Animals in Mesolithic Burials in Europe

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ABSTRACT
Animal remains have been excavated in many Mesolithic burials. A large variety of skeletal and body parts (e.g. antlers, claws, hoofs, horns, long bones, mandibles, paws, skulls, tails and vertebrae) from different mammals were interred with the deceased. In addition, beaks, wings and long bones from birds, as well as teeth and lower jaws of fish were found. Vertebrae of snakes, carapaces of pond turtles and femora of amphibians, as well as opened and unopened mollusc shells were likewise included in burial inventories. On occasion, complete animals (dogs – *Canis familiaris* –, pigs, fawn, fish) or a fish soup were placed with the dead or in pits next to the grave. Animal finds could have been remains of sacrificial food offerings to the dead, raw material for items in the afterlife or left-overs from the funeral feast. Animal teeth, mollusc shells and, occasionally, vertebrae of fish were used in jewellery and to decorate clothing. Certain bones or body parts may have been amulets or items with a special ritual meaning. Mandibles of wild pigs (*Sus scrofa*) and red deer (*Cervus elaphus*) were deposited in ritual fire places above the graves. Antlers could have been used in the burial structure and possibly also as part of shamans' masks. The largest variety of items was found in cemeteries. Animal remains were more frequently excavated from double and group burials, than from single graves. The aim of this paper is to summarize the data of more than 200 burial sites and discuss the possible function of animal remains in Mesolithic burials.

KEY WORDS
Mesolithic,
Europe,
animal remains,
burials,
funerary rites,
food offerings,
grave goods,
mortuary practices,
personal ornaments,
sacrifice.

RÉSUMÉ
Les animaux dans les sépultures mésolithiques en Europe.
La présence de restes d'animaux est attestée dans de nombreuses sépultures mésolithiques en Europe. Leur représentation recouvre les formes les plus diverses : parties de squelettes, éléments isolés (bois, ongles, sabots, cornes, mandibules, crânes, queues et vertèbres) de mammifères très divers ainsi que des restes d'oiseaux (becs, ailes et extrémités) ou encore des dents et des mandibules de poissons, vertèbres de serpents, carapaces de tortues et fémurs d'amphibiens,

coquillages (ouverts ou non) qui constituent des éléments à part entière du mobilier funéraire. Plus occasionnellement ont également été déposés des animaux complets (chiens – *Canis familiaris* –, sangliers, faon, poissons) ainsi que des préparations à base d'animaux comme des soupes de poisons à proximité du défunt ou dans des fosses situées au voisinage des tombes. Ces vestiges peuvent correspondre à des depôts alimentaires ou de matières premières destinées au défunt ou représenter des restes de repas de funérailles. Les dents d'animaux, les coquillages et parfois des vertèbres de poissons sont utilisés pour réaliser des parures ou des ornements de vêtements. Certains os ou certaines parties du corps étaient peut-être des amulettes ou des objets ayant une signification particulière. Des mandibules de sanglier (*Sus scrofa*) et de cerf (*Cervus elaphus*) étaient placées dans les foyers rituels surmontant certaines sépultures. Des bois sont employés dans la structure funéraire, à moins qu'ils ne correspondent à une partie d'un masque de chamane. C'est dans les cimetières que la diversité des restes animaux est la plus marquée, avec des concentrations fréquemment plus importantes dans les sépultures doubles ou communes que dans les tombes individuelles. L'objet de cette contribution est de proposer une synthèse des données collectées dans plus de 200 sites funéraires et de préciser le rôle des restes animaux dans les sépultures mésolithiques.

MOTS CLÉS
Mésolithique,
Europe,
restes d'animaux,
sépultures,
rites funéraires,
offrandes alimentaires,
mobilier funéraire,
pratiques mortuaires,
parures,
sacrifice.

INTRODUCTION

The Mesolithic is a more than 5000-year-long period beginning with the Holocene at c. 9600 cal. BC and ending with the onset of the Neolithic period, in the southern part of Central Europe at c. 5500 cal. BC and in Northern Europe and the Baltic region at c. 4300. Currently, there are approximately 232 known Mesolithic burial sites in Europe. These consist of the remains of more than 2000 individuals and are located across 24 countries. France (38) and Denmark (31) have the highest numbers of Mesolithic burial sites. The majority of human remains with more than 400 individuals were excavated in Portugal and in the Iron Gates, especially in Serbia. Two-thirds of the burial sites contain only one or two burials. However, cemeteries are also known. The largest number of Mesolithic individuals, at least 177, were documented at Olenij ostrov in Carelia (Russia), and at Zvejnieki (Latvia), where around 144 individuals were recorded.

Animal remains were excavated from no less than 98 Mesolithic burial sites in 17 European countries (Grünberg 2000). This article summarizes the current data and discusses their possible function in six different contexts (Fig. 1).

ANIMAL TEETH AND BONE PENDANTS

Tooth ornaments

Animal remains in Mesolithic burials derive predominately from mammals. Animal teeth were used mainly for necklaces or to decorate the garments at 20% of the burial sites (47/232). Necklaces were worn by men (Arene Canide, Janisławice, Mondeval de Sora, Popovo, Steinhagen), women (Große Ofnet, Kamieński 1, Mszano, Pierkunowo) and children (Pierkunowo, Téviec). Especially in northern, central and north-eastern Europe, animal teeth and bone pendants were widely used as decorative ornaments. They were sewn in rows onto belts in Denmark (Henriksholm-Bøgebakken) and Sweden (Skateholm I) and worn by women. Animal teeth were also fixed onto the edges of clothing in Carelia (Olenij ostrov) and Latvia (Zvejnieki). In the same regions, men and women wore head gear embellished with animal teeth (e.g. Donkalnis, Groß Fredenwalde, Mszano, Olenij ostrov, Skateholm I & II, Vedbæk-Gøngehusvej 7, Zvejnieki). There is also some evidence that head dresses were worn in France (Sous Balme). In addition, pendants seem to have been applied to cushions or wraps, on or in which the de-

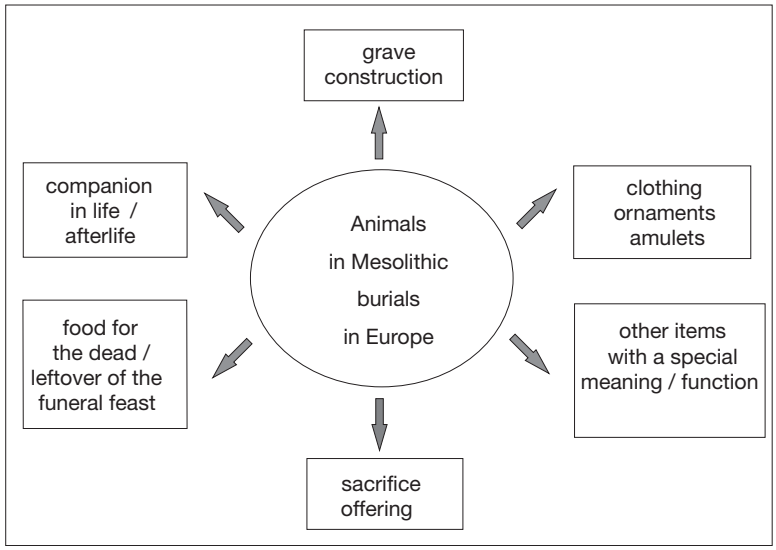

Fig. 1. — Contexts of animal remains in Mesolithic burials.

ceased were placed (Henriksholm-Bøgebakken, Zvejnieki). Sometimes they adorned pouches for tools (Olenij ostrov).

ANIMAL SPECIES

The use, variety and quantity of animal teeth pendants differed in Europe. Most of the animal teeth were excavated in northern, central and especially in north-eastern Europe. In total, the teeth of at least 18 mammal species, mainly from large herbivores (Fig. 2A), were chosen for use as decorative ornaments: aurochs (*Bos primigenius*) or bison (*Bison bonasus*), elk (*Alces alces*), red deer (*Cervus elaphus*) and roe deer (*Capreolus capreolus*). Pendants made from the front teeth of wild horse (*Equus ferus*) are documented, e.g. at Zvejnieki and Smoląg, albeit very rarely. Reindeer (*Rangifer tarandus*) teeth, mostly unmodified molars, were identified only at Olenij ostrov. Teeth from smaller mammals (Fig. 2A, B) were likewise employed: badger (*Meles meles*), beaver (*Castor fiber*), blue hare (*Lepus timidus*), and especially wild boar (*Sus scrofa*). Occasionally, teeth were taken from sea mammals, mostly from the grey seal (*Halichoerus grypus*). Finally, some teeth of carnivores were included in the ornaments or given possibly as ritual gifts in unmodified condition. They derived primarily from brown bear (*Ursus arctos*) and much less often from dog (*Canis familiaris*), otter (*Lutra lutra*), pine marten (*Martes martes*), red fox (*Vulpes vulpes*) and wolf (*Canis lupus*).

