ANTHROPOLOGIE * XXIV/2—3 * 1986

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FORENSIC OSTEOLOGICAL ANALYSIS OF A MALE SKELETON FROM TŘINEC

ABSTRACT — Forensic osteological analysis was performed of an individual whose body remains were found scattered in a field on the outskirts of an industrial town. They were in an advanced state of decomposition. The skeleton was not complete. The dead person was a brachycranial, brown-haired male aged about 55 years and 6 months. He was of small stature and his skeleton was of medium robustness. There were many healed and unhealed injuries on the bones. The paper reports on the difficulties encountered during the identification based on medical reports, which were not accurate, nor complete. The most difficult question to answer was whether the injuries inflicted by an E 280 cutter during corn harvest on 25 August 1982 were fatal or not.

KEY WORDS: Forensic osteology — Human skeleton — Identification of skeletal remains.

INTRODUCTION

Human osteology specialized in identification of skeletal remains for the needs of the Criminal Investigation Department is at present usually called forensic osteology. It should be stressed that forensic osteological expertise is only performed either when there are only bones available or if the soft tissues are in such a state of decomposition as to be of no avail for identification. At Palacký University, forensic osteological problems have been solved for more than 20 years by a team of three experts — a forensic pathologist, an anthropologist-anatomist, and a forensic stomatologist.

The present case is described for several reasons. We intend to show that the forensic osteologist must not only be able to analyse bone remains but also to critically evaluate the written materials, be it medical reports or testimonies by witnesses. The identification of a person may be quite a difficult task even if there are medical reports available. The difficulties may arise when some of the data, such as the description of past injuries, their localization, etc. are incomplete or inaccurate. On the other hand, it is the skeletal remains that may often be incomplete, and it is sometimes just the bones mentioned in the report that are missing.

The biggest stumbling-block in the case to be solved was the problem to find out what inflicted the complicated injuries seen on some of the bones and whether they were fatal or not. There is no method available by which it could be reliably ascertained whether the bones were injured e.g. one hour prior to death or after the death.

CASE TO BE SOLVED

On 15 September 1982 human body remains in an advanced state of decomposition were found in a stubble-field in Třinec I - Starý Borek. They were scattered over an area about 40 m long. Some of the remains were bones almost totally devoid of soft tissues (*Fig. 1*), on others, particularly on the lower limbs, the soft tissues were preserved, partly mummified, partly slushy.

FIGURE 1. *State of one part of the skeletal remains at the scene of death.*

An E 280 cutter was used to harvest the crops of oats from the above-mentioned field on 25 August 1982, between 7 and 8 p. m. According to the statements by the members of the crew of the cutter "the visibility was still very good at that time of the day". The front aspect bar of the cutter is fitted with metal teeth 70 to 80 mm apart. The working position of the cutter bar on flat surface is 100 to 150 mm above the ground. The surface of the oats field was, however, uneven and the growth was high and full of grass and weeds. For these reasons, the driver kept the cutting bar higher than usual. With respect to the great amount of weeds the oats were not harvested for grain. The whole green mass was chopped and blown-out on the body of lorries taking it away to be dried and used as animal feed.

Found with the above-mentioned remains were also pieces of male clothing with written documents on the name J. B., born on 27 November 1926. The remains and the clothing were in some places covered with white mould. The doctor concluded that death was likely to have occurred three or more weeks before.

The man in question was a painter by profession. After 1948 he worked as a temporary worker in a coal pit for about 8 years, and then, approximately till 1974, as a painter. Later he had no job. He did not live with his family and divorced his wife in 1968. He started drinking at the age of 18. He became an alcohol addict. He was hospitalized in a mental hospital. In the last months of his life he lived on food and beer leftovers in snack bars and slept on a bench at the railway station. One of the last medical diagnoses states: Chronic bronchopulmonary disease, cor pulmonale, asthma bronchiale, cirrhosis hepatis, alcoholism of the IVth phase with personality degradation and characteropathy.

His body mass towards the end of 1981 was 53.3 kg.

