**Supplementary On-line Material**

**Palaeontology**

**Material and Methods**

A small collection of the fossils from the excavations in the Khorramabad Valley was taken to Tarragona and has been studied in detail. Those specimens are presently (and temporarily) kept in the IPHES and were compared to fossil and recent animals. Most of the comparisons are with recent mammals from the IPHES collections. Where comparative data are explicitly cited, the acronym of the institution where the material was studied, or where it is presently kept, is given: ASM = Artsakh State Museum, Stepanakert; AUT = Aristotle University of Thessaloniki; FASMN = Römisch-Germanisisches Zentralmuseum, Forschungsinstitut für Vor- und Frühgeschichte, Forschungsbereich Altsteinzeit Schloss Monrepos, Neuwied; CIAG = Centre d'Investigacions Arquelògics de Girona; GSM = Georgian State Museum, Tbilisi; HUJ = Hebrew University, Jerusalem; IPHES = Institut Català de Paleoecologia Humana i Evolució Social, Tarragona; IPUW = Institut für Paläontologie der Universität, Wien; IQW = Institut für Quartärpaläontologie, Weimar. (at present: Senckenberg Forschungsinstitut und Naturmuseum, Forschungsstation für Quartärpaläontologie, Weimar); LVH = Landesmuseum für Vorgeschichte, Halle; MNCN = Museo Nacional de Ciencias Naturales, Madrid; MRA = Museum Requien, Avignon; MUB = Medical University, Baku; MNB = Museum für Naturkunde der Humboldt-Universität, Berlin; NNML = Nationaal Natuurhistorisch Museum, Leiden; NMP = National Museum, Prague.

Measurements were taken according to Van der Made (1996) and Van der Made & Tong (2008). The measurements are given in mm and are indicated with the following acronyms: DAP = antero-posterior diameter (maximum or at the occlusal surface of a tooth); DAPd = DAP of the distal part of a bone; DAPp = DAP of the proximal part of a bone or DAP of the posterior lobe of a tooth; DAPb = DAP at the base of the crown of a tooth; DLL = labio-lingual diameter of an incisor; DMD = mesio-distal diameter of an incisor; DT = transverse diameter; DTa = DT of the anterior lobe of a tooth; DTd = DT of the distal end of a bone; DTp = DT of the proximal end of a bone or of the posterior lobe of a tooth; Ha = height of the crown of a molar measured at the lingual (lower) or buccal (upper) side of the anterior lobe; Hli = height of the crown of an incisor measured at the lingual side; L = length; Li = width of the lingual side of the male lower canine in suids.

**Systematic description, comparison and discussion.**

The most indicative specimens of the small collection that was taken to the IPHES are described below.

**Crustacea indet.** A pincer of a crab was recovered from Kaldar Cave (Figure 8-5). The fragment has a length of 12.8, greatest width of 7.4 and height of 6.9 mm.

**Rhinocerotidae indet.?** An enamel fragment from Gilvaran Cave, level 4 (Figure 8-2) has a length of over 19, a width of over 7, and a thickness of about 2.7 mm. The surface is flat and very smooth. The fragment must have belonged to a large tooth with an extensive flat surface. It may have formed part of the buccal surface of an upper tooth of a rhinoceros. Species like *Stephanorhinus hemitoechus* and *Coelodonta antiquitatis* have enamel that is more crenelated. Species with relatively smooth enamel include *Stephanorhinus kirchbergensis* and *Rhinoceros unicornis*. In any case, the presence of a rhinoceros should be considered to be tentative.

An unidentified species of “*Dicerorhinus*” was cited from the Wezmeh Cave in Iran (Mashkour et al., 2008). *Dicerorhinus sumatrensis* is a species that lives in SE Asia, while *Rhinoceros unicornis* is the living Indian species (Duff & Lawson, 2004). Both genera have long fossil records in in East Asia and the Indian Subcontinent, respectively (Colbert, 1935; Xue & Zhang, 1991). However, it was custom to assign the European and North Asian rhinoceroses to *Dicerorhinus*, that are now placed in *Stephanorhinus* and this may have been meant in the case of the material from Wezmeh Cave. *Stephanorhinus kirchbergensis,* *S. hemitoechus and Coelodonta antiquitatis* are the typical West Eurasian species for the late Middle and Late Pleistocene of western Eurasia (Guérin, 1980; Van der Made, 2010; Van der Made & Grube, 2010). The first two species have been described from Azokh, in Nagorno Karabach (Van der Made et al. in press). *Coelodonta* was cited from the Indian Subcontinent (Colbert, 1935). From this review it is obvious that it would be very interesting if rhinoceros species could be identified from the Pleistocene of Iran. At present the identification is not possible for the fossil from Gilvaran Cave.

