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Magdalenian Barbed Points: Harpoons, Spears and Arrowheads

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1. Introduction

Barbed points from the Magdalenian are still regarded by most authors as harpoons. However some authors have always doubted the general application of the harpoon concept for all barbed points of the Late Glacial (Rust, 1943; Clark, 1936 & 1975; Feustel, 1980). A closer look at the morphology of the Magdalenian material makes clear that there is a great internal variation and differentiation (Deffarge *et al.*, 1974; Kozlowski & Kozlowski, 1977; Julien, 1982). This internal structure can not be fully understood by archaeological means alone. Therefore I have made an ethnoarchaeological comparison of European Magdalenian barbed points with those from ethnohistoric Northamerican Indian and Eskimo context (Weniger, in press). A sample of 300 objects of different museum collections from each region is the basis of my analysis.

2. Ethnohistoric barbed points

The analysis of the ethnohistoric material documents that five different types of barbed points were used: harpoons, harpoon-arrows, arrows, multipronged arrows and multipronged spears (fig. 1–3). These types can be distinguished morphometrically because they follow different models of construction. The heads of harpoons and harpoon-arrows are mobile while those of arrows, and multipronged arrows and spears are fixed. The most distinguishing features are the general shape of the point and the modelling of the barbed zone (table 1). There is a clear graduation from the heavily built harpoons with a broad diameter via harpoon-arrows, arrows and multipronged arrows to multipronged spears, the most slender type of barbed points.

The same ranking is displayed by the absolute and relative number of barbs as well as by the relationship between the portion of the barbs in relation to the width of the barbed zone. Harpoons only have few widely spaced barbs while multipronged spears at the other end of the line have three or even four times more barbs, which are close together. It is proved by the portion of barbs in relation to the width of the barbed zone, that the barbs of harpoons are big, while those of harpoon-arrows and arrows up to multipronged spears are getting constantly smaller. The reason for this is the different function of the barbed points.

Harpoons and harpoon-arrows (fig. 1) are used to make the escape of the prey difficult or impossible. Therefore the heads of these weapons are connected by a line with either the hunter or the shaft of his weapon. After the prey has been hit and tries to escape, the barbs have to

	Harpoons	Harpoons-arrows	Arrows	Multipronged arrows	Multipronged spears
Relationship width/length	1:8	1:9	1:15	1:20	1:26
Absolute number of barbs (only R1)	3.1	3.8	7.1	8.0	13.0
Relative number of barbs per 10 cm barbed zone (only R1)	3.8	5.9	8.0	10.3	10.0
Portion of barbs in relation to width of barbed zone (%)	42	29	23	21	17

Table 1 — Average values of typical features of ethnohistoric barbed points.

