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Sydney Smith

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THE EXAMINATION OF SKELETAL REMAINS*

SYDNEY SMITH†

An expert examination of skeletal remains will often reveal much useful and definite information regarding the race, age, sex, and stature of the deceased. Furthermore, an identification may be rendered even more personal and individual by the presence of evidence revealing occupation, habits, or state of health, either in the past or at the time of death. In the same way, identification may become very precise if the fragments present features indicative of deformity or long-continued disability. In addition to the identification of the individual, it is commonly possible to obtain sufficient evidence to enable the examiner to arrive at certain conclusions as to the cause or manner of death, and the method of disposal of the body, and also in some cases to allow of a reconstruction of the crime, which may be very helpful in suggesting suitable lines of police investigation. Certain of these points are well illustrated by the case about to be described.

A certain village well, disused for years, was being cleaned out with a view to rendering it once more serviceable. In the course of cleaning operations, three separate bones were found. The find was reported to the police, who took possession of the bones and passed them on to the laboratory for examination and report.

The bones were human, and comprised two hip bones (right and left), and a sacrum, which could be accurately articulated. (See Figures 1-A, B, and C.) All three, therefore, came from one and the same body, of which they had, in fact, formed the pelvis.

* [EDITOR'S NOTE: This is the fourth of a series of articles on "Studies in Identification" published by Dr. Sydney Smith in *The Police Journal* (of England). It is here reproduced with the kind permission of Dr. Smith and Mr. P. B. M. Allan, Editor of *The Police Journal*.]

† M. D., Department of Forensic Medicine, University of Edinburgh.

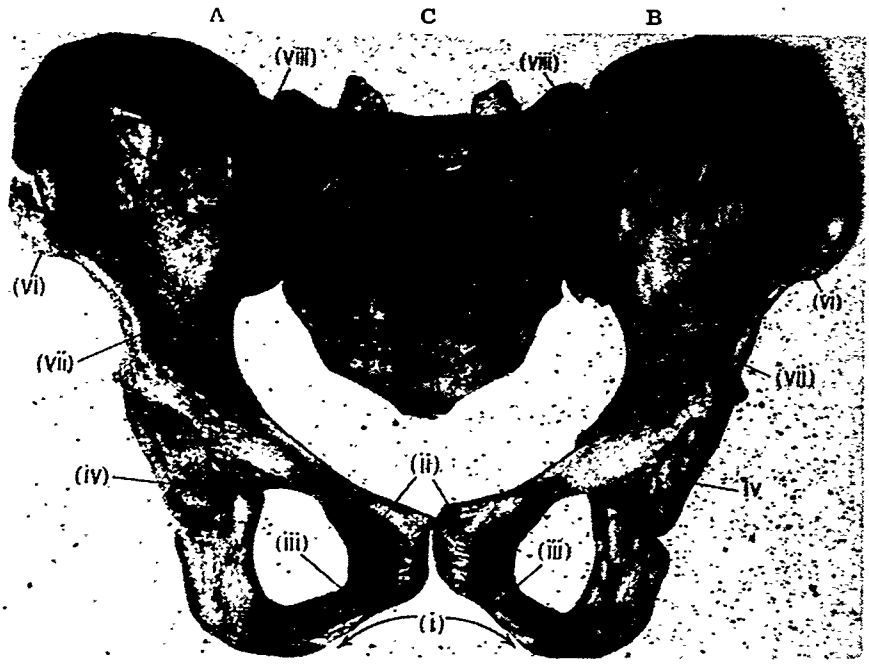

FIGURE 1

Reconstructed Pelvis

(A) Right hip-bone. (B) Left hip-bone. (C) Sacrum

(i) Pubic arch
(ii) Body of pubic bone
(iii) Constricted neck of bone between body and lower limb of pubic bone
(iv) Acetabulum
(v) Crest of ilium
(vi) Anterior spine of iliac crest
(vii) Pre-auricular sulcus
(viii) Sacro-iliac joint

Of all the bones of the body the pelvis is the one which presents the most characteristic sexual features, and a definite identification of sex can almost invariably be made if this part of the skeleton is available. The illustrated pelvis shows quite well certain of the sex characteristics which prove it to be that of a female. Among these (in Figure 1) may be mentioned the greater width and rounded apex of the pubic arch (*i*), the square shape of the body of the pubic bone (*ii*), and the pinched appearance (*iii*) at its junction with the narrow pubic ramus or limb. The typically short, wide, triangular sacrum (C) can also be seen. In addition, as shown in Figure 3, the great sciatic notches are widely open, and the acetabula (i.e., the sockets for the heads of the thigh bones) are small and measure only some 46 mm. in diameter. The presence of all these features may be considered positive proof that the bones are those of a female.