DISTRIBUTION

The types of animal teeth differ considerably. Except for north-eastern Europe, front teeth of red deer were most frequently favoured (Fig. 2A). In Denmark, incisors of red deer and to a lesser extent of roe deer and wild boar were preferred (Fig. 2B). In Sweden, incisors of red deer, elk and wild boar dominate. In both regions, complete rows of front teeth, consisting of six incisors and two canines were also attached. This is reminiscent of the sets of front teeth of reindeer and red deer that were cut out of the gum in the Magdalenian period and is possibly a surviving tradition from the Late Glacial (Poplin 1972). In central Germany (e.g. Bad Dürrenberg, Steinhagen) and Poland (Brajniki, Janisławice, Pierkunowo), front teeth of aurochs and red deer are more frequent than those of wild boar. At Donkalnis,

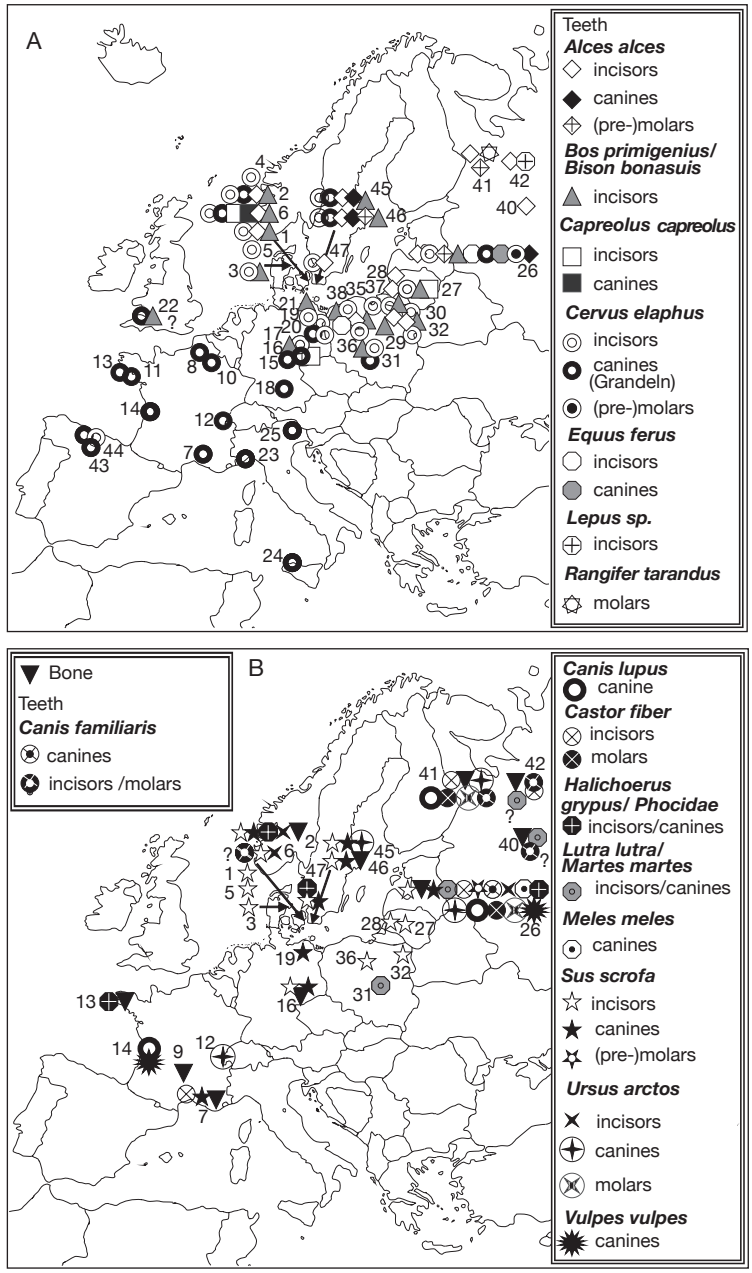

Fig. 2. — **A**, Teeth of herbivores; **B**, Teeth of carnivores, omnivores and bone pendants in Mesolithic burials. (*Denmark:* 1 Dragsholm, 2 Henriksholm-Bøgebakken, 3 Nederst, 4 Nivå 10, 5 Strøby Egede, 6 Vedbæk, Gøngehusvej 7; *France:* 7 Aven des Iboussières, 8 La Chaussée-Tirancourt, 9 Le Cheix, 10 Concevreux "les Jombras", 11 Hoëdic, 12 Sous Balme, 13 Téviec, 14 La Vergne; *Germany:* 15 Abri Fuchskirche, 16 Bad Dürrenberg, 17 Groß Fredenwalde, 18 Große Ofnet, 19 Plau, 20 Rathsdorf, 21 Steinhagen; *Great Britain:* 22 Aveline's Hole; *Italy:* 23 Arene Candide, 24 Grotta dell'Uzzo, 25 Mondeval de Sora; *Latvia:* 26 Zvejnieki; *Lithuania:* 27 D(u)onkalnis, 28 Spiginas; *Poland:* 29 Brajniki, 30 Dudka, 31 Janisławice, 32 Kamieński, site 1, (33 Kasparus), (34 Konne), 35 Łojewo, 36 Mszano, 37 Pierkunowo, 38 Smoląg, (39 Żórawno); *Russia:* 40 Minino I, 41 Olenij ostrov, 42 Popovo; *Spain:* 43 La Braña-Arintero, 44 Los Canes; *Sweden:* 45 Skateholm I, 46 Skateholm II, 47 Tågerup).

front teeth of elk and red deer were found in large numbers (Česnys & Butrimas 2009). At Zvejnieki, more than 1900 tooth pendants, mostly made of incisors from wild boar (502) and elk (470), were registered in the burials of 144 individuals from the Mesolithic and Mesolithic/Neolithic transitional period (Zagorskis 1987). The graves of the Middle Mesolithic are dominated by wild boar tooth pendants, followed by elk. Red deer and aurochs also occur. In contrast, elk dominates the burial inventories of the Late Mesolithic/Early Neolithic, followed by red deer and wild boar (Lõugas 2006). In contrast to other regions in Europe, premolars and molars of elk had been valued at Zvejnieki and Popovo. At Olenij ostrov, more than 5600 animal tooth pendants were documented. In total 76% (4273) of the pieces were incisors of elk and 21% (1201) of beaver (Gurina 1956).

Teeth of brown bear (*Ursus arctos*), mostly canines, were documented at only six (13%) of the 47 Mesolithic burial sites with mammal teeth (Fig. 2B). These occurred mainly in northern (Henriksholm-Bøgebakken, Vedbæk-Gøngehusvej 7, Skateholm I) and north-eastern Europe (Olenij ostrov, Zvejnieki), but also in eastern France (Sous Balme). The largest number of brown bear teeth (127) was found in the cemetery at Olenij ostrov. Teeth of carnivores, chiefly canines, were also excavated at six Mesolithic burial sites (Minino I, Olenij ostrov, Popovo, Vedbæk-Gøngehusvej 7, La Vergne, Zvejnieki). At four burial places (Henriksholm-Bøgebakken, Tågerup, Téviec and Zvejnieki) one or two canines of *Phocidae* were associated with a few human remains.

Mammal teeth have not yet been found in Mesolithic burials in Portugal and south-east Europe (Greece, Rumania, Serbia, Ukraine). Animal tooth pendants were rarely found in western, south-western and southern Europe. In addition, and in contrast to northern and north-eastern Europe, tooth beads were primarily made of canines taken from the upper jaw of red deer (the so-called "Hirschgrandeln", Fig. 2A). They were found in association with human remains in France (e.g. Aven des Iboussières, La Chaussée-Tirancourt, Concevreux "les Jombras", Hoëdic, Sous Balme, Téviec, La Vergne), Italy (Arene Candide, Mondeval de Sora, Grotta dell'Uzzo) and Spain (La Braña-Arintero, Los Canes). This preference follows a habitual practice known from the late Last Glacial Magdalenian culture having its center of origin in south-western Europe. In this respect Germany seems to be exceptional, as both predilections occur. At two sites, Bad Dürrenberg (Saxony-Anhalt) and Plau (Mecklenburg-Vorpommern), incisors of red deer dominate or are exclusively present. At Groß Fredenwalde (Brandenburg), the numbers of incisors and upper jaw canines are almost the same (Gramsch & Schoknecht 2000). At Abri Fuchskirche in Thuringia and the Große Ofnet in Bavaria, only canines from the maxilla were found (Küßner & Birkenbeil 2011; Schmidt 1913). In the latter case, more than 200 were associated with head burials.

PRODUCTION TECHNIQUES

At least three different modes of shaping tooth beads have been identified (Gurina 1956; Larsson 2006; Rigaud *et al.* 2010; Rigaud 2011). Pendants were perforated using either a drill or by making depressions on opposite sides of the piece. Some pieces show traces of grinding prior to drilling. In other pendants, grooves were cut into the root or edge in order to attach them to a thread. Different methods can be distinguished regionally and chronologically, but were sometimes also observed in the same burial ground. In Latvia, premolars and molars of elk were split (Zagorskis 1987), as were tusks of wild boar in Germany, e.g. Bad Dürrenberg and Plau. Additionally, at the latter site, crescent-shaped segments had been carved out in the middle parts (Beltz 1928). In Carelia, incisors of beaver were cut into plates (Gurina 1956). Some pendants show use-wear and had been worn prior to the individual's death, while others have not and seem to have been attached solely for the funeral.

VALUE AND MEANING

Animal teeth were most likely of social importance, because they conveyed information about the age, sex

and status of the individual (O'Shea & Zvelebil 1984; Jacobs 1995; Larsson 2009). Species, size and colour of the animal teeth could also have had an additional symbolic significance, e.g. the orange brown colour of beaver incisors (Grünberg 2000). Tooth pendants were only given to a few individuals in larger quantities (Grünberg 1996, 1998). A rich inventory including more than ten ornamental pieces and more than two tools was often associated with an adult male of 20 to 40 years in age in a single burial, or an adult female in a double or group burial. The largest number of animal teeth found in a Mesolithic burial was 431. They were excavated from Grave 100 in the cemetery at Olenij ostrov, which contained an adult male buried in an upright sitting position (Gurina 1956; Grünberg 2008).