There is great controversy in the testimonies among the four witnesses as to when J. B. was seen alive for the last time. One of them claims to have seen him at the railway station in Třinec on 7 or 8 August 1982. Another witness met him in July 1982. The waitress in the bar often frequented by J. B. declares that she saw him in May 1982. Most interesting is the testimony by the fourth witness saying that he saw him towards the end of April 1982 and adding "I haven't seen J. B. since then, I have only found his coat and sweater behind the laundry near the shop at Borek. I found these things shortly after I had seen him for the last time. I don't know why he had left the sweater and the coat behind that laundry, because it was still rather cold. When somebody declares that he saw him at the railway station in August, it can't be true. At that time he was not to be seen in Třinec any more. He was a poor wretch and was quite harmless. He had no enemies and there was certainly nobody to care for him. I don't think anybody could have done him any harm."

These testimonies must of course be evaluated critically. Not all of them may be true. Possible errors (mistaken identity at the station) or memory failure (meeting the person before or after the date given by the witness) cannot be ruled out.

ANALYSIS OF THE SKELETAL REMAINS

The body remains submitted for expertise were infested with a great number of necrophagous insects in various stages of development.

(1) After being anatomically arranged, the skeleton was found incomplete and some of its parts missing, in the first place parts of the vertebral column, most left ribs, and both left limbs (*Fig. 2*). The right-hand side was more complete.

(2) The available bones were of the same human individual.

As to the two following items, it should be noted that as the sex and age of the person were known from the documents, the forensic-osteological expertise was performed to confirm them.

(3) Six methods were used to determine the sex. Most of the results have confirmed male sex.

(4) Eight methods were used to determine the age. The results show that the body belonged to an adult person, falling probably in the category "maturus" (i.e., according to the Gejvall 1960 or, resp. Breitinger 1961 classification, within the brackets of 41 to 60 years), most probably in the second half of this category, i.e. between 51 and 60 years.

The person under our notice was born on 27 November 1926, his body remains were found on 15 September 1982. As we do not know the exact date of his death, we estimate his age at about 55 years and 6 months.

(5) The stature was reconstructed using the formulas, or tables, resp., of 7 authors (*Table 1*). All of them were used according to the instructions and recommendations of the respective authors.

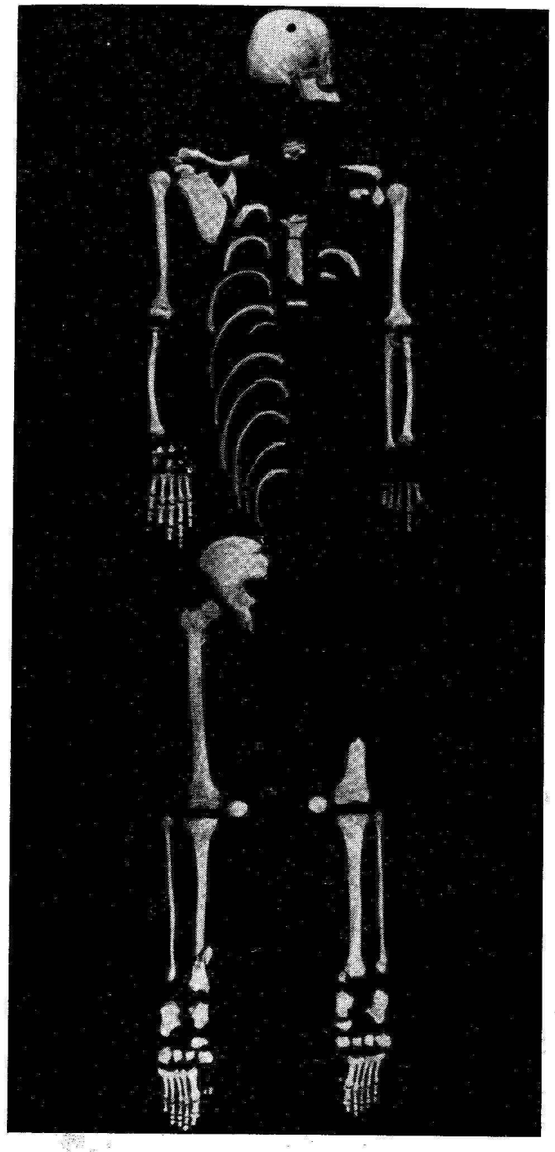

FIGURE 2. *Anatomically arranged preparated skeletal remains.*

TABLE 1. *Reconstruction of stature*

Authors of the tables or formulas	Mean reconstructed stature (cm)	Mean of 29 reconstructions according to the first four authors (cm)	Approximate living stature according to the statements by the relatives (cm)
(1) Manouvrier 1892	163.7	165.5	162.0
(2) Pearson 1899	162.6		
(3) Telkkä 1950	166.1		
(4) Trotter and Gleser 1952	167.1		
(5) Nainys 1972	163.6		
(6) Rother 1978 (Mollison's material)	168.9		
(7) Černý and Komenda 1982	163.5		

