SOME OBSERVATIONS ON THE ANIMAL ENGRAVINGS FROM GLOZEL

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Abstract

Excavations at the site of Glozel between 1924 and 1936 unearthed many bone and stone artifacts engraved and sculptured with images of various animals including cervids. Some of these resemble reindeer and are accompanied by alphabetic symbols similar to those on many ceramic tablets from Glozel. In order to verify the species identification, photographs of ten bone and stone artifacts with engraved or sculptured cervids were sent to a curator at the Zoological Museum in Bergen, Norway, who identified all of them as reindeer Although the alphabetic symbols accompanying the reindeer suggest that the artifacts are the same age as the ceramic tablets, firmly dated by thermoluminescence to Gallo-Roman times, the reindeer on bone are apparently much more recent. Three bones with animal engravings (horses and reindeer) have recently been dated by AMS C-14 to the 13th century AD, and nitrogen measurements on a large number of other bone objects suggest a similar age. Although we cannot date the animal engravings on stone, several of them have excellent provenance and may date to the earlier period. We raise the question o f possible survival of a relict population of reindeer in the Bois Noirs, perhaps to the Celtic period. The authors also discuss preliminary results of a new study of the engraved galets and bone objects using the scanning electron microscope (SEM). Examination of the highly magnified SEM images by experts can reveal information as to the type of tools used for engraving, whether the same tools were used for animal figures and for alphabetic symbols, and whether the engraved lines were made on fresh or weathered bone.

Excavations at the site of Glozel between 1924 and 1936 unearthed engravings of many different animals on both bone and stone. As well as engravings, there are bas reliefs and sculptures in the round carved in bone. The animals represented on bone are identified by Dr. Morlet as reindeer, horses, deer, bovids, felines (panther, lion, and wild cat), caprids, rabbits, foxes, bears, dogs and wolves, wild boar, a lizard, a water bird, ibex, a badger and a wolverine. On stone the list is much smaller: reindeer, elk, ibex, horse, bovids, dog, wolf, bear, and one fish. Many of the carvings are accompanied by alphabetic symbols, which are placed to one side of or surrounding the animals.

One of the first controversies at Glozel concerned a reindeer engraved on a galet. The Abbé Breuil called the animal a generic cervid, or a cerf elaphe, not a reindeer at all. But Professor Aug. Brinkmann, Director of the Bergen Zoological Museum, clearly identified a picture of the cervid as a typical reindeer. The distinction is an important one. Red deer still exist today in Europe, but zoologists have found no reindeer remains south of Scandinavia dating to less than 9,000 BP. Glozel is not the only site where such controversies have arisen, according to Bahn (1988): “Apart from a few descriptions of the giant deer (Megaceros) and sporadic claims for elk, and for fallow deer, all Paleolithic depictions are either of red deer or reindeer. Occasionally, it is difficult to differentiate between the two types of deer; on the famous baton from Lortet with a scene of

deer and fish engraved around it, some scholars see stags, but others see reindeer. Similarly, all but one of the 91 deer on the walls of Lascaux have been assumed to be red deer but a number of experts on caribou instead see some of them as reindeer."

In 1997, seventy years after Dr. Morlet claimed his galet depicted a reindeer, the authors took several pictures of Glozel engravings identified as reindeer to an American archaeologist who has worked in French Paleolithic sites. He told us he thought that they were all of red deer, not reindeer. One of us (R. Gerard), who has observed large numbers of caribou (same species as reindeer) in Northern Alaska, was not satisfied with the archaeologist's interpretation. Therefore we decided to investigate criteria for distinguishing between the two animals by studying pictures of red deer and reindeer from reference books and other sources.

After careful study we identified three criteria which we believed would help to distinguish reindeer from red deer viewed in profile (virtually all stone age animal art is in profile). These are not subtle anatomical features that only a zoologist could discern, but obvious characteristics, easily identified in most of the animal renderings. We added a fourth criterion which had been mentioned in 1927 by Dr. Brinkmann.

REINDEER PROFILE CRITERIA

(see Figure 1)

1) The depiction of overall antler shape generally has the form of an arc curving upward and forward with branches normally near the base and branching again at the tops, while the mid portion of the bar is often without projecting tines or branches.

2) Only reindeer have an ante ocular branch which begins at the base of one bar and grows into a flat surface centered above the animal's face, reaching down to the nose in mature males. The forward edge of this vertical plate often has spike-like projections.

3) A fanon or throat mane, most prominent in the male reindeer, creates the appearance of rounded bulge in the area of throat and chest.

