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Sebastian J. Pfeifer

Projectiles for Kids – New Evidence of Child and Youth Versions of Magdalenian Osseous Points from the Teufelsbrücke Cave Site (Thuringia, Germany)

Abstract

The Magdalenian Teufelsbrücke cave site (Thuringia, Germany) yielded a big inventory of osseous projectiles that was reexamined by the author. According to the metric data, the great majority of the points, having a mesial width of 7–10 mm, are comparatively delicate. That can be due to functional requirements or because the quality of the locally available raw material – in most cases reindeer antler – did not allow for making them bigger. Additionally, there is a group of points that are even smaller, actually too small to be used effectively for horse and reindeer hunting. Against the background of similar specimens in other Magdalenian inventories, these particularly tiny points are interpreted as child and youth weapons. The ethnographic record shows the ubiquity of small-scale projectiles in hunter-gatherer societies: To become a good hunter, the use of projectile technology had to be trained from early childhood on and thus the weapons ‚grew up' with their owners.

Keywords: antler, points, technology, reindeer, foreshaft, Late Upper Paleolithic, Europe

Neue Belege für Kinder- und Jugendausführungen magdalénienzeitlicher Geschossspitzen von der Höhlenfundstelle Teufelsbrücke (Thüringen, Deutschland)

Zusammenfassung

Die bekannte magdalénienzeitliche Höhlenstation Teufelsbrücke (Thüringen, Deutschland) erbrachte ein umfangreiches Inventar organischer Projektile, das durch den Verfasser neu aufgenommen wurde. Die metrischen Daten zeigen, dass die große Mehrheit der Spitzen mit einer medialen Breite von 7–10 mm vergleichsweise zierlich ist. Das kann mit funktionalen Anforderungen zusammenhängen oder aber mit der Qualität des lokal verfügbaren Rohmaterials Rengeweih, die keine größeren Spitzen zuließ. Darüber hinaus gibt es eine Gruppe von Spitzen, die noch kleiner ist, tatsächlich zu klein, um Pferde und Rentiere damit zu jagen. Vor dem Hintergrund ähnlicher Vertreter in anderen Magdalénieninventaren werden diese besonders kleinen Spitzen als Kinder- und Jugendversionen interpretiert. Der ethnografische Befund zeigt, dass Miniaturversionen von Projektilen in Wildbeutergesellschaften weit verbreitet sind: Um ein erfolgreicher Jäger zu werden, musste die Nutzung von Projektiltechnologie von klein auf geübt werden und die Waffen wurden gemeinsam mit ihren Besitzern ‚erwachsen'.

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Schlüsselwörter: Geweih, Geschossspitzen, Technologie, Rentier, Vorschaft, Spätes Jungpaläolithikum, Europa

Introduction

Being directly connected to the sphere of hunting, projectiles are central components of hunter-gatherer toolkits and thus comprise a lot of information. A lance, dart, harpoon, or arrow is always part of a complex system that is characterized by multiple interactions of the conditioning parameters raw material availability, prey species, technological knowhow and tradition: „There is no doubt that functional and organizational concerns structure and limit the techniques used in the manipulation of particular raw materials, as well as the design of serviceable projectile weapons. Beyond the empirical concerns of availability, workability, use-efficiency, durability, and maintainability, cultural choice must be considered as a factor in the selection of individual media for projectile point production." (Knecht 1997, 207). Additionally, projectiles frequently play an important role as media of social communication (Höneisen 1993; Weniger 1987). To study their projectile technologies therefore has great potential to contribute new insights to our understanding of hunter-gatherer societies.[1]

Concerning the archaeological dimension of projectile technology, particular interest has traditionally been shown to the European Magdalenian: Points of ivory, bone and

