SYNOPSIS OF THE PALEOLITHIC CENTRAL ASIA - SIBERIA

Period	Sites	Tools/*Hominids*/ Symbolic Behavior	Fauna
'Classic Oldowan' (Lower or Early Paleolithic)	General technology: hammerstone/anvil bipolar continues adding direct freehand percussion; cores: choppers, polyhedrons, discoids, spheroids and subspheroids. Standardized small tools appear: 'light and heavy-duty' scrapers on flakes or fragments, rare burins and protobifaces; utilized unmodified flakes; rare worked bone *(LM 1971); Homo habilis and Homo rudolfensis*		
Developed Oldowan A (Africa, SW Asia)	General technology: pebble core-flake tools ('Mode I') with standardized small tools (variable random to regular retouch), bipolar and single platform cores; reduced % core-choppers, discoids, polyhedrons and heavy-duty scrapers, more refined light-duty scrapers, burins; 1st appearance of awls, edge-trimmed flakes *(LM1971, WJ1982); Homo ergaster/Homo erectus*		
Early Acheulian	General technology: (Africa): flake blanks used as cores, in turn used as tools ('core tools'), including crude handaxes with sinuous edges and large flake scars, trihedral picks, rare cleavers; large component of flakes; hand-sized flakes from large cores; secondary flaking rare; small flakes with no secondary retouch; sharp edges made by intersect dorsal flake scar and ventral surface; Kombewa technique common; pointed working edge more important than shaping; chopper, polyhedron, spheroid, heavy-duty scrapers; hard hammer; absence of Levallois or other prepared core techniques; *Homo erectus*		

Middle Acheulian *[though the Siberian industries all appear to be related to Developed Oldowan]*	General technology: (Africa): hardhammer, standardization of blank shape and reduction techniques (e.g., Kombewa, Victoria West); more regularized biface shapes: cordiform, amydaloid, lanceolate, oval handaxes, cleavers with bits made from single flat surface scars, trihedral picks; flake and flake tools (mostly denticulates, notches, scrapers); some assemblages only core-choppers and flakes; few polyhedrons, spheroids; *Homo erectus*		
	Zasukhino, western Transbaikal 800-900 ka (Rezanov and Lbova 2002) *(LS2003)*		
	Berezhekovo-1, Yenisei, Krasnoyarsk Lake, northern Minusinsk Depression 65m Terrace: possibly up to Jarmillo reversed paleomag. **<0.9 mya** (tentative); Berezhekovo-2 L6: similar to 65m Terrace; Razlog I series (ditto)	65m Terrace: few pebble tools *(DN1999)* Razlog 1 series: EP, cobble chopper/cores, quartzite tools, rolled	*Equus hemionus, Equus* sp., reindeer, etc. *(DN1999)*
	Ulalinka, Ulalinka tributary to Maima and Ob Rivers, Gorny Altai, Siberia Lower Level: below reversed geomag. = B/M boundary, thus >690 ka (OA1982) *[since then the B/M dated at 780 ka 2004; brief Emperor reversal 420 ka; Blake 120 ka, , ergo the date would be **>780 ka** – JBH]* but (geo-flora-palaeo-carpological) only 10-13 ka. (Baryshnikov 1990) *(BG1999)* Upper Level: post-Sartan <25 ka *(OA1982)*	Lower Level: pebble core, chopping tool, scraper-like tool, flake with retouched edge; blanks created by fire heating and cooling; Upper Level: UP, flakes, prismatic core, point, small scraper, semi-lunar blade obsidian; *(OA1982)*	
	Mokhovo-1, Kuznetsk Basin, SW Siberia 500-600 ka (Foronova 2000) *(LS2003)*		