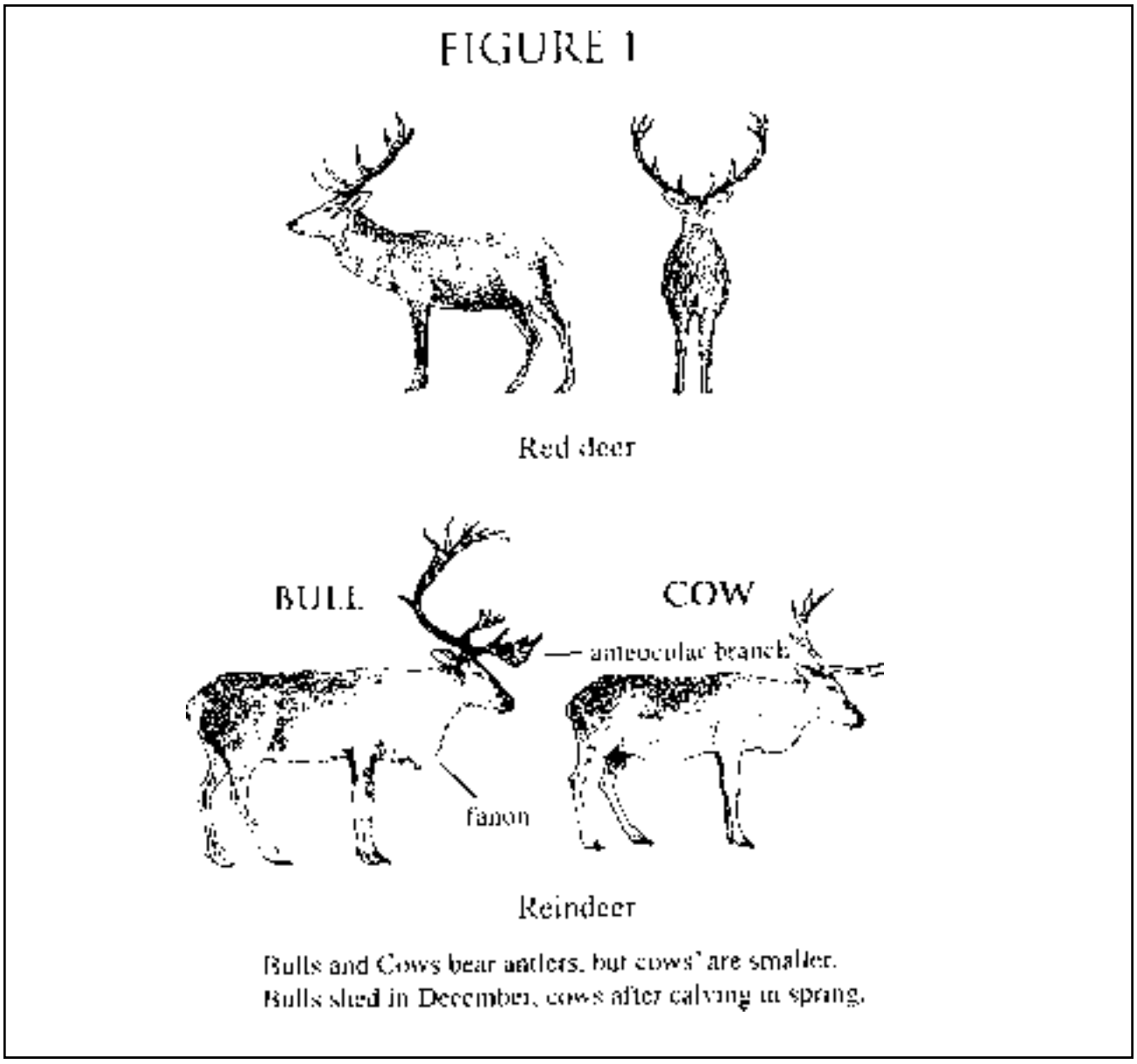
4) The tops of reindeer antlers may branch or sometimes are broad and flattened in contrast to the red deer whose tops never branch, but end in multiple tines.

Obviously, zoologists would have many more criteria, but these few seemed useful enough to make a distinction when one or more of them is clearly present. When we considered these points, which held true for all the pictures of reindeer and red deer in our reference collection, and then looked at the Glozel engravings of cervids, many of them seemed to have the features of reindeer, not red deer.

In order to test these criteria, we contacted the Zoological Museum in Bergen, Norway, and asked for assistance in identifying reindeer. On August 28 we received a response from Ingvar Byrkjedal, a zoologist at the museum, giving reasons for his identification of all ten of the pictures we had sent to him as reindeer, not red deer. He wrote:

"Reindeer (Rangifer tarandus) can be separated from the other similarly sized or smaller European cervids ... by a relatively long and rectangular body, relatively short legs and neck, and a long straight and fairly thick muzzle. The head is usually held more horizontally than in the other species, especially in running animals, and the neck is more or less aligning horizontally with the back profile. The reindeer antlers differ from that of the other species by branched anterior beams and strongly curved posterior beams with little or no palmation.

All the images resemble reindeer. As wildlife art some of these engravings are very interesting. The artist(s) certainly



knew the animals well. I have the following comments to the individual pictures:
Figure 2a: (GF1818) Curved posterior antler beams, branched anterior beams, thick muzzle, short neck, long rectangular body are typical reindeer characteristics. Head is above back level, but this could be ascribed to the animal throwing back its head, being hit by two spearheads!
Figure 2b: (GF1670) Curved posterior antler beams, branched anterior beams, thick muzzle, short neck, long body and short legs — typical reindeer.

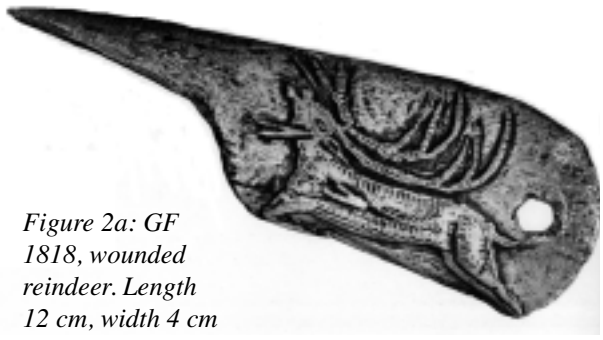


Figure 2a: GF 1818, wounded reindeer. Length 12 cm, width 4 cm

Figure 2b: GF1670, Reindeer licking its foot
Length 12.5 cm, height, 5 cm

Figure 2c: Curved posterior beams, branched anterior beam, thick muzzle, short neck, long body, short legs - characteristics of reindeer. A running red deer (especially if hit, as this animal appears to be) would have carried the head much higher.