***Sus scrofa.*** A canine from Kaldar Cave (Figure 8-1) has the characteristics of the lower canine of a male suid: it is very high crowned (hypselodont) and has a triangular section with the posterior side lacking enamel and a large facet near the tip. The section is “scrofic”, meaning that the posterior side (which lacks enamel) is wider than the labial side, as opposed to a “verrucose” section with the posterior side narrower than labial side. The specimen is large (Li >20.6).

*Sus scrofa* and the very small *Sus salvanius* are the only species of *Sus* that are known to have canines with “scrofic” sections, while the remaining species of *Sus* have “verrucose” sections. The size of the specimen from Kaldar is far superior to that of the canines of *Sus salvanius*. *Sus scrofa* is also present in Gilvaran Cave and has been cited or described from Wezmeh, Bisitun and Yafteh Caves in Iran (Trinkaus & Biglari, 2006; Mashkour et al., 2008; Maskour et al. 2012), as well as from Azokh Cave in Nagorno Karabach (Van der Made et al. in press) and Shanidar in Iraq (Evins, 1982), which are not very far away from the Khorramabad Valley.

The wild boar *Sus scrofa* appeared not later than some 800 ka ago in Western Europe (Van der Made, 1999; Franzen et al., 2000). It must have come from Asia, but at present older records have not been documented there. At present it lives in an area that extends from western Europe and Morocco to Japan and Indonesia, including Iran. In most of this area it is the only suid species since the beginning of the Middle Pleistocene onwards, but in Nepal and surrounding areas it is sympatric with the very small *Sus salvanius* and in SE Asia it is sympatric with *Sus barbatus* and *Sus verrucosus* (Duff & Lawson, 2004).

***Capreolus* sp.** A first (or “proximal”) phalanx (Figure 8-7) from Kaldar Cave has a morphology as occurs in artiodactyls. It is narrower than in the Suidae. The proximal side is wide and its dorsal edge is flat, but this is at least partially due to the fact that the proximo-dorsal area is slightly damaged there. The articular surface axial of the dorso-plantar grove is narrow, but is wider in a specimen from Gar Arjeneh rock shelter (Figure 9-2). In both specimens, the facets for the sesamoids are small. The measurements of the first specimen are: DAPp >15.2, DAPpf >12.9, DTp = 10.9, L = 41.7, DAPd = 8.4, DTd = 10.7. Those of the second are: DAPp = 15.6, DAPpf = 15.6, DTp = 13.0. Metrically the complete phalanx is narrower than in typical Caprini, such as *Capra, Hemitragus* and even *Ovis*, but somewhat wider than in recent *Gazella* and *Axis* (SOM Figure 9, DTp-L diagram). Despite its proximo-dorsal damage, the phalanx is proximally relatively narrower than in *Saiga* or slender caprines like *Rupicapra* (SOM Figure 9, DTp-DAPp diagram). The distal articulation is wider than in *Antilope*, *Saiga* and *Gazella* (SOM Figure 9, DTd-DAPd diagram). In one or another bivariate diagram the specimen from Kaldar Cave is separate from each of the taxa with which it was compared, save for *Capreolus.* (Surprisingly, this result could not be obtained in a single diagram of the principal components.) The two specimens tend to be large or larger than their homologues in *Capreolus capreolus*.

Being small and simple bones, sesamoids are generally not studied. However, it is possible to assign them to taxa and even they may help to determine a taxon. Artiodactyls have in each finger or toe two sesamoids at the plantar side proximal to the first phalanx and a third one proximal to the third phalanx. The latter is wide and low and the former two are long and narrow. Of these the axial one is “low” (with a short dorso-plantar diameter) and the abaxial one is “high”. A sesamoid from Gilvaran Cave (SOM figure 10-1) had the morphology of an axial sesamoid of an artiodactyl. It has a plantar surface with rounded edges (SOM Figures 10-1a & f), like in cervids (SOM Figures 10-2a & f, 10-3a & f), whereas in bovids (or at least caprines) this surface tends to be flatter (in transverse direction) and tends to form more clearly defined angles with the axial and abaxial sides of the bone, particularly making a sharp angle with the abaxial side (SOM Figures 10-4a & f; 10-5a & f). In suids this angle is even much sharper. The specimen from Gilvaran has the size (DPD = 11.0, DT = 5.6, DDPmax ≥6.0, DDPmini = 5.9) of the axial sesamoid behind the first phalanx of a *Capreolus*. In the diagram in SOM Figure 10 the *Capreolus* sesamoids form two clusters for the manus and pes, respectively, whereas the sesamoids of manus and pes of the same individuals of Caprini are closer together.