'Later Acheulian' (Africa: 300-650 ka) *[though the Siberian industries all appear to be related to Developed Oldowan]*	General technology: (Africa, SW Asia, Europe): bifaces more symmetrical and refined, cordiform, amygdaloid, ovate handaxes; some assemblages ovate dominates; greater use of soft hammer; increase use of Levallois technique, but some sites no Levallois; disappearance of core-choppers; often length of handaxes decreases; denticulates, notches, scrapers continue; few blades late contemporaneous with Final Acheulian; and during this time period prior technological modes may persist at some sites; (India): low % bifaces, high ratio cleavers to handaxes; high % flake tools; more refined and increased retouch and bifacial thinning/flaking; *Homo rhodesiensis/heidelbergensis*; late *Homo erectus*		
	Berezhekovo-1, Yenisei, Krasnoyarsk Lake, northern Minusinsk Depression L8a: (fauna, flora) **<0.5 mya** Tobol=Holstein Interglacial (270-390 ka) *(DN1999)*	L8a: EP: rudimentary flaked pebble tools, quartzite *(DN1999)*	L8a: *Mammuthus primi-genius, Equus mosbach. Saiga tatarica, Megaceros*, *Coelodonta antiquitatis (DN1999)*
	Kamennyy Log (ditto) Sukhoy Log (ditto) Razlog II series (ditto) *(DN1999)*	EP: quartzite pebble tool industry, unifacial and rare bifacial cores *(DN1999)*	(ditto) *(DN1999)*
	Verknyy Kamen (ditto) *(DN1999)*	EP: macrolithic pebble tools with large fossil bones *(DN1999)*	Horse, *Mammuthus chosaricus* (if associated with culture) implies Riss glacial age *(DN1999)*
	Diring-Yuriakh, Lena River, Central Siberia, near Yakutsk Artifacts in lag gravel bounded by Unit IIIe loess TL: 240±19, 251±21, 264±22 kyr; and Cultural Layer: Unit IIIa 267±24, and in a wedge into Unit II, 366±32 kyr, thus **>260,000 BP**, possibly between 270 and 370,000 BP *(WM1, WM2)* but Mochanov 1988 on typological basis, and geostratigraphy suggests terrace 3.2-1.8 MYA; Alekseev et al. 1990, paleomag. reversed, thus greater than **780,000** years; also TL method questions, TL on single pebble perhaps only **78k** (HD1997)(CR2001)	4033 artifacts, 500 classed as tools; pebble cores, quartz, quartzite, block-on-block (hammerstone/ anvil) technique; hammerstones, flakes, debris pile with quartz flakes and refits; retouch rare (Mochanov 1992); but Dumond 1994 and R. Klein question if not natural *(WM1999),* but 14 similar sites on Tabagan terrace, including Ust Buotoma, with discrete clusters of artifacts around anvils *(CR2001)*	(Mochanov 1988, 1993; Alekseev et al. 1990)

Final Acheulian (Africa ~150-300 ka)	**Final Acheulian (~150-300 ka):** General technology (African/SW Asia): multiple reduction strategies, Acheulian bifaces, sometimes made on Levallois flakes, Levallois and disc cores; variable presence of handaxes, cleavers as well as points, blades; termed 'Final Acheulian' or 'Intermediate' with regional variants; blades in African Kapthurin and Fauresmith and Levantine Mugharan Tradition; *archaic Homo sapiens* or *erectus* transitional to *H. sapiens*		

Early Middle Paleolithic (80-130 ka)	General technology (Africa /Southwest Asia): elongated or large, relatively thick, blades and point blanks flaked from radial, single or opposed platform cores, recurrent and some or no Levallois, with minimal preparation of striking platform; retouched points—many elongated, prismatic blades, endscrapers and burins common; no backed microliths; evidence of hafting points and blades (tangs, grooves, mastic); intra-regional point styles suggesting diverse cultural traditions; use of color pigments extensive by Mid-MSA; *archaic Homo sapiens/Homo helmei*		
	Denisova Cave, Anui River, Altai, Siberia Basal Layers 280 ka (*LS2003)*	EMP, earliest site	
	Ust'-Izhul', Yenisei River Krasnoyarsk Lake, northern Minusinsk Basin, Southern Siberia CL: geostratigraphy OIS5e soil, fauna, paleomag. (Blake event) = last interglacial, **ca. 125,000 BP** *(KY2006a, CJ2003);* CL TL-IRSL **125±5 ka** overlain by 105±10 ka *(CJ2003)* 14C (bone, charcoal 4x) >40-42 kya, but as noted above OIS5 = 73/110 to 130 ka *(DN1999)*	220 artifacts, MP, mainly unmodified or only marginally retouched primary flakes and rudimentary flaked pebbles; some Levallois prepared core typical of Mousterian; percussion marked and fractured, rhino, bison bone, mammoth tusk; mammoth tusk flaked as bipolar core; antler tools; 3 hearths *(CJ2003, DN1999)* "a short-term MP camp-/kill processing site" *(CJ2003)*	*Mammuthus primigenius, Coelodonta antiquitatis, Bison priscus, Equus* sp, red deer, marmot, etc.; hyenas and other scavengers *(DN1999; CJ2003)*
	Berezhekovo-1, Yenisei, Krasnoyarsk Lake, northern Minusinsk Depression L7, Kazantsevo, last interglacial; Kamennyy Log *(DN1999)*	L7: MP, Mousterian K.Log: Mousterian	(ditto)

	Denisova Cave, Anui River, Altai, Siberia Layers 22-14: (pollen spectrum; reversed paleomag. Blake subchron 110-120 kya) **80-130 kya** *(GT1999b)* Lowest level, TL, 171±43 to 282±56 ka, do not match fauna and archaeology; most probably OIS5e 125 ka (A. K. Agadzhinyan) *(KJ2010)* L21: 14C range 3>34 to 39 ±1 kya Entrance L9: 46±2 kya *(VS2002)*	MP *(KY2006a)*, distinctly Levallois and Mousterian, primarily unifacial retouch, few bifacial; sidescrapers, denticulates, notches, knives, retouched Levallois flakes and points; no bone, antler or ivory tools or art *(GT1999b)*	*Homo indet*. 2 teeth // Shanidar *Neanderthal*; Nearly every MP site: horse, woolly rhinoceros, bison, argali sheep, woolly mammoth, red deer, roe deer, reindeer *(GT1999b)* Nearly all MP sites in mountainous areas, high vertical relief, plateaus where canyons open into broad river alleys *(GT1999b)*