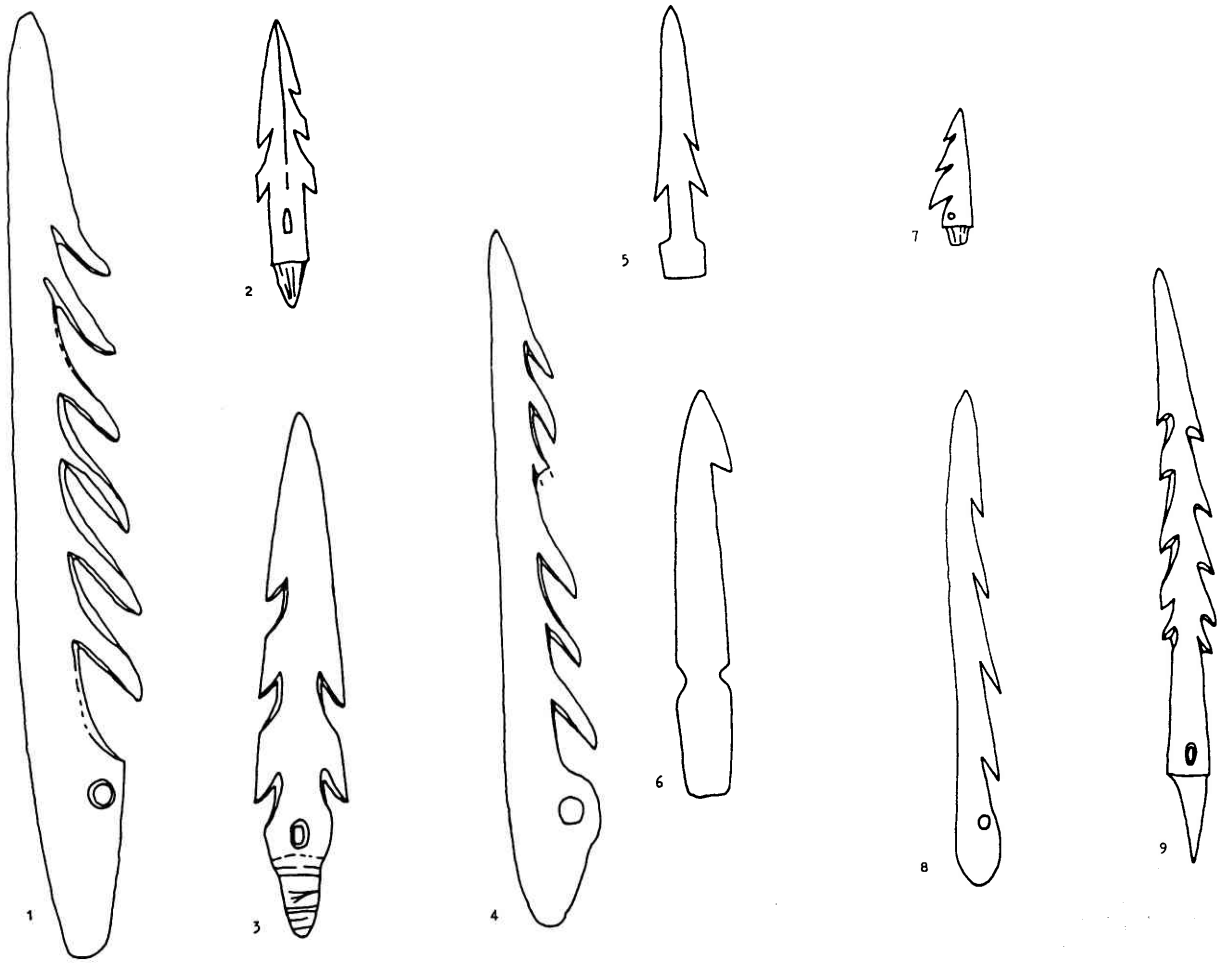

Fig. 1 — Ethnohistoric barbed points from North America; 1–6: harpoons; 7–9: harpoon arrows (½).