A patella from Gilvaran Cave has a wide facet for the femur. There is a clear angle in the facet, while in the Caprini it is more rounded. The bone is wide (transverse diameter DT = 19.0) and thick (antero-posterior diameter 14.5; its height was superior to 18.9 mm). *Lynx* has a wide and flat patella, while *Canis lupus* has a narrow and thick patella. The patella of *Gazella* is flat with a not so clear angle in the facet. The latter is also the case in *Capra*. *Capreolus* has a relatively thick and wide patella with a clear angle in the middle of the facet. The specimen from Gilvaran is somewhat larger than the specimens from recent *Capreolus capreolus* from Spain we used for comparison (IPHES).

*Capreolus capreolus* lives from Europe to the area south of the Caspian Sea in northern Iran, while *Capreolus pygargus,* which is larger with larger antlers, lives in an area from north of the Caucasus extending eastward into Asia (Duff & Lawson, 2004; Aulagnier et al., 2009). In Western Europe, the size of *Capreolus* decreased markedly during the Late Pleistocene, while a fossil *Capreolus* fromAzokh Cave in Nagorno Karabach is very large (Van der Made et al., in press). Evins (1982) noted that *Capreolus* is a rare element in SW Asia and indicated its presence in Jarmo and “Mousterian levels” of Shanidar Cave in Iraq, but not in Iran. The material was assigned to *Capreolus capreolus*, but there does not seem to be much more than a carpal from the former and a P2 from the latter locality. This P2 is indeed not very large and is in the metrical ranges of recent *Capreolus capreolus*. The remains from the Khorramabad valley are relatively large and are in the metrical ranges of, what in Western Europe would be called, *Capreolus priscus* or *C. capreolus priscus*, but could also to belong to *C. pygargus*. While *Capreolus pygargus* ranges far south into China, this is possibly the southernmost record of the genus in western Eurasia.

**Cervidae indet. cf. *Cervus elaphus.*** The tip of an antler (Figure 8-3) from Kaldar Cave has a length of 3 cm. At one side there is probably some rodent gnawing and apart from this the section is round and has a diameter of about 11 mm. Such tips may occur in *Cervus elaphus*, *Cervus unicolor*, *Cervus duvauceli, Cervus eldi* and *Axis*, as well as in the lower tines in the different species of *Dama*. The fragment is too robust for *Capreolus*.

A fragment of a lumbar vertebra from Gilvaran Cave (Figure 8-4) preserves the right side of the vertebral arch, the cranial articular process, and the base of the transverse process. The transverse process is wing-like as is typical of lumbar vertebras, and is directed outward and slightly forward. The cranial articular process has an S-shaped articular surface, as in cervids, but unlike in bovids, equids and carnivores. The curvature of what is left of the wall of the vertebral foramen indicates that this foramen was relatively high, higher than in *Sus scrofa*. The vertebra seems to belong to a cervid. The S-shaped facet is about the only thing that can be measured in this specimen; its length is 18.6 mm. The general size of the specimen is slightly larger than that of a recent *Cervus elaphus* from Spain, which is a small sized subspecies.

Today the large *Cervus elaphus maral* lives in an area that includes the north of Iran, while *C. e. bactrianus* (Turkmenistan, Afghanistan) and *C. e. hanglu* (Norhern India) are also large, as well as *Cervus duvauceli* and *Cervus unicolor* (both living in India) (Whitehead, 1993; Gurung & Singh, 1996). *Cervus elaphus* has been cited or described from Nagorno Karabach (Lioubine 2002; Rivals 2004; Van der Made et al. in press), NE Irak (Evins, 1982) and from Iran (Trinkaus & Biglari, 2006; Mashkour et al., 2008). In some of these cases, it is not clear on which features the determination is based. It seems likely that the material from Kaldar and Gilvaran Caves belongs to *Cervus elaphus*, but we have to await more material to be able to make a determination based on morphology. If confirmed, these finds represent the southern most record of *Cervus elaphus* en the western part of Eurasia.

**Caprini indet. cf. *Capra aegagrus.*** Some lower molars (Figure 8-9; SOM Figures, 11-5, 11-6) have high crowns, smooth lingual surfaces, lack an interlobular column at the buccal side and have a caprine fold. Some upper molars (SOM figure 11-1) have buccal walls with three pronounced styles, but no buccal crests departing from the para- and metacone (paraexostyle and metaexostyle; nomenclature Van der Made, 1996) and lack a lingual interlobular column. Such a morphology fits Caprinae, such as *Capra*, *Hemitragus*, *Rupicapra*, and *Ovis*, but also antelopes such as *Saiga* and *Pantholops*. The two lower molars measure DAP=12.9, DAPb=11.6, DTa=7.6, DTp=8.5 (KLD-10) and DAP=18.3, DAPb=15.9, DTa≥8.6, DTp≥8.3, Ha>28.4. The upper molar measures DAP=19.2, DAPb=18.2, DTa≈15.2, DTp≈16.1. The size of these molars is large for *Rupicapra*, *Saiga* and *Pantholops*.