Middle MP Late Zyrian glacial or early Karga interglacial about 40-75 kya *(GT1999b)*	General technology (African, SW Asia): continuation of Early MP/MSA production of blanks by multiple reduction methods (single, double, multiple platforms, radial disc cores, Kombewa), sometimes ovoid and large flakes, regional variants of specialized prepared core techniques (e.g., Levallois, Nubian) and specialized point, blade or scraper styles (e.g., African Nazlet Khater, Aterian, Pre-Aurignacian, North African Mousterian, Ethiopian MSA, Kenya Rift MSA, Mumba Industry, Final Lupemban, Katanda MSA, Bambatan, Pietersburg, MSA-IV, Howiesons Poort, Stillbay; Levantine Nahr Ibrahim, Denticulate or 'Typical' Mousterian, Mousterian of Acheulian Tradition, Tabun C); (Australia) horsehoof bipolar cores; and general increased frequency and variety of symbolic behavior, palaeoart, 'burials'; (Central Asia/Siberia): denticulates, scrapers, Levallois blade and other end products, subprismatic blades, crested blades, bladelets; *Homo sapiens sapiens*		
	Kara Bom, open-air, Ob source, near Mongolia-Kazakhstan L9 **ESR 62,200 (cal)** *(BP2001)*	L9-7: MP, chert Levallois-like flat-faced cores; combination tools with mix of notched, denticulate, and scraper elements; 15% blade end-products: Levallois and subprismatic blades, pointed blades, crested blades, bladelets; *(BP2001)*	(Okladnikov 1983; Derevianko 2001; Derevianko & Rybin 2003; Derevianko et al. 2003) *(KY2009)*

Late MP ca. 27-34 BP *(KY2006b)* Final Karginsky Interglacial 24-30 kya *(VS2002)*	General technology: (African) continuous Levallois for production of blades as in UP and thin flakes, light-duty flake tools, or single, double platform or radial cores for flakes and blades; high % denticulates; notches, Tayac point, end- and sidescrapers; but no LSA geometrics; no backed pieces like Howiesons Poort and no bifacial points like Stillbay *(KR2004)*; (Levant Tabun B) return to triangular blanks removed from mainly unipolar convergent Levallois cores, broad-based Levallois points; short thin flakes and some blades; also radially prepared cores in upper contexts of Tabun B *(BO1995)*; (Sahul): waisted, grooved, ungrooved ground axes, ground edge tools; *Homo sapiens sapiens* and *Neanderthal*		
	Okladnikov Cave, Altai subadult humerus, 29,990±500, 34,860±360 and 37,800±450, mean age **34,190±760 BP** adult bone 24,260±180 BP (Krause et al 2007) *(KJ2007)* L3 AMS (bone) 43,300±1310; 40,700±1100 32,400±500 (Derevianko 1998) L1 AMS (bone) 33,500±700 (VS2002) UP 24,300 BP	Layer 3: Late MP, 'classic Mousterian'	*Neanderthal*, 3 long bones, including subadult humerus, DNA analysis; teeth also of Neanderthal morphology *(KJ2007)*
	Strashnaya Cave, Altai C14 (bone) 31.5±2.6 ka *(VS2002)* Ustkanskaya Cave	Late MP: 'classic Mousterian'	
	Ust-Karakol-1, open-air, Altai, east of Lake Baikal L20-18 *(KY2006a)*	Late MP, small debris concentration *(GT1999b)*	
	Khotyk 3, layers 3-4 *(KY2006a)*	Late MP, small debris concentration *(GT1999b)*	But Lbova 2006 says this is UP

	Dvuglazka Cave, Yenisei River basin L7: up to ~ 27,000 BP *(KY2006a)*	Late MP *(KY2006a)*	
	Mokhovo-2, open-air *(KY2006b)*	Late MP, small debris concentration *(GT1999b)*	
	Kurtak-4, Yenisei, above confluence with Abakan R. L17: 14C (charcoal) 31,650±520, (bone) 32,280±280 *(VS2002)*	Late MP *(KY2006b)*	
	Aryshevskoe-1 Layer 6 *(KY2006b)*	Late MP *(KY2006b)*	
	Tsagaan Agui Cave, northern Gobi, Mongolia Main Chamber **33,000 BP** *(BP2001)* 6 AMS (charcoal) 33,840±640 32,960±670 --931±65 33,777±585 33,497±600 30,942±478 BP *(OJ2000)*	Late MP, jasper, quartz Lower Grotto: Flake cores (unidirectional), flakes (general, Levallois 2.7%, Kombewa 0.5%, edge 10%, other), 6% retouched flakes, mostly scrapers; shatter 53%. Main Chamber 6-13: both loci, Levallois core technology, but with strategic modification for poor quality material; on large flake blanks, may share truncated-faceted pieces // Nahr Ibrahim Technique of Levantine Mousterian *(BO2000)*	(Derevianko et al. 2000) *(BP2001)* *[broad-faced core possible mammoth sculpture Fig. 10a - JBH]*
	Teshik-Tash Cave, Uzbekistan	Late MP: 'classic Mousterian'	Child, *Neanderthal*, left femur DNA analysis *(KJ2007)*
	Obi-Rakhmat Grotto, eastern Uzbekistan		Juvenile, 9-12 years, partial maxilla, fragmentary cranium, *Neanderthal (BS2008)*