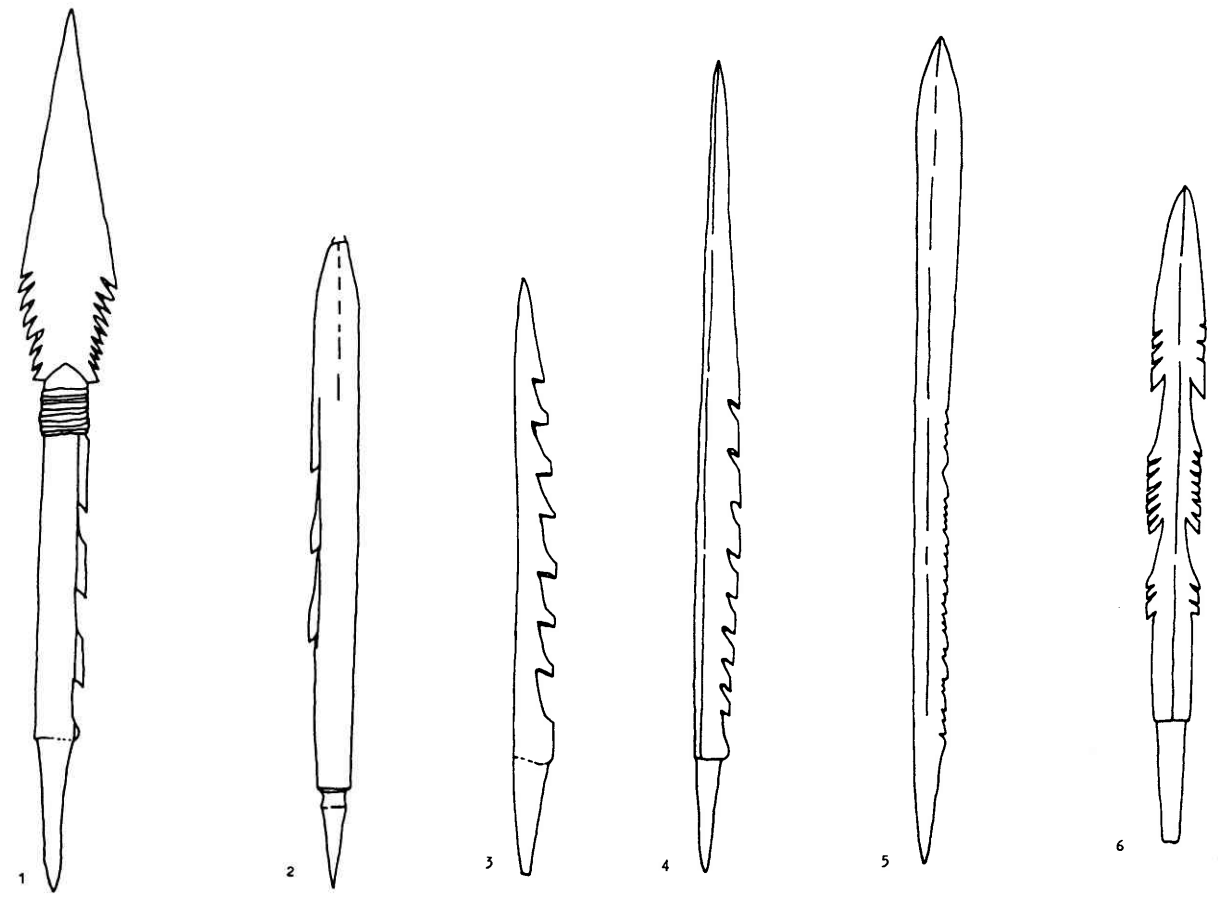

Fig. 2 — Ethnohistoric barbed arrow heads from North America (½).

resist the forces that are transmitted to the line. For this reason a close connection between point and prey is important. Big and widely spaced barbs that incorporate a good deal of animal tissue between the inner edge of the barb and the shaft of the point ensure a stable connection.

Arrows and multipronged points (fig. 2, 3) do not have to resist to the same kind of forces. The barbs of arrows only serve to keep the point in the prey and have to support a deeper penetration of the point by the movements of the fleeing animal. Therefore the barbs are smaller but more frequent and the general shape of the point is more slender.

Multipronged points (fig. 3) hold the prey by the co-ordination of several points. Therefore their barbs can be very small and the general shape is very slim. The combination of several prongs increases the probability to hit the prey. This also reduces the energy of penetration because it is distributed over several points. A slim shape and small barbs help to keep this loss of energy low.

The base of the barbed point and the way of hafting reflect the different ways of functioning. The most prominent way of hafting harpoons, harpoon-arrows and arrows is the pin-hafting. The conical, cylindrical or sometimes oval base of the barbed point is centred in a hole in the shaft. The shaft encircles the base entirely. Another type of hafting is the clamp-hafting. In this case the double bevelled base is fixed in a central slot of the shaft that is open at both sides. Quite similar is the lateral-hafting. In this case the conical or asymmetrically shaped base is fixed in a lateral slot of the shaft. Both ways of hafting are documented with a few arrows and are common with multipronged arrows and multipronged spears.

The bases of mobile points like harpoons and harpoon-arrows are characterised by a big linehole (fig. 1). Even immobile arrowheads sometimes have a perforation through which