Some lower incisors (SOM Figures 11-2, 11-4) are very high crowned as in Caprinae and *Saiga*. The larger one is possibly a I2 and has the following measurements: DT = 6.6, DLL = 5.2, DMD = 5.7. The smaller one seems to have a distal facet, so cannot be a canine and should be the I3. Its measurements are: DT = 4.8, DMD = 4.1, DLL = 4.7. In *Saiga*, the size of the incisiform teeth decreases rapidly from I1 to the canine, while in the caprines, this cline is not so strong. The I3 is larger than what is expected in *Saiga*, but would fit *Capra*.

The distal part of a first (or “proximal”) phalanx from sublevel B at Ghamari Cave has the typical morphology of a ruminant (SOM figure 11-3). The morphology of the distal articulation recalls cervids, but is damaged and it is not possible to rule out small bovids. It is smaller (DAPd=12.3, DTd=16.2) than its homologue in *Cervus elaphus*, close in size to that of *Dama dama* and larger than that of *Axis* (Bivariate diagram Figure 11). Peculiar is its small anteroposterior diameter, which might be due to some minor damage of the planto-axial area, but possibly it is real and is a resemblance to phalanges of *Capra* and a difference with *Dama*.

Each of these elements could be assigned to more than one taxon, but all of them could belong to a species of *Capra* or *Hemitragus*, more or less of the size of *Capra caucasica*. Today *Capra caucasica* and *C. cylindircornis* live in the Caucasus, while *Capra nubiana* (or *C. ibex nubiana*) lives in the Arabian Peninsula, *Capra falconeri* and *C. siberica* live in areas that include parts of Afghanistan and Pakistan, *C. aegagrus* lives in southern Iran and *Hemitragus jemlahicus* lives in the Himalaya as far west as the north of India and two other species or subspecies in Oman and Unites Arab Emirates and in the south of India (Duff & Lawson, 2004; Gurung & Singh, 1996; Aulagnier et al., 2009). Relatively little is known of the fossil record of all these species. *Hemitragus* had a wide geographic distribution and *H. bonali* was common in the late Early and most of the Middle Pleistocene of Europe and if not the direct ancestor of the living species, must have been close to their common ancestor. Fossil material from the Caucasus was assigned to *C. aegagrus* and *C. caucasica* (Lioubine 2002; Touchabramichvili 2003; Rivals 2004; Van der Made et al. in press). *Capra aegagrus* was cited from Shanidar in NE Irak (Evins, 1982). Fossil material from Iran was assigned to *Capra aegagrus* (Marean, 1998; Mashkour et al., 2008) or/and indefinite species (Mashkour et al., 2009). It is generally not clear on which features the specific assignation is based. Whereas the different species can be recognized by their external morphology, it is more difficult to recognize their bones or teeth. Important differences exist in horn core morphology, and there are minor differences in size. It is likely that the material from the Khorramabad Valley belongs to *Capra aegagrus*, but more material is needed to confirm such an assignation with morphology or biometrics.

**Bovini indet.** The presence of a bovine in Ghamari Cave is indicated by a second upper premolar (Figure 8-6). It is a large (DAP≥19.3, DAPb≥18.2, DT ≥15.3) and high crowned tooth. Numerous fragmentary fossils indicate the presence of a bovine in Gilvaran and Ghamari Caves. Some of the remains belonged to individuals of very large size. *Bos*, *Bison* and *Bubalus* all occured in the Middle to Late Pleistocene of both Europe and the Indian Subcontinent. Indian *Bubalus* reached very large sizes. *Bison* was cited or described from Azokh Cave in Nagorno Karabach (Lioubine 2002; Rivals 2004; Van der Made et al. in press), which is not so far away from Khorramabad. Fossil auerochs *Bos primigenius* or an unidentfied species of *Bos* have been cited from Iran (Mashkour et al, 2008; Trikaus & Biglari, 2006; Mashkour et al., 2012) and the auerochs has been cited tentatively from Shanidar in northern Irak (Evins, 1982). The studied remains from Ghamari Cave do not allow a precise assignation.

***Hystrix* sp. cf. *Hystrix indica.*** An axis from Ghamari (Figure 8-8; SOM figure 12-2) has a dorsal spine that is posteriorly high (17.3 mm from the vertebral foramen to the tip). In Carnivora it is low. The “tooth” is flattened with a relatively flat ventral facet, which is not confluent with the obliquely oriented antero-lateral facets. This is unlike in ruminants. In Proboscidea and Perissodactyla the bone is much larger and in Lagomorpha and even the largest Insectivora (eg. *Erinceus*) it is much smaller. In primates and a large rodent, like *Castor*, the bone is much shorter. The bone has many resemblances to its homologue in *Hystix cristata* (SOM figure 12-1), but also many minor points of difference: the shape of the “tooth” and the circumference of the posterior articulation (the fossil is of a juvenile and the articular surface is not fused) and it is more robust. The minimal width in the middle is 22.4, the width at the anterior facets is 27.2 and at the posterior facets 22.1 mm. The length at the lower side of the specimen is 22.0 mm. The total height is 37.9. mm. Several other vertebra seem to belong to the same species and probably even the same individual.