Figure 2d: (GF60) Again a running animal. Although sketchy, the image beautifully depicts a reindeer. The muzzle, neck and body are unmistakably that of a reindeer, and the way the head is carried during running is typical for the species. The picture wonderfully captures the characteristics of a running reindeer.

Figure 2e: (GF3 11) The head and muzzle profile bears a certain resemblance to red deer, and the neck is more similar to that of a red deer than to a reindeer. Yet the

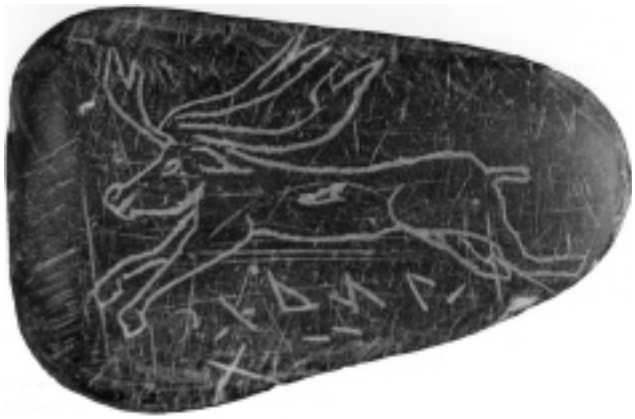


Figure 2c: GF 87, Galloping reindeer
Lemgth 4 cm, height 2.5 cm

Figure 2d: GF60, Running reindeer
Length 16 cm, height 9.5 cm

Figure 2e: GF311, Reindeer on a shoulderblade
Length 9 cm, height 6.5 cm

antlers show in great detail all characteristics of those of reindeer.

Figure 2f: (984.2.201) A reindeer cow with a small (newborn?) calf. Reindeer is the only deer species in which females have antlers. In cervids, females and males are separated in the calving period, so this is clearly a female. This is a very convincing picture - the artist must have observed a situation like that to depict it so accurately. [The Glozel Museum contains eight artifacts, five on stone and three on bone, showing an adult cervid with antlers and a newborn fawn. Using Dr. Byrkjedal's criteria, these scenes can only be of female reindeer

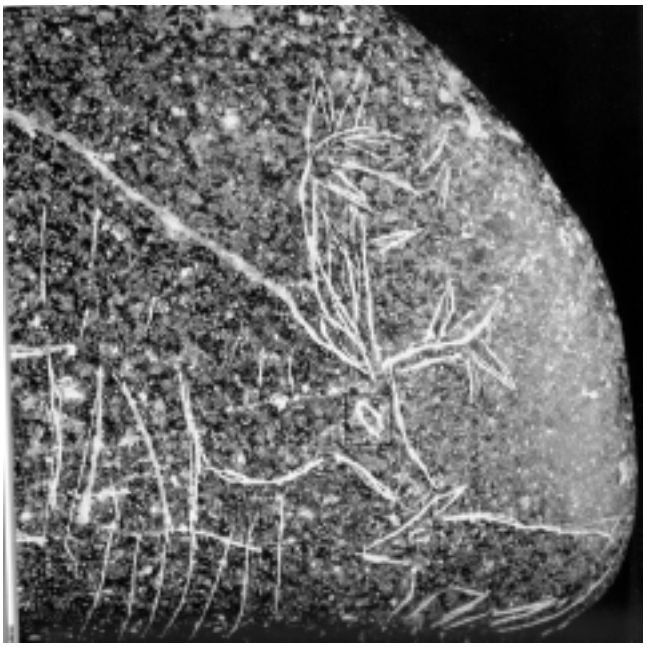


Figure 2f: 984.2.201, Reindeer licking its fawn
Length 14.5 cm, height 7 cm

Figure 2g: GF61, Reindeer with a ring of letters
Length 11 cm, height 7 cm

and their young.

Figure 2g: (GF61) A more sketchy rendering. Yet antler form, head profile and carriage, body form and leg length are those of reindeer.

Figure 2h: All the reindeer characteristics are present.

Figure 2i: (984.2.132) The animals in both pictures show the characteristics of reindeer."

There is no doubt that many of the Glozel cervids are reindeer, and some clearly seem to have been drawn from personal experience with the animal. Only

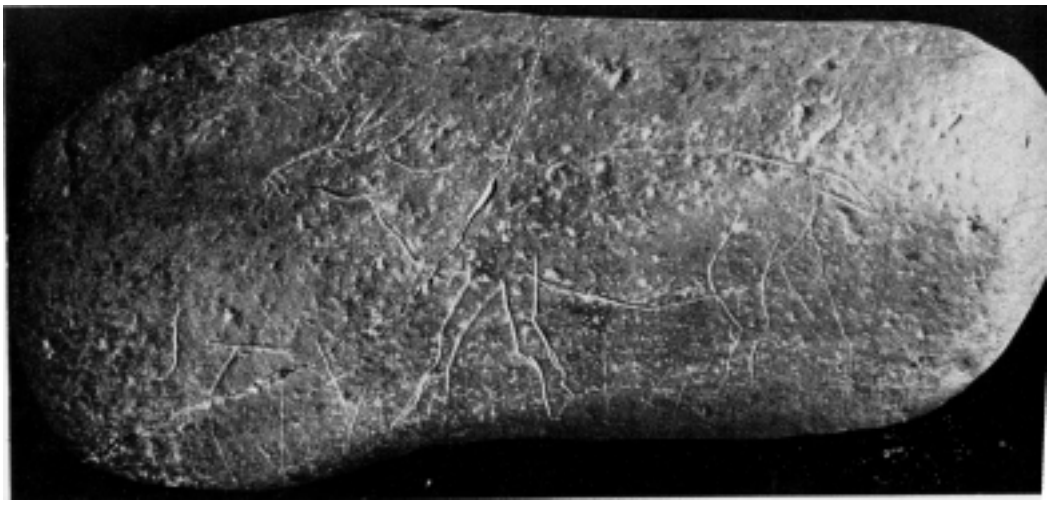


Figure 2h: Walking reindeer, no number
Length 15 cm, height 6 cm

Figure 2i: 984.2.132, Manche de Poignard, face 1
Length 17.5 cm, height 4.3/2.5 cm