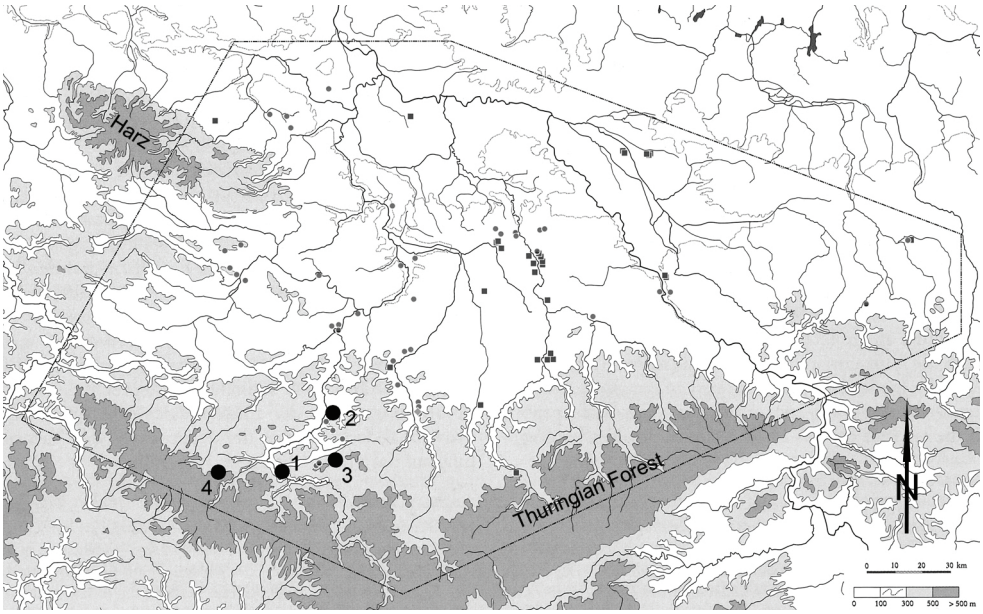

Fig. 1: Late Upper Paleolithic and Late Paleolithic sites in Thuringia, Eastern Germany. 1: Teufelsbrücke; 2: Oelknitz; 3: Kniegrotte; 4: Garsitz-Bärenkeller. Dot: Magdalenian; rectangle: Azilian (after Küßner 2009).

1 e. g. Bohr 2000; Knecht 1997; Langley 2016; Stodiek 1993.

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reindeer antler are possibly the most characteristic and significant feature of that late Upper Paleolithic techno-complex.[2] Inventories of several dozen or even hundred pieces are not uncommon.[3]

For Central Europe, the present federal state of Thuringia in Eastern Germany is a very important research region (Küßner 2009) (Fig. 1). The sites of Oelknitz (Gaudzinski-Windheuser 2013), Kniegrotte (Höck 2000), Garsitz-Bärenkeller (Feustel et al. 1971) and Teufelsbrücke (Feustel 1980) are known for their rich and well preserved organic inventories (Maier 2015, Fig. 6.46–48). The osseous projectiles from the latter site were reexamined by the author in the course of a comprehensive study focusing on Magdalenian osseous projectile technology.

The site

The Teufelsbrücke is located 400 m above sea level on top of the Gleitsch mountain, 4 km SSE the city of Saalfeld in Thuringia (Fig. 1). The present-day archaeological site is the relic of a big cave in the Upper Permian whose roof has collapsed (Feustel 1980, Pl. I–III).

Some undocumented activities of amateur researchers between 1964 and 1970 yielded find material from the Bronze and Iron Age and the Middle Ages but also revealed Pleistocene sediments and Paleolithic artifacts (Feustel 1970, 239). The thorough excavation of the site was then carried out in 1970–1972 under the direction of Rudolf Feustel (1980). 120 m^2 were investigated in overall 13 weeks (ibid. 9). Four Upper Paleolithic layers with corresponding artifacts could be observed that by petrographic analysis were divided into an older (layer 1 & 2) and a younger (layer 3 & 4) complex (ibid. 10; 13; Fig. 4; 5). The sediments of layer 3 and the lower part of layer 4 were red-colored by ochre and yielded by far most of the find material. Hence that complex was interpreted as main cultural layer, or „*Hauptkulturschicht*“ (ibid. 11). However, since pronounced dislocation/mixing by cryoturbation, solifluction and human activities were observed already during the excavation works (ibid. 12; Feustel 1970, 239) and since the hurried campaign was only very sparsely documented, some doubts on this schematic stratigraphy might not be unfounded.

Six AMS ^{14}C measurements[4] on modified horse and reindeer bones cover a time span of 13,000–12,600 yrs BP hence the end of Greenland Isotope Stadial GS-2.1a (Housley et al. 1997; Street 2000; Maier 2015, Tab. A.6):

- ***Layer 1***: 15,520 ± 260 yrs cal BP (OxA-5725)
- ***Layer 2***: 15,370 ± 210 yrs cal BP (OxA-5722), 15,770 ± 400 yrs cal BP (OxA-5724), 16,010 ± 440 yrs cal BP (OxA-5723)

2 Hahn 1993, 331 ff.; Langley 2015, 341; Maier 2015, 125; Pétillon 2016, 108; Stodiek 1993, 156.

3 e. g. Allain et al. 1985, 101; Cupillard/Welté 2006; Höneisen/Peyer 1994; Le Tensorer 1998; Mania 1999; Pasda 1994; Pétillon 2006; Pfeifer 2016; Stahl Gretsch 2006; Tinnes 1994; Valoch 2001.