*Hystrix cristata* is the largest living species of the genus and is larger than the European fossil forms, but the living species *Hystrix indica* is nearly as large. The latter species occurs today in Iran (Aulagnier et al., 2009) and has been cited from the Iranian Late Pleistocene (Mashkour et al., 2009). It is possible that the material from Ghamari Cave belongs to that species, but this needs to be confirmed.

**Micromammals.**The small mammals have been identified by comparing with the fossil collections which are housed at IPHES. SOM Table 1 shows the list of most indicative specimens that we have identified.

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| --- | --- | --- | --- |
| **Site** | **Level** | **Anatomic part** | **Taxa** |
| GHAMARI | level 5 | femur | Gliridae |
| KALDAR | level 5 | fragmented femur | Mustelidae |
| KALDAR | level 5 | fragmented femur | Mustelidae |
| KALDAR | level 5 | distal epiphysis femur | Leporidae? |
| GHAMARI | level 5 | fragmented humerus | Erinaceidae |
| KALDAR | level 4 | humerus | Gliridae |
| GHAMARI | level 4 | proximal epihysis femur | Chiroptera indet. |
| GHAMARI | level 4 | distal epiphisis humerus | Rodentia indet. |

**SOM Table 1**.List of identified micromammals from the Khorramabad sites.

**Additional references to Supplementary On-line Material – paleontology**

Aulagnier, S., P. Haffner, A.J. Michell-Jones, F. Moutou & J. Zima, 2009. Guía de los mamíferos de Europa, del norte de África y de Oriente Medio. Lynx - Barcelona: 270 pp.

Duff, A. & A. Lawson, 2004. Mammals of the world - a checklist. A & C Black - London: 312 pp.

Evins, M.A., 1982. The Fauna from Shanidar Cave : Mousterian wild goat exploitation in Northeastern Iraq. Paléorient, 8(1): 37-58.

Franzen, J.L., E. Gliozzi, T. Jellinek, R. Scholger & M. Weidenfeller 2000. Die spätaltpleistozäne Fossillagerstätte Dorn-Dürkheim 3 und ihre Bedeutung für die Rekonstruktion der Entwicklung des rhenischen Flusssystems. Senckenbergiana Lethaea, 80(1), 305-353.

Guérin, C. 1980. Les Rhinoceros (Mammalia, Perissodactyla) du Miocène terminal au Pléistocène Supérieur en Europe occidentale. Comparaison avec les espèces actuelles. Documents des Laboratoires de Géologie Lyon, 79(1-3), 1-1185.

Gurung, K.K. & R. Singh, 1996.Field Guide to the Mammals of the Indian Subcontinent. Academic Press - San Diego: 140 pp.

Lioubine, V.P. 2002. L'Acheuléen du Caucase. Études et Reschrches Archéologiques de l'Université de Liège, 93, 1-140.

Made, J. van der, 1996. Listriodontinae (Suidae, Mammalia), their evolution, systematics and distribution in time and space. Contributions to Tertiary and Quaternary Geology, 33(1-4): 3-254, microficha 54 pp.

Made, J. van der, 1999.Ungulates from Atapuerca-TD6.Journal of Human Evolution, 37(3-4): 389-413.

Made, J. van der, 2010. The rhinos from the Middle Pleistocene of Neumark Nord (Saxony-Anhalt).Veröffentlichungen des Landesamtes für Archäologie, 62: 432-527.

Made, J. van der & R. Grube, 2010. The rhinoceroses from Neumark-Nord and their nutrition.In: D. Höhne & W. Schwarz (eds) "Elefantentreich - Eine Fossilwelt in Europa". Landesamt für Denkmalpflege und Archälogie Sachsen-Anhalt & Landesmuseum für Vorgeschichte, Halle: 383-394.

Made, J. van der & Tong H.W., 2008. Phylogeny of the giant deer with palmate brow tines Megaloceros from west and Sinomegaceros from east Eurasia. Quaternary International, 179: 135-162.

Rivals, F. 2004. Les petits bovidés (Caprini et Rupicaprini) pléistocènes dans le bassin méditerranéen et le Caucase. Étude paléontologique, biostratigraphique, archéozoologizue et paléoécologique. BAR International Series 1327, 1-252.

Touchabramichvili, N. 2003. Les industries du Paléolithique inférieur dans le Caucase méridional. L'Anthropologie, 107, 565-576.

Whitehead, G.K., 1993. The Whitehead Encyclopedia of Deer. Swanhill Press - Shrewsbury: 597 pp.