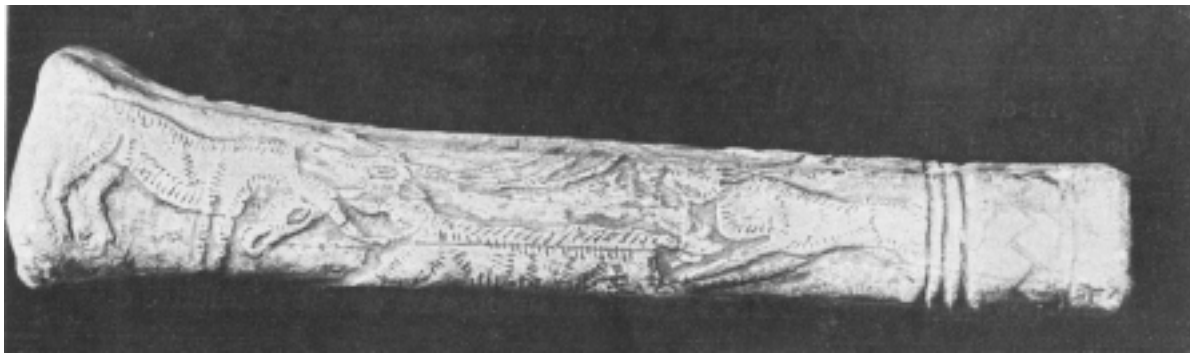


Figure 2i: 984.2.132, Manche de Poignard, face 2

someone who had seen reindeer would know that the females have antlers, and that the animals are often caught in traps or in pits.

However, recent C-14 dates and the nitrogen analyses made by McKerrell (McKerrell et al, 1999) indicate that most of the engraved bones date to the Medieval period, long after the reindeer had disappeared from the Montagne Bourbonnais.

Morlet's books *Glozel* (1929) and *Glozel II* (1962) contain pictures of 45 animals engraved on stone, nine of them from the two tombs found in June, 1927. Most are on river-worn galets of diorite which appear to come from the site. A few are on larger, rougher, granitic slabs. The engravings include ten cervids identified as reindeer, five of them accompanied by letters. Two of the engravings on larger stones have no alphabetic symbols and depict scenes of reindeer capture using pits and nets.

In contrast to the bone engravings, virtually all of which lack information as to location, depth, and date of recovery, four of the animal engravings on stone have good provenance. One engraved galet, shown in Figure 3a, was found by the International Commission during its second day of excavation, November 6, 1927. The trench, begun the day before, had been marked in plaster with symbols known only to the Commission members in order to detect any overnight disturbance. Morlet (1970) describes the finding of this piece.

"At 11: 15 M. Forrer, who was working beside M. Peyrony, announced, 'A galet!' The Commission gathered together. The object, fallen to the bottom of the trench, was replaced by M. Peyrony in its natural position. Everyone was able to examine the conditions of the find. Nothing suspicious was found. The Abbé ran to wash this piece, about 10 centimeters in width, in the stream. ... A magnificent head of a cervid, emphasized by an inscription

Figure 3a: GF281, found by the International Commission Length 11.5 cm, height 7 cm

of six letters, clearly Glozelian, appeared." Although the Commission eventually concluded that this piece, like almost everything else they found, was not authentic, they gave no evidence to contradict the unanimous belief in the authenticity of the piece expressed by numerous close witnesses to its discovery. The animal has both a fanon and an ante ocular branch, clearly identifying it as a reindeer.

Another engraved galet, the Renne Courant (Figure 2d) previously discussed by Ingvar Byrkjedal, was found in the archaeological layer at a depth of 60 cm on April 12, 1928, by members of the Comité d'études. This was the first day of their formal excavations; they had chosen a spot in virgin soil to start a new trench. Their official report, also quoted in Morlet (1970), states:

"As a laborer worked alone, in the middle of the trench, the noise of a small impact, followed by the words, 'I have found something,' was clearly heard by MM. Audollent, J. and W, Loth, Arcelin, and Foat, who was keeping the worker under observation. ... Everyone present gathered around the trench... The members of the Comité asked M. Audollent to remove the galet which, after having been hit by the tool, was lying at an angle of about 30° from the horizontal. ...M. Audollent pulled out the object and saw that it was engraved. ...

The rounded galet, about 17 cms by 10 cms in size, is a black metamorphic schist with three light lines on the reverse side, made by the tool which struck it; the engravings on the other side, notably a running reindeer and several alphabetic characters, are absolutely intact.

Signed: J. Loth, Dr. Bayet, Ch. Depéret, Aug. Audollent, F. W. G. Foat, William Loth, F. Arcelin, A. Van Gennep, Harry Söderman, Tricot-Royer, F. Roman, Salomon Reinach."