MOBILITY AND EXCHANGE

Exotic items found in settlements signify contact between different regions in the Mesolithic. A few teeth from non-local animals were also found in burials. In Denmark, species like aurochs (*Bos primigenius*), elk (*Alces alces*) and brown bear (*Ursus arctos*) had already become extinct on Sjælland at the beginning of the Kongemose period (Albrethsen & Brinch Petersen 1977; Larsson 1988; Brinch Petersen 2006). Nevertheless, teeth of these species are associated with two of the 18 burials at Henriksholm-Bøgebakken. A single tooth pendant of elk and brown bear was placed into the elaborately furnished double burial of a young woman and a newborn. A single tooth pendant made from aurochs was probably part of a necklace tossed into the triple burial of an adult man, who had been killed, an adult woman and a one-year-old child (Albrethsen & Brinch Petersen 1975, 1977). Single tooth pendants from elk, aurochs and brown bear were also uncovered in one of the seven burials at Vedbæk-Gøngehusvej 7. They were part of a very complex set of ornaments of a c. 40-year-old woman, who had been killed, and a three-year-old boy (Brinch Petersen *et al.* 1993).

UNMODIFIED ANIMAL TEETH

Sometimes, unmodified animal teeth, as for example in the double burial from Bad Dürrenberg, were given to the deceased as raw material for use in the afterlife (Grünberg 2001, 2004). In other cases, unperforated animal teeth were placed into the burial or into a pit next to the burial as offerings (e.g. Popovo). At Olenij ostrov, canines of wolf, molars of elk and reindeer, and a few bones of the same species were associated with seven individuals, mostly in single graves, but also in one double and a group burial of men and women (Gurina 1956). As part of the funeral ceremony, tooth pendants also seem to have been included in the grave fill, if they did not accidently enter the burial (Larsson 1984, 1989b).

COMPOSITION

At 13 (28%) of the 47 Mesolithic burial sites with animal teeth, at least four different mammal species were identified. However at five Mesolithic burial sites in Poland (Dudka, Kasparus, Konne, Smoląg, Żórawno), a detailed analysis of the animal teeth has yet to be undertaken. A large variety of different mammal teeth was not only found in cemeteries, but also in single burials, e.g. Bad Dürrenberg, Dragsholm and Kamieński 1. The largest number, up to 15 different mammal species at Zvejnieki, and greatest diversity of tooth beads were documented in northern, central and especially north-eastern Europe (Larsson 2009). This large diversity may be a result of changing rites over time, e.g. in the cemetery at Zvejnieki, although it is also reflected in the composition of the inventories of certain individuals (Henriksholm-Bøgebakken, Olenij ostrov, Vedbæk-Gøngehusvej 7, Zvejnieki).

BONE PENDANTS

In some regions, the Mesolithic burial inventory also included bone pendants. They were found at ten (21%) of the 47 Mesolithic burial sites (Fig. 2B). A small number was excavated in France (e.g. Aven des Iboussières, Cheix, Téviec) and many more in north-eastern Europe. 111 bone pendants of only 1 cm length decorated with small incisions were counted in Grave 19 at Minino I that con-

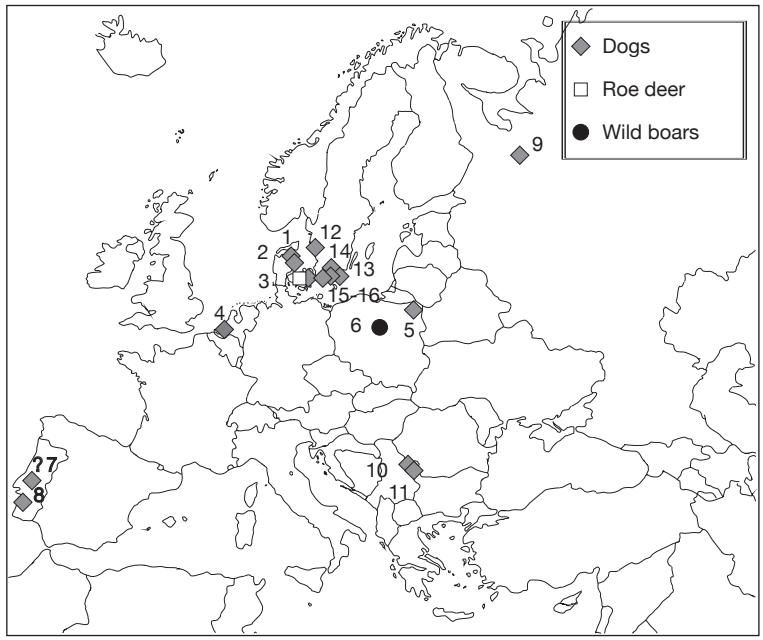

FIG. 3. — Mesolithic burials of animals. (*Denmark:* 1 Ertebølle, 2 Nederst, 3 Vedbæk, Gøngehusvej 7; *Netherlands:* 4 Hardinxveld-Giessendam, Polderweg; *Poland:* 5 Dudka, 6 Mszano; *Portugal:* 7 Cabeço da Arruda, 8 Cabeço das Amoreiras; *Russia:* 9 Popovo; *Serbia:* 10 Lepenski Vir, 11 Vlasac; *Sweden:* 12 Almeö, 13 Bredasten, 14 Sjöholmen, 15 Skateholm I, 16 Skateholm II).

tained three individuals (Buzhilova *et al.* 2008). In the cemetery at Popovo, a belt, whose edge was decorated with 19 incisors and 58 hyoid bones from at least 29 elks, had been wound around the waist of a 20-year-old man (Oshibkina 2008). At Zvejnieki, eight (5.5%) of the 144 individuals of the Mesolithic and Mesolithic/Neolithic transitional period were associated with 47 bone pendants (Zagorskis 1987). Most of them were made of beaver astragali, but in one case also of wild cat. In a few burials, the third phalanges of red deer and a first phalanx of *Phocidae* were used as pendants. A neck decoration, including a perforated roe deer claw, fragments of roe deer metacarpals and two wild boar tusks, was worn by a young man sitting in a double burial in the cemetery at Skateholm II (Nilsson Stutz 2003). At Olenji ostrov, 23 (13%) of the 177 individuals were associated with 167 bone pendants, among them hyoid bones, ulnae of beaver, a phalanx of a bear, and mandible halves of beaver and reindeer. The number of bone pendants per individual varied between one and 30 pieces (Gurina 1956).

BURIALS OF ANIMALS

DOGS

Dogs (*Canis familiaris*) were already the companion of humans in life and in death in the Late Palaeolithic. So far, the oldest example found is still the double grave exposed in February 1914 at Bonn-Oberkassel in Germany. Here, a young adult woman and a late mature man were probably buried together with a dog between 12.650 and 11.280 cal. BC (Verworn *et al.* 1919; Nobis 1986; Hedges *et al.* 1998).

Most Mesolithic animal burials involved dogs. Dog burials are known from 15 sites in seven European countries: Denmark, Netherlands, Poland, Portugal, Russia, Serbia and Sweden (Fig. 3). All of them were found at open air sites, including some in shell middens, e.g. Ertebølle, Cabeço das Amoreiras and

Cabeço da Arruda (Detry & Cardoso 2010). The burial pits were generally rather shallow. Dogs were buried at dwelling sites (Almeö, Sjöholmen) and in huts (Bredasten), but also at human burial grounds (Dudka; Hardinxveld-Giessendam, Polderweg; Nederst; Skateholm I & II). They were either interred alone (Hardinxveld-Giessendam, Polderweg; Nederst; Vedbæk-Gøngehusvej 7) or together with human remains (Dudka; Lepenski Vir; Skateholm II; Vlasac). In all cases no more than one dog was deposited in a grave. Most of them were excavated in the cemeteries at Skateholm I & II. There, at least four of the 13 dogs were associated with burial gifts, e.g. flint flakes or blades, a maxilla fragment of a roe deer, a red deer antler or a large decorated antler hammer (Larsson 1984). At least five of the nine dogs at Skateholm I were sprinkled with red ochre in the same manner as human remains often were. In two instances, Bredasten and Skateholm I, Grave 65, even puppies were formally buried, the latter one covered with plenty of red ochre (Jonsson 1986a; Larsson 1994). A few dogs were killed and tossed into burials, e.g. that of an adult woman and two adult men (Skateholm II, Graves VIII & X). One dog had lain alongside the grave of a child at Vedbæk-Gøngehusvej 7 (Brinch Petersen 1990). Only at Popovo, a young dog and an adult dog had been placed on top of an offering pit containing a hearth at the bottom with pieces of other animal bones and tool fragments. The pit was located near a child's burial (Oshibkina 2008).

The calibrated ^{14}C-dates of two burials (G3 and G4) at Hardinxveld-Giessendam, Polderweg 5650 - 5480 cal. BC (GrA-9807) and 4910 - 4580 cal. BC (GrA-10902), indicate that dogs were buried in the same place over a long period of time (Louwe Kooijmans 2001). It should be added that early dog burials are also known from the Natufian in Israel/Palestine, the Jomon culture in Japan and from the Archaic complexes in North America (Larsson 1989b, 1990, 1991, 1994; Radovanović 1999; Grünberg 2000; Morey 2006).

As in younger periods, dogs were obviously treated in a variety of ways. The fact that dogs either occur partially scattered in grave fillings (e.g. at Skateholm I & II), sometimes mixed with bones of other animals (e.g. in ritual pits at Popovo) or in anatomical order imply different meanings. Some of the dogs seem to have been recognized as companions and therefore were buried with similar mortuary rites like their human counterparts (Bökönyi 1970; Gräslund 2004; Losey *et al.* 2011).