4 Four conventional ^{14}C dates from the 1970s (Feustel 1980, 114) were not factored in since the reliability of such early measuring has to be doubted.

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- ***Layer 3***: 15,100 ± 270 yrs cal BP (OxA-5726). Additionally, a horse bone from layer 3 gave a preboreal date of 11,640 ± 290 yrs cal BP (OxA-5727).
- For **layer 4**, no AMS dating was carried out.

The absolute dates seem to correspond to the petrographic statement that the sediment package of layer 3 is younger than 1 and 2. But a single Magdalenian date from layer 3 (OxA-5726) is not evidence enough to conclude that the find material in the upper layers is younger as well. Possibly, the occupation history of our site is beyond ^{14}C resolution.[5]

The mammal remains comprise horse, reindeer, hare, saiga, ibex, marmot, arctic fox, bear (all these species with postulated man-made impact fractures or cut marks) as well as bovine, roe deer, wolf, red fox, dog, cave lion and leopard.[6] Some incisions on pebbles possibly depict wooly rhino and mammoth (Feustel 1980, Pl. XVIII). A few pieces of mammoth ivory were also recorded (ibid. Fig. 15). By individual numbers, hare, reindeer and horse were the most important prey species (Musil 1980, 14 f.).

The extensive lithic and osseous artifact inventory from the Teufelsbrücke (Feustel 1980, 28) can without doubt typologically be attributed to the Central European Magdalenian (Küßner 2009, 185; Maier 2015, Tab. A.1; Street 2000, 62).

Osseous projectiles

109 osseous projectiles were recorded during the reexamination of the material by the author at the Thuringian Archaeological Service Weimar (Tab. 1). Osseous projectiles were present only in the upper horizon: 72 % of the stratified specimens come from the red-colored „*Hauptfundschicht*“ layer 3. That coincides with the distribution of the lithic and faunal remains (Feustel 1980, 11; 47 f.) and – against the background of the absolute dates (see above) – can be the result of several occupation episodes within a comparatively short time period.

Tab. 1: Osseous projectiles from the Teufelsbrücke. N = 109.

layer 1	layer 2	layer 3	layer 3–4	layer 4	unstratified
-	1	54	4	16	34

The category of unstratified material very likely also comprises a substantial number of finds from the preceding amateur campaigns (Feustel 1970, 239).

The preservation is very good, regularly retaining a polished surface as well as use and tool marks. The spongiosa though is often decayed – a very characteristic phenomenon of antler artifacts (Pfeifer 2016, 64). The material is heavily fragmented by both use and

5 Compare Gaudzinski-Windheuser (2013, 380) for the case of Oelknitz.
6 Housley et al. 1997; Musil 1980; Street 2000; Turner 2003.

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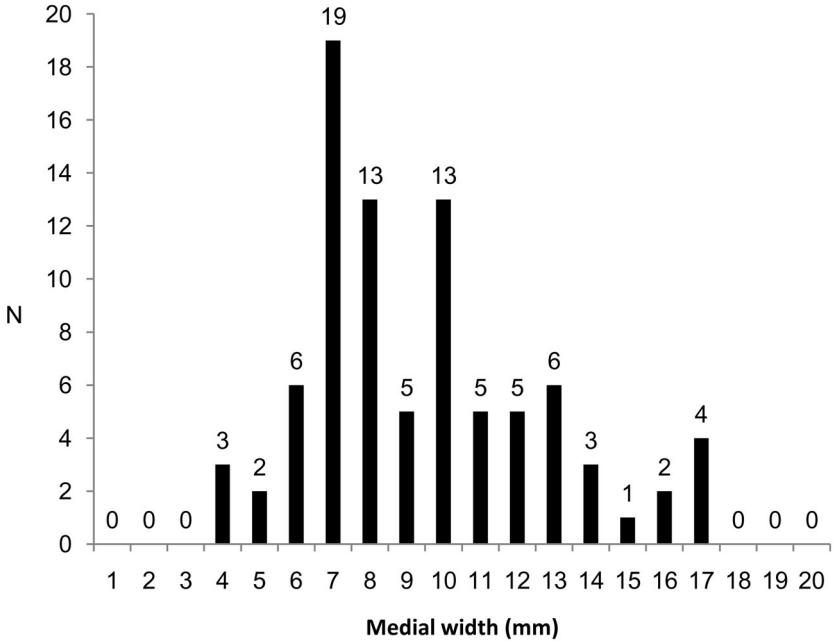

Fig. 2: Complete mesial widths of the osseous points. N = 87 (Author).