Upper Paleolithic	Bering Land Bridge formed 50-70 cal yr BP, remained partly emergent during Karginski/MW Interval, 23-50 cal yr BP *(PV2004)*) "The very early UP assemblages of the Altai Mountains challenge the model of Near Eastern origin of UP and its spread first from Levant toward Europe, and afterwards from Europe to Siberia." *(KY2006a)* "Environmental conditions at *ca.* 43–34 ka 14C-BP corresponding to OIS 3 were cool, and a major part of Siberia was covered with tundra and forest tundra in the north, and forest and forest steppe in the south." *(KY2006b)*		
Early or Initial UP— 38-43 kya *(VS2002)*	(Africa): selectively, radial cores, bipolar/opposed platform cores, blades, bladelets, backed microliths, burins, side and endscrapers, bone points and tools, beads; with or without MSA points, not yet microblade cores; (SW Asia): hardhammer single platform reduction strategy for blade blanks, slender elongated interior blades, for El Wad points and retouched blade and bladelet blanks, not yet differentiation into distinct reduction strategies for blades vs bladelets; dominated by UP tool forms (endscrapers, burins, truncations) on blades though may be made on Levallois blanks may include MP forms (sidescrapers and denticulates) // Bohunician central Europe (43-36 ka) and Kara Bom, Altai, Siberia (43 ka) and Bacho-Kirian pre-Aurignacian, then early or proto-Aurignacian 38-32 ka *(OM2003)*; Ust'-Karakol, Baikal, ~35 ka; ivory and bone tools, small antler points, bone awls, ivory and bone retouchers *(GT1999b)*; (Australia): although Australian archaeology does not use any UP designations, innovation of multi-platform cores for blades, flakes retouched into side and endscrapers, denticulates, does occur; *Homo sapiens sapiens*		
	Baigara, Irtysh, Western Siberia **40-43,000 BP** or 40-50,000 BP *(KY2009)*	Upper Paleolithic	'Most probably' *Homo sapiens sapiens (?)*, adult male talus bone (comparable to Skhul IV), AMS 14C **>40,300** BP or **>48,100 BP** *(KY2009)*
	Kara-Bom, open-air, Ob source, near Mongolia-Kazakhstan AMS (charcoal) L6 **43,200±1,500 BP** L5 43,300±1,600 BP L4 34,180±640, 33,780±570 L3 30,990±460 'up from L3': 38,080±910 *(VS2002)* Malaia Syia, between Ob and Yenisei sources (LY)	L6: Early UP: chert subprismatic blade cores; 42% blade products; 'Typical IUP, with Levallois-like core technology specialized toward blade production'; 'most striking parallels with western Eurasian sites of Bohunician, 'flat cores' and 'cores with lateral crests', Turkey, Syria and Levant IUP – except for high % MP-like sidescrapers, notched-denticulate tools' L5-3: UP *(BP2001)* large open site, lined hearths, pits, stone rings of dwellings *(GT1999b)*	(Okladnikov 1983; Derevianko 2001; Derevianko & Rybin 2003; Derevianko et al. 2003) *(KY2009)* "Nearly all of the known early UP occupations are open sites situated on high terrace-like landforms overlooking broad floodplains" *(GT1999b)*

	Denisova Cave, Altai, Ob source, Western Siberia Layers 11-9: around 43 kya *(KY2009)* L11 (Main chamber), lowermost 11.3 14C **48,650±2380** uncal. BP 11.2, infinite >37,325; 11/10 29,200±360 *(KJ2010)*	Early UP artifacts L11: MP-like foliate bifaces, sidescrapers, notches, Mousterian and Levallois points + UP-like bone implements and adornments; not mixed levels, typical of EUP at Kara-Bom and Ust-Karakol, latter having no MP level *(KJ2010)* small open site, unlined hearths, distinct work areas *(GT1999b)*	L11.2 (Eastern Gallery, correlated to Main by geology and archaeology) *Homo indet.,* juvenile phalanx, mtDNA analysis, shares common ancestor with Neanderthal and *Homo sapiens sapiens* at 1.0 MYA, post 1.9 MYA out-of-Africa and before *Homo heidelbergensis* or *rhodesiensis* out-of-Africa circa 300-500 ka, and *H.s.s.* , 50 ka [!] *(KJ2010)*
	Mamontovaya Kurya, Usa River, Urals, Komi Republic, Russia **35-40,000 BP** Unit 1: 21 14C (tusk) 14C 36,630+1310-1130 AMS 2x, mean **34,655±570 BP** (uncal, add 2k) (mammal bones) mean **35,000 BP** (uncal, add 2k) Unit 1: 9 OSL 34,000±2000 BP 41,000±3000 BP 48,000±3000 BP Overlying deposits, 8 AMS 31,400-23,800 BP; Unit II OSL 27,000±2000 BP Unit III OSL 19,800±2100 BP *(SJ2003)*	Unit 1: Few stone artifacts, 1 scraper, 1 slate bifacial tool interpreted as knife, unmodified flakes; resembles eastern Europe MP Mousterian and UP, so not diagnostic; Mammoth tusk with human made incision marks made by chopper but appear not accidental to chopping, but organized in rows in regular and repeatable pattern, thus infer "made intentionally with artistic or symbolic meaning" *(SJ2003)* *(PP2001)*	123 mammal bones, primarily *Mammuthus primigenius*; but also *Rangifer tarandus, Canis Lupus, Equus caballus*; no unambiguous cutmarks; no hominid fossils, so unknown if *H. s. s*. or Neanderthal *(SJ2003)*
	Malaya Syia, Yenisei River basin AMS (bone) 29,450±420 (Kuzmin & Orlova 1998) 14 C (bone) 24-30 kya (charcoal) 20.3 kya *(VS2002)*	UP	