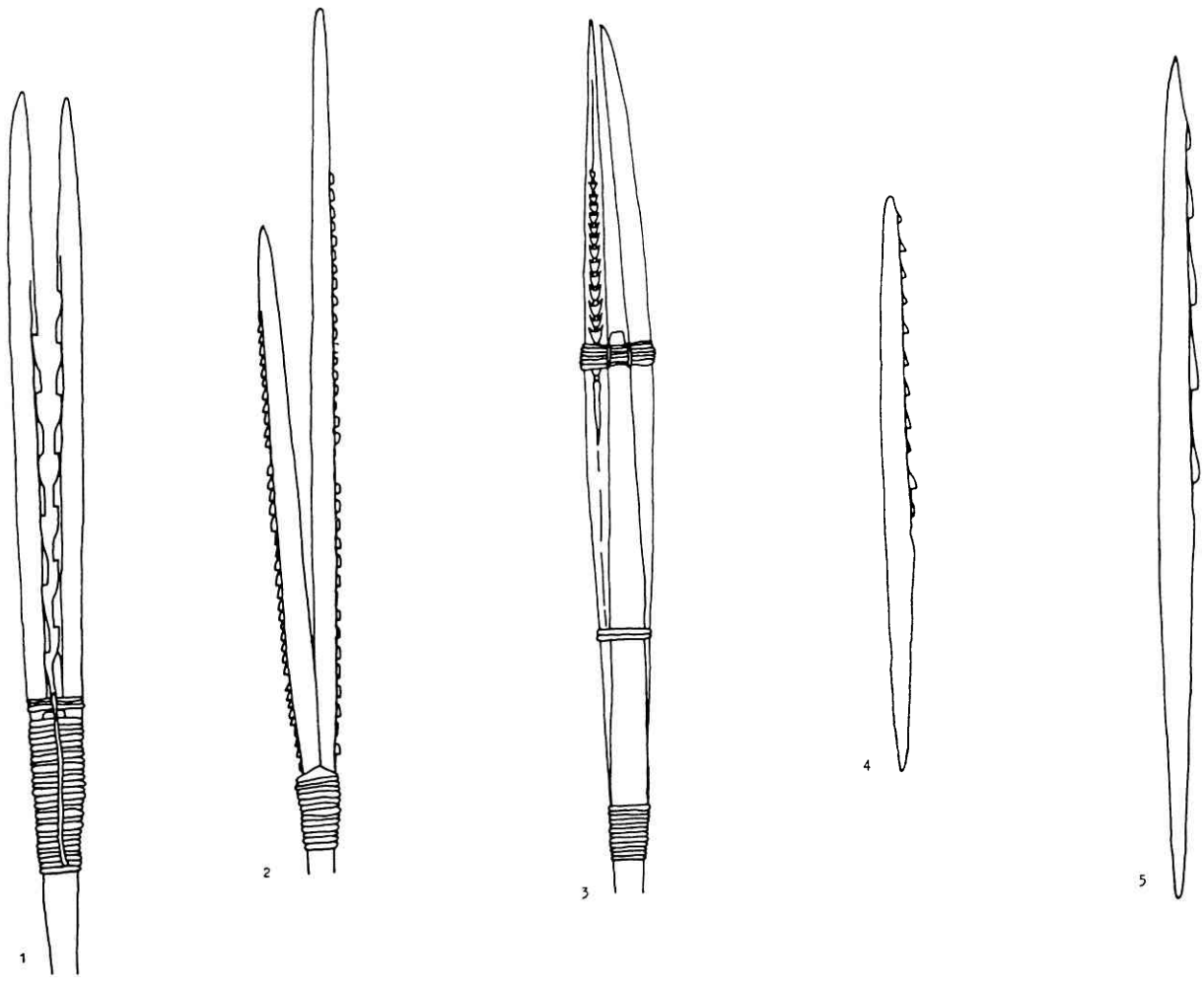

Fig. 3 — Ethnohistoric multipronged arrows from North America (½).

runs the binding and that serves to give the base a stronger hold in the shaft. These holes are obviously smaller than lineholes. Another regular feature of the pin-hafting is a socket or lateral bulb. They have to prevent a deep penetration of the base into the shaft, which then might split. Both morphological characteristics are documented from harpoons as well as arrows. Therefore pin-haftings are found with mobile as well as immobile barbed points. Pin-haftings without any special morphological feature as the simple conical base of some fixed arrowheads can be regarded as typical bases of immobile barbed points.

The clamp-hafting and the lateral-hafting are also typical for fixed points. They are documented mainly from multipronged arrows and spears and are rare with simple arrowheads. The asymmetrical diameter of the base of most multipronged points is a significant feature of the lateral-hafting.

Another important feature is the width of the base in the shaft. Harpoons usually display a variation from 9 mm to 25 mm. Only an extremely small subtype of R2-harpoons from Alaskan Eskimos goes beyond the value of 9 mm. It can be regarded as an exception. Barbed points mounted on arrows have a smaller width of the base in the shaft. They range from 4 mm to 10 mm with a maximum by 6 mm to 7 mm. Therefore the width of the base can be used to distinguish between arrow-heads and harpoon-heads. If the width is smaller than 7 mm, we can be quite sure that the point was used with bow and arrow.

3. Magdalenian barbed points

Considering the results of the morphometrical analysis of the ethnohistoric barbed points, we can examine our Magdalenian barbed points. A very important difference between the two groups of objects is their different state of conservation (Weniger, 1987, in press). The ethnohistoric points are well preserved and in many cases the complete context of the weapon can be studied. The Magdalenian points are isolated from their functional context and their reason for deposition in the archaeological context is because they were waste. In most cases the Magdalenian barbed points are heavily damaged and have lost their function. Original forms are very rare. Even points that seem to be quite well preserved have been reworked because of former damages and do not display a primary form. The Magdalenian barbed points were well prized and once damaged one tried to repair the object or at least to transform it into another secondary form that could be useful.