Other mammals

There are only a few known examples of other buried species. At Vedbæk-Gøngehusvej 7, the unburnt remains of an apparently complete roe deer, about three months in age, were found above the cremated remains of a man. The faun seems to have been bedded on a wooden plate together with a fresh, unburnt flint blade possibly used to kill the animal (Brinch Petersen & Meiklejohn 2003). At Mszano, a single cremation pit burial of one young and one adult wild boar with a stone pavement and neighbouring bonfire was found in the vicinity of human burials. Considerable degree of bone overheating and absence of charcoals indicated burning at a different combustion place, followed by cleaning and deposition of the bones in an animal bladder or similar item. The bonfire appears to have been part of a circle of bonfires. Bonfire 9, however, was twice as big as the others, bordered and covered with the highest layer of comparatively large, very regularly placed stones. The rareness and care associated with these finds seem to contradict the idea that these animals represent just simple offerings (Marciniak 2001).

PARTS OF MAMMALS

Antlers, claws/paws, hoofs, horns, mandibles, skulls, tails and other bones were found in unburnt or calcinated state (Fig. 4A). Unmodified mammal remains were excavated at 54 (23%) of the 232 Mesolithic burial sites (Fig. 4B).

Antlers

Antlers were documented at at least 21 Mesolithic burial sites (Fig. 4A). They were associated with human remains in Denmark, France, Germany, Italy, Poland, Russia, Serbia, Sweden and maybe also in England. At two further sites (Los Azules, Janisławice) only single unworked antler tines were excavated. At 18 sites, they derived from red deer (*Cervus elaphus*). Some antlers were shed (Hoëdic,

Téviec), others unshed and taken from slain animals, e.g. Grotta dell'Uzzo, Henriksholm-Bøgebakken, Lepenski Vir, Skateholm II (Piperno & Tusa 1976; Radovanović 1996; Larsson 1983). Occasionally, a single antler was found in a burial, in other cases two or more. Three burials at Téviec (A, D, K) contained six antlers each (Péquart *et al.* 1937). 22 antlers from stags were found at Hoëdic (Péquart & Péquart 1954). In the cremation burial of Val-de-Reuil, more than 2250 antler fragments were counted (Billard *et al.* 2001). Sometimes, they seem to have been used for the construction of the grave, e.g. at Hoëdic and Téviec, where they outlined or covered the inhumations. In northern Europe, a few men and women were found lying with their head or body on antlers or sat on them, e.g. Henriksholm-Bøgebakken, Nederst and Skateholm II (Albrethsen & Brinch Petersen 1975, 1977; Larsson 1984; Nilsson Stutz 2003). At times, it seems that they held the body in an upright sitting position, e.g. Skateholm II (Larsson 1984, 1989a). Maybe the collection of five red deer antlers, three of which were shed and two that were still attached to the skull cap, placed on the lower legs and feet, were trophies honouring an outstanding young hunter in Grave XI at Skateholm II. Some antlers were modified, showed use-wear and had previously been used as tools, e.g. at Hoëdic, Téviec.

At a few sites, antlers of other cervids were found. At Olenij ostrov, one antler and one antler fragment of reindeer (*Rangifer tarandus*) were placed in two burials. In the cave of Arene Candide (Italy), two large parts of a complete antler of an elk (*Alces alces*), cut at the base, were placed next to the head of a child. A perforated antler beam of roe deer was identified at Téviec. In the double burial of an adult woman and a newborn at Bad Dürrenberg, a roe deer (*Capreolus capreolus*) antler was found that was still attached to a piece of skull, implying that it might have been part of a head mask (Grünberg 2001, 2004). Several Mesolithic masks and head dresses made of red deer (*Cervus elaphus*) antler were excavated in Germany (Bedburg-Königshoven, Berlin-Biesdorf, Hohen Viecheln), but also in England (Star Carr) (Street 1989; Reinbacher 1956; Schuldt 1961; Clark 1954). Similarily, roe deer antlers were not only regarded as trophies, but were also intentionally deposited in dwelling structures, as implied by unshed pieces excavated at the Late Mesolithic sites of Lollikhuse and Nivå 10 in Denmark (Lass Jensen 2009; Sørensen 2009). Their ritual function and significance seems to have persisted into the early Neolithic, possibly as a result of residual Mesolithic groups, as illustrated by a roe deer antler mask from the earliest Linear Pottery site excavated at Eilsleben in Saxony-Anhalt (Kaufmann 2010).

Skulls

At 17 Mesolithic burial sites, mammal skulls of different sizes and fragments thereof were documented (Fig. 4A). Cremated or unburnt skulls or heads were deposited in graves and in pits next to the burials, maybe as offerings to outstanding hunters, shamans or for other ritual reasons. They were associated with adults and juveniles of both sexes. Evidence for this practice can be found in various regions: France, Germany, Poland, Russia, Serbia, Spain and Sweden. Skulls of aurochs (*Bos primigenius*) were documented in Serbia (e.g. Lepenski Vir) and France (Auneau, Aven des Iboussières, Val-de-Reuil, La Vergne). At Val-de-Reuil, the cremated remains of several heads of red deer (*Cervus elaphus*) and roe deer (*Capreolus capreolus*) with their antlers attached, that of a large aurochs complete with horns and that of a wild boar were associated with a group burial (Billard *et al.* 2001). Likewise at Kamieński 1, heads of male roe deer and red deer had been cremated for a funeral (Łapo 1998). A red deer skull was also associated with a burial at Vlasac (Borić *et al.* 2009). At Los Canes, two frontal bones of a female ibex (*Capra pyrenaica)* had been added to structure II/2 (Arias Cabal & Pérez Suárez 1992). Apart from Val-de-Reuil, large fragments of a skull from a wild boar (*Sus scrofa)* were also found in a pit situated close to human burials at La Chaussée-Tirancourt (Ducrocq 1999). Three boar skulls were excavated near a human calvaria in the Blätterhöhle (Orschiedt *et al.* 2010). At Peschanitsa, several pits around the burials contained skulls, e.g. the skulls of up to six or seven blue hares (*Le-*

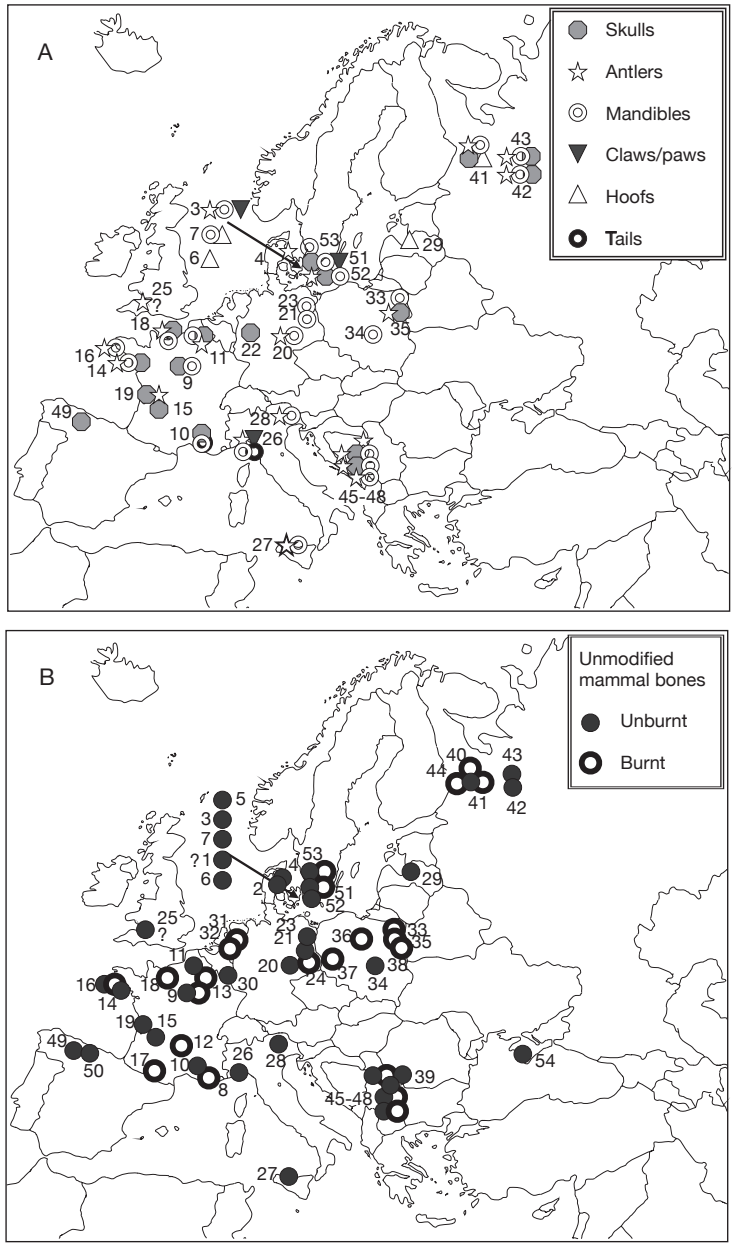

Fig. 4. — **A**, selected skeletal/body parts of mammals; **B**, other unmodified parts of mammals in Mesolithic burials. (*Denmark*: 1 Bloksbjerg (?), 2 Hammelev, 3 Henriksholm-Bøgebakken, 4 Nederst, 5 Nivå 10, 6 Strøby Egede, 7 Vedbæk, Gøngehusvej 7; *France*: 8 Abri Cornille-Sulauze I, 9 Auneau, 10 Aven des Iboussières, 11 La Chaussée-Tirancourt, 12 Le Cheix, 13 Concevreux "les Jombras", 14 Hoëdic, 15 Le Peyrat, 16 Téviec, 17 Le Trou Violet, 18 Val-de-Reuil, 19 La Vergne; *Germany*: 20 Bad Dürrenberg, 21 Berlin-Schmöckwitz, 22 Blätterhöhle, 23 Groß Fredenwalde, 24 Schöpsdorf, site 14; *Great Britain*: 25 Aveline's Hole (?); *Italy*: 26 Arene Candide, 27 Grotta dell'Uzzo, 28 Mezzocorona; *Latvia*: 29 Zvejnieki (modified hoofs); *Luxemburg*: 30 Abri du Loschbour; *Netherlands*: 31 Dalfsen, 32 Oirschot V-21; *Poland*: 33 Dudka, 34 Janisławice, 35 Kamieński, site 1, 36 Mszano, 37 Pomorsko 1, 38 Wożna Wieś 1; *Rumania*: 39 Schela Cladovei; *Russia*: 40 Černaja guba I, 41 Olenij ostrov, 42 Peschanitsa, 43 Popovo, 44 Szamozerskij II; *Serbia*: 45 Hajdučka Vodenica, 46 Lepenski Vir, 47 Padina, 48 Vlasac; *Spain*: 49 Los Azules, 50 Los Canes; *Sweden*: 51 Skateholm I, 52 Skateholm II, 53 Tågerup; *Ukraine*: 54 Zamil'Koba 1).

pus timidus) (Oshibkina 1994). A badger (*Meles meles*) skull from Los Azules, a skull of a pine marten (*Martes martes*) from Skateholm II, and a large fragment from either pine marten or otter (*Lutra lutra*) and a dog (*Canis familiaris*) skull from Skateholm I were documented in human burials. Skulls retained their symbolic function well into the Neolithic period (Borić 1999).