Xue Xiangxi & Zhang Yunxiang, 1991.Quaternary mammalian fossils and fossil human beings. In Zhang Z., Shao S., Tong G. & Cao J. (eds). The Quaternary of China. Beijing: China Ocean Press: 307-374.

**SOM Figure 1.** Gilvaran Cave: A) Aerial view and present position relative to the Khorramabad River, general view,B) Excavation of the A8 trench C) A8 trench, exposed huge collapsed rocks D) Position of AY1 trench E) Detailed topography of the cave and surroundings.

**SOM Figure 1.** Grotte de Gilvaran : A) Vue aérienne et position relative de la Riviére Khorramabad, B) fouilles de la tranchée A8, C) Tranchée A8, énormes rochers effondrés; D) Position de la tranchée AY1 E) Topographie détaillée de la grotte et ses environs.

**SOM Figure 2.** Kaldar Cave: A) General view, B), Cave entrance C) View from inside the cave and position of the test pit.

**SOM Figure 2.** Grotte de Kaldar : A) Vue générale, B) Entrée de la grotte, C) Vue de l’intérieure de la grotte et position du sondage.

**SOM Figure 3.**Ghamari Cave: A) Plotting inside the cave B) General view, C) The F2 test pit excavation.

**SOM Figure 3**. Grotte de Gilvaran : A) disposition intérieure, B) Vue générale, C) Sondage F2.

**SOM Figure 4.**Gar Arjene Rock Shelter: A) General view, B) The H1 test pit excavation, C) The E-4 test pit excavation.

**SOM Figure 4.** Abri de Gar Arjene : A) Vue générale, B) Sondage H1, C) Sondage E4.

**SOM Figure 5. (A1&A2). Selected artifacts from Gilvaran Cave-AY1, level 5&4:** 1) Endscraper 2) Sidescraper on natural core- edge blade 3) Pointed flake with dihedral platform 4) Pointed flake with flat platform and pseudo retouch 5) Burnt blade fragment with pseudo retouch 6) Fragment of pointed flake with stepped retouch on the right side 7) Retouched bladelet fragment.

**SOM Figure 5. (A1&A2).**Sélection d’artefacts de la Grotte Gilvaran-AY1, niveau 5et 4. 1) Grattoir, 2) Racloir sur lame, 3) Éclat appointé à talon dièdre, 4) Éclat appointé avec talon lisse et pseudo-retouch, 5) Lame brulée, 6) Éclat appointé avec retouches scalariformes et pseudo-retouches, 7) Fragment de lame retouchée.

**SOM Figure 6. (A1&A2).Selected artifacts from GLV-A8 trench, level 3:** 1) Mousterian point, platform is absent, 2) Distal portion of fragmented pointed flake, probably on Levallois blank with pseudo retouch on the right side 3) Sidescraper on core-edge flake with flat platform, the blank could be Levallois recurrent centripetal, 4) Flake produced by Levallois recurrent unidirectional convergent technology, the concretion covers the right side and the platform, 5) Pointed flake, 6), Bilateral retouched bladelet, 7) Fractured blade with retouches on the right side 8) Endscraper, 9) Distal fragment of backed bladelet / Arjeneh point, 10) Burned blade fragment with retouch on the right side, 11) Levallois recurrent unidirectional core.

**SOM Figure 6**. **(A1&A2).**Sélection d’outils de la tranchée GLV-A8, niveau 3 : 1) Pointe Moustérienne ; 2) Fragment distal d’un éclat appointé sur un support Levallois, 3) Racloir sur éclat latéral à talon lisse, le support peut être Levallois ou récurrent, 4) Éclat produit par Levallois unidirectionnel et convergent, 5) Éclat appointé, 6) Retouches bilatérales sur lamelle, 7) Lame fracturée avec retouches latérales, 8) Grattoir, 9) Fragment distal de lamelle â dos (pointe de Arjeneh), 10) Lame brulée retouchée, 11) Nucleus Levallois.

**SOM Figure 7.** Hammer stones from GLV AY1 & A8 trenches. (1, 2 & 3 AY1 – 4 ,5 & 6 A8).

**SOM Figure 7.**  Percuteur en pierre de GLV AY1 et tranchée 8 (1, 2 & 3 AY1 – 4, 5 & 6 A8).

**SOM Figure 8.**  General and closer view of a Pleistocene deposit of high quality of raw materials in the banks of the Khorramabad River.

**SOM Figure 8.**  Vue générale et détaille d’un dépôt Pléistocène avec des matières premières de bonne qualité sur les rives de la rivière Khorramabad.