The third piece, found in the souterrain of Puyravel and shown in Figure 3b, also seems to have an irreproachable provenance. Charles Depéret, recognized even today as an extremely competent geologist, wrote about this piece in a

Figure 3b: Both sides of galet from Puy Ravel, discovered by Depéret

letter to the epigrapher René Dussaud, who had questioned the conditions of its find: (Fradin, 1990)

"Several people entered the cave of Puyravel with me, notably my collaborators Arcelin, Mayet and Roman, who made a superficial scraping of the floor of the cavern and stopped because they thought they had reached the solid rock of the floor. Arriving eight days later, I said to myself that men wouldn't have dug a cavern where they couldn't stand upright, and I was the first to have the idea of continuing to dig deeper. I was able, with blows of a pickaxe, to break up the floor, formed of blocks of granulite cemented by a dense clay. At a depth of 16 inches into the very hard, undisturbed, floor, I had the pleasure of finding a fine pebble of schist with a horse's head on one side, and on the other, a page of writing, identical to that of Glozel, then another round pebble of hard granulite, covered with Glozelian characters. The conditions of the find are impeccable, and they challenge all the criticisms of Mr. Dussaud."

And Mr. Depéret added, in an article which he published on this topic, (Cote, 1988): "The situation of the artificial cavern of Puyravel is beyond all criticism, the opening having been closed by a thick layer of ancient debris and the cavern never having been visited before the excavation. The existence, under the compact floor of this cavern, of several pieces with writing like that at Glozel is in our opinion completely conclusive. "

Unfortunately, these objects have disappeared.

An engraved galet, (984.2.202) shown in Figure 3c, was found in 1927 at another nearby hamlet. Dr. Morlet writes (Morlet, 1928):

"In the middle of December, 1927 Mr. Claude Mercier, of the village of Chez Guerrier, (commune of Mayet-de-Montagne), while working in his field noticed 'a big black cobble of a kind not usually seen in this soil.' Noticing a resemblance to the stones from Glozel that he had seen in the Fradin Museum, he took the galet to wash it and saw an engraving of an animal with an inscription of about 20 signs. ... neighbors let me know about this find, and I went immediately, on Monday, January 16, to the village of Chez Guerrier. I examined it [the pebble] in full light on the doorstep. It was an elongated galet, basalt, with both ends polished in the form of cutting edges; one was in the shape of a semi-circular curve and the other was almost straight." On one side

Figure 3c: 984.2.202, Horse from Chez Guerrier
Length 16 cm, height 7 cm

was the forepart of a horse, 21 alphabetiform letters, and five parallel lines.

Ceramic tablets bearing similar alphabetic symbols have been reliably dated by thermoluminescence to ca. 50 BC (see McKerrell, 1999). These four galets, two depicting horses with alphabetic symbols and two depicting reindeer accompanied by alphabetic symbols, are of special significance in understanding the question of reindeer at Glozel because of their indisputable provenance.

How can one explain the presence of alphabetic symbols dating to the Gallo-Roman period on galets engraved with reindeer? Several possible answers come to mind. The first, of course, is fraud. Although critics of Glozel have always contended that many artifacts found there were recently created, the discovery conditions of these four finds provide clear evidence for their authenticity.

Another possible explanation is that the reindeer images were engraved early in the Holocene period, some nine thousand years ago. Perhaps they were found much later by Iron Age people using the alphabetic script of Glozel. The Celts, who worshipped a deer god, Cernunnos, may have believed that these pieces were magic talismans and added letters to the reindeer engravings. Study of the engraved lines using SEM, which we will discuss later on in this paper, could establish whether the reindeer figures and the letters were engraved at the same time.

Hans-Rudolf Hitz (1998) reports that of the 26 letters he has identified on the ceramic tablets, only 19 are present on the stones and on the face urns. These pieces also use fewer of the specialized ligatures, unique to Glozel, found on the clay tablets, suggesting that the symbols on the galets might be earlier, perhaps by several hundred years, than those on the ceramic tablets.

A third possibility to consider is the extended survival of reindeer in the area to a few hundred years BC. Owing to the lack of fossil evidence, zoologists generally assume that the reindeer population of central Europe migrated northward following the retreat of the continental glaciers at the end of the ice age. However, there are known exceptions. Eriksen, (Straus, 1996) states: "...a recent find of a reindeer metatarsus in an early Mesolithic settlement horizon from Rottenburg-Siebenlinden I... indicates that this species might have survived quite a while as a relict population in mountainous areas like the Black Forest or the Swiss Jura." Nowak (1991) writes: "In historical times, the single species, Rangifer tarandus, occurred in Ireland, Scotland, Scandinavia, Germany Poland ... The genus survived in Germany until Roman times, in the British Isles until the Middle Ages, and in Poland until the 16th century." Hall (1981) notes that a remnant population of reindeer survived on the Queen Charlotte Islands of British Columbia until early in the 20th century, when they were exterminated as the result of uncontrolled hunting. They had adapted to a relatively warm and humid maritime climate with average January and July temperatures of -0.05C and 11.75C respectively. The Icelandic Orkneyinga Saga tells of the Earls of the Orkney Islands voyaging across to north Scotland (Caithness) to hunt both red deer and reindeer in the 12th century AD. Presumably these herds did not survive hunting by man in the Middle Ages.

