Vers une anthropologie des catastrophes
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# A mass grave from a Mediaeval Russian town: the anthropological evidence of a social catastrophe

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**Key-words –** Mediaeval archaeology, mass grave, skeletal traumas, Ancient Russians.

**Abstract –** The main purpose of excavations conducted in Yaroslavl (European Russia) in 2005-2006 was to find the ancient foundations of the Cathedral of the Assumption of the Virgin Mary and to investigate the various cultural strata of historical Yaroslavl around its largest religious edifice. A mass grave which included the remains of many adults and children was located below the ruins of a barn which had been destroyed by fire in the Mediaeval period. It was dated by archaeological artefacts to the early 13th century. Numerous cases of skull fractures caused by mace blows, sword wounds, decapitation, and the evidence of various parts of the body pierced by an arrow, provided us with information enabling us to ascertain that death was caused by military aggression. According to historical annals, in the winter of 1238, the Golden Horde forced its way into the town of Yaroslavl. This was the beginning of a long-term occupation of Mediaeval Russia by the Mongolo-Tatars.

## Un charnier dans une ville médiévale russe : le témoignage anthropologique d'une catastrophe sociale

**Mots-clés –** Archéologie médiévale, charnier, lésions osseuses, Russes anciens.

**Résumé –** Le principal but des fouilles menées à Yaroslavl (Russie d'Europe) en 2005-2006 était de découvrir les fondations de la Cathédrale de l'Assomption de la Vierge Marie et d'étudier les diverses strates culturelles autour de l'édifice ecclésial le plus important de cette cité historique. Un charnier fut mis au jour sous les ruines d'une grange détruite par le feu au Moyen Âge. Daté, par des artefacts archéologiques, du début du XIIIe siècle, il renfermait les restes de nombreux adultes et enfants. Plusieurs cas de fractures du crâne causées par des coups de massue, d'épée, des décapitations, et les marques de pénétration de flèches dans les membres sont les raisons pour lesquelles nous voyons dans la cause des décès une agression militaire. Selon les annales historiques, au cours de l'hiver 1238, la Horde d'Or s'empara de la ville de Yaroslavl. Ce fut le début d'une longue occupation de la Russie par les Mongols et Tatars.

## Introduction

In 2005-2006, two seasons of salvage excavations were conducted by A.V. Engovatova over an area of up to 1 200 m$^2$ in the centre of the modern town of Yaroslavl (European Russia) on behalf of the Institute of Archaeology of the Moscow Russian Academy of Sciences (fig. 1).

Two goals had been set: to find the ancient foundations of the Cathedral of the Assumption of the Virgin Mary, and to investigate the various cultural strata of historical Yaroslavl around its largest religious edifice. Twenty-five Mediaeval houses and farms in various states of conservation were uncovered. Over one hundred domestic pits testified to the dynamism of urban development in that period (Engovatova *et al.*, in press).


**Fig. 1.** *Modern Yaroslavl in Russia.*

A mass grave which included the remains of many adults and children (fig. 2) was located below the ruins of a barn which had been destroyed by fire in the Mediaeval period. The total area of this grave was no more than 12 m$^2$. The most common causes of collective burials are military aggression, epidemics and famines. The analysis of the Yaroslavl skeletal material has focused on the reasons of death of those interred.

## Data and methods

The human remains were found in the grave in various positions. Six layers of human remains were uncovered *in situ*. Approximately one third of the mass grave had been disturbed by the building of the Cathedral in the Middle Ages, and its contents partly destroyed. A few skeletons were found in pits or in the foundations of other buildings, and in most cases these were fragmentary. Thus, the anthropological material consisted of two parts: a small part was represented by fragments of skeletons of less than ten individuals, and the greater part was a series of more or less complete skeletons totalling about one hundred individuals.

The human remains of the first group were analysed in order to identify the number of individuals and, in some cases, to estimate their sex and age. The total number of individuals was determined by adding the number of preserved skulls, cranial vaults, and frontal bones with preserved *Glabella*[1], the occipital with the preserved part of the occipital crest, and

1. The most forward projecting point in the midline of the forehead at the level of the supra-orbital ridges and above the naso-frontal suture.

