to these later modifications. When a reference is given between brackets, the material from Ain Hanech is not explicitly mentioned, but the taxonomy in that paper is adopted.

<table>
<thead>
<tr>
<th>Arambourg (1979)</th>
<th>Later</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>? Anancus osiris</td>
<td>Anancus</td>
<td>Sahnouni et al. 2011</td>
</tr>
<tr>
<td>? Elephas africanaus</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>Elephas morgreiensis</td>
<td>Elephas recki ileretensis, Mammutthus meridionalis</td>
<td>Geraads &amp; Metz-Muller 1999, Sanders et al. 2010</td>
</tr>
<tr>
<td>Ceratotherium simum mauritanicum</td>
<td>Ceratotherium simum, Ceratotherium mauritanicum</td>
<td>Sahnouni &amp; Van der Made 2009, Geraads 2010</td>
</tr>
<tr>
<td>? Stylodhipparion libycum</td>
<td>Hipparion libycum</td>
<td>Sahnouni &amp; Van der Made 2009</td>
</tr>
<tr>
<td>Equus numidicus</td>
<td>Equus (Hippotigris) burchelli, Equus tabeti</td>
<td>Churcher &amp; Richardson 1978, Bernor et al. 2010</td>
</tr>
<tr>
<td>Equus numidicus</td>
<td>Equus mauritanicus</td>
<td>Geraads et al. 2004</td>
</tr>
<tr>
<td>Equus tabeti</td>
<td>Equus (Hippotigris) burchelli, Equus tabeti</td>
<td>Churcher &amp; Richardson 1978, Bernor et al. 2010</td>
</tr>
<tr>
<td>Equus tabeti</td>
<td>Equus mauritanicus</td>
<td>Geraads et al. 2004</td>
</tr>
<tr>
<td>Hippopotamus amphibius</td>
<td>Hippopotamus gorgops</td>
<td>(Weston &amp; Boissiere, 2010)</td>
</tr>
<tr>
<td>Omochoerus phacochoeroides</td>
<td>Kolpochoerus heseloni</td>
<td>Sahnouni et al. 2002, 2004; Sahnouni &amp; Van der Made, 2009</td>
</tr>
<tr>
<td>Libytherium mauritanium</td>
<td>Sivatherium mauritanium</td>
<td>Harris et al. 2010</td>
</tr>
<tr>
<td>Giraffa pomeli</td>
<td>&quot;Giraffa&quot; pomeli</td>
<td>Harris et al. 2010</td>
</tr>
<tr>
<td>Gazella pomeli</td>
<td>Gazella pomeli</td>
<td>Gentry 2010</td>
</tr>
<tr>
<td>Oryx el eulmensis</td>
<td>Oryx gazella, Oryx eulmensis</td>
<td>Geraads et al. 2004, Gentry 2010</td>
</tr>
<tr>
<td>Alcelaphus sp.</td>
<td>Alcelaphini?</td>
<td>This paper</td>
</tr>
<tr>
<td>Numidocapra crassicornis</td>
<td>Numidocapra crassicornis</td>
<td>Geraads 1981; Gentry 2010; Sahnouni et al. 2011</td>
</tr>
<tr>
<td>Taurotragus gaudryi</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Canis cfr. atroc</td>
<td>Lycaon hyaenoides, Canis cfr. falcioni</td>
<td>Martínez Navarro &amp; Rook 2003, Werdelin &amp; Peigné 2010</td>
</tr>
<tr>
<td>Cricenta crocata</td>
<td>Cricenta crocata</td>
<td>Werdelin &amp; Peigné 2010</td>
</tr>
<tr>
<td>Struthio barbarus</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>
3.3. El Kherba Faunal List

The locality of El Kherba is at short distance from Ain Hanech and is in the same horizon. Though excavations have been going on for several years, nearly none of the material has been described, but tables have been published that include part of the El Kherba faunal list (Sahnouni & Van der Made, 2009, figure 3; Sahnouni et al., 2011, figure 4).

3.3.1. Proboscideans

A right and left mandible with milk teeth, a complete molar and some other remains belong to an elephant. The material probably belongs to “Elephas mogrebiensis”, but as pointed out above, that name is not used anymore, while opinions diverge as on whether the type material should be included in Mammutthus meridionalis or Elephas recki.