Mandibles

Other animal parts such as mandibles from large and small mammals were either interred as part of the tool kit and perhaps used as saws, or as part of ornaments or amulets worn for ritual reasons. Mandibles, or predominantly mandible halves, were found at 25 Mesolithic burials sites throughout Europe (Fig. 4A). Mandibles of the following species were documented in association with human graves:
– **Aurochs** (*Bos primigenius*): Auneau, Berlin-Schmöckwitz, La Chaussée-Tirancourt;
– **Beaver** (*Castor fiber*): Arene Candide, Aven des Iboussières, Janisławice, Olenij ostrov;
– **Brown bear** (*Ursus arctos*): Olenij ostrov;
– **Dog** (*Canis familiaris*): Lepenski Vir, Olenij ostrov, Vlasac;
– **Grey seal** (*Halichoerus grypus*): Skateholm I;
– **Hedgehog** (*Erinaceus europaeus*): Arene Candide, Aven des Iboussières;
– **Pine marten** (*Martes martes*) or another *Mustela sp.*: Henriksholm-Bøgebakken, Tågerup;
– **Rabbit** (*Oryctolagus cuniculus*): Aven des Iboussières;
– **Red deer** (*Cervus elaphus*): La Chaussée-Tirancourt, Grotta dell'Uzzo, Hajdučka Vodenica, Lepenski Vir, Mezzocorona, Skateholm I, Téviec, Vlasac, Vedbæk-Gøngehusvej 7;
– **Reindeer** (*Rangifer tarandus*): Olenij ostrov;
– **Roe deer** (*Capreolus capreolus*): Bad Dürrenberg, Skateholm I, Val-de-Reuil;
– **Wild boar** (*Sus scrofa*): La Chaussée-Tirancourt, Dudka, Hoëdic, Skateholm I, Téviec;
– **Wolf** (*Canis lupus*): Skateholm II.

Mandible halves of mammals occur only with a small number of individuals. They were associated with women (Bad Dürrenberg, Henriksholm-Bøgebakken, Hoëdic, Skateholm II, Tågerup), men (Arene Candide, Grotta dell'Uzzo, Janisławice) and children (Olenij ostrov, Henriksholm-Bøgebakken) in single, double and group burials. Only at Téviec, mandibles of red deer and wild boar were more frequent in association with five of the ten graves. Often, only a single mandible was placed into a burial. However in some burials, several pieces (Arene Candide, Bad Dürrenberg, Mezzocorona, Olenij ostrov, Skateholm I, Val-de-Reuil) were present. In some cases, these derived from more than one species (Aven des Iboussières, La Chaussée-Tirancourt). The largest number of animal mandibles was counted in a burial that contained eight individuals at Aven des Iboussières. Several mandibles were decorated (Gély & Morand 1998; d'Errico & Vanhaeren 2000). A total of 13 mandible halves originated from hedgehog, two from beaver and two from rabbit. At Olenij ostrov, mandibles of no less than four different mammal species (beaver, brown bear, dog and reindeer) were given to the deceased (Gurina 1956).

Claws/hoofs/paws

In Denmark, Sweden, Latvia, Carelia and Italy examples of the use of claws and hoofs, possibly as amulets integrated into personal and decorative ornaments, or as a ritual gift, were found (Fig. 4A). At Henriksholm-Bøgebakken, a claw of a roe deer (*Capreolus capreolus*) was part of a pectoral consisting of red deer, wild boar, aurochs teeth and a pine marten mandible, that was probably tossed onto a woman in a group burial (Albrethsen & Brinch Petersen 1975, 1977). At Skateholm I, a claw of wild boar (*Sus scrofa*) was placed near the head of a juvenile woman, who had been killed by a heavy blow against the temple. She had been buried together with a mature man (Larsson 1981-1982). Red deer (*Cervus elaphus*) hoofs (Phalanx III) were part of the grave goods in feature CÆ at Vedbæk-Gøngehusvej 7. At Olenij ostrov, six elk (*Alces alces*) hoofs were associated with only one mature woman buried together with a mature man. At Zvejnieki, hoofs of juvenile ruminants had been notched and worn as pendants by two children. Seven squirrel (*Sciurus vulgaris*) paws without their claws seemed to have been decorating the clothing of two children and one young adult man at Arene Candide. At Hoëdic, paws of

carnivores (*Canis lupus* or *Canis familiaris*) were associated with human remains (Tresset 2005).

Tails

Only one example of the use of mammals' tails is known (Fig. 4A). At Arene Candide, caudal vertebrae of squirrels (*Sciurus vulgaris*) were found on the thoraces of children in correct anatomical order. This suggests that the squirrel tails had probably been ornaments on their garments. The number of caudal vertebrae varied largely. The largest number, more than 443 caudal vertebrae, were associated with a six- or seven-year-old child in grave VIII (d'Errico & Vanhaeren 2000). In Grave IX, the caudal vertebrae were concentrated near the foot bones. In total, more than 580 caudal vertebrae were recorded that belonged to a minimum of 17 squirrels (Cardini 1980).

Other mammal bones

Further skeletal elements (horns, phalanges, rib bones, scapulae, vertebrae etc.) of various large and small mammals, herbivores, carnivores and omnivores, were found in Mesolithic burials in at least 15 countries (Fig. 4B).

Occasionally, unburnt animal bones have been found associated with human cremation burials (e.g. La Chaussée-Tirancourt, Hammelev). Large parts of slaughtered animals might have been sacrificial offerings, food for the afterlife or leftovers from the funeral feast (e.g. Auneau, Aven des Iboussières, Peschanitsa, Popovo, Val-de-Reuil, La Vergne). Large amounts of animals were excavated around the inhumation of one or two men at Peschanitsa. The mammal remains mainly consisted of bones of blue hare (*Lepus timidus*), but also of elk (*Alces alces*), hedgehog (*Erinaceus europaeus*), lynx *(Lynx lynx*), pine marten (*Martes martes*), red fox *(Vulpes vulpes*), reindeer *(Rangifer tarandus*) and *Rodentia* (Oshibkina 2008). They were placed in four large pits and in at least eleven accumulations around the burials. In Pit 4, the complete thorax of an elk carcass was interred. At Tågerup, fragments from almost every part of the body of a piglet were found evenly spread in a grave of a 50-year-old woman. As they occur as single bones and often burnt, they are interpreted by the excavators as possible remains of a funeral meal (Karsten & Knarrström 2003).

Burnt animal bones

Burnt animal bones were found in human cremation burials, e.g. at Concevreux "les Jombras"; Dalfsen; Oirschot V-21; Pomorsko 1; Skateholm I; Vlasac (Fig. 4B). In addition, they were also documented in hearths (Le Cheix, Téviec, Le Trou Violet) and in ritual pits alongside a human burial (Auneau, Mszano). They were also found deposited in burial pits or in the grave filling, or strewn over inhumations (e.g. Abri Cornille-Sulauze I; Černaja guba I, Dudka, Hajdučka Vodenica, Kamieński, Olenij ostrov, Padina, Schöpsdorf, site 14; Szamozerskij II, Tågerup, Val-de-Reuil, Vlasac). These might be leftovers from the burial feast, food for the dead or deposited for other ritual or symbolic reasons. At Kamieński 1, 1860 cremated animal bone fragments from red and roe deer, including those of skulls and postcranial bones, were gathered in a pit of 70 cm x 190 cm and scattered over an inhumation burial of a fourteen- to fifteen-year-old girl (Gręzak *et al.* 1998; Łapo 1998). Almost 12 kg of cremated mammal bone fragments, including several complete skulls of red deer (*Cervus elaphus*), roe deer (*Capreolus capreolus*), aurochs (*Bos primigenius*) and wild boar (*Sus scrofa*) together with shoulder blades from red and roe deer and a pelvis and front leg of a beaver (*Castor fiber*), were excavated at Val-de-Reuil (Billard *et al.* 2001).

BIRDS

Bird bones were found at 18 Mesolithic burial sites (Fig. 5). However in some cases, the intentional inclusion remains questionable (e.g. Aveline's Hole, Bloksbjerg). Certain bird species seemed to have been favoured. In Denmark, Sweden and Latvia, primarily water fowl were placed into the burials, e.g. swan (*Cygnus cygnus*), red-necked grebe (*Podiceps grisegena*), red-throated diver (*Gavia stellata* Pontoppidan), mallard (*Anas platyrhynchos*), black throated diver (*Gavia arctica*), goosander (*Mergus merganser*) and red-breasted merganser (*Mergus serrator)*.