Tab. 2: Types of osseous projectiles. N = 109.

points	barbed points	half-round rods	foreshafts[7]
104	3	1	1

sediment pressure (Fig. 2). Yet, it was not possible to re-fit neither fresh nor old breaks.

95.4 % of the projectiles are points (Tab. 2). A round-oval cross section strongly dominates. 19 double beveled and ten single beveled bases are preserved and 20 points show longitudinal grooves on the upper and lower side for inserting lithic bladelets (comp. Höck 2000, 134; Pl. 31; Photopl. 6; Pétillon et al. 2011, Fig. 6; 7; Stahl Gretsch 2006, 112; 113). In 99 cases, the raw material is antler. Four mesial fragments are of ivory and one fragment is possibly of bone. The working of antler, bone and ivory at the site itself is proven by numerous work pieces and pre-forms.

To assess the size of the points, the complete mesial widths were measured (Fig. 2). It is conspicuous that the cluster of 7–10 mm, comprising the majority of the measurable pieces (n = 50; 57.5 %), is sharply marked off to both the smaller and the bigger projectiles.

7 Feustel (1980, Fig. 12.4; 12.5; 8.2) mentions three foreshafts at the Teufelsbrücke and the author followed him in his work on Magdalenian foreshafts while raising some doubts about the integrity of the pieces at the same time (Pfeifer 2012, 44 f.). The reexamination of the material now showed that two of the pieces actually are not foreshafts but broken simple points. Only one specimen (Inv.-No. 642/69 – Pfeifer 2012, Fig. 3.1) has intended basal and distal bevels.

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One way to explain that observation is functional ideal: Possibly, the hunters at the Teufelsbrücke regarded osseous points 7–10 mm wide as most suitable for hunting horse and reindeer. Yet, compared to other Magdalenian inventories[8], the Teufelsbrücke points appear rather skinny.

Another explanation could be found in the quality of the raw material. 73.5 % (n = 72) of the measurable point fragments have a compacta thickness of just 4–6 mm. Compared, for instance, to the Magdalenian Petersfels cave site (Baden-Wuerttemberg, Germany) where only 55.7 % (n = 196) of the antler points have a compacta thickness of 4–6 mm but 35.2 % (n = 124) of 7–8 mm (Pfeifer 2016, Fig. 79), this is rather inferior raw material. Thus the Teufelsbrücke hunters were maybe forced to make their points a bit smaller to avoid a too big portion of the weak spongiosa. In 26 cases (29.9 %) the mesial width exceeds 10 mm; four specimens are even 17 mm wide. These few sturdy points which are not necessarily made of more compact raw material might reflect personal preferences of their owners or an adaptation to bigger prey species (Pfeifer 2016, 60; Stodiek 1993, 201).

Child and youth versions of projectiles?

The group of the very small points arouses particular interest: 11 pieces have a mesial width of just 4–6 mm (Fig. 3). Since the find material is heavily fragmented, of course, it can be asked whether these pieces really are projectile points. From the numerous needles at the Teufelsbrücke (Feustel 1980, Fig. 10.1–11), however, they clearly differ by their round cross section and the greater diameter. Moreover, all certain needle fragments are most likely of bone and not of antler.

Another noteworthy objection is that a small fragment's position within the original point cannot always be determined with certainty: A distal part of a very long, barely tapering point can very much resemble a mesial part of a much smaller projectile. That methodical problem always has to be taken into account, especially when dealing with heavily fragmented material. Yet, some specimens in our inventory still have their single or double beveled bases preserved (Fig. 3.1; 4; 6; 8; 10; 11), proofing that tiny versions of osseous points doubtlessly exist (see also Stodiek 1993, Fig. 154; 155). None of the small points bears longitudinal grooves to support the insertion of backed bladelets.