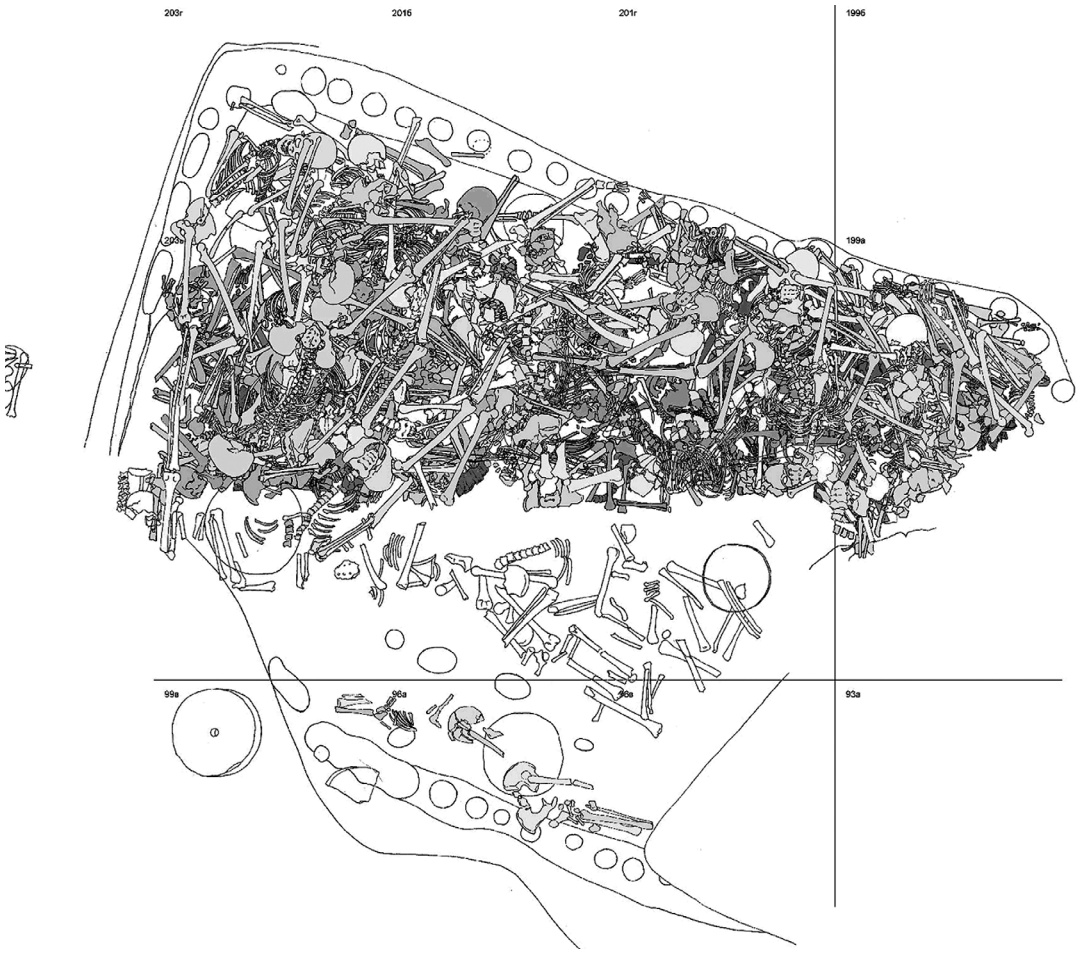


**Fig. 2.** *The first layer in the mass grave in the foundations of a barn with* in situ *position of skeletons in specific squares during excavation (Drawing: D. O. Osipov).*

mandibles with parts of the *Gnathion*.[2] A maximum number of observations on one class of bones was compared with the results of calculating the number of persons by the remains of *pelvis*, *sacrum* and long bones (*humeri*, *ulnae*, *radii*, *femora*, *tibiae* and *fibulae*). It is important to note that the number of individuals reached was on the basis of bones on one side of the body and one part of the upper or lower fragment of the diaphysis (fig. 3). Thus, 44 adults and 14 children were identified. Of these, sex and age were estimated for 21 adults, and solely age for 14 children.

The second group, which consisted of complete and incomplete skeletons, was analysed in order to identify the maximum number of buried individuals, on the basis of the maximum

2. The lowest median point on the lower border of the mandible.

| Bones | Males | Females | Ambiguous (paired bones left/right) | Total adults | Children (paired bones left/right) | Total children |
|---|---|---|---|---|---|---|
| Skull vault | 1 | 3 | | 4 | | |
| Frontal with part of *Glabella* | 5 | 7 | 3 | 15 | 11 | 11 |
| Temporal | | | 16/19 | 19 | | |
| Occipital | | | 11 | 11 | 9 | 9 |
| *Maxilla* | | | 15/19 | 19 | 9/8 | 9 |
| Mandible | 9 | 12 | 3 | 24 | 14 | 14 |
| *Humerus* | | | 12/17 | 17 | 5/9 | 9 |
| *Ulna* | | | 11/9 | 11 | 3/7 | 7 |
| *Radius* | | | 14/23 | 23 | 4/5 | 5 |
| Pelvic bones | 3 | 9 | 5/7 | 19 | 7/3 | 7 |
| *Sacrum* | | | 18 | 18 | 8 | 8 |
| *Femur* | 4 | 12 | 8/1 | 24 | 12/13 | 13 |
| *Tibia* | 6 | 11 | 7/5 | 24 | 6/8 | 8 |
| **TOTAL** | **9** | **12** | **23** | **44** | **14** | **14** |

**Fig. 3.** *Identification of the number of persons from the first group.*

number of preserved parts of single and paired bones. The possible number of individuals reached for this series was 89. Thus, in total, the remains of at least 127 persons were studied by the authors.