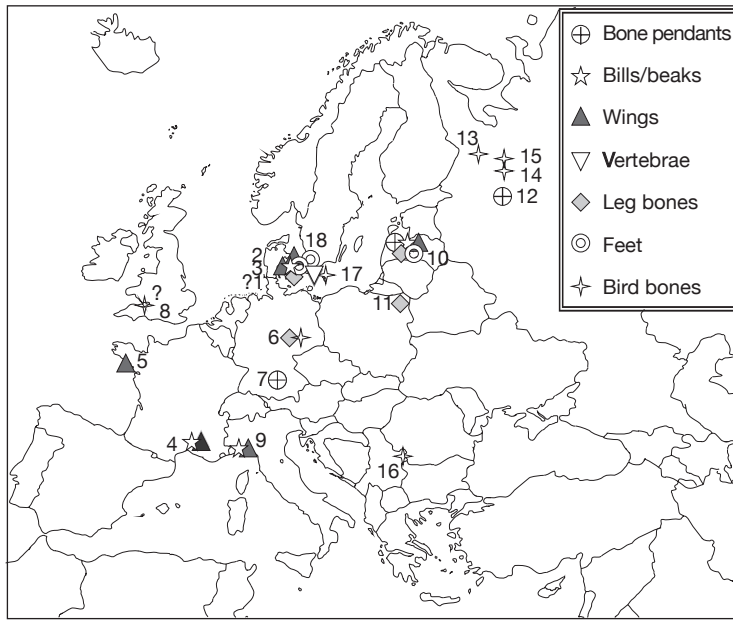

Fig. 5. — Birds in Mesolithic burials. (*Denmark:* 1 Bloksbjerg (?), 2 Henriksholm-Bøgebakken, 3 Vedbæk, Gøngehusvej 7; *France:* 4 Aven des Iboussières, 5 Hoëdic; *Germany:* 6 Bad Dürrenberg, 7 Burg Nassenfels; *Great Britain:* 8 Aveline's Hole (?); *Italy:* 9 Arene Candide; *Latvia:* 10 Zvejnieki; *Poland:* 11 Dudka; *Russia:* 12 Minino I, 13 Olenij ostrov, 14 Peschanitsa, 15 Popovo; *Serbia:* 16 Vlasac; *Sweden:* 17 Skateholm I, 18 Tågerup).

Bird bones had been used as decorative ornaments at three Mesolithic burial sites. At Zvejnieki, pendants were made from the humeri of *Anas platyrhynchos, Aythya sp./Bucephala clangula, Mergus merganser* and *Mergus serrator* (Mannermaa 2006). At Minino I, birds' ribs and fragments of tubular bones were sewn onto the clothing (Oshibkina 2008). At Burg Nassenfels, a two- to four-year-old child wore a necklace made of four fish vertebrae and the midshaft fragment of a bird bone with cut marks (Rieder 1986).

It is highly likely that bird wings and beaks were associated with the dead for ritual reasons. A newborn seemed to have been bedded on a swan wing next to his 18-year-old mother at Henriksholm-Bøgebakken (Albrethsen & Brinch Petersen 1975, 1977). At Arene Candide, two beaks and one wing of the Alpine chough (*Pyrrhocorax graculus*) were placed on the thorax of a six- or seven-year-old child. A wing of a corncrake (*Crex crex*) had lain next to the feet of a young-adult male and on the thorax of a juvenile child (Cardini 1980). A coracoid of a juvenile bird was also found in the burial of an adult male at Zvejnieki (Mannermaa 2006). About 55 different bird species were identified at the settlements of Skateholm I and II, but only a single cervical vertebra of a red-throated diver was excavated in the double burial of a juvenile man and a newborn at Skateholm I (Jonsson 1988). Skeletal parts of birds of prey, e.g. white-tailed eagle (*Haliaetus albicilla*), were deposited in several burials (Hoëdic, Olenij ostrov, Tågerup), which is further evidence of their symbolic meaning (Tresset 2005; Mannermaa 2008a; Karsten & Knarrström 2003). Osprey (*Pandion haliaetus*) was the most numerous bird species found at Olenij ostrov, which suggests that special importance was perhaps attached to this species. It may have been regarded as a totem or power animal (Mannermaa 2008b).

In a few instances, remains of gamebirds and other non-passerines have been documented. Bones of a wood grouse (*Tetrao urogallus*) were excavated around and under the leg bones of an adult man at Peschanitsa (Oshibkina 1994). In the double

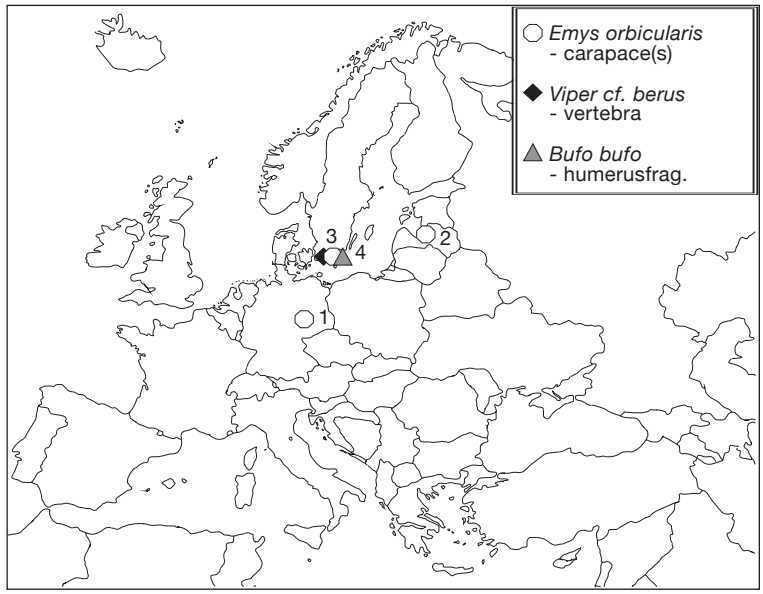

Fig. 6. — Amphibians and Reptiles in Mesolithic burials. (*Germany:* 1 Bad Dürrenberg; *Latvia*: 2 Zvejnieki; *Sweden:* 3 Skateholm I, 4 Skateholm II).

burial of an adult woman and a newborn at Bad Dürrenberg, the midshaft of a crane (*Grus sp.*) humerus was used as a container to store microliths. An unmodified tibiotarsus-diaphysis from the same bird species was also deposited in the grave, possibly as raw-material for use in the afterlife (Bicker 1936; Teichert & Teichert 1977).

Bird remains in graves and in pits located next to human burials may have been offerings for the afterlife. This appears to have been a popular custom in north-eastern Europe (e.g. Bad Dürrenberg, Dudka, Olenij ostrov, Peschanitsa, Popovo, Zvejnieki). Water fowl, e.g. coot *(Fulica atra),* black-throated diver *(Gavia arctica*), whooper swan (*Cygnus cygnus*) and *Anatidae*, and wading birds, e.g. bittern (*Botaurus stellaris),* are the dominant species found (Mannermaa 2008a; Tomek & Gumiński 2003; Oshibkina 2008). At Olenij ostrov, 27 of 177 (15%) individuals were associated with bird bones or parts of birds (nine woman, twelve men, two children, four indeterminate). 18 individuals were buried in single burials, seven in double burials and two in group burials. They represent more than half of the individuals that were associated with unmodified animal remains (Gurina 1956).

The impressive appearance of some birds (*Cygnus sp., Grus sp., Pyrrhocorax graculus, Tetrao urogallus*), the red colour of their neck (*Podiceps grisegena*), throat (*Gavia stellata*), breast (*Mergus serrator) or* legs (*Pyrrhocorax graculus*), the yellow colour of their bill (*Pyrrhocorax graculus*) or their ability to fly may have played an important part in burial rites (Mannermaa 2008a).

Amphibians and Reptiles

Amphibians and reptile remains were identified only at four Mesolithic burial sites (Fig. 6). At three sites in Germany, Sweden and Latvia, the carapaces of European pond turtles (*Emys orbicularis*) were found. At least three carapaces were interred in the richly furnished double burial of a woman and a newborn at Bad Dürrenberg (Bicker 1936; Teichert & Teichert 1977). They may have been bowls, small drums or intended for use as food or raw material in the afterlife. In a triple burial at Zvejnieki, four fragments of a single carapace were excavated near the skull

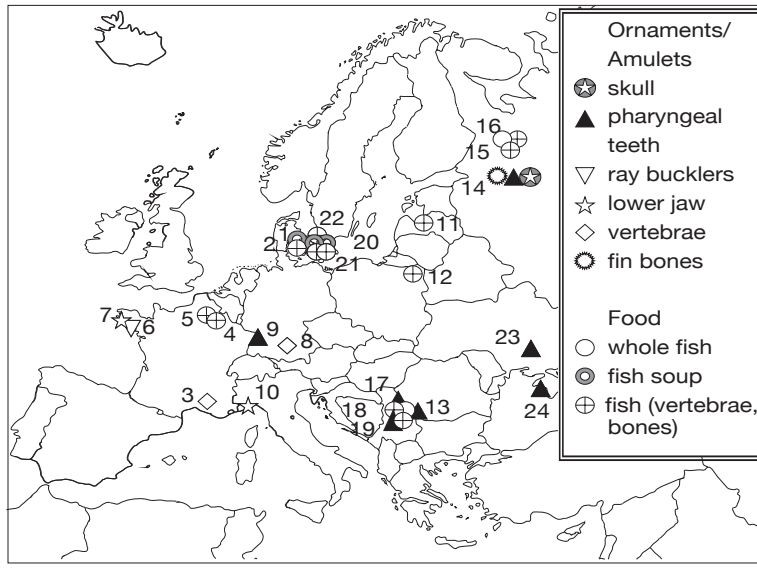

Fig. 7. — Fish in Mesolithic burials. (*Denmark:* 1 Nivå 10, 2 Vedbæk, Gøngehusvej 7; *France:* 3 Aven des Iboussières, 4 Concevreux "les Jombras", 5 Cuiry-les-Chaudardes, 6 Hoëdic, 7 Téviec; *Germany:* 8 Burg Nassenfels, 9 Hohlenstein-Stadel; *Italy:* 10 Arene Candide; *Latvia:* 11 Zvejnieki; *Poland:* 12 Dudka; *Rumania:* 13 Schela Cladovei; *Russia :* 14 Minino I, 15 Peschanitsa, 16 Popovo; *Serbia:* 17 Kula, 18 Lepenski Vir, 19 Vlasac; *Sweden:* 20 Skateholm I, 21 Skateholm II, 22 Tågerup; *Ukraine:* 23 Mar'ievka, 24 Zamil'Koba 1).

of one of the deceased and were probably part of a head dress (Lõugas 2006; Zagorskis 1987).