Other Magdalenian inventories with very small points are reported e. g. from Andernach-Martinsberg, Gönnersdorf, the Petersfels, Isturitz, the Kniegrotte, the Pekárna cave and Veyrier[9] (Tab. 3).

Very probably, the Magdalenian osseous points were parts of throwing darts meant to be launched with atlatls.[10] Their typical osseous end pieces are rare but common finds in Western Europe (Stodiek 1993, Tab. 12; 2009, 192) whereas they are almost absent in the

8 Guthrie 1983, 285; Pasda 1994, 68; Pétillon 2006, Fig. 33; Pfeifer 2016, Fig. 52; Stahl Gretsch 2006, Fig. 178; Stodiek 1993, Fig. 156–159; Tinnes 1994, 157.

9 For both the Kniegrotte and Veyrier (Dép. Jura, France), only qualitative information are available since concerning the measured widths it was not differentiated between basal, mesial, or distal fragments (comp. Höck 2000, 133; Fig. 66; Stahl Gretsch 2006, Fig. 178).

10 Guthrie 1983; Pétillon 2005; 2006; Pétillon et al. 2011, 1276; Stodiek 1993.

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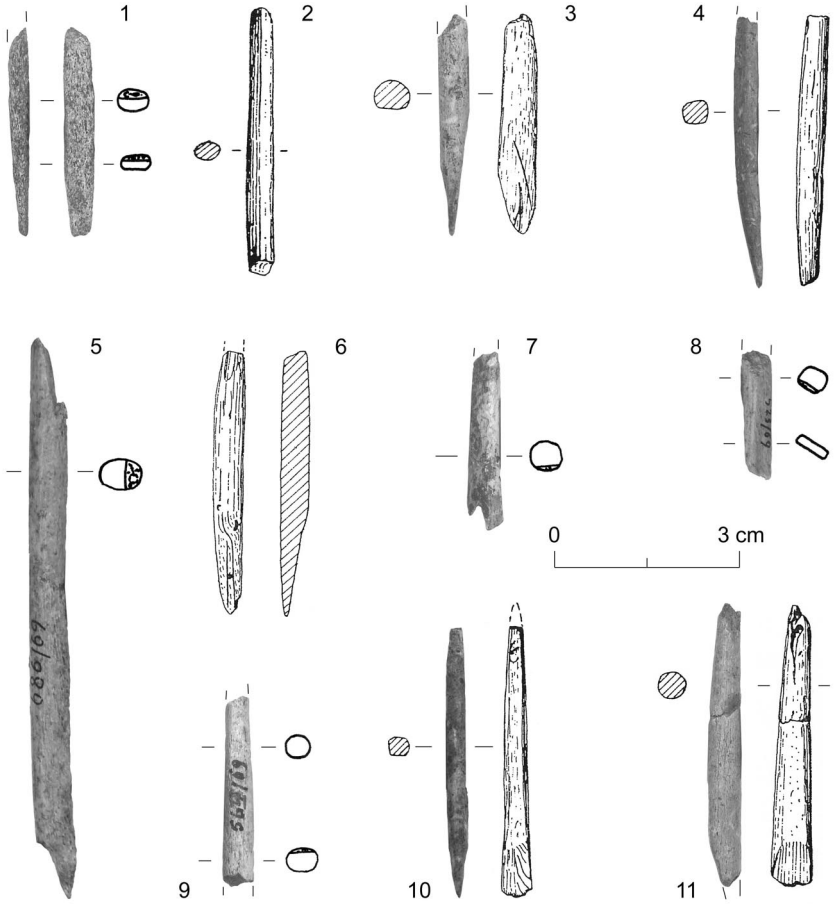

Fig. 3: Very small points from the Teufelsbrücke site. 1: 627/69; 2: 561/69; 3: 528a/69; 4: 529b/69; 5: 686/69; 6: 529a/69; 7: 525c/69; 8: 523e/69; 9: 563/69; 10: 522c/69; 11: 528b/69 (1: Author; 2: Feustel 1980a; 3: Feustel 1980a / Author; 4: Feustel 1980a / Author; 5: Author; 6: Feustel 1980a; 7: Author; 8: Author: 9: Author; 10: Feustel 1980a / Author; 11: Feustel 1980a / Author).

Central European Magdalenian (Höneisen 1993, Fig. 85; Stodiek 1993, 15). Interestingly, right the Teufelsbrücke yielded one antler specimen shaped like a small horse head (Feustel 1980, Fig. 35).