Determination of the age and sex of skeletons was achieved by standard methods which took into account various morphological criteria (Bass, 1995). Specific measurements were taken to estimate the sex of adults and the age of children (Bass, 1995; Ubelaker, 1978). The usual measurements were taken on skulls and on long bones (Alexeev, Debetz, 1964; Alexeev, 1966). The length of long bones was used to calculate stature according to the formulae developed by M. Trotter and G.C. Gleser, G. Olivier and V.V. Bunak (Alekseev, 1966). The general state of dentition, osteoarthropathies and infections, metabolic disorders and indicators of physical stress were all investigated (Cohen, Armelagos, 1984; Ortner, Putschar, 1985; Ortner, Ericksen, 1997).

Several traumas and results of injuries were analysed using methods particular to forensic anthropology, so as to determine *post mortem* damage produced by degradation characteristic of a process of diagenesis (destruction of bones by physical and chemical agents). This part of our study was conducted according to methods of differential diagnostic with macro and micro views (Dobryak, 1960).

## Anthropological peculiarities and general state of health

The total number of individuals was 127, of whom 89 were adults. Thus, children constituted 30% of all series. Infant mortality, which approximated 9%, was not as high as usual in the Mediaeval period (fig. 4). Mean age at death was around 33 years, this parameter being slightly higher for males than for females. The elderly represented only 7% of the total.

| Demographic parameters | Total | Males | Females | All adults |
|---|---|---|---|---|
| Number of individuals (N) | 127 | 30 | 51 | 89 |
| Mean age at death (A) | 25,0 | 33,7 | 32,4 | **33,1** |
| Mortality rate of children, % (PCD) | **30,2** | **-** | **-** | **-** |
| Mortality rate of children, % in age 0-1 years (PBD) | **8,9** | **-** | **-** | **-** |
| Index of sex (SR) | - | - | - | 58,8 |
| Percentage of every sex, % (PSR) | **-** | **37,0** | **63,0** | - |
| Percentage of individuals older then 15 years (CA) | 69,8 | - | - | - |
| Percentage of individuals older then 50 years (C50+) | 6,7 | **12,8** | 7,3 | 9,6 |

**Fig. 4.** *Main demographic parameters of the series.*

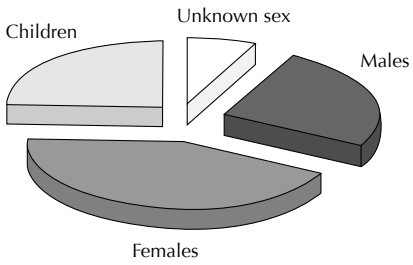


**Fig. 5.** *Percentage of children, males, females and persons of unknown sex.*

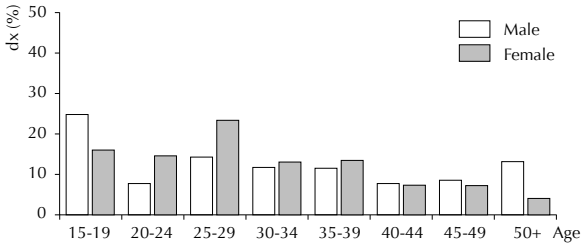


**Fig. 6.** *Percentage of men and women in each age group.*

It is interesting to note that our skeletal series exhibits traits which differentiate it from other known Mediaeval series. Firstly, the number of men (37%) in the group was small, while females reached 63%. It thus appears that the greater part of the series consisted of females and children (fig. 5). Secondly, the elderly and young were more numerous amongst men than amongst women. Finally, other age intervals were less represented by men than by women (fig. 6). All these details indicate that at the time of the events that led to the burial of at least 127 individuals in the Yaroslavl mass grave, only a small percentage of men had died, the greater number being away from Yaroslavl.

The analysis of anomalies and congenital non-metric traits enabled us to hypothesize as to the origin of this group. The results of our in-depth investigations have to some extent assumed that the chief factor governing the expression of these variants was the genetic make-up of the individuals, and hence of the sample. This premise was based on tests on

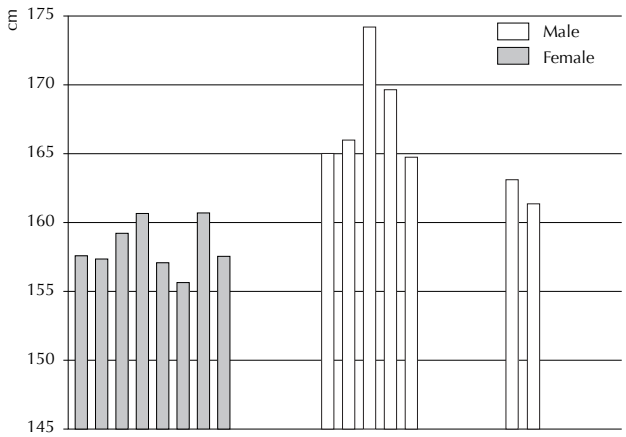


**Fig. 7.** *Stature of men and women.*

laboratory mice: some authors have showed that minor skeletal variants were under complex multigenic control, while others have demonstrated the effects of the maternal environment. In connection with population studies, having provided a large number of variants under examination, R.J. Berry (1975) has concluded that overall, genetic control was predominant.