Bones of amphibians and reptiles were presumably added to the fish soup constituents found in the Mesolithic cemeteries in Sweden (Jonsson 1986b, 1988). Fish remains and a vertebra of a northern viper (*Vipera berus*) were recovered from the belly region, as well as from below the thorax of a late mature man, who was buried on his stomach at Skateholm I. The grave fill of a woman, who was buried on her back at Skateholm II, contained fish remains. Among them were a carapace fragment from a European pond turtle (*Emys orbicularis*) and a fragment of a humerus from a common toad (*Bufo bufo*).

FISH

Fish remains were found at 24 Mesolithic burial sites (Fig. 7). Most of them were uncovered in the cemeteries associated with the settlements at Skateholm I & II, where 16 to 17 different species were documented in the burials and interpreted as food offerings. A total of 33 (40%) of the 83 individuals buried there were associated with fish remains (Jonsson 1986b, 1988). Fish remains were often located in the stomach or pelvic region. Occasionally, fish bones were found on the ventral side, under the body. In other graves, they were recorded between the jaws, behind the head, on the left and right shoulders, between the legs or knees and by the feet. In some graves, fish bones were also contained in the backfill and could have been tossed into it during ceremonial activities. One tooth from a porbeagle shark *(Lamna nasus)* was identified in a single burial at Skateholm I, where it was associated with a late mature person, and another at Skateholm II associated with a juvenile man. Likewise, a fossil shark tooth was documented in a single burial at both cemeteries at Skateholm I, in association with a mature female and at Skateholm II, with an adult male. At Popovo, one man was holding a small fish in his right hand, while another had one in his left hand (Oshibkina 2008).

Fish bones were also uncovered in burials at Cuiry-les-Chaudardes, Dudka, Lepenski Vir, Nivå 10, Popovo, Tågerup and Zvejnieki, and in grave fills (Tågerup), in

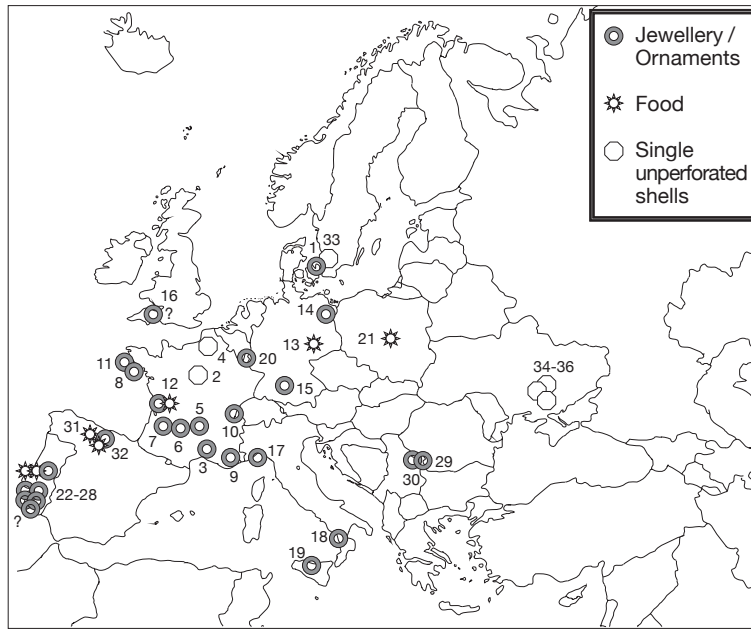

Fig. 8. — Molluscs in Mesolithic burials. (*Denmark:* 1 Henriksholm-Bøgebakken; *France:* 2 Auneau, 3 Aven des Iboussières, 4 La Chaussée-Tirancourt, 5 Le Cheix, 6 Le Cuzoul de Gramat, 7 Combe Capelle, 8 Hoëdic, 9 Le Rastel, 10 Sous Balme, 11 Téviec, 12 La Vergne; *Germany:* 13 Bad Dürrenberg, 14 Criewen, 15 Große Ofnet; *Great Britain:* 16 Aveline's Hole (?); *Italy:* 17 Arene Candide, 18 Grotta del Santuario della Madonna, 19 Grotta dell'Uzzo; *Luxemburg:* 20 Abri du Loschbour; *Poland:* 21 Janisławice; *Portugal:* 22 Arapouco, 23 Cabeço da Amoreira, 24 Cabeço das Amoreiras, 25 Cabeço do Pez, 26 Moita do Sebastião, 27 Poças de São Bento, 28 Vale de Romeiras; *Rumania:* 29 Schela Cladovei; *Serbia:* 30 Vlasac; *Spain:* 31 Los Azules, 32 Los Canes; *Sweden:* 33 Tågerup; *Ukraine:* 34 Mar'ievka, 35 Vasil'evka I, 36 Vasil'evka III).

ritual pits (Popovo) and in accumulations of fauna surrounding the graves at Peschanitsa. Burnt fish vertebrae of flounder (*Platichthys flesus*) or pike (*Esox lucius*) were also excavated from cremation burials, e.g. at Vebæk-Gøngehusvej 7 and Concevreux "les Jombras". Pike appeared to have been favoured, e.g. at Concevreux "les Jombras", Dudka and Zvejnieki (Robert 2006; Gumiński 1995; Lõugas 2006). In addition, scuta from *Acipenser sturio* and bones from *Coregonus sp.*, *Lota lota*, *Perca fluviatilis* occur in the burial inventories at Peschanitsa and Zvejnieki.

In a few cases, a mandible of a large fish, e.g. meagre (*Argyrosomus regius*), that was sometimes decorated, was associated with a special burial (e.g. at Arene Candide and Téviec) and may have possessed a ritual significance. At Lepenski Vir, the skeleton of a large fish was found next to a human burial.

Fish remains were also used in jewellery or to decorate garments. At Minino I, 109 pendants made of fin bone fragments, four teeth and a modified skull from fish had been sewn onto clothing (Buzhilova *et al.* 2008). Fish vertebrae, especially those of pike, were worn on necklaces, e.g. at Burg Nassenfels and Aven des Iboussières. At Hoëdic, bucklers of *Myliobatidae* were integrated into personal ornaments. From the upper part of the Danube river (Hohlenstein-Stadel) to the Iron Gates (Kula, Schela Cladovei, Vlasac) to the Crimea (Zamil'-Koba I) and up the Dnieper river (Mar'ievka), burnt and unburnt, perforated, notched or unmodified pharyngeal teeth of *Cyprinidae* were commonly found. At Hohlenstein-Stadel, twelve large pieces might have belonged to a necklace placed around the head of a decapitated young-adult woman, which was buried together with the head of a decapitated young-adult man and of a one-year-old child (Wehrberger 1995; Rigaud 2011). More than 400 such pieces were

recorded in burials at Schela Cladovei, Kula and Vlasac. Here, the pharyngeal teeth were most frequently concentrated in the pelvis region and seemed to have embellished belts, worn by men, women and children. In some cases, pharyngeal teeth were distributed around the skull (Vlasac) and may have decorated head dresses (Borić *et al.* 2009). The use of fish teeth continues in the early Neolithic period along the Danube river. At Aufhausen in Lower Bavaria, about 20 very large pieces from *Rutilus pigus* were excavated from a burial of an eight- to ten-year-old boy, dating to the early Linear Pottery culture (Kreiner & Pscheidl 2005). Several fish teeth were also found in Neolithic burials in the Ukraine (Lillie 2003).

MOLLUSCS

Mollusc shells were associated with human remains at at least 36 Mesolithic burial sites (Fig. 8). In contrast with the distribution of tooth beads, mollusc shells were mainly excavated in western, south-western and southern Europe. The identified species differ regionally. Small aquatic gastropods, *Theodoxus fluviatilis,* were found in north-east Germany (Criewen), Denmark (Henriksholm-Bøgebakken) and, among other species, also in Portugal (e.g. Arapouco, Cabeço das Amoreiras, Moita do Sebastião). Marine gastropods, *Littorina obtusata, Trivia monacha* and *Nassarius reticulatus,* were preferred in western France (Combe Capelle, Hoëdic, Téviec, La Vergne) and northern Spain (Los Canes). Other seashells, *Columbella rustica, Dentalia* and *Nassa,* were selected in east and south-east France (e.g. Aven des Iboussières, Le Cheix, Le Cuzoul de Gramat, Le Rastel, Sous Balme) and north-west Italy (Arene Candide). Freshwater mussels, e.g. *Unionidae*, were placed into burials in Germany (Bad Dürrenberg), Poland (Janisławice) and the Ukraine (Mar'ievka, Vasil'evka I & III).