3.3.2. Perissodactyls

3.3.2.1. Rhinoceroses

A rhinoceros metapodial IV, lacking the distal articulation, is long and relatively gracile suggested to Sahnouni et al. (2010) the possible presence of “Diceros rhinoceros” africanus in El Kherba. This species is now placed with reservation in Stephanorhinus (Geeraads, 2010): Stephanorhinus? africanus. The living species of Ceratotherium is more robust than most, and certainly the early species of Stephanorhinus. Whereas the North African Late Early and Middle Pleistocene Ceratotherium specimens, including the one from Tighenif, were previously placed in Ceratotherium simum (Geeraads, 2002), now this material is assigned to the species Ceratotherium mauritanicum (with type locality Tighenif). This species is more gracile than the living species, and a careful study of this feature is necessary. Some scraps of enamel belonged to teeth that are probably too hypsodont, and the enamel is too rugose to belong to an early species of Stephanorhinus and more probably belong to Ceratotherium.

3.3.2.2. Equids

There is abundant material of Equus. The material from El Kherba was assigned to Equus tabeti, though the metapodials are close to the upper ranges of the sample from Ain Hanech and close to the smaller sample of Equus numidicus from Ain Boucherit (Sahnouni et al., 2011, figure 5).

3.3.3. Artiodactyls

3.3.3.1. Hippopotamus

There is abundant hippopotamus material, including a skull with orbits that are elevated about 9 cm above the skull roof at the median plane. A great elevation of the orbits is a feature typical of Hippopotamus gorgops.

3.3.3.2. Suids

Some of the suid material from El Kherba was described and figured as Kolpochoerus heseloni (Sahnouni et al., 2002, 2004; Sahnouni & Van der Made, 2009).

3.3.3.3. Giraffids

Two mandibles and some other remains indicate the presence of Sivatherium maurus. Some tooth fragments of the size of “Giraffa” pomelii indicate the presence of a smaller giraffid.

3.3.4. Bovids

There are few remains of a gazelle that fit Gazella pomelii (but see discussion on that species above).

There are two fragmentary skulls and much other material of Numidocapra crassicornis. The holotype of the species is a skull that is reconstructed with abundant plaster of Paris, which, as suggested by the new specimens, may have altered some of its important features.
The species *Pelorovis howelli* was named on the basis of a skull fragment with two complete horn cores from El Kherba (Hadjouis and Sahnouni, 2006) and is discussed by Gentry (2010).

### 3.3.5. Carnivores

A mandible fragment with second molar has the morphology of the Canidae. There is also a toothless mandible fragment. The molar has a size comparable to the one described by Arambourg (1979) from Ain Boucherit as *Canis (Thos) anthus primaevus*. As argued above, other African material of many localities of similar age is assigned to *Canis cf. mesomelas*, while Arambourg’s name *Canis primaevus* is available.

A coprolite and a large incisor, as well as some other remains, indicate the presence of *Crocuta*.

### 3.3.6. Lagomorpha, Crocodyle, and Mauremys

An astragalus belongs to the Lagomorpha. A tooth testifies the presence of a crocodyle (Figure 2: 2a-2e) and some plate fragments probably belong to the same turtle as in Ain Boucherit, *Mauremys* sp. Gasteropods were also collected.