	Makarovoa-4, Lena, west of Lake Baikal, Siberia AMS **ca. 39 kya** *(KY2006b)* Podzvonkaya *(KY2006a)* Arembovskii	Early UP *(KY2006a)* small open site, unlined hearths, distinct work areas *(GT1999b)*	
	Kamenka-1, east of Lake Baikal, Siberia 14C **40.5 kya** *(KY2006b)*	Early UP *(KY2006a)* large open site, lined hearths, pits, stone rings of dwellings *(GT1999b)*	
	Varvarina Gora, Angara River, east of Lake Baikal, Siberia AMS **>35 kya** *(GT1999b)*	Early UP *(KY2006a);* stone 'semi-disk' with red ochre, possibly a fragment of pendant *(GT1999a)* large open site, lined hearths, pits, stone rings of dwellings *(GT1999b)*	
	Voennyi Gospital, Ushakovska River confluence with Angara River, Irkutsk, west of Lake Baikal, Siberia C14 (horse bone) 29,700±500 BP *(GT1999a)*	Early UP, quartz cobble chopper, 2 cores, 2 sidescrapers on flakes, endscrapers on jasper blade, blade, flakes (Medvedev 1998); incised ivory spheroid; several ivory and bone pendants with biconical drill holes; bison horn ring or bracelet, ivory awl, rod (Cherskii 1872) *(GT1999a)*	Woolly mammoth, giant elk, red deer, reindeer, bison, Kovalevski's horse (Cherskii 1872; Larichev 1969; Medvedev et al 1990) *(GT1999a)*

Early or Proto-Aurignacian (38-32 kyr BP), western most, perhaps origin area of Aurignacian (Iran, Uzbekistan, Afghanistan) (OM2003)	Ust'-Karakol, Altai, east of Lake Baikal L10: 14C (charcoal) 35,100±2,850 (Derevianko 1998) (VS2002) **35 kya** *(KY2006b)*	L11-9: Early UP artifacts *(KY2006a)* Early Aurignacian *(OM)*	
	Tolbaga, east of Lake Baikal, Transbaikal, Siberia 2 AMS 29,200±1000 and 25,500±260 BP, suggesting repeated occupations **25-35,000 BP** (Goebel & Waters 2000) 4 C14 (bone) range from 26,900±225 to 34,860±2,100 BP *(GT1999a)*	Early UP, 10,000 artifacts; flat-faced cores for production of blades, flake-blades, and flakes, unifacial retouch; possible carving of bear's head on woolly rhinoceros vertebrae (Vasil'ev et al. 1987) *(GT1999b);* 7 possible dwellings, 1-12 hearths each; 3 pits (Konstantinov 1991) *(GT1999a)*	Steppe species, horse, woolly rhinoceros, Kiakhta antelope, Mongolian gazelle, argali sheep, 1 reindeer (Ovodov 1987) *(GT1999a)*
	Masterov Kliuch, Khilok River, east of Lake Baikal, Siberia Component 1: AMS (bone) **29,860±1000** **32,510±1440 BP** *(GT2001)* Sannyi Mys	Early UP: flat-faced core and blade technology; retouched blades and flakes, knives, denticulates, endscrapers, burins, gravers; local, embedded lithic resource use typical of EUP of inner Asia 30-42K BP *(GT2001)*	*Equus* sp.; *Marmota* sp.; large mammal indet. *(GT2001)* No hominid material, so either *H. s. s*. or *H. s. a (PP2001)*

	Yana RHS, Yana River, northeastern Siberia **30 kya (calibr.)** AMS 14C 27,300±270 on horse mandible with flakes + rhino foreshaft 27,440±210 +ivory foreshaft 28,250±170 + multiple 14 C dates *(PV2004)* **31,000 cal BP** cold period *(FS2006)*	UP, on slate and quartz pebbles; cores, chopper and chopping tools; bifacial and unifacial tools, incl. pointed pieces, sided and angle scrapers, endscrapers, chisel-like tools, retouched flakes, 1 hammerstone, flakes; rhino foreshaft with beveled ends // Clovis; 2 mammoth ivory foreshafts; awl on wolf metatarsal; small red ochre pieces; no blades 'worked piece of quartz' *[possible mammoth sculpture - JBH]*	*Coelodonta antiquitatis* (Wooly rhinoceros*); Mammuthus primigenius*; *Canis lupus; Equus caballus*; *Rangifer tarandus*; *Bison priscus*; *Lepus tanaiticus* (hare); plus associated, *Ovibus moschatus*; *Alopex lagopus; Lusthera spelaea* (lion); *Gulo gulo* (wolverine); brown bear; birds; primary game = reindeer, horse, birds