The largest variety and number of shells was interred with the Mesolithic deceased along the eastern Atlantic coast and were used for personal and decorative ornaments. The maximum number recorded is 2900 shells of *Littorina obtusata* counted in the burial C/2 of two four- to six-year-old children at Hoëdic (Péquart & Péquart 1954). The maximum number of different species identified in a single location is between 12 and 17 in each of the Mesolithic cemeteries at Hoëdic, Téviec and La Vergne (d'Errico & Vanhaeren 2000; Dupont 2006, 2007).

At the shell-midden sites of Hoëdic and Téviec, necklaces, bracelets on both wrists and ankle chains made of mollusc shells were favoured (Péquart & Péquart 1954; Péquart *et al.* 1937). Necklaces and bracelets were worn by women, men and children, while ankle chains were associated with women only. In addition, loin cloths were decorated with shells. Women, men and children wore head dresses adorned with mollusc shells. Similarly, the deceased in the shell-midden of Moita do Sebastião wore shell jewellery or shell adorned belts and hair-nets (Roche 1959), but their occurrence elsewhere is much rarer. At Arene Candide, men and especially children favoured perforated marine species, Nassariidae, but also *Patella caerulea, aspera, Patella lusitanica, Mytilus edulis* and *Helcion pectunculus,* often shaped into half-moons and polished (Cardini 1980). In southern Italy, only single perforated mollusc shells, e.g. *Donax trunculus*, *Patella ferruginea*, *Cardium edule*, decorated a handful of individuals (Grotta dell'Uzzo, Grotta del Santuario della Madonna). Occasionally, perforated and unperforated shells were found in a burial, e.g. of *Columbella rustica, Trochus* and *Patella caerulea* in the burial of an adult male at Rastel. In the Iron Gates, merely a few individuals were associated with ornaments, e.g. at Vlasac, made of shells from sea snails (*Columbella rustica, Cyclope neritea, Helcion pectunculus),* but also freshwater snails *(Melanopsis impressa)* and mussels (*Unio).*

In some instances, molluscs and animal tooth beads were combined. At Henriksholm-Bøgebakken, an 18-year-old woman buried with a newborn was dressed with a belt decorated with 60, mainly perforated, red deer (*Cervus elaphus*) incisors and around 200 shells of *Theodoxus fluviatilis* that were arranged in five rows. In addition, her head was placed on a cushion or garment ornamented with 190 animal tooth pendants and many of these river nerites (Albrethsen & Brinch Petersen 1975, 1977). At the Große Ofnet, c. 4250 small snail shells of the species *Lithoglyphus naticoides, Theodoxus gregarius, Gyraulus trochiformis* and *Columbella rustica,* together

with upper canines of red deer (*Cervus elaphus*), the former were probably attached onto head dresses that covered the heads of children of less than seven years in age (Schmidt 1913; Rigaud 2011). Similarly, a 30- to 35-year-old man at Sous Balme probably wore a head dress with twelve *Columbella rustica* and ten upper canines from red deer. The same kind of sea snails also decorated the head dress of a young-adult man buried at Le Cuzoul de Gramat. At Schela Cladovei, a woman buried together with a foetus probably wore a belt, adorned with 138 shells of land snails, *Helix pomatia,* and 338 fish teeth (Boroneanț 1993).

In France, Germany, Poland, Portugal and Spain, right and left valves of molluscs were excavated in Mesolithic graves, implying that they had been interred in their closed state and were to be used as food in the afterlife. Around 120 fragments of at least four species of freshwater mussels (*Unio tumidus, Unio crassus, Unio pictorum & Margaritana margaritifera*) were found next to an adult woman buried with a newborn at Bad Dürrenberg. At Janisławice, an adult male had five *Unio tumidus.* At a number of burial grounds, especially in the Ukraine, single unperforated valves *of Unionidae* were placed mostly or possibly exclusively next to men (Mar'ievka; Vasil'evka I). An association with women has still to be confirmed (Mar'ievka, N 13 & 14). At Vasil'evka III, only one of the 45 individuals, a mature man (N 42), had unmodified shells interred with him: two *Anodonta* and one *Viviparus viviparus*. At Los Azules, ten to twelve large sea mussel shells of *Modiolus barbatus* were part of the funeral gifts. At Cabeço da Amoreira, numerous *Cardium edule* were placed around a skeleton that was excavated in 1930. Unopened *Theba pisana*, *Scrobicularia plana* and *Ruditapes decussatus* were concentrated around the inhumations of Moita do Sebastião. Many land snails (*Cepaea nemoralis),* but also some *Patella sp.,* were possibly tossed into the fill of at least two burials at Los Canes (Arias Cabal & Pérez Suárez 1992).

Fossil shells also occur, e.g. at the Große Ofnet (*Gyraulus trochiformis, Theodoxus gregarius*) and Abri du Loschbour (*Bayana lactea*). A single Mesozoic fossil, possibly an oyster shell, was found with a man in a double burial and placed next to a similarly mature woman at Tågerup. In addition to c. 60 perforated *Neritoides obtusatus,* seven body chamber fragments of ammonites may have been associated with a Mesolithic burial at Aveline's Hole.

DISTRIBUTION OF UNMODIFIED ANIMAL REMAINS IN THE CEMETERY AT OLENIJ OSTROV (CARELIA)

Similar to all other grave goods, animal remains were not evenly distributed in the burials. At Olenij ostrov, unmodified animal remains were only associated with 30% of the individuals (53/177). However, they were placed in two-thirds of the group burials and in more than 50% of the double burials. In addition, they were given to juveniles and adults of both sexes. More than half of the burials (28/53) that contained animal remains were richly furnished with tools and ornaments, a further 20 burials were rich in tools or ornaments and only five individuals were poorly furnished; their grave goods included less than two tools and less than ten pieces of ornaments (Grünberg 2000).

ANIMAL EFFIGIES

Animal effigies made of bone, antler, tooth and amber were very rarely placed into the graves. They were only present at the two large burial grounds at Olenij ostrov and Zvejnieki. The largest number of animal effigies was excavated at Olenij ostrov. Animal and human figurines were found in eight burials and with at least nine (5%) of the 177 individuals (Gurina 1956, 1990). Three handles, two made of reindeer antler and one made of bone, were shaped into an elk's head and were associated with a mature man in a group burial (Grave 55/56/57), a man and a woman in a double burial (Grave 152/153) and with an adult of unknown gender in a single burial (Grave 61). One elk figurine and four elk heads were carved out of antler and bone and found in three single burials and one double burial (Graves 64, 68, 80/81 & 82). They

were associated with both sexes. Snake figurines made of bone were excavated in the previously mentioned group burial (Grave 55/56/57) and in a single burial (Grave 23). In the former, it belonged to an adult woman. The gender of the individual in the latter is unknown.

At Zvejnieki, two of the 144 Mesolithic and Mesolithic/Neolithic burials contained animal effigies. A bird figurine in the burial of a woman (Grave 74) was made of a boar tusk. The second figurine derived from the burial of an older child (Grave 100) and was made of decorated bone (Zagorskis 1987).

SUMMARY AND CONCLUSIONS

Many Mesolithic burials contained a large variety of animal remains including those of mammals, birds, reptiles, amphibians, fish and molluscs. The type and frequency of animal remains in burials varies regionally and locally and can be taken as evidence for different burial traditions in Mesolithic Europe (Grünberg 2000). The largest supra-regional difference relates to the composition of personal and decorative ornaments. Particularly in north-eastern Europe, animal teeth were largely or exclusively used for the manufacture of personal ornaments, while mollusc shells were preferred in western Europe. In addition, incisors taken from red deer or elk were favoured in the former region and upper jaw canines from stags ("Hirschgrandeln") in the latter.

Animals played an important role in the daily life and in the ideology of hunter-gatherer-fishers (Jeunesse 2001; Mannermaa 2008b). They were part of a cultural intercommunication system (Newell *et al.* 1990). Thus, a wild-animal symbolism existed throughout Europe and was not confined to a certain period or region (Zvelebil 2008). Animal remains functioned as important cultural and social markers for the living and the deceased and reflected the economic basis and the environment of the Mesolithic hunter-gatherer-fishers and took on a multidimensional ritual meaning. A large variety of skeletal or body parts (e.g. antlers, claws, heads, hoofs, horns, long bones, lower jaws, paws, skulls, tails and vertebrae) from different mammals were interred with the deceased. In addition, beaks, wings and long bones from birds, as well as teeth and lower jaws of fish were included in burials. Likewise vertebrae of snakes, carapaces of pond turtles and femora of amphibians, as well as perforated valves and unopened mollusc shells were sometimes part of the burial inventory. Occasionally, a type of fish soup or a whole fish was given to the dead. Complete dogs, more rarely pigs or a fawn were placed in burials or pits next to the grave as companions or for ritual purposes rather than simply as food.

Animal parts could have been the remains of sacrificial food offerings to the dead, food or raw material for use in the afterlife, left-overs from the funeral feast or remains of the last meal. Most animal teeth, mollusc shells and sometimes vertebrae of fish were used in jewellery or to decorate clothing. Certain bones or body parts may have been amulets or items with a special ritual or symbolic meaning, as could the lower jaws of wild pigs and red deer put in hearths above the graves. Antlers could have been used in the burial structure, as offerings to outstanding hunters and possibly also as part of shamans' masks. The largest variety of animal remains was present in cemeteries. They usually occurred more frequently in double and group burials, than in single graves. Animal remains continued to play a role in Neolithic burial practices, especially in those regions in which the diet remained similar to Mesolithic subsistence and continued to be based on hunting-gathering-fishing.

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