If the formulas of the first four authors given in Table 1 are used (the formulas of the remaining three being calculated for control purposes), then the mean of the total of 29 reconstructions is 165.5 cm. According to the classification of statures in the Czech Provinces (Fetter et al. 1967), this can be classified as small stature.

(6) The skeleton of the dead person is of medium robustness.

(7) The muscle attachments are well developed on all bones.

(8) The skull was submitted to examination without teeth (*Figs. 3 and 4*). According to the medical reports, there were only two teeth left in the upper jaw. There is no stomatological documentation available. The forensic stomatological examination shows that the examined person must have been in the last years of his life remarkable for a protrusion of his chin, especially with tight jaws.

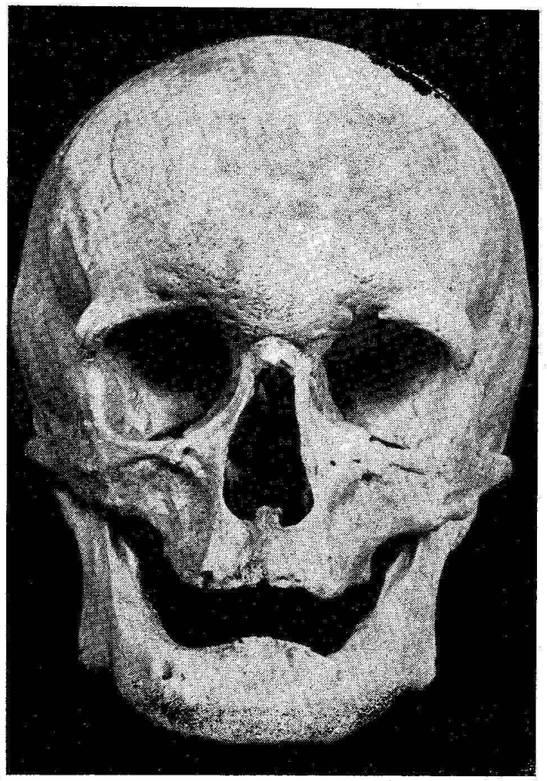

FIGURE 3. *Cranium, norma frontalis.*

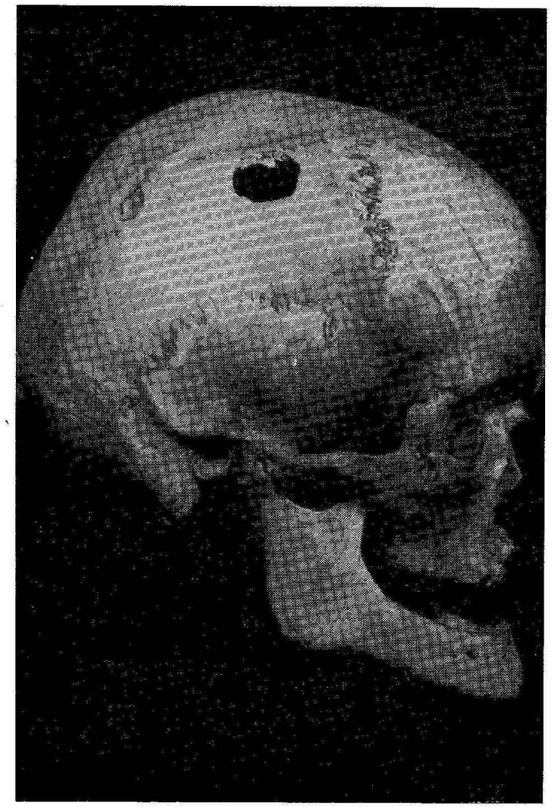

FIGURE 4. *Cranium, norma lateralis, right.*

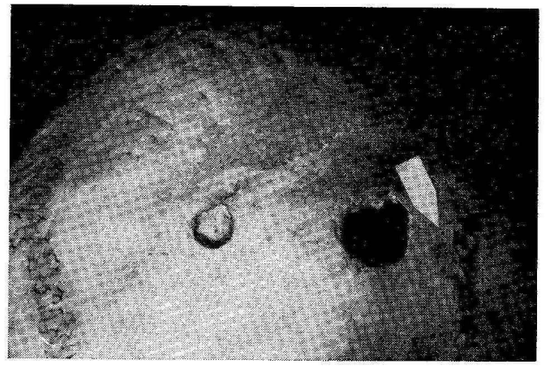

FIGURE 5. *Two injuries on the right parietal bone. View of the lamina externa. The arrow points to the site of two oblique scratches.*