*Crania*, mandibles and postcranial variants were recorded for the presence or absence of 24 non-metric traits. This is part of well-known non-metric traits programmes (Berry, Berry, 1967; Finnegan, 1974). Sacral and vertebral clefts were included in this analysis in view of their importance in pathology (Buzhilova, 1998).

Thus, for example in our series, the high frequency level of *Sutura metopica* (21.5%) on frontal bones, of *Fossa intercondylare* (25.3%) on *humeri*, and *Spina bifida* (27.3%) on *sacra*, may point to biological links between individuals. It is important to note that they were all stacked together in a mass grave in the ruins of a barn. Consequently, the majority of those buried in the collective grave could be members of a same household.

Moreover, supporting our hypothesis further is the fact, derived from modern clinical experience, that *Spina bifida* (vertebral arch abnormality) is a potentially life-threatening condition affecting between one and three per thousand infants, and often resulting in severe disabilities (Miles, 2002).

Craniological investigation has confirmed the presence of longheaded males with a long, narrow face, and a moderately high-bridged nose. Skulls of females were smaller and gracile. Stature, which was reconstructed by various methods, presented the usual variations, between 162 and 174 cm for men. The stature of women oscillated between 158 and 161 cm (fig. 7). Sex diphormism was defined. Indeed a few males were more robust and taller than the others. So, in general, the stature of non robust men was not really high (162-167 cm). Protrusion of bone in long bones at points where muscle was attached, clearly indicates vigorous physical activity. In general, few cases of enthesopathies were noted in places of deltoid attachment on the *humerus* and of the *gluteus* on the *femora*. Patterns of cavities were recorded in areas of

*Ligamentum costoclaviculare* on the clavicle resulting from degenerative processes of mechanical stress connected with a certain activity (for instance, chopping with an axe on a bench, or brandishing a sabre). Most cases of physical activity were recorded amongst males.

A specific analysis was conducted in order to detect horse-riders. The markers related to the particular topography of muscular development. Horsemen frequently display enthesopathies in the areas where muscles or ligaments are attached. Moreover, patterns of pathological conditions of joint surfaces with cavities, and osteophytes resulting from mechanical stress, were recorded, particularly in the lower limb bones and the spine (Buzhilova, 1998, p. 169-173). As well as for other reconstructions of activity, differential diagnosis of certain system diseases was undertaken. Finally, four cases were selected – all of men – which cast no doubts as to their categories.

The state of the dentition of the individuals examined resembled that of other Mediaeval Russian groups. Foremost were noted various types of caries. Their incidence was not really high, reaching 24%. Most common were cases of occlusal surface caries of molars, much more severe examples being the first molar of the mandible. Two root caries of the mesial, interproximal surface of the lower first molar, in the series of female skeletons, had been treated. The upper margin on both sides of the alveolar bone was almost 3-4 mm below the cemento-enamel junction of every tooth, which is not normal and is indicative of considerable alveolar resorption due to root caries. Secondary effects of dental caries focused on *maxilla* in adult men. In one case, an abscess was noted at the base of the *alveolus* of the second left premolar. Major periapical lesions were associated with the first molar on this side. Both teeth had large cavities in the crowns. The infection had resulted in lytic lesions of the *maxilla*, which had penetrated the external surface of the jaw.

A few examples of local and general resorption of the alveolar bone could be associated with periodontal disease. Most mandibles had been broken *post mortem*, and only fragments were recovered. Teeth were characterised by considerable root exposure, resulting from alveolar resorption. Extensive wear of molars without any caries was also present. These changes were frequently associated with the deposition of *calculus* on the buccal surface of the frontal teeth, and sometimes of the molars. *Periodontitis* was noted in both male and female skeletons.

Disturbance of enamel development was second in importance. Hypoplastic defect in the enamel was detected on the surface of the crown of permanent teeth (especially frontal) of adults and children. It is known that 95% of frontal teeth and not many molars are affected by this defect (Goodman *et al*., 1984). Because of the time needed for the formation of the dental crown, this defect effectively reflects negative health conditions before the age of six.

Enamel hypoplasia in the series predominantly affected permanent incisors and canines of the upper and lower jaws of adult and children, with a frequency of about 31%. Thus, owing to the presence of this marker in the series, we were able to detect that the population under examination had suffered in childhood from infections and parasitic diseases, and possibly extended malnutrition, mostly in winter.