**SOM Figure 9:** Bivariate diagrams of the first (or proximal) phalanx of: *Capreolus* from Kaldar Cave, level 4 and Gar Arjeneh Rock Shelter (only DTp-DAPp diagram); *Capreolus priscus / suessenbornensis* from Voigtstedt (IQW), Süssenborn (IQW), Koneprusy (NMP), Miesenheim I (FASMN), Azokh V (MUB), Grotte des Cèdres (MRA), Ehringsdorf (IQW); *Capreolus capreolus* from Can Rubau (CIAG), Cueva Morín (MNCN) and recent from Spain (IPHES); recent *Axis axis* (MNCN); recent *Antilope cervicapra* (MNCN); recent *Gazella cuvieri* (MNCN) and recent *Gazella dorcas?* (IPHES, MNCN); recent *Saiga tatarica* (NNML); recent *Rupicapra pyrenaica* (MNCN, all first phalanges of individual no. 14259); and, all together *Capra ibex* from Petralona (AUT); recent *Capra pyrenaica* (IPHES); *Capra caucasica?*from Azykh V (MUB), Ortvala (GSM) and Sakazia (GSM); *Hemitragus bonali* from Hundsheim (IPUW) and feral *Ovis* from Spain (MNCN).

Photographs: 1) KLD-14, level 4 - first phalanx right of the axis of the foot/hand of *Capreolus* from Kaldar Cave; a) axial, b) dorsal, c) abaxial, d) plantar, e) distal, and f) proximal views 2) GRA-5 - proximal epiphysis of first phalanx, left of the axis of the foot from the Gar Arjeneh rock shelter; juvenile, not fused to the diaphysis; proximal view.

**SOM Figure 9:** Diagramme à deux entrées de la première phalange d’une *Capreolus* de la Grotte Kaldar, niveau 4 et de l'Abri Gar Arjeneh (seulement sur le diagramme DTp-DAPp); *Capreolus priscus / suessenbornensis* de Voigtstedt (IQW), Süssenborn (IQW), Koneprusy (NMP), Miesenheim (FASMN), Azokh V (MUB), Grotte des Cèdres (MRA), Ehringsdorf (IQW); *Capreolus capreolus* de Can Rubau (CIAG), Cueva Morín (MNCN) et récent d'Espagne (IPHES); récent *Axis axis* (MNCN); récent *Antilope cervicapra* (MNCN); récent *Gazella cuvieri* (MNCN) et récent *Gazella dorcas?* (IPHES, MNCN); récent *Saiga tatarica* (NNML); récent *Rupicapra pyrenaica* (MNCN, toutes les premières phalanges de l‘individu no. 14259); et ensemble avec *Capra ibex* de Petralona (AUT); récent *Capra pyrenaica* (IPHES); *Capra caucasica?* de Azykh V (MUB), Ortvala (GSM) and Sakazia (GSM); *Hemitragus bonali* de Hundsheim (IPUW) et *Ovis* sauvage de l’Espagne (MNCN).

Photographie: 1) KLD-14, niveau 4 -première phalange droite de *Capreolus* de la Grotte Kaldar; vue a) axiale, b) dorsale, c) latérale, d) plantare, e) distal, et f) proximale. 2) GRA-5 - épiphyse proximale de la première phalange, de l’Abri Gar Arjeneh; jeune individu, diaphyse pas fusionnée; vue proximale.

**SOM Figure 10.**Bivariate diagram of the axial sesamoid behind the first phalanx of: *Capreolus* from Gilvaran Cave, level 5; recent *Capreolus capreolus* from Spain (MNCN); recent *Axis axis* (MNCN); *Dama dama geiselana* from Neumark Nord (LVH); recent *Rupicapra rupicapra* from Spain (MNCN); feral *Ovis* from Spain (MNCN); *Capra pyrenaica* from the Sierra de Gredos (Spain; MNCN).

Photographs: All axial sesamoids from behind the first phalanx, right of the axis of the foot or figured in mirror image (figs 3-5), in each case: a) distal, b) abaxial, c) dorsal, d) axial, e) plantar, and f) proximal views. 1) GLV-AY1-35, level 5 - *Capreolus* from Gilvaran Cave 2) MNCN no number comparative collection Palaeobiology - sesamoid of the manus of *Axis axis* 3) MNCN 21437 - sesamoid of the pes of *Capreolus capreolus* from Otero del Valle (Spain) 4) MNCN 18247 - sesamoid of the manus of *Capra pyrenaica* from the Sierra de Gredos (Spain) 5) MNCN 14259 - sesamoid of the manus of *Rupicapra pyrenaica* from Asturias (Spain).

**SOM Figure 10.** Diagramme â double entrée de sésamoïde dernière la première phalange de: *Capreolus* de la Grotte Gilvaran, niveau 5; récent *Capreolus capreolus* d'Espagne (MNCN); récent *Axis axis* (MNCN); *Dama dama geiselana* de Neumark Nord (LVH); récent *Rupicapra rupicapra* d'Espagne (MNCN); *Ovis* sauvage de l’Espagne (MNCN); *Capra pyrenaica* de la Sierra de Gredos (Espagne; MNCN).