The stature of the deceased female could not be accurately estimated, but from the small size and light weight of the bones it could be deduced that she was at all events small and slightly built. Indeed, an inexpert examination might, and in fact did, lead to the opinion that the bones were those of a child rather than an adult. That this is not so, however, is evident from the state of ossification. As mentioned in the writer's previous publications, practically all the epiphyses or growing ends of the long bones have united with their shafts at about twenty years of age. Between twenty and twenty-five years, certain minor epiphyses begin to unite, and these are seen in three places, namely, the ends of the ribs, the ends of the collar bones, and the margins of the hip bones. In the latter, there is an epiphysis along the crest of the ilium, which forms the main part of the hip bone. This crest unites with the remainder of the ilium at about twenty-two or twenty-three years of age. In the bones from the well, it can be seen that the crests have united, but only recently, as the line of union is still apparent. The secondary centre along the margin of the pubic ramus is still separate (Fig. 2), and since union of this centre occurs at about twenty-four years, the age of the deceased woman could be estimated with relative certainty at about twenty-three or twenty-four years.

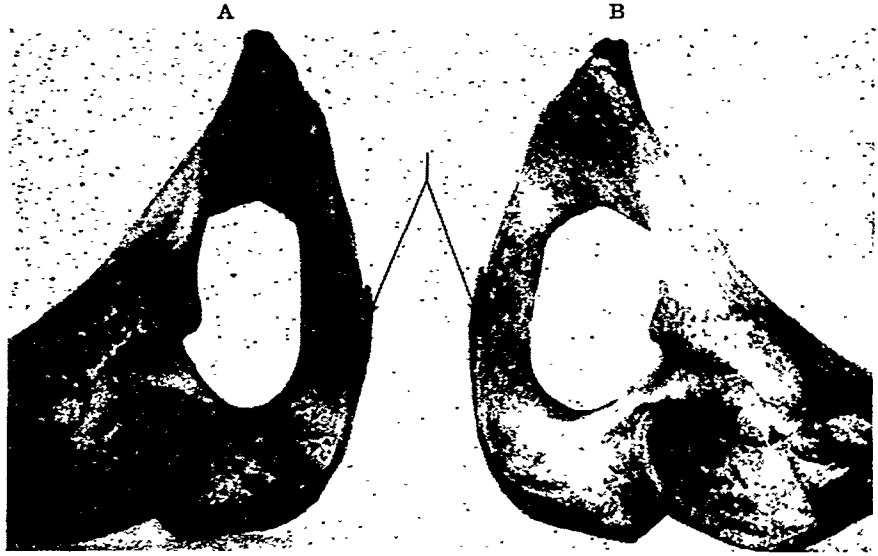

FIGURE 2
Lower Ends of Hip-bones
Arrows indicate the line of separation between areas of primary and secondary ossification.

Another feature of significance is the presence in either hip bone of a groove, situated just in front of the articular surface which, with the corresponding area on the sacrum, forms the sacro-iliac joint (Fig. 1—*viii*). Such a groove is called the pre-auricular sulcus (Fig 1—*vii*), and in the writer's opinion the presence of a pre-auricular sulcus, moderately well developed, in a young woman of twenty-three or twenty-four years of age, is very suggestive of a previous pregnancy. This is not advanced as an authoritative statement, but rather as a suggestion the writer has found to be borne out on more than one occasion by facts subsequently ascertained.

So far, then, confident opinions could be expressed regarding the age, sex, stature and general build of the deceased. In addition, there was the suggestion of previous pregnancy and a possible indication, therefore, of her marital status, frequently a helpful point in the identification of females, and one which should always be noted when possible.

Information of a still more personal nature was obtained by careful comparison of the two hip bones. As can be seen in Figure 3, the right and left bones show obvious differences. For example, the great sciatic notch (*ix*) is wider and the ischial tuberosity (*x*) heavier on the right side than on the left. Associated with these differences, other points of asymmetry can be noted on the hinder margins of the bones. The cavity for the head of the thigh bone (acetabulum) on the right side is of rather greater capacity and depth than that on the left. The difference is not easily shown photographically, but is sufficiently indicated in Figure 4, which is a photograph of casts from the two acetabula. There is a difference also in the measurements of the areas which form a joint with the sacrum on the right and left sides, and a slight asymmetry of the sacrum itself. The weight of the right hip bone is slightly greater than that of the left. These differences between the two sides suggested that the right hip bone had borne most of the weight of the body, and, therefore, that there had been prolonged disability and comparative disuse of the left leg, probably dating back to birth or early childhood.