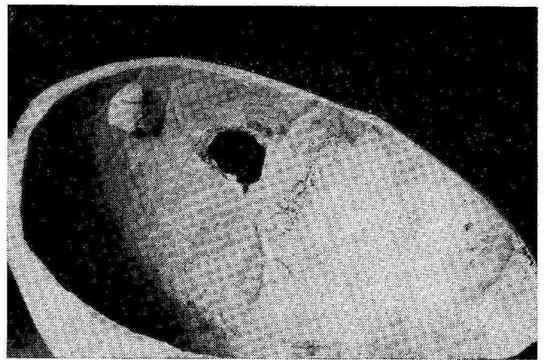

FIGURE 6. *Two injuries on the right parietal bone. View of the lamina interna.*

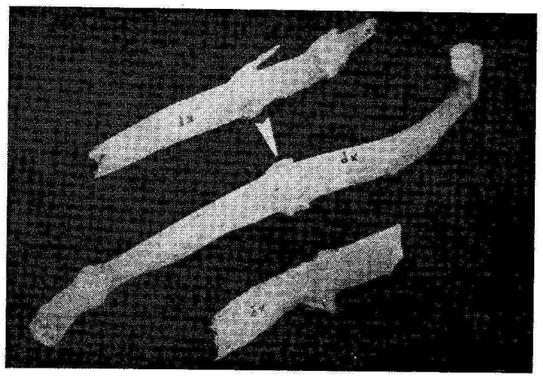

FIGURE 7. *Traces of healed fractures seen on the fragments of the right ribs.*

(9) Traces of past, healed injuries:

(a) Marked thickenings are found on 6 right ribs (*Fig. 7*), bone outgrowths being seen at these sites on some of them. These are quite clear and macroscopically visible traces of past healed fractures.

The medical report of 3 May 1979 describes "the state after the fracture of the first right rib". However, no state after fracture of the first right rib can be proved either macroscopically or roentgenologically. There is no mention in the medical report of other fractures of the right ribs.

Mentioned in another medical report is "fracture of a left rib", and in still another "the state after fracture of ribs on the left". However, of the left ribs only two fragments probably of the 2nd rib and another of some other rib are available. They show no signs of fractures.

A relative of the deceased reported later on that J. B. had been beaten in a fight and had then his head broken and his ribs fractured.

(b) The distal articular surface on the medial phalanx of the third right finger is uneven and seen on it are several tubercles and depressions. This articular surface was probably not functional. It is likely to be a posttraumatic or postinflammatory state.

The medical report of 23 September 1981 states "Besides, he had an injury of the third right finger with a loss of the last phalanx". According to the statements by the relatives of the deceased, this accident may have happened in the years 1972 to 1974.

(c) On the articular surface of the right patella is a macroscopically evident line of fracture suggesting a past fracture at the outer margin of the bone

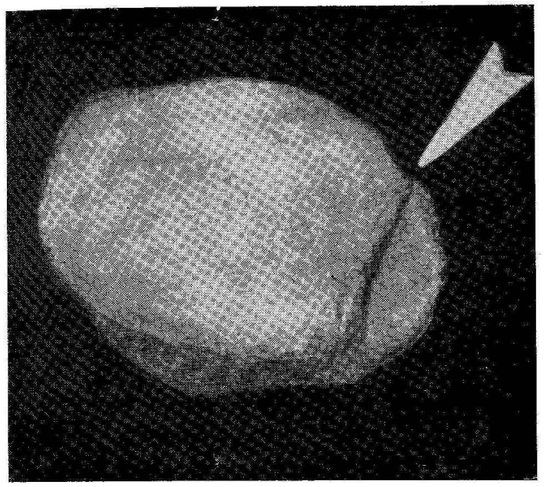

FIGURE 8. *Right patella, healed fracture. View of the articular surface.*

bone (*Fig. 8*). This line can also be seen, though less clearly, on the anterior surface.