Middle UP – 20-30,000 BP (uncal) Final Karginsky Interglacial 24-30 kya *(VS2002)*	(Africa): blade-and-burin industry, punched blades, backed bladelets, burins, endscrapers; (SW Asia): differentiation into distinct reduction strategies for blades versus bladelets, burins, backed blades, no remnants of Mousterian lithics; (India): blade-based; prismatic cores, scrapers, increase of burins and backed blades, microlithic, bifacial and tanged points, but standardization of retouched forms not comparable to Aurignacian or other UP Europe; ostrich eggshell in over 40 sites dating 25-40 ka *(BR2003)*; (East Asia): retouched points, blades, bladelets, small and microlithic tools; bone tools, soft hammer, more art; (Central Asia and Siberia) nearly all mid-UP sites are on open alluvial terraces overlooking estuaries of river and stream confluences; lithics characterized by subprismatic blade and flake primary reduction; variable blade size 10 cm to bladelets 2-3 cm and <1 cm wide; wedge-shaped microblade cores and their removals are absent (*GT1999b);* 'Classic' Aurignacian, 34-28 kyr BP *(OM2003)*; (Australia): although Australian archaeology does not use any UP designations, innovation of blade and burin cores, does occur; *Homo sapiens sapiens*		
(LGM = ~ 18 kya; 24,000 cal yr BP) (*GT2003)* Sartan Glacial 22-25 kya	Ust'-Karakol-1, Altai, east of Lake Baikal L9 14C (charcoal 3x) 29,720±360, 29,860±355 33,400±1285 (Derevianko 1998) *(VS2002)*	**Late UP**: microblade "Represent the earliest evidence of microblade technology in northern Eurasia" *(KY2006a)*	small open site, unlined hearths, distinct work areas *(GT1999b)*
	Anyi-2, Altai, east of Lake Baikal L12: 14C 26.8, 27.9 kya L9: 27 kya L8: (charcoal 3x) 20,350±290, 22,610±140, 24,205±420 (Derevianko 1998) *(VS2002)*		
	Byzovaya, Pechora River, Komi Republic, Russia 38 14C dates: range 26-29,000 BP (*SJ2003)* **mean 28.6 kya = 34.0 cal** *(HH2010)*	EUP, 400 artifacts; similar to Sungir and 'eastern Szeletian with Aurignacian Traits' *(PP2001)*	4000 animal bones, mainly mammoth; similar to Sungir *Homo s. s.* with UP ≥28k, Kostenki IV H. s. s. 30k *(PP2001)*
	Shestakova, Ob source area AMS (bone) L24 24,590±110, 25,660±200 L22 (3x) 22.2-23.3 L19 (charcoal 3x) 23,250±110, 23,290±200, 20,800±450 (bone) 22,340±180/170 kya L17 (bone) 21,560±100 (Zenin et al 2000) *(VS2002)*	UP	

	Achinsk, west of Yenisei and Angara confluence, Siberia	Middle UP, small incised ivory baton, calendar? (Larichev et al 1987) *(GT1999b)*	
	Kurtak-4, Yenisei, above confluence with Abakan R. Layer 1, 9 14C/AMS (charcoal) 24.5-27.0 kya Acceptable **23-26 kya** *(GK2009)*		
	Sabanikha, Yenisei (Lake) 5 14C/AMS (charcoal, bone) pooled mean **25,990±130** BP *(GK2009)*		
	Kashatanka-1, Yenisei Lake 14C/AMS mean **21,700±190** BP (GK2009)	L11: MP, blade industry *(DN1999)*	