No signs of chronic infections, anaemia and scurvy were seen on the skeletons examined. Two cases of *Cribra orbitalia* were detected. Rickets had affected the long bones of a few skele-

tons of children. Possible consequences of this were illustrated by two adults with bowing *tibiae*. The main causes of this disease were the insufficient intake of vitamin D from food and ultraviolet sources, but genetic problems in the absorption of vitamins and their retention may produce the same pathological changes (Ortner, Putschar, 1985).

Osteoarthritis in the human remains from the Yaroslavl mass grave occurred predominantly on the margins of subchondral bone. Porosity and arthritic marginal hypertrophy in the joints of the long bones of a few elderly individuals, both male and female, were noted. In two cases, eburnation of the disturbed surface of the distal *femur* and *humerus* of males was visible in the local polishing of part of the joint surface. From archaeological evidence, it is known that elbow and knee are more often affected by arthritis, this being in agreement with modern clinical observations.

There were few healed fractures of forearms and low extremities, and one case of ossified myositis of gluteus on the *femur* of a male.

Thus, in general, the state of health of this group was adequate, and undistinguishable by some peculiarities from other Mediaeval Russian populations. Nevertheless, the series was characterised by a great number of parry fractures, various traumas to skulls, sword wounds in bone, and *peri mortem* variants of traumas. The prevalence of women and children in the Yaroslavl mass grave could be indirect evidence for violence as the cause of death of those interred.

## What caused this tragic death?

The number of fractures and other bone wounds under study was limited, since most of the skulls and bones had been broken as the result of mechanical blows on dry bones, perhaps in connection with the construction of the Mediaeval Cathedral. Nevertheless, for a host of reasons, the findings are highly illuminating.

Perforated injuries which affected different parts of skulls, scapulae, pelvic bones, bodies of vertebrae, long bones and *calcanea* of males, females and children between 5 and 8 years of age, formed a large group. In 17 cases, the penetrated area was mostly circular, with a diameter of about 11-12 mm, and sharp-edged lesions of the bone. It is important to note that the external hole was 2 mm wide along its internal size (fig. 8). These lesions appeared to have been man-made, since no organic *in vivo* pathology may cause such injuries. Different parts of skeletons were affected. Furthermore, out of six cases of such wounds, four were of pelvic bones of women. The size of the wound was a little larger than described above, this suggesting arrow wounds. They certainly had the appearance of *peri mortem* sharp weapon blows, perhaps from a pick-axe, as indicated by the size of the circular damages. Some examples did not include penetrated holes, only circular injuries of the external bone surface. These wounds, all identical in size, were caused by less forceful blows than in the case of penetrated bones (fig. 9).

The circular shape and small size of all these damages and the evidence of a sharp, forceful blow point to arrow wounds. Unfortunately, in the above examples, no arrowhead was found embedded in the bone, which would have confirmed our hypothesis.

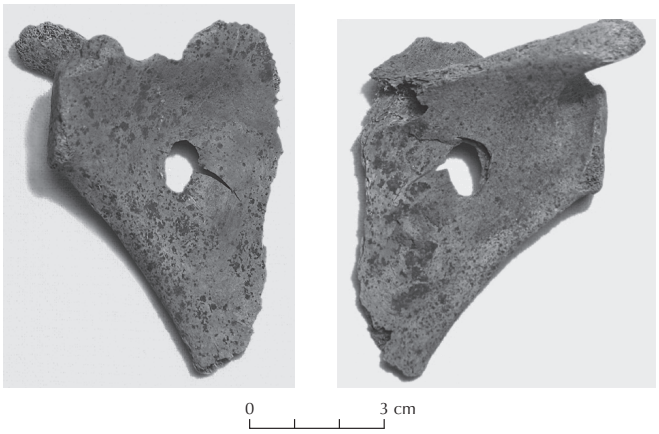


**Fig. 8.** *Example of parry fracture of scapulae of a child. The external length of the hole is wider than the internal one.*