There is no mention in the available medical reports of a fracture of the right patella. According to the statements by the relatives, this bone may have been fractured before the year 1955, when J. B. was working in a coal pit, or only after 1968.

(d) Two other accidents are mentioned in the available medical reports "Besides ... he had an injury to the thumb of the left hand, with partial abrasion of the distal phalanx". Unfortunately, no distal phalanges of the left hand are available.

The report further states "He had a broken head about 10 years ago, with a scar visible in the middle of the forehead". However, no injury can be seen, either macroscopically, or roentgenologically, in the middle of the squama of the frontal bone.

If the respective bones were available, the presence or absence of the above mentioned injuries could have been verified also roentgenologically.

The below described unhealed injuries on the bones can be divided into two groups: Injuries probably due to the impact of the bar of the cutter, and those due to the passage over the body of the wheels of the cutter, or those of accompanying lorries, or humans stepping on it.

(10) Presence of injuries that may have been due to the action of the cutter:

(a) One of the cervical vertebrae is cut through, so that only the incomplete right half is available. On both its body and its arch there is an oblique cutting area which could have been caused by the cutter bar.

(b) Two injuries are seen on the right parietal bone (*Figs. 4, 5, 6*). The middle of the larger of the two injuries is situated about 31 mm from the coronal suture. This injury is irregularly circular, its area being about 21×17 mm. The vault of the skull in this site is completely driven inwards. The margins of this opening are rough and uneven. The opening is internally wider than externally.

The other injury is smaller. It is situated occipitally to the larger of the two injuries. Its centre lies about 73 mm occipitally to the coronal suture. This injury is also circular in shape, its dimensions being about 10×12 mm. It is a depression fracture. The cranial fragments are in the whole extent of the injury in the cranial cavity (*Fig. 6*), but has not been separated from the surrounding bone. It had not been detached so that there is no opening.

The centres of the two injuries are 43 mm apart, the remotest margines 57 mm apart, the nearest margins 29 mm apart. All measurements were taken on the outer table of the skull.

Here attention must be drawn to the difference in the distance between the two injuries and that between individual teeth of the cutter bar, the latter being 70 to 80 mm. However, we do not know the position of the skull at the moment when it was run over by the cutter, or, respectively, in what manner it was rolled before the cutter. The scratches seen on the skull between the coronal suture and the larger of the two injuries (Fig. 5, see the arrow) might be suggestive of the possible oblique anterio-posterior and lateral tangential movement of the cutter bar over the skull.

(c) There are three injuries visible on the right hip bone (*Fig. 9*). The first (upper lateral) injury is

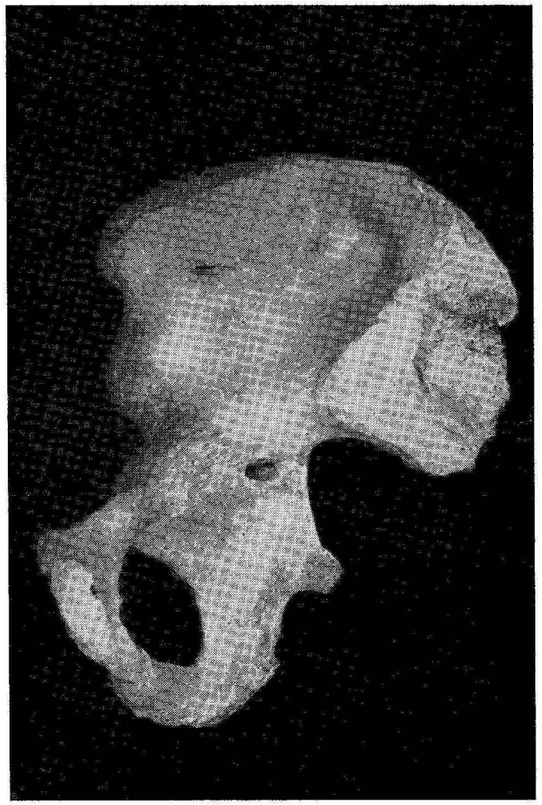

FIGURE 9. *Right hip bone with three injuries.*

situated on the ala of ilium with its centre about 41 mm medially and caudally from the anterior superior iliac spine, i.e. 34 mm below the iliac crest. It is an elongated fissured injury 16 mm in length penetrating the wall of the ala of ilium to reach the gluteal surface, where it forms an irregularly-shaped injury measuring about 8×6 mm.