Photographie: sésamoïdes axiaux, à l'arrière de la première phalange, du côté droite de l’axe du pied (figs 3-5), dans chaque cas: vue a) distale, b) latérale, c) dorsale, d) axiale, e) plantaire, et f) proximale. 1) GLV-AY1-35, niveau 5 - *Capreolus* de la Grotte Gilvaran 2) MNCN exemplaire sans numeró de la collection du département de paleobiologie - sésamoïde du pied de *Axis axis* 3) MNCN 21437 - sésamoïde de le pied de *Capreolus capreolus* de Otero del Valle (Espagne) 4) MNCN 18247 - sésamoïde de le pied *Capra pyrenaica* de the Sierra de Gredos (Espagne) 5) MNCN 14259 – sésamoïde de le pied de *Rupicapra pyrenaica* de Asturias (Espagne).

**SOM Figure 11.**Bivariate diagram of the first phalanx of: Ghamari Cave specimen GHM-17; recent *Axis axis* (MNCN, HUJ); *Dama dama geiselana* from Neumark Nord (LVH); *Cervus elaphus* from Neumark Nord (LVH) and Roter Berg (NMB); recent *Capra pyrenaica* (MNCN, IPHES); *Capra caucasica?*from Azykh V (MUB), Ortvala (GSM) and Sakazia (GSM); *Capra ibex* from Petralona (AUT); *Hemitragus bonali* from Hundsheim (IPUW).

Photographs: 1) KLD-12, level 5 - left M1/2 of *Capra* from Kaldar Cave; buccal view 2) GLV-AY1-97, level 3 - left I2 of *Capra* from Gilvaran Cave; a) lingual, b) mesial, c) labial, and d) distal views 3) GHM-17, level 4 - distal fragment of a first (or “proximal”) phalanx from Ghamari Cave of cf. *Dama mesopotamica*; a) distal, b) axial, c) dorsal, d) abaxial, and e) abaxial views 4) KLD-20, level 4 - right I3 of *Capra* from Kaldar Cave; a) lingual, b) distal, c) labial, and d) mesial views 5) GHM-48, level 5 - left M1/2 (M2?) of *Capra* from Ghamari Cave; a) buccal, b) occlusal, and c) lingual views 6) KLD-10, level 5 - left M1/2 (M1?) of *Capra* from Kaldar Cave; a) buccal, b) occlusal, and c) lingual views. The scale bar represents 1.5 cm for figure 4 and 3 cm for the remaining figures.

**SOM Figure 11.** Diagramme â deux entrées de la première phalange de: Grotte Ghamari spécimen GHM-17; *Axis axis* récente (MNCN, HUJ); *Dama dama geiselana* de Neumark Nord (LVH); *Cervus elaphus* de Neumark Nord (LVH) et Roter Berg (NMB); *Capra pyrenaica* récente (MNCN, IPHES); *Capra caucasica?*de Azykh V (MUB), Ortvala (GSM) et Sakazia (GSM); *Capra ibex* de Petralona (AUT); *Hemitragus bonali* from Hundsheim (IPUW).

Photographie: 1) KLD-12, niveau 5 - M1/2 gauche de *Capra* de Grotte Kaldar; vue buccale 2) GLV-AY1-97, niveau 3 - I2 gauche de *Capra* de la Grotte Gilvaran; vue a) linguale, b) mesiale, c) labiale, et d) distale. 3) GHM-17, niveau 4 - fragment distal d'une phalange de la Grotte Ghamari de cf. *Dama mesopotamica*; vue a) distale, b) axiale, c) dorsale, d) latérale, et e) latérale. 4) KLD-20, niveau 4 - I3 droite de *Capra* de la Grotte Kaldar; vue a) linguale, b) distale, c) labiale, et d) mesiale. 5) GHM-48, niveau 5 - M1/2 (M2?) gauche de *Capra* de la Grotte Ghamari; vue a) buccale, b) occlusale, et c) linguale. 6) KLD-10, niveau 5 - M1/2 (M1?) gauche de *Capra* de la Grotte Kaldar; vues a) buccale, b) occlusale, et c) linguale. L’échelle est de 1,5 cm à la figure 4 et 3cm pour les autres figures.

**SOM Figure 12.**

1) CENIEH O-75 - axis of *Hystrix cristata*; a) dorsal, b) posterior, c) ventral, d) left lateral, and e) anterior views. 2) GHM-F2-22, level 4 - axis of *Hystrix* from Ghamari; a) dorsal, b) posterior, c) ventral, d) right lateral, and e) anterior views.

**SOM Figure 12.**

1) CENIEH O-75 - axis de *Hystrix cristata*; vues a) dorsal, b) postérieure, c) ventrale, d) latéral gauche, et e) antérieure. 2) GHM-F2-22, niveau 4 - axis de *Hystrix* de Ghamari; vues a) dorsale, b) posterieure, c) ventrale, d) latérale droite, et e) antérieure.