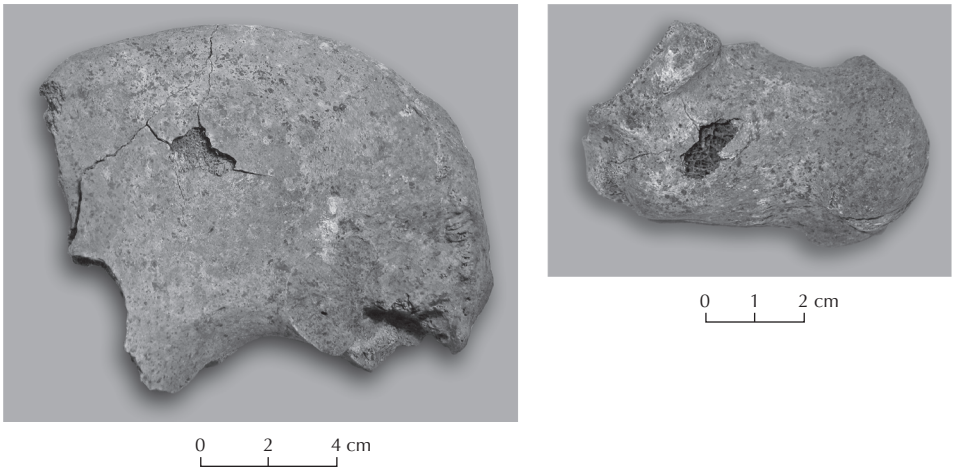


**Fig. 9.** *Examples of parry fractures of pelvic bone and calcaneus of adults. The length of holes is nearly the same, without* post mortem *damages.*

In two cases of parry fractures of the skull, the injury formed a line 12-13 mm long (fig. 10). Few fracture lines radiated from a central depression resulting from the blow of an object at high velocity. The presence of sharp edges and smooth polished surfaces indicate that the changes must have happened around the time of death, before the soft tissues were lost. Furthermore, the lesions were of the same colour as the surrounding bone and not pale as when damaged in excavation.

There were another 14 cases of various perforation traumas to skulls, mainly of adults. Injuries fell into three groups. In the first group, holes (diam. *ca* 36-45 mm) were oval (fig. 11). The margins were straight, smooth and shiny with sharp edges. There was no evidence of

**Fig. 10.** *Example of* peri mortem *sharp force, weapon injury on the skull of a male (left parietal bone).*


**Fig. 11.** *Example of* peri mortem *force blow injury on the skull of an adult (right parietal bone).*

periosteal reaction or bone remodelling around a lesion. In agreement with modern diagnoses of forensic anthropology, such damages could be the result of a forceful blow by point contact. After a pick-axe blow, parts of bones with circular deformations were lost, and the lateral fracture line radiated from the centre of the depression (fig. 11). Consequently, all these lesions are not incompatible with "peri-excavation" traumas, and certainly have the appearance of *peri mortem* injuries from a sharp, striking weapon.

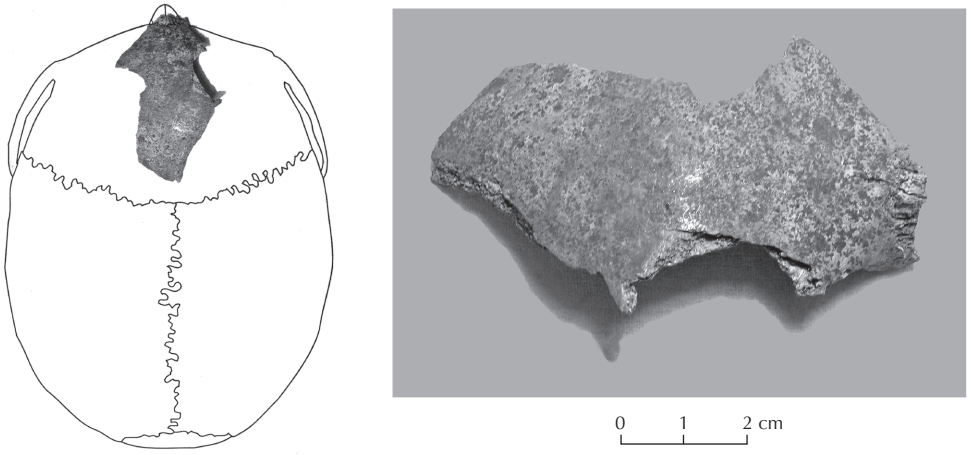


**Fig. 12.** *Example of* peri mortem *force blow injury on the skull of an adult (part of frontal bone). Note the perpendicular orientation of injuries after possibly two blows of a battle-axe.*

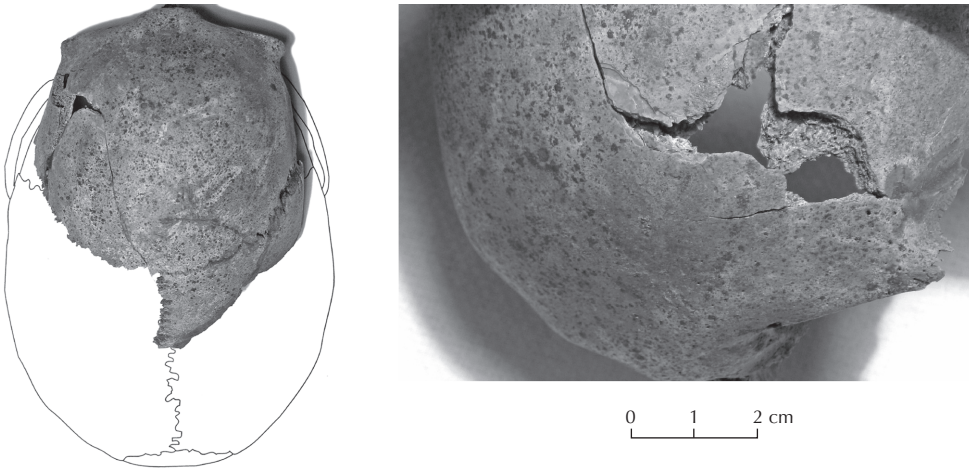


**Fig. 13.** *Example of* peri mortem *force blow injury on the skull of an adult (frontal bone). Note paired injuries with little* post mortem *damage after one blow.*