	Mal'ta, Angara River, west of Lake Baikal, Southern Siberia	Middle UP: narrow bladelets detached from small prismatic cores, intensive reduction to economize material *(KY2009)* 29 female figurines *(DH1979)* countless beads, pendants, badges; carvings of swan or goose, ptarmigan (or loon), wolverine (Gerasimov 1931, 1964; Abramova 1995; Medvedev 1998) *(GT1999b)*	Double child burial, 19,880±160 BP (Richards et al., 2001) *(KY2009)*
	Buret', Angara River, west of Lake Baikal, Southern Siberia	Middle UP, 5 female figurines *(DH1979)*	
	Igeteiskii Log, Angara River (Lake), west of Lake Baikal Ui-1 all 14C 20-25,000 BP *(GT2002)*	Middle UP: narrow bladelets detached from small prismatic cores (Goebel 1999; Vasil'ev 1993) *(GT2002)*	
	Ust'-Kova, Lower Angara River, NW of Lake Baikal	Middle UP, ivory carving woolly mammoth, several flat bone beads and tooth pendants *(GT1999b)*	
	Chikhen Agui, central Mongolia L3: 1 AMS (charcoal) **27,432±872 BP** with humate fraction 21,620±180 BP and (bone) associated open-air component-2 **30,550±410** BP *(BP2001)*	Middle UP: chert, small Levallois-like bidirectional blade cores with opposed striking platforms; 2 Levallois flake or point cores; equal % Levallois blades and bladelets; no evidence of different reduction strategies for blade/bladelet blanks *(BP2001)*	
LGM Hiatus 18-19,000 BP (uncal) *(GT2002)* but contra, no hiatus of settlements, at least 14 14C dated sites *(VS2002)*	But GISP2 Hulu Cave: coldest episodes last 40k: ca. 36,000 cal BP (32,000 rcbp); 33,000 cal BP (28,000 rcbp); 32-29,000 cal BP (28-25,000 rcbp), and 24,000 cal BP (20,000 rcbp). At ca. 18-19,000 rcbp or 21-22,000 cal BP (Hughen et al 2004), it was quite cold but not measurably colder than at ca. 12,500 or 16,000 cal BP and not nearly as cold as at ca. 24-30 cal BP. Longest sustained cold with no warming oscillation is 4000 years from 27,500 to 23,500 cal BP (ca. 24,000-20,000 rcbp) *(FS2006)*		

Late UP— **< 20,000 BP (uncal)**	**Late UP:** (SW Asia): multiple reduction strategies (opposed platform for large blades; single platform for bladelets); soft-hammer for 'classic' microblade and bladelet products; retouched bladelets; blanks into burins and endscrapers; small microlithic tools; bone tools, soft hammer, more art; (Africa): microblade industry, dominated by backed bladelets, endscrapers and burins made on flake by-products of bladelet manufacture; (India): prismatic cores for blades, microlithic blade and bladelets, geometric lunates and triangles; beads, engraved geometric signs; (Australia): although Australian archaeology does not use UP designations, innovation of multiple reduction strategies, points, backed microblades does occur; (Central Asia and Siberia) microblades are typically no more than 2 cm long and 1 cm wide, serially removed from wedge-shaped microcores and inset into osseous points; composite projectile technology; bone needles, awls, beads common *(GT2003); Homo sapiens sapiens*		
	Ust'-Ul'ma-I 14C 19.3 kya, but needs more dates *(GT1999b)*	Late UP: wedge-shaped cores and microblades;	
	Krasnyi-Iar-1, Angara River (Lake), west of Lake Baikal L6 14C 19,000±100 kya, but only 1 *(GT1999a)*	Late UP: wedge-shaped cores, microblades, large quartzite cores, scrapers, ostrich eggshell ornaments (Medvedev 1998) *(GT2002)* 1 female figurine (Petersfels type) (Abramova 1962) (DH1979)	Wooly rhinoceros; hearths with combustible shale rather than wood, suggests LGM cold *(GT1999a)*
	Ust'-Menza-2, Chikoi River, SE of Lake Baikal (border central Mongolia) Upper: 14C 14,800 to 16,900 Lower 2 components: 14C **17,600±250 BP** **16,980±150 BP** (Konstantinov 1994)	Late UP: wedge-shaped cores and microblades; hearths in dwellings *(GT2002)*	Red deer
	Studenoe-2 (ditto locale) Component 4/5: AMS **17,885±120 BP** Component 5: AMS **17,165±115 BP** *(GT2002)*	Late UP: wedge-shaped cores and microblades; hearths in dwellings *(GT2002)*	Red deer
	Listvenka, Yenisei River, above confluence with Angara River at Krasnoyarsk CL19 2 (charcoal, bone) mean **17,030±190** BP CL12 (bone, charcoal) Mean **13,350±130** BP *(GK2009)*	Late UP:	

	Chernoozer'e-2, Ob 14,500 BP or 12,000 BP (Petrin 1986) *(GT2002)*	Late UP: wedge-shaped cores and microblades; *(GT2002)*	
	Maininskaia East, Yenisei, above confluence with Abakan River L5: 14C (bone) mean **16,370±120** BP L2-1 (bone) mean **12,180±90 BP** (*GK2009)* Maininskaia Main Kokorevo-4b, Novoselovo-7 all 14C 15-15,500 BP	Late UP: wedge-shaped cores and microblades; clay human statuette (Drozdov et al. 1990) *(GT2002)*	Each layer and site dominated by different species, either reindeer, Siberian mountain goat, red deer or bison. E.g., Novoselovo 6, 7: reindeer; hare high % some sites
	Kurtak-3, Yenisei, above confluence with Abakan R EB1, 2, 3: 14C pooled mean **14,370±70** BP (GK2009)	Late UP:	
	Oznachennoe-1, Yenisei, above confluence with Abakan River CL (bone) range 13.8-15.3 kya *(GK2009)*	Late UP:	
	Afontova Gora-2, Yenisei River, above confluence with Angara River at Krasnoiarsk 3 AMS (charcoal) mean **13,920±60** *(GK2009)*	Late UP:	*Homo sapiens sapiens*, 1 adult, 1 juvenile; only hominid yet found in a Late UP site
	Ui-2, Yenisei, above confluence with Abakan River AMS (bone) mean **12,900±50** *(GK2009)*	Late UP:	
	Ignatevskaia Cave, southern Urals Cultural layer: C14 14 kya *(GT1999b)*	Cave paintings, mammoths, horses, human figures (Petrin 1992; Abramova 1995) but association to culture layer uncertain *(GT1999b)*	