About 45 years ago reindeer were re-introduced into a forest area in the Cairngorm Mountains of Scotland (southeast of Loch Ness) and a herd is thriving there at the present time. This is an area of the Scottish Highlands which has climate, plant communities, and elevations (500-1000 M) resembling the Bois Noirs,

TABLE 1

COMPARISON OF CLIMATE PARAMETERS FOR THE CAIRNGORM MOUNTAINS, SCOTLAND, AND THE BOIS NOIRS, FRANCE

LOCATION	ALTITUDE METERS	JANUARY °C	JULY °C	ANNUAL PRECIP. mm.
CAIRNGORMS	600-800			
Avg. Monthly Max.		3.1	15.3	
Avg. Monthly Min.		-2.1	5.2	
Rainfall				1024
BOIS NOIRS	800-1000			
Avg. Monthly Max.		5.6	24.1	
Avg. Monthly Min.		-1.5	11.0	
Rainfall				859

not far from Glozel. Table 1 compares present climate data for the Cairngorm region with that of the Bois Noirs, showing close similarity for the two locations. Paleoclimate studies based on pollen analysis indicate that climate and vegetation patterns in Western Europe have remained basically unchanged throughout the Holocene period (12,500 years BP to the present time). Therefore, conditions for the survival of reindeer in the Bois Noirs in Celtic times were as favorable as they are today in the Scottish Highlands.

There is as yet no evidence, aside from the engravings, for reindeer survival in the Glozel area. Depéret, who was a paleontologist as well as a geologist, identified thirteen teeth, an astragalus, and a second phalange, all from reindeer, at the site. It is unfortunate that no reindeer remains from Glozel have ever been dated. Only a few teeth remain in the museum today. The dating of a bonafide reindeer tooth from Glozel by C-14 could answer important questions about the site.

We believe that the galets which show authentic scenes and postures of reindeer were created by people who lived at a time when the animals were present in the Bois Noirs. Since there is no direct way to date the animal engravings on the galets, we have begun a microscopic study to examine the details of the engraved lines in both animal figures and alphabetic symbols. If evidence can be found that the same tools and techniques were used for engraving the animal figures and the symbols, it would strongly suggest that both date to the Celtic period. But this would not explain reindeer images and Celtic symbols on 13th century bone. However if microscopic studies confirm that the engravings were made on fresh bone, it might indicate either that Celtic influence around Glozel lasted through more than a millennium of the Christian era, or that the objects were copied from the older galets found by people who knew neither reindeer nor Celtic writing. This would explain why the reindeer images on bone are less realistic than those on the galets, and why some, such as those on the Manche de Poignard, resemble mythical creatures.

Microscopic studies of stone and bone artifacts have revealed clues as to the uses of objects, the nature of various markings, and the tools used to create them. By such studies White (1982) has identified the types of flint burins and their mode of usage in producing different incisions on stone and bone artifacts. Cook (1991) has

identified types of flint tools used to create various cut marks on human bone. Sieveking (1980) has used microscopic examination to assess the authenticity of decorated bone artifacts by distinguishing whether engraved lines crossing natural cracks were made prior to, or after, the development of the cracks.

In 1997 while visiting the Glozel Museum we used the technique developed by d'Errico (1994) to make silicone rubber molds from four engraved galets and one polished axe. When we returned to the United States, urethane resin castings were made of selected portions from the galet molds and from two molds of Glozel bone artifacts (one harpoon and the Manche de poignard) sent to us by Hugh McKerrell.

The resin plastic castings were taken to the Scanning Electron Microscope (SEM) Laboratory of Lamont-Doherty Earth Observatory of Columbia University where we obtained 13 micrographs with 18 to 40 X magnification. Although the SEM is capable of magnification exceeding 100,000 X, the chief advantage for our purposes is its greater resolving power and infinite depth of field compared to the light microscope. The following figures (4, 5, and 6), showing features on two of the seven artifact castings, illustrate the kind of information available with SEM.

An American archaeologist who is an authority on the process of engraving on bone and stone was shown the SEM images and helped us in identifying certain features.

RENNE COURANT

Figure 4 shows the running reindeer about which Dr. Morlet says, "The galet on which the running reindeer is engraved must have previously had other drawings that were effaced by scraping, clearly visible at certain points. ... "

According to our archaeologist colleague, the broad grooving which appears

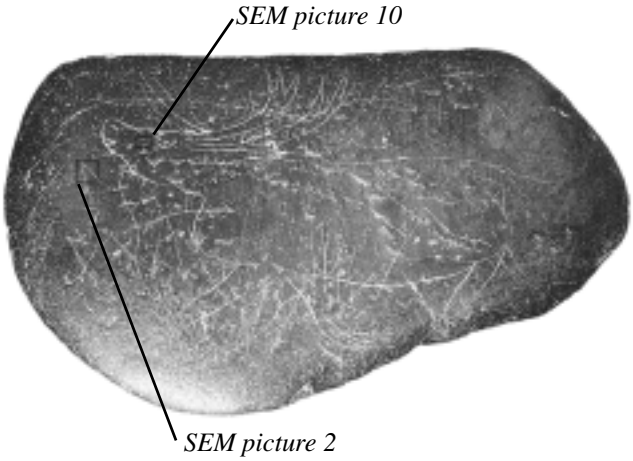
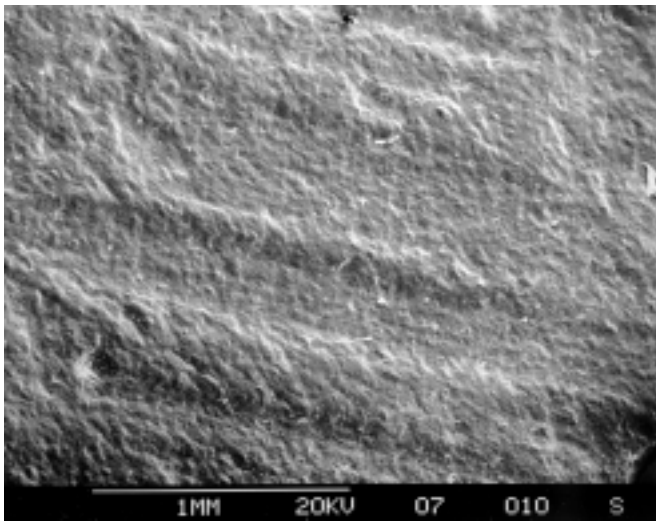
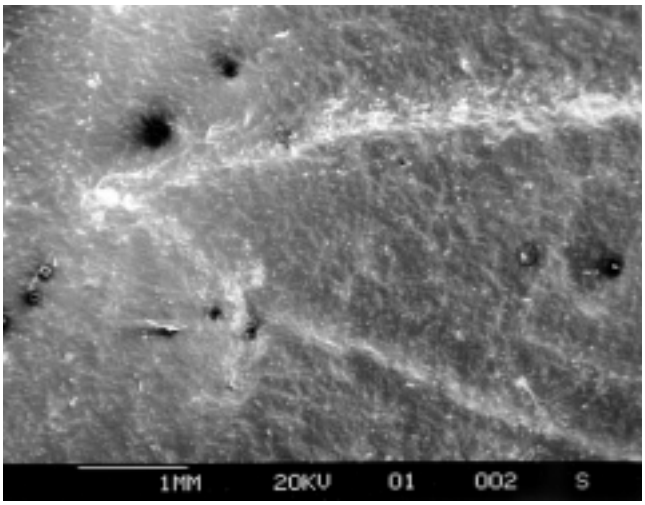