The second type of perforation of the skull was rectangular and no more than 15-16 mm long. As in previous cases, there was evidence for periosteal reaction or bone remodelling around some lesions, of the same colour as the other parts of the skull, and not pale as occurs in excavation damage. One example indicated two blows in one place, which could be indirect evidence for a "contact" weapon (such as a battle-axe), rather than a "distance" weapon (fig. 12).

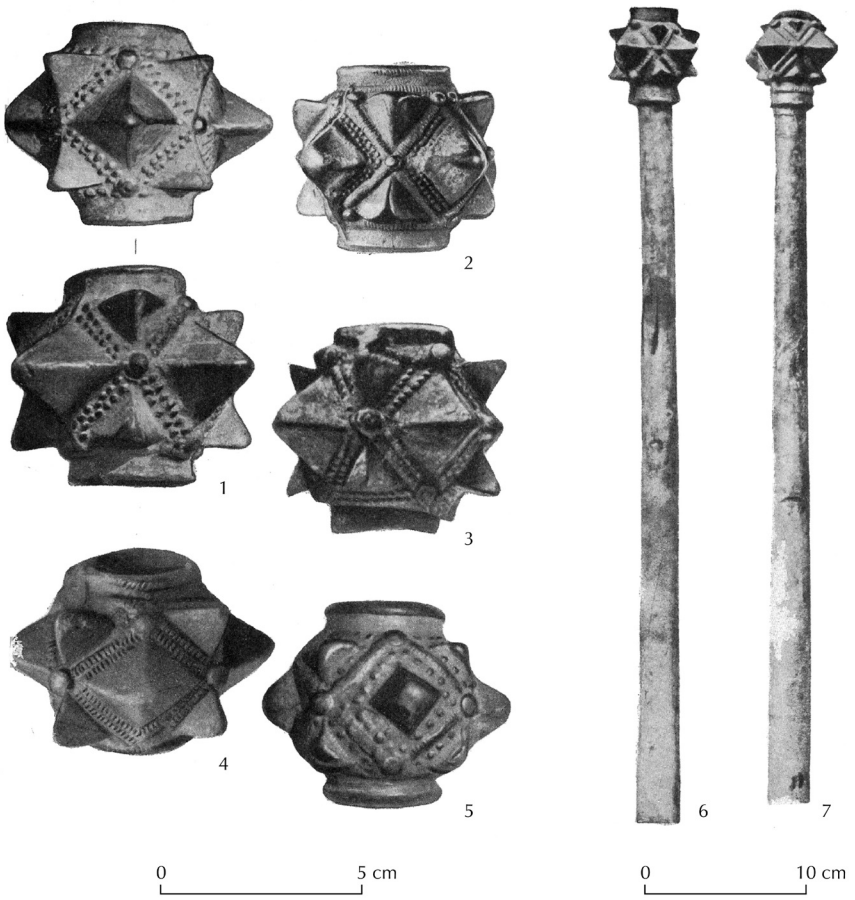


**Fig. 14.** *Examples of different type of maces which could have been used to inflict skull traumas.*

The last type of skull perforation is illustrated by a pair of oval-shaped holes at a certain distance from each other. The injuries were located in different parts of adult skulls, mostly in the frontal and occipital zones (fig. 13). A few cases of the same types of damage were found in tubular bones. For example, in the distal zone of a *femur*, a paired injury was detected near the knee. It is difficult to surmise the type of weapon which had caused the damage. Searching for a weapon with a certain size and paired convexities, our attention was drawn to the universal battle mace – *palitca* or *bulava* (fig. 14). It was used in this area in the Middle Ages by Russians and also by various tribes of military nomads.

At the end of this large group of perforated fractures, we recorded injuries which could have resulted from point contact with sword or pick. The damage was around 3-5 mm in depth. Out of four cases, three were of a wound in the thorax and lumbar *vertebrae*. The injuries were located on both the right and left sides of the *vertebrae*. Two of these three cases concerned children.