It is very unlikely that points of 4–6 mm mesial width were used on full-sized darts against horse and reindeer: The great majority of osseous projectiles in Magdalenian inventories are much sturdier (see above) and hence modern replica used successfully in numerous throwing experiments have widths between 8 and 14 mm.[11] Just as unlikely seems the scenario of an adaptation of the small points especially for small animals: Disregarding that hurling a ca. 2 m long and 150 g heavy dart (Stodiek 1993, 175) at foxes,

11 Guthrie 1983, 285; Pétillon 2006, Fig. 72; 108; Pétillon et al. 2011, Tab. 1; Stodiek 2009, 193.

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Tab. 3: Magdalenian osseous point inventories with very small specimens.

Site	total number of point fragments	point fragments with complete mesial widths	point fragments with complete mesial widths < 7 mm	reference
Teufelsbrücke (Thuringia, Germany)	104	87	11	this work
Petersfels (Baden-Wuerttemberg, Germany)	357	319	20	Pfeifer 2016
Schweizersbild (Schaffhausen, Switzerland)	51	45	7	this work
Pekárna (Okr. Brno-venkov, Czech Republic)	336	253	7	this work
Andernach (Rhineland-Palatinate, Germany)	34	13	2	this work
Gönnersdorf (Rhineland-Palatinate, Germany)	36	22	3	this work
Isturitz (Dép. Pyrénées-Atlantiques, France)	396 (forked base type)	379	10	Pétillon 2006

hare or even birds would pretty much mean to break a fly on the wheel, the atlatl is not a very accurate weapon requiring rather big targets (ibid. 83; Stodiek 2009, 195).

Based on these considerations the author favors an interpretation of the eleven small points from the Teufelsbrücke, following Ulrich Stodiek's hypothesis (1993, 170), as weapons of children and teenagers. At rich sites with multiple occupations, their presence has to be anticipated.

Ethnographic observations of hunter-gatherer societies from all over the world which use projectile technologies show the ubiquity of child and youth versions. Some examples shall be given here: In 20th century Western Australia, the fieldwork of Richard A. Gould (1970, 4 f.; Fig. 4A) has highlighted the importance of training hunting techniques amongst Aboriginal Ngatatjara children and teens: By the age of five, boys start using miniature atlatls and darts against improvised targets and smaller animals.

In Africa, the Hadza in the Lake Eyasi valley (Tanzania) still use bow and arrow for hunting almost exclusively. Every boy from three years up owns a miniature archery set and practices shooting several hours every day (Marlowe 2010, 84; 86; 157; Fig. 6.10).

The historic North American Plains Indians applied bow and arrow invariably as an important weapon for both hunting and warfare. Boys started practicing with small-scale archery equipment by the age of three (Bohr 2000, 10). Bob Dawe (1997) thus argues that tiny, often poorly made stone arrow heads known from numerous Plains sites belonged

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Fig. 4: Central Arctic Netsilik children with bow and arrows as portrayed during the 5th Thule expedition 1921–1924 (© The National Museum of Denmark – Ethnographic Collections).

to child weapons. Amongst the Huron Indians in the North American Great Lakes area, practicing archery and spearing fish with small-scale projectiles was a daily occupation of the boys (Tooker 1991, 124).

In Greenland, historic Inuit societies made extensive use of bow and arrow to hunt reindeer and musk ox[12] and so laboriously made child bows and arrows are a very common phenomenon in the archaeological and ethnographic record (Gulløv 1997, 213; Pfeifer 2014, 31; Tab. 5; Pl. 30) (Fig. 4).

As the child grew up, its spears, darts, harpoons, bows and arrows gradually grew with it until they finally reached the size of fully capable hunting weapons (comp. Bohr 2000, 24; Marlowe 2010, 157; Stodiek 1993, 69 f.).The successful hunt and hence survival of hunter-gatherer groups relied very much on the expert use of projectiles. Thus, their application had to be trained constantly from early childhood on. The Magdalenian horse and reindeer hunters were no exception.

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12 Birket-Smith 1918; Fabricius 1818, 239; Grønnow et al. 1983, 27; Steensby 1910, 302.

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Sebastian J. Pfeifer
Friedrich-Schiller-Universität Jena, Institut für Orientalistik, Indogermanistik, Ur- und frühgeschichtliche Archäologie, Seminar für Ur- und Frühgeschichte, Löbdergraben 24a, D-07743 Jena
sebastian.pfeifer@uni-jena.de

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