The second (lower) injury is situated on the borderline between the iliac and ischial bones, with the centre about 19 mm from the nearest margin of the greater sciatic notch, i.e. about 20 mm below the arcuate line. This injury is also elongated, but substantially wider than the one described above. It is 14 mm long and its greatest width is 9 mm. It extends from the inner pelvic surface to the upper portion of the acetabulum, between the lunate surface and acetabular fossa (*Fig. 10*). The injury forms here an irregular pattern, its dimensions being 8×7 mm.

The fact that the femoral head is absolutely undamaged is of importance. No scratch can be seen on it. It can be reliably concluded that the two injuries run from the inside of the pelvis outwards.

The centres of the two elongated injuries are about 75 mm apart, their remotest margins 81 mm

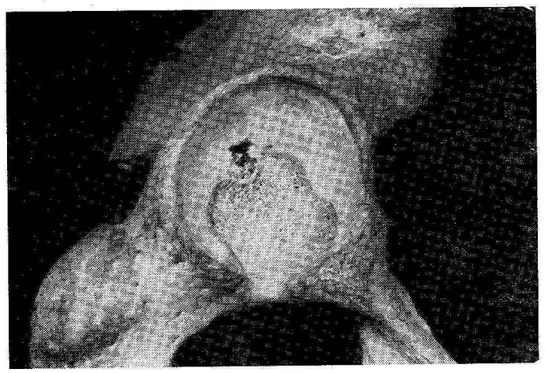

FIGURE 10. *Right hip bone, injury on the acetabulum.*

and the nearest margins 73 mm apart. These values were obtained on the inner pelvic surface. The distance between these two injuries correspond to those between the teeth on the cutter bar.

The third (upper medial) injury is situated on the ala of ilium, in the region of the iliac tuberosity (*Fig. 9*). The posterior superior iliac spine is broken-off. It is rather an extensive wedge-shaped injury to the posterior margin of the ala of ilium, about 49 mm in height, with the apex running about 20 mm laterally in the area of the iliac tuberosity.

The centre of this upper medial injury is situated about 101 mm from the centre of the upper lateral fissured injury and about 93 mm from the centre of the lower injury. It is very difficult to determine whether the medial injury had been inflicted by the same mechanism as the two above mentioned injuries.

The injuries seen on the ilium are somewhat different in character from those on the skull. When evaluating these differences, also the different structures of the two bones should be considered because they can account for the difference in their fractures when struck by different agents. Therefore, different agents may not be the cause of the difference between the above described injuries.

(11) Injuries probably inflicted by the passage of wheels over the body or by people stepping on it:

We can see a number of other minor and severe injuries on the skull and on the postcranial skeleton. They are probably due to the passage of the wheels of the cutter over the body remains or of those of the accompanying lorries, or by people stepping on the body remains (*Fig. 2, 11 and 12*).

(12) Cause of death:

The fact that body remains of the man J. B. were found in the oats field that had been harvested on 25 August 1982 offers the hypothesis that J. B. has suffered fatal injuries and had been run over by the cutter. The authors have denied this hypothesis for the following reasons:

(a) If the cutter E 280 had passed over a living human and damaged a cervical vertebra, the skull and the right hip bone, it would certainly have inflicted injuries also to the soft tissues and inner (e. g. abdominal) organs followed by massive bleeding. If this had been the case, then the clothing and probably