#### Table 3: The faunal list of El Kherba and references to previous citations of the taxa.

<table>
<thead>
<tr>
<th>Taxon</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Canis primaevus</em></td>
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</tr>
<tr>
<td><em>Crocuta</em></td>
<td>this paper</td>
</tr>
<tr>
<td><em>Panthera</em> sp.</td>
<td>this paper</td>
</tr>
<tr>
<td><em>Felis</em></td>
<td>this paper</td>
</tr>
<tr>
<td>Lagomorpha</td>
<td>this paper</td>
</tr>
<tr>
<td>“Elephas mogrebiensis”</td>
<td>this paper</td>
</tr>
<tr>
<td><em>Equus</em> tabeti</td>
<td>Sahnouni et al., 2004</td>
</tr>
<tr>
<td><em>Equus</em> cf. numidicus</td>
<td>Sahnouni et al., 2004</td>
</tr>
<tr>
<td><em>Ceratotherium</em></td>
<td>this paper</td>
</tr>
<tr>
<td>“Dicerorhinus” africanus</td>
<td>Sahnouni et al. 2010</td>
</tr>
<tr>
<td><em>Kolpochoerus</em> heseloni</td>
<td>Sahnouni et al. 2004; Sahnouni &amp; Van der Made 2009</td>
</tr>
<tr>
<td><em>Hippopotamus gergops</em></td>
<td>Sahnouni &amp; Van der Made 2009</td>
</tr>
<tr>
<td><em>Sivatherium</em> maurusium</td>
<td>Sahnouni &amp; Van der Made 2009</td>
</tr>
<tr>
<td>“Giraffa” pomelii</td>
<td>this paper</td>
</tr>
<tr>
<td><em>Gazella</em> pomelii</td>
<td>Sahnouni &amp; Van der Made 2009</td>
</tr>
<tr>
<td><em>Numidocapra crassicornis</em></td>
<td>Sahnouni &amp; Van der Made 2009</td>
</tr>
<tr>
<td><em>Pelorovis</em> howelli</td>
<td>Hadjouis &amp; Sahnouni, 2006; Gentry 2010</td>
</tr>
<tr>
<td>Crocodylia</td>
<td>this paper</td>
</tr>
<tr>
<td><em>Mauremys</em></td>
<td>this paper</td>
</tr>
<tr>
<td>Gasteropoda</td>
<td>this paper</td>
</tr>
</tbody>
</table>
4.0. CONCLUSIONS

Arambourg (1970, 1979) described in two monographs the faunas of Ain Boucherit, Ain Hanech and several other North African localities. His faunal lists for these two localities have been discussed and updated and the faunal list for El Kherba is presented. Arambourg listed 20 taxa for Ain Boucherit. Six of the identifications remain exactly the same, the presence of one taxon is not confirmed, the material of six other taxa is assigned to other species, in up to seven cases the material is classified in a different genus, while eight new taxa for the locality are reported. The current list includes 24 taxa. The removal of Cephalophus leporinus and Cephalophus sp. from the faunal list leaves it dominated by taxa adapted to dry or open landscapes. However, some of taxa that are new in the list; such as Crocodylia indet., Mauremys leprosa, Teleostei indet., Ostracoda indet, and Gasteropoda indet.; suggest the presence of an important permanent water body in the vicinity.

Arambourg listed 21 taxa for Ain Hanech. Six identifications remain the same, in nine cases the material is assigned to a different species, the presence of one taxon is not confirmed, in eight cases the material is classified in a different genus, and three new taxa are reported. The new list contains 22 taxa. A new find confirms the presence of Anancus. There is discussion on the North African Kalpochoerus, but the material from Ain Hanech belongs to K. belsoni. The available biochronological data support the palaeomagnetic interpretation that the locality is situated in sediments belonging to the Olduvai Event.

For the first time a faunal list for the locality of El Kherba is presented. It contains 20 taxa. Eleven of them are also present in Ain Hanech. Most of the species suggest an open or dry landscape, while Hippopotamus gorgops, Crocodylia indet., Mauremys, and Gasteropoda suggest the presence of a large permanent body of water in the vicinity.

Acknowledgements

We thank Christine Argot (MNHN) for access to the Arambourg faunal collections and other material from Algeria. This paper is a contribution to the Ain Hanech/Ain Boucherit Palaeoanthropological Project, north-eastern Algeria supported by the Algerian Ministry of Culture, Centre National de Recherches Préhistoriques, Anthropologiques et Historiques (CNRPAH), Institute of Archaeology (University of Algiers 2), CENIEH, National Science Foundation, Wenner-Gren Foundation for Anthropological Research, The Leakey Foundation, and projects CGL2009-12703-C03-01 and CGL2008-03881 funded by the Spanish Ministry of Science and Innovation.

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Actes du Colloque International de Préhistoire
Sétif du 26 au 28 octobre 2009

Africa, cradle of humanity:
Recent discoveries

L’Afrique, berceau de l’humanité:
Découvertes récentes

Deuxième festival culturel panafricain d’Alger
PROCEEDINGS OF THE INTERNATIONAL SYMPOSIUM

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DÉCOUVERTES RÉCENTES

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