Figure 4: GF60, Running reindeer



SEM picture 10



SEM picture 2

on SEM picture 10 clearly resembles the kind of mark made by the edge of a broad flint burin, which in this case was used to scrape away previous engraving. He was a bit uncertain about the engraved lines on the galets. In some respects, they had the look of a metal tool but he qualified this by saying that the properties of the diorite stone might confuse the interpretation. Lines are often gone over several times, deepening and enlarging the initial stroke. Thus a typically striated mark made by a flint tool could begin to look more and more like the ideal "vee" groove profile of a typical metal tool. However, Iron Age artisans could have used both flint and metal tools.

THE MANCHE DE POIGNARD

Antonin Morlet described this piece, shown in figure 5, as the handle of a tool or dagger, made of some kind of animal leg bone. The cervids on the piece have been identified as reindeer by Ingvar Byrkjedal. In December, 1997, this piece was carbon-dated to AD 1260-1410 at the University of Arizona AMS laboratory. (See McKerrell et al, 1999).

The photograph of side 1 of the Manche, taken by Morlet in 1929, clearly shows a longitudinal crack running through the zone between SEM pictures 9 and 12. Cook (1986) states that cracks which occur on bone exposed to atmospheric weathering develop slowly, on the

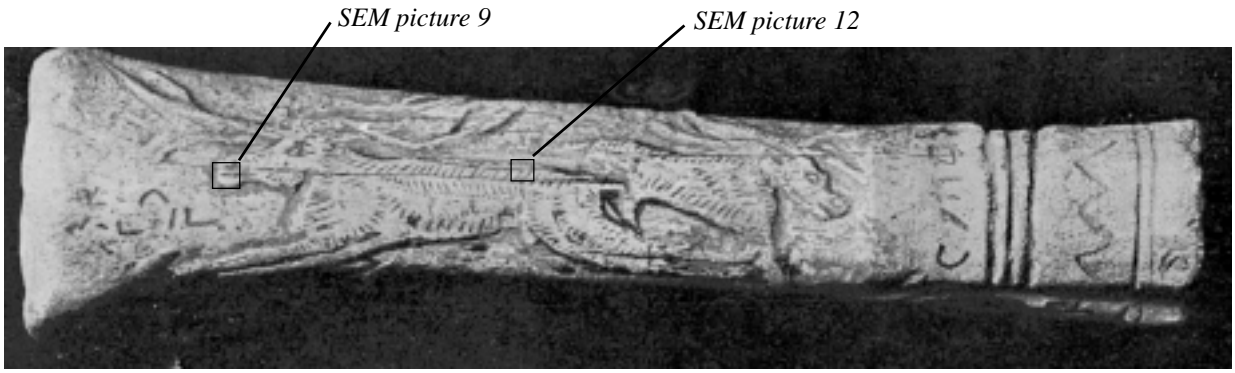
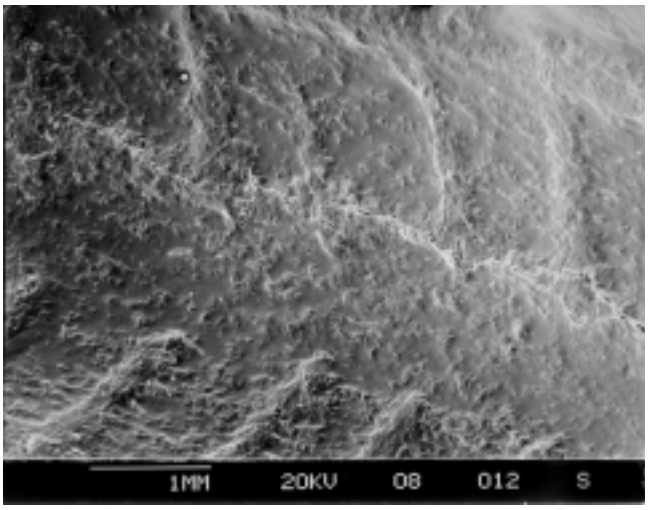
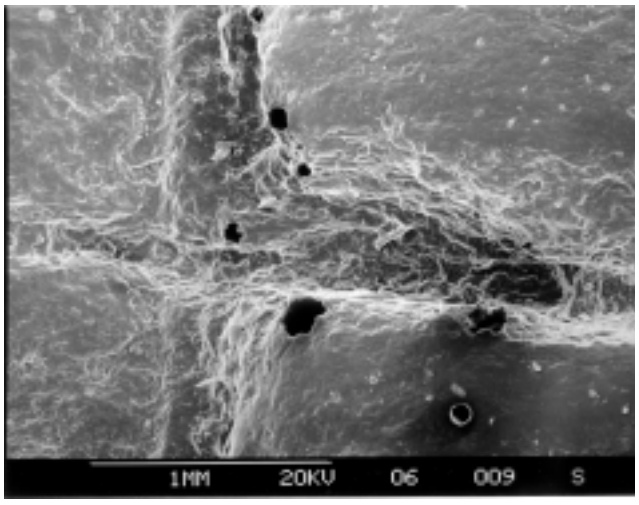