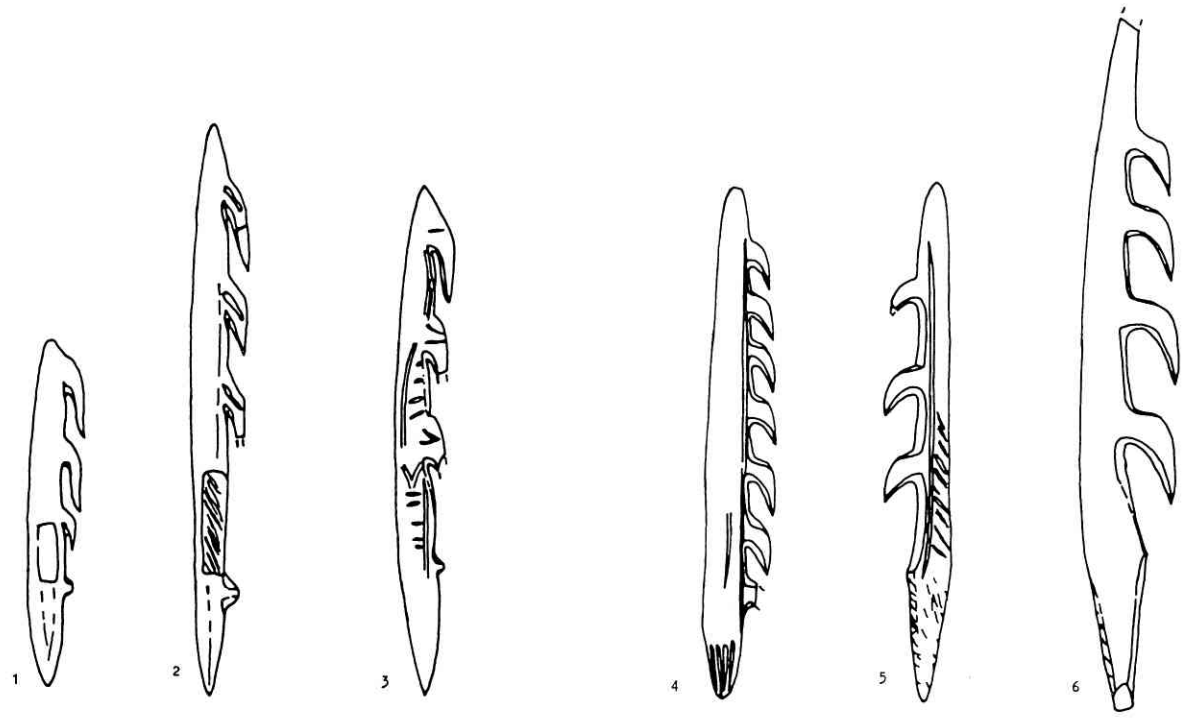

Fig. 4 — Typical Magdalenian R1-points of group A (½).

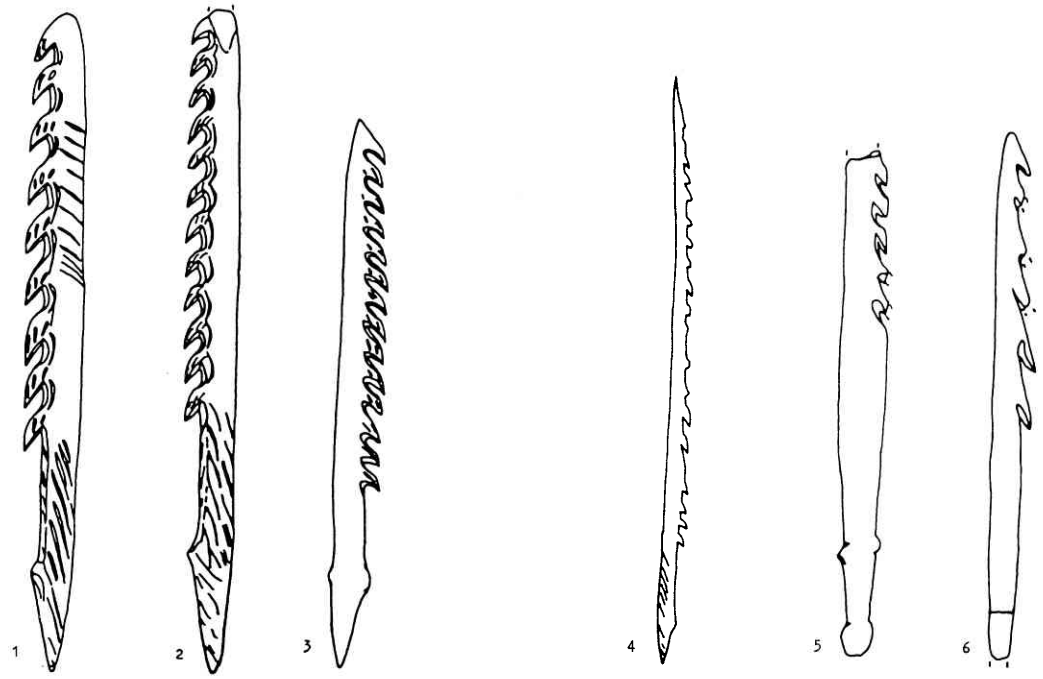

Fig. 5 — Typical Magdalenian R1-points of group B (½).

Therefore the state of conservation must be kept in mind.