FIGURE 11. *Right scapula, injury inflicted probably after death.*

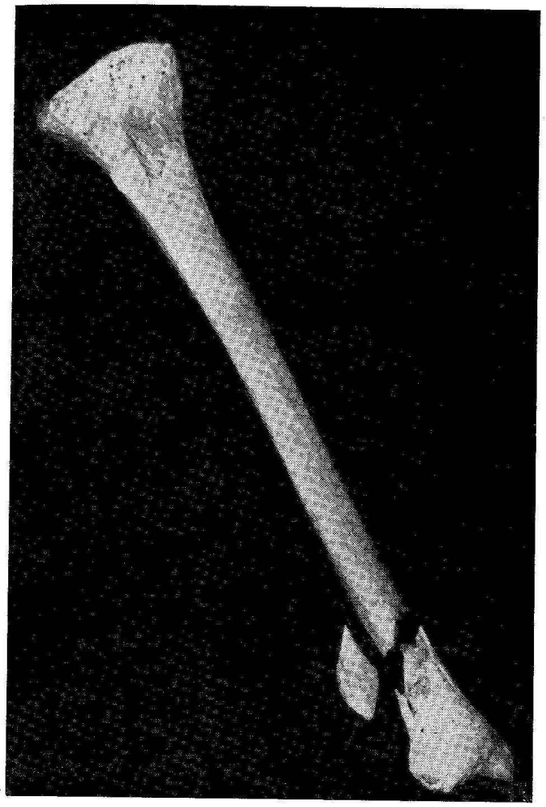

FIGURE 12. *Right tibia, injury inflicted probably after death.*

also the documents found in it would certainly have been blood-stained. Blood would have stained the cutter bar and penetrated into various spaces of the harvester. The chopped crops would have been partly blood-stained and contained cut pieces of soft tissues. Traces of blood would have been seen also on the bodies of the lorries onto which the chopped crops were blown-out. Nothing like that has been found.

(b) The driver of the cutter would probably have felt the impact of the cutter against the body of a living person or a fresh cadaver. However, the driver expressly declared that during the harvest of the field he had not noticed anything of the kind.

(c) On 15 September 1982 some of the bone remains of the deceased were found almost devoid of soft tissues. Unburied human remains lying in the open usually reach this state in several months'time but not as early as in 21 days after death, though this is also possible.

(d) The above conclusion is supported by the finding of moulds on the remains of soft tissues and cartilages, which, according to Tesař (1976), appear only two months after death, rarely earlier.

(e) One of the injuries on the right hip bone extends into the acetabulum (*Fig. 10*), but the femoral head has been left undamaged or even unscratched.

It follows that the injuries were probably inflicted to the right hip bone at the time when the remains of the deceased were already in such a state of decomposition that the femoral head was displaced from the acetabulum.

The cutter probably damaged and scattered over an extensive area body remains of the individual who had been dead for a longer time and whose remains were in an advanced stage of decomposition.

(13) The time elapsing since death:

The found body remains were in such a state of decomposition that the cadaver may have been lying in the open for two or more months. The finding of bones almost totally devoid of soft tissues and the presence of mummified and slushy soft tissues support this hypothesis. The finding of moulds lends it further support.

(14) Anthropological characteristics:

The deceased was a brachycranial brown-haired male of small stature and skeleton of medium robustness. The cranial index = 84.8.

CONCLUSIONS

(1) The determination of sex and age and the reconstruction of stature did not raise any substantial difficulties. The results served in most cases as confirmation of the data known from written documents.

(2) Seen on the skeletal remains were:

(A) Traces after healed injuries inflicted in life.

(B) A number of large and minor injuries, which can be divided into two groups:

(a) Injuries likely to have been inflicted by the bar of the E 280 cutter.

(b) Injuries probably caused by the passage over the body of the wheels of the cutter or of those of accompanying lorries, or by people stepping on it.

(3) The death of the deceased was probably not caused by the cutter during the harvest of the oats field on 25 August 1982. Many findings and circumstances suggest that the death had occurred earlier and the cutter only damaged and scattered over the field the body remains that were already in a state of advanced decomposition.

ACKNOWLEDGEMENTS

Valuable information and photographic documentation were obtained from the officer M. Kubisz from Třinec. Further valuable information was obtained from MUDr. M. Kučerová and the relatives of the deceased. The skeletal remains were preparated by late B. Navrátil, an autopsy technician at the Department of Forensic Medicine, Medical Faculty, Palacký University in Olomouc. The X-ray pictures were made by the Chief Laboratory Technician Mrs. J. Řehulková and described by Professor MUDr. V. Roček, DrSc., Head of the Department of Radiology of the Faculty Hospital. Photograph No. 1 was supplied by the Criminal Investigation Department in Třinec, the author of the rest of the photographs is Mrs. Z. Budíková from the Regional Department of Forensic Medicine, Faculty Hospital in Olomouc. The

problems encountered were consulted with specialists in various medical fields. The authors express their thanks to all of them.

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