	Verkne-Troitskaya, Yakutia 18,000 BP *(VS2002)*	Late UP	
	Khaergas Cave, Sakha Republic (Yakutia), Eastern Siberia 16,000 BP	Late UP: wedge-shaped cores and microblades; *(GT2002)*	
	Suvorovo-4, Amur 15,000 BP Gorbatka-3 <13,500 BP	Late UP: wedge-shaped cores and microblades; *(GT2002)*	
If Nenana and Denali are different cultural traditions, two waves from Asia: Nenana ca. 11-12,000 BP; then Dyuktai to Denali, 10-11,000 BP; Northern Paleoindian with projectile points in N and W Alaska 10-12,000 BP at Mesa, Bedwell, Hilltop and Tuluaq *(VS2002)*	Dyuktai Cave, Aldan River, tributary Lena, Sakha Republic (Yakutia), Eastern Siberia Unit 7a: 14C (wood & charcoal) 12,100±120, 13,200±250, (mammoth bone) 12,250±250 kya Unit 7b: 14C (hearth charcoal) 13,070±90, 14,000±100; 30 cm below, 12,690±120 BP, thus range 13-15,000 years or **~14,000 BP** Unit7c below, 13,110±90 *(MY1996)* Avdeikha 13,000 BP *(GT2002)*	Late UP: Unit 7a: 16 wedge-shaped cores (12 preforms) and microblades; 3flat unifacial subprismatic, 2 prismatic; 60 blades, 5 ski spalls, 2 burins, 2 knives on blades, 10 bifacial knives, 3 bifacial projectile points, 3 backed blades, 4 blade inserts, 2 sidescrapers, 4 scrapers on flakes and blades, 1 abrader; 8 bone artifacts, 4 long bone fragments showing incisions and cut marks Unit 7b: wedge-shaped and prismatic blade cores; 82 blades, 2 crested blades, burins, knives Unit7c, 8, 9 similar *(MY1996)*	Unit 7a: *Mammuthus primigenius*; bison, horse, reindeer, moose, snow sheep, wolf, red fox, arctic fox, hare, squirrel, rodents, birds, fish; Unit 7b: Mammoth, bison, horse, moose, snow sheep, Panthera sp., red fox, arctic fox, squirrel, marmot, beaver, hare, etc. *(MY1996)* 'There is little question but that Dyuktai culture (core-and-blade and biface industry in a context that included mammoth and other large fauna) people were successful hunters of these large animals, and that eventually the Dyuktai people found their way to America" *(MY1996)*
	Berelekh, Berelekh River tributary to Indigirka River, Sakha Republic (Yakutia), Eastern Siberia CL C14 **12.9-13.4 kya** Represents final stage of Dyuktai culture (Vereshchagin & Mochanov 1972) *(MY1996b)*	Flake core, flint blades, retouched blades and blade-like flakes, bifacial knives or spear point fragments, chisel, waste flakes; ivory and bone tools, some incised with crisscross lines; 4 stone pendants and nearby 5th of jadeite, biconical drills, one of white calcite bears 19 short parallel notches, one of pyrophillite, shows 5 similar notches; local collector showed mammoth tusk fragment engraved with image of mammoth *(MY1996b)*	'Mammoth cemetery': mammoth 98.6%, woolly rhinoceros, bison, horse, reindeer, cave lion, wolf, wolverine, hare. CL: possible midden: *Mammuthus primigenius*, rare bones of bison or horse, reindeer, hare, partridge, fish *(MY1996b)*

cal yr = + 1,500	Ushki-1 and -5, Ushki Lake, Kamchatka River, maritime SW Beringia C7 **12,900 to 13,130 cal** BP C6 **11,955 to 12,355 cal** BP *(GT2003)* 10,700 BP *(GT2002)* C7 14C 16,800 cal BP C6 14C 12,600 cal BP (Dikov 1977; Dikov & Titov 1984) Ushki dates are suspect *(VS2002)*	C7: 2 hearths; simple flake and blade industry, small bifacial stemmed points on flakes, knives, drill, burins, leaf-shaped biface; 11 drilled beads/pendants *(MY1996b)* perhaps affinities to other early non-microblade complexes (Nenana, Alaska, 12,800 to 14,000 cal yr BP) *GT confirming Dikov)* C6: wedge-shaped microblade cores, microblades, screblo-burnisher; small leaf-shaped bifaces; side and end scrapers, burins hearth; dwelling; 3 drilled beads/pendants; sandstone slab incised parallel lines and 'tent-like huts' *(DN1996)* (suggests affinities to Dyuktai and Denali) *(GT confirming Dikov)*	"Beringia and the Americas were colonized during the late glacial, 14 to 12 kya" *(GT1999b)*

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