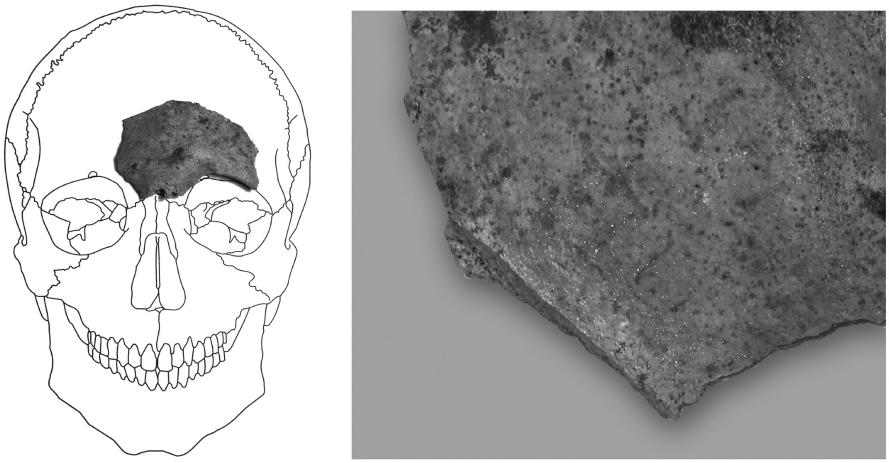

**Fig. 15.** *Examples of sword wound on the forehead of an adult. Note the macro view which shows the sharp edges and smooth polished surfaces of the margins. These changes must have occurred around the time of death, before the soft tissues were lost.*

In addition to perforated fractures, there were different types of sword traumas to skulls, long bones and scapulae (fig. 15). These were typically straight, with smooth, shiny margins and sharp edges. Their line size varied between 25 and 37 mm. There was no evidence of periosteal reaction or bone remodelling around any lesion. The appearance of the lesions was most compatible with a diagnosis of weapon injuries from a sharp, thin blade, such as a sword. One wound, five or six times the size quoted above for line destruction, was present on the right, temporal-parietal zone of a male skull. The second was on the lateral part of the *diaphysis* of the right femur of a male. It consisted of two linear cut-marks on the external part of the bone tissue. The same linear injury, but on the left femur, was noted on a female skeleton. In the latter case, an oblique, *superolateralis* to *inferomedialis* lesion divided the bone completely into two parts. In another example, the wound on the occipital zone of a young male skull was located between the cervical knoll and the lateral margin of the occipital foramen. It could represent one of the known variants of decapitation. Other wounds were detected in a few mandibles, which had been divided into two. A wound was noted on the adjacent maxilla of a young woman. The prominence of the maxilla had been lost on account of this wound, this suggesting a blow on the cheek. Another wound was located in the frontal and parietal bones of the skull of another individual. Finally, another individual had been wounded in the humerus of the left shoulder. This was a deep, straight, longitudinal lesion in the head and proximal shaft of the bone in the sagittal plane.

Some pelvis bones, sacra and long bones of adults and children showed *post mortem* fractures due to a blow on a bone which was not yet dry, but not from a weapon. This could have happened after the bodies had been dumped into the grave. Most of these individuals had no facial bones, and only some fragile and thin bones of the skull were present. These facts may

support our hypothesis that the deceased were reburied belatedly after the tragic events that caused their death.

## Conclusion

Archaeological artefacts (mainly women's rings typical of the Yaroslavl region in Mediaeval Russia), which were found with the skeletons, dated the mass grave to the beginning of the 13th century. Remnants of silk and woollen clothes, as well as woollen headscarves, suggest that death and burial took place in the cold season of the year (Engovatova *et al*., in press).

The number of people buried in the mass grave was around 100, of which the majority were women and children. Blunt-force skull fractures, sword wounds, variants of decapitation, and the evidence of arrows piercing various parts of the body, have led us to interpret this dramatic event as a military aggression.

According to historical annals, in the winter of 1238, using the iced-over Volga River as a road, the Golden Horde forced its way into the town of Yaroslavl. This marked the beginning of the lengthy occupation of Russia by Golden Horde. During the first invasion of the Russian principalities, in February 1238, the conquerors seized more than fourteen cities, including Moscow which was occupied on 2nd February, Vladimir which fell on 7th February, and Rostov, Yaroslavl, Kostroma, Uglich, Dmitrov and Tver, which surrendered in the last days of February.

So far, only one anthropological study has been conducted on human remains dated to the occupation of Russia by the Golden Horde: a series of about 200 skeletons studied by D.G. Rokhlin (1965). In 1957-1958, the Russian archaeologist M.K. Karger excavated the ruins of the small town of Izaslavl in the Khmelnitsky district of modern Ukraine. The town had been completely destroyed during the campaign of the Golden Horde. Several layers of human remains were discovered between the burnt houses and later constructions. A third of the bodies belonged to children, and most of the deceased were women and children. D.G. Rokhlin (1965) noted that typical traumas were wounds from swords and battle-hammers. Most of the deceased had suffered head injuries.

Thus, the reconstruction of the tragedy that befell Yaroslavl and Izaslavl allows us to stress that their surrender followed rapidly an aggressive take-over. At this time, nomads did not keep captives, and all people including women and children were massacred.

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