The analysis of the Magdalenian barbed points makes clear that significant differences exist between them. Different models of construction are evident in the archaeological material if one considers the shape, the relative and absolute number of barbs and the size of the barbs. The greatest variety is displayed from the R1-points. They form two groups. Group A has a broad shape and few widely spaced barbs (fig. 4). Group B has a slim shape and many small barbs (fig. 5). Each group can be split up into different types of barbed points (table 2). Examples of group A show close similarities to ethnohistoric harpoons, while those of group B are closer to arrows and multipronged points.

Besides features as the general shape, the dentition and the base are very important for the functioning of types, especially for their mobility or immobility. Five different types of bases are recorded:

1. *Simple or double bevelled base.* This type is well known from simple Magdalenian bone points (sagaies). It forms part of a clamp-hafting or an oblique terminal-hafting. Both are typical

	Relationship width/length	Absolute number of barbs	Relative number of barbs per 10 cm	Portion of barbs in relation to width of barbed zone (%)
Group A				
Cantabrian	1:9/1:10	5.7	8.2	33
Tongue-type	1:7/1:85.7	3–4	4.0	30
Bigbarb-type	1:8/1:9	4.9	5.6	41
Bulb-type	1:11/1:13	3.2	5.1	38
Closebarb-type	1:12/1:13	4.6	5.1	43
Onebarb-type	1:10/1:12	1	–	30
Group B				
Multibarb-type	1:13/1:14	1:13	9.7	29
Prong-type	1:16/1:20	21.6	18.8	20
Harpoon-arrow-type	1:13/1:14	9.5	17.3	39
Arrow-type	1:12/1:13	6.0	7.6	35
Protoharpoon	1:16	8.5	11.0	–

Table 2 — Average values of typical features of the Magdalenian barbed R1-points.

for *immobile points* and are poorly represented within the R1-points of our sample (7 %). Some of the bases are probably secondary.

2. *Conical or cylindrical shape without any special feature.* This type goes together with a pin-hafting and considering ethnohistoric context must be regarded as typical for *immobile points*. It is represented by some objects in our sample (14 %). Some of the bases are probably secondary.
3. *Light lateral bulb.* On the same side as the barbs the base shows a smooth bulb that sometimes is hard to recognise. It evolves gradually out of the base. This morphological feature goes together with a pin-hafting. It is the most frequent type of base within our sample (40 %). Without further characteristics it is not possible to distinguish whether the base is *mobile or immobile.*
4. *Sharp lateral bulb.* On the same side as the barbs the base shows a clear cut bulb, which erupts suddenly out of the base. This morphology also goes together with a pin-hafting and is quite frequent within our sample (29 %). Without further characteristics it is not possible to distinguish if the base is *mobile or immobile.*
5. *Linehole.* Some bases (12 %) with a sharp lateral bulb have a linehole and therefore must be regarded as *mobile.*

To answer the question if the bases with bulbs—the majority of our objects—are mobile or immobile, we have to look closer at striations that are quite frequent with some of the barbed points (fig. 4:2, 5; fig. 5:1–2, 4). These striations are different from decorations and are well known from the simple Magdalenian bone points. There they are recorded from the bevelled part of the base and are interpreted as technical aid. They rough up the surface which results in a better fixing of the base on the shaft (Allain & Rigaud, 1986). These striations and their location on the base correlate with different types of bases (table 3). It is important to distinguish the proximal part (the area between the tip of the base and the lateral bulb) and the distal part of the base (the area between the bulb and the barbed zone).

Type	Quantity of base with striations within the sample (%)	Localisation on the base
Conical shape	14	majority proximal
Bevelled	63	proximal
Light bulb	96	majority proximal/distal
Sharp bulb	38	majority distal

Table 3 — Type of base combined with striations.

If the equation

striations = rough surface = better fixing

is correct, then there are three reasons to put striations on the different parts of the base:

(1)
proximal base = better fixing of base on shaft = immobile;

(2)
distal base = better fixing of harpoon-line = mobile;

(3)
proximal base + distal base
= better fixing of base + better fixing of binding
= immobile.

Following these interpretations the bases with a light bulb are immobile and those with a sharp bulb are basically mobile (table 3). None of the two types of bases shows only one configuration of striations. The separation is valid because of significant quantitative differences. A further argument is that the striations on the distal part of bases with sharp bulbs usually are restricted to a small zone (one line = limited area of contact) while those of the bases with light bulbs often are covering the entire basis (bindings = large area of contact).

An ultimate point that supports our interpretation is a flat portion in some cases even a notch that appears on the distal part of some bases with a sharp bulb (fig. 4:1–2). This feature seems to coincide with the fixing of a line and often the striations are strictly limited to this zone. The morphology of the bases therefore helps to classify the different types of R1-points (table 4). More than half of these types can be regarded as immobile and obviously are not harpoons.