Figure 5: 984.2.132, Manche de Poignard, face 1



SEM picture 12



SEM picture 9

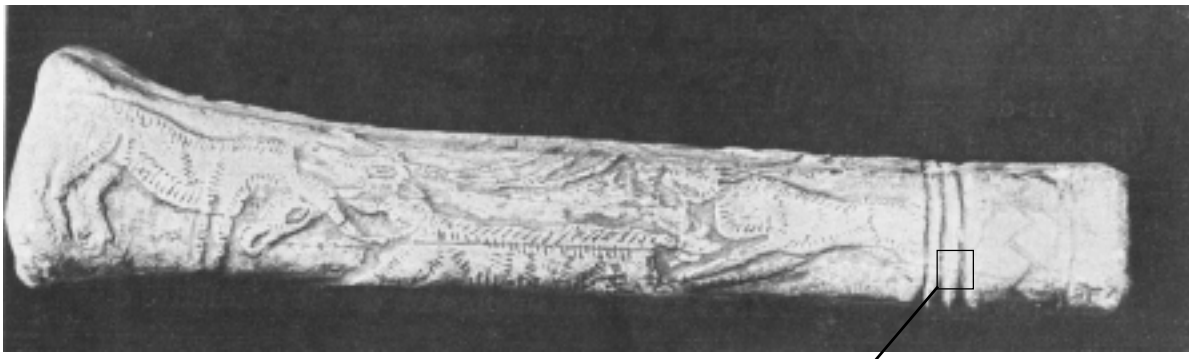
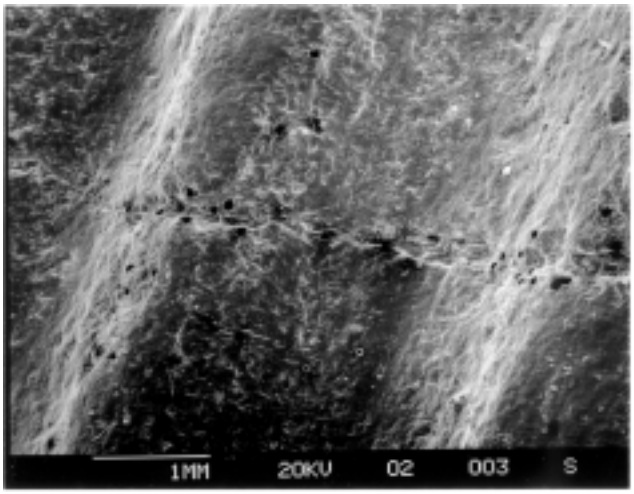


Figure 6: Manche de Poignard, face 2 *SEM picture 3*

order of years. Other observations indicate that bone buried in moist soil, when unearthed, quickly develops cracks upon drying. SEM picture 9 shows a vertical engraved line (marking the snout of the reindeer) crossing the horizontal crack. Sieveking (1980) has shown that if a crack pre-dates an engraved line, the cut dips down into the crack, whereas a line engraved before cracking occurred would maintain a uniform depth. This picture appears to show that the engraved line was made before the crack occurred, therefore probably before burial.

SEM picture 12 shows the crack as an irregular line passing from lower left to upper right and contacting the lower ends of series of four hatch marks. Between each hatch mark, the crack has the form of a series of arcs with downward pointing cusps at the contact with each hatch mark. Although the crack appears perfectly straight to the naked eye, at this enlarged scale it appears as a wave form of arcs and cusps. This pattern is what one would expect to see if a developing crack was influenced by pre-existing points of weakness (hatch marks) already carved into the surface layers of the bone.

Figure 6 shows side 2 of the Manche and SEM picture 3 in which a longitudinal crack crosses two deeply carved bands which go around the entire piece. As in SEM picture 9 (of the opposite side) the incised bands appear unaffected at the



SEM picture 3

crack intersection, indicating that they pre-date the crack.

Our archaeological colleague believes that the carving and engraving of the Manche is the work of a metal tool. Considering the C-14 date for this object, this is not unexpected. He also agrees that the engraving and carving of the Manche seems to have taken place before the cracks developed. If so, the piece could not have been carved in the 192O's.

We consider our SEM work to be a preliminary study However, the results that we report, although tentative, show that this method can be a valuable aid in the study of Glozel artifacts and has the potential to answer many of the questions we have raised about the animal engravings.

RECOMMENDATIONS AND CONCLUSIONS

In conclusion, it is our hope that the new data presented at this conference will encourage archaeologists to engage in research at Glozel. Only by undertaking new excavations, using modern scientific methods, can the long debate on the nature of this site be resolved.

In order to investigate the origin of reindeer images at Glozel, we recommend that an attempt be made to identify and date a reindeer tooth from the Glozel museum. We also recommend that additional studies of engraved bone and stone objects from Glozel be carried out by experts in this field to understand the relationships between the decorated bone and stone artifacts from Glozel.

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