The R2-points from the Magdalenian are much more homogenous than the R1-points (fig. 6). Five different types can be distinguished (table 5). Their shape in general is very close to that of ethnohistoric R2-harpoons. Only the multibarb-type (fig. 6:6–8) is closer to ethnohistoric R2-arrowheads. The same is true concerning the absolute and relative number of barbs. The closebarb-type takes an intermediate position but is still in the range of harpoons.

The morphology of the bases of the R2-points shows in general the same types as the R1-points. The bases types with lateral bulbs

Type	Morphology of base	Mobile/immobile	Functional type
Cantabrian-type	linehole	mobile	harpoon
Tongue-type	linehole	mobile	harpoon
Bulb-type	sharp bulb	mobile	harpoon
	(width of hafting < 7 mm)	(mobile)	(harpoon-arrow)
Bigbarb-type	light bulb/without any features	immobile	spear
	(sharp bulb)	(mobile)	(harpoon)
Closebarb-type	light bulb/without any features/bevelled	immobile	spear
Arrow-type	light barb/without any features	immobile	arrow
Prong-type	light bulb/without any features	immobile	spear (multipronged?)
Harpoon-arrow-type	light bulb/bevelled	immobile	arrow
	pronounced bulb/linehole	mobile	harpoon-arrow
Multibarb-type	light bulb/without any features	immobile	spear
	(width of hafting < 7 mm)	(immobile)	(arrow)
Photoharpoon	bevelled	immobile	spear

Table 4 — Magdalenian Types of barbed R1-points and their function.

	Relationship width/length	Absolute number of barbs	Relative number of barbs per 10 cm barbed zone	Portion of barbs in relation to width of barbed zone (%)
Tongue-type	1:7	5–6	8.3	43
Bigbarb-type	1:7/1:8	6.1	6.6	50
Intermediate-type	1:9/1:10	6.6	7.7	50
Closebarb-type	1:10/1:11	10.8	10.7	48
Multibarb-type	1:10/1:12	12.2	18.1	50

Table 5 — Average values of typical features of the Magdalenian barbed R2-points.

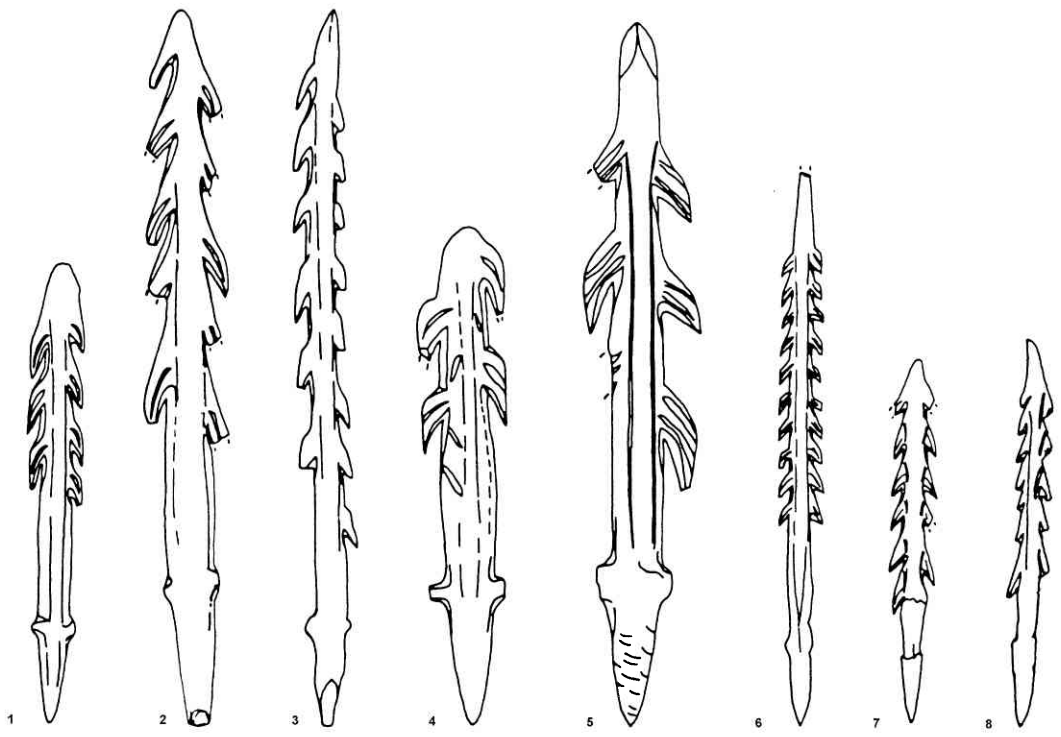

Fig. 6 — Typical Magdalenian R2-points (½).

Type	Morphology of base	Mobile/immobile	Functional type
Tongue-type	linehole	mobile	harpoon
Bigbarb-type	sharp bulbs	mobile	harpoon
Intermediate-type	sharp bulbs	mobile	harpoon
Closebarb-type	sharp bulbs	mobile	harpoon
	(width of hafting < 7 mm)	(mobile)	(harpoon-arrow)
Multibarb-type	sharp bulbs	mobile	(harpoon-arrow)
	(light bulbs)	immobile	(arrow)

Table 6 — Magdalenian types of R2-points and their function.

have two bulbs instead of one, but the frequency of occurrence of the different types of bases is very distinct from the R1-points. More than 82 % of the R2-points of our sample have sharp bulbs. The bases with a linehole and without any special features cover each 6 %, while light lateral bulbs and bevelled bases are represented only by 4 % and 2 % respectively. The bevelled bases and those without any special feature are probably secondary.

Striations are quite rare within the R2-points. Only 23 % of the sample have them, but the striations display the same configuration as already analysed with the R1-points. In their majority they are localised on the distal base of the R2-points. Therefore these in general can be classified as mobile points (table 6). The only exception is the multibarb-type. Some of these points were used as fixed arrow-heads. The interpretation of the R2-points as basically mobile weapon heads is supported by the frequent occurrence of a flat portion on the distal base (28 %).

4. Conclusion

Only in the light of the ethnoarchaeological comparison the internal structure of the Magdalenian barbed points can be understood. The wide variety of 11 morphological types of R1-points and 5 morphological types of R2-points represents basically four functional types: harpoons, spears, harpoon-arrows and arrows (table 4, 6–7). These functional types can be identified by three basic features: the general shape of the point, the composition of the barbed zone and the type of base. Besides the width of the base in the shaft is important to identify arrow-heads.

The analysis states clearly that only a part (mainly the R2-points) of the Magdalenian barbed points are harpoon-heads (fig. 4 : 1–3; fig. 6 : 1–5). The majority of morphological types within the R1-points are spear-heads (fig. 4 : 4–6; fig. 5). Some of the R1-points as well as the R2-points can be classified as arrow-heads (fig. 6 : 6–8).

Within the harpoons a morphological variation from heavy forms as the tongue-type or bigbarb-type to light forms as for example the cantabrian-type is evident. This variation is even more pronounced within the R1-points. Forms as the R1-multibarb-type and the prong-type are so slender that some of these points may have been used as multipronged spears.

Barbed points		
Shot with a bow	Thrown by hand (spearthrower)	
Arrow Harpoon-arrow	Harpoon Spear	
Slim shape Small barbs High relative number of barbs Width of hafting < 7 mm	Broad shape Big barbs Low relative number of barbs	Slim shape Small barbs High relative number of Barbs
Base: bevelled/conical/light bulb = arrow Base: linehole/sharp bulb = harpoon-arrow	Base: bevelled/conical/light bulb = spear Base: linehole/sharp bulb = harpoon	Spear

Table 7 — Functional types and their characteristics of Magdalenian barbed points.

The evolution of barbed points in the Magdalenian started with the so called "protoharpoons", but these were not harpoons but fixed spearheads. They were still standing in the tradition of the simple bone points (*sagaies*). Their dentition is more similar to that of bone points with inserted bladelets than to that of barbed bone points. The only real difference between the so called "protoharpoons" and *sagaies* with inserted bladelets is that the protoharpoons are made from one piece. The next and probably more important step was the invention of a new type of hafting, the pin-hafting, which was used with all functional types of barbed points.

In the Magdalenian started a process by which the clamp-hafting and the oblique terminal hafting were slowly replaced by this new type of hafting. At the beginning of the Holocene the pin-hafting is the most prominent way of hafting bone points of Northern hunter-gatherers in general.

The harpoons and harpoon-arrows as well as the heavy spears were probably used for fishing. While the fixed barbed arrow-heads have probably been used also for big game hunting. In the ethnohistoric record they are the main weapon for land mammal hunting. If barbed arrow-heads were used for land mammal hunting in the Magdalenian then we cannot exclude that the most important hunting weapon for big game hunting in the Magdalenian, the spear used with the spear-thrower, was mounted with a barbed point too. Considering the evolution of the technical process from *sagaies* with inserted bladelets via protoharpoons to barbed points this gets very probable. Harpoon, barbed arrow and barbed spear were used at the same time in the Magdalenian. In the Holocene harpoons develop further and are used for fish and sea mammal hunting, while the spear used with a spear-thrower for land mammal hunting has lost its importance. In the equipment of Northern hunter-gatherers it has been replaced by bow and arrow.

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