It will have been noticed in Figures 1 and 3 that the right hip bone has been injured. The nature of the injuries is perhaps still better shown in Figure 5. Close to the sacral iliac joint, an irregularly-shaped lead slug or pellet is embedded in the bone (*a*). About one inch above and in front of this, a triangular fracture (*b*) can be seen. At the original examination this fragment was found still

FIGURE 3
Rear View of Hip-bones
(ix) Great sciatic notches (x) Ischial tuberosities

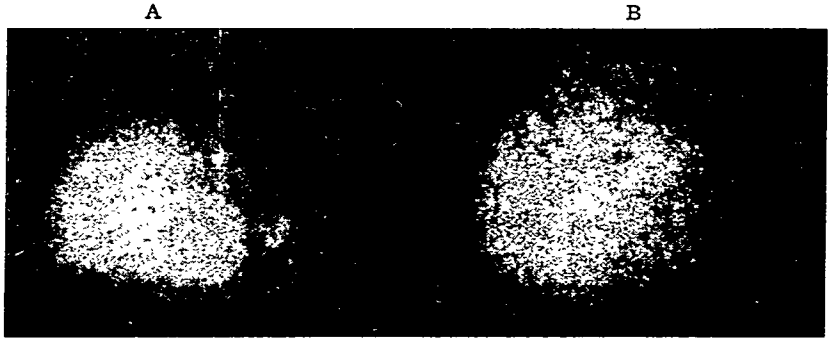

FIGURE 4
Casts of Acetabula

"hinged" to the main mass of the bone, as if dislodgment had been caused by something passing through the bone from before backwards (*b*). In the spine-like part of the ilium there is an injury (*c*) showing a grooving or channelling of the bone from before back-

wards and slightly upwards. This injury has caused some comminution of the neighboring bone, and a fracture running downwards, well seen in the illustration. Since a slug was actually present in the bone, it is a reasonable assumption that the objects which passed through the bone at the other points described were also slugs, and that the injuries were all due to the discharge of a shot-gun loaded with heavy, rough, or irregular slugs. The spacing of the injuries gives some idea of the dispersion of the shot, and suggests a range of at least a few yards.

FIGURE 5
Right Hip-bone
(a) Irregularly shaped lead slug embedded in bone
(b) Triangular piece of fractured bone
(c) Grooved fracture, showing erosion of bone

The margins of the injury near the iliac spine show a considerable degree of erosion of the bone, such as is characteristically produced by suppuration. The extent of this erosion indicates that vital processes were active for about seven to ten days after the injury was sustained, that is to say, the victim lived for that length of time after the injury. The position of the injuries to the bone show that the abdomen must have been penetrated, and this fact,

coupled with the definite evidence of septic infection, suggested that the cause of death was probably septic peritonitis. As regards the time since death, it was impossible to be very accurate. In the adherent tags of soft tissue, however, there was a small amount of adipocere, such as would require at least three months, and probably even longer, for its formation.

From the examination, therefore, a fairly detailed report was made as follows: The bones are from the same body, and have formed a pelvis of a young woman of small stature and light build. She was twenty-three or twenty-four years of age, and possibly had had one or more pregnancies. She had been lame on the left side since infancy or early childhood. She was injured by the discharge of a shot-gun loaded with irregularly-shaped and possibly home-made slugs. The shot was fired from in front of the woman, at a range of some yards. If the woman was in an erect position at the time, the direction of the shot was from before backwards, slightly from left to right, and slightly upwards. The shot must have penetrated the abdomen and injured the viscera. Death occurred about seven to ten days after the shooting, and was probably due to septic peritonitis. The whole occurrence is not more recent than three months ago, and may be considerably more remote.

As a result of this report, police investigation led to the discovery that a woman had been missing from a neighboring village for some months. A perfectly innocent explanation for her absence was at first advanced, but the description of the missing woman included all the features described in the report, except that she had been lame in *both* legs since infancy, from what cause the writer was unable to learn. She had been married and divorced, had had one child, and had been living in the village with her father. The father was arrested, charged with the murder of the woman, and at once he made an explanatory statement regarding the tragedy. It appeared that the girl had been standing in the doorway of the house, while he was seated on the ground in the vicinity, cleaning a shot-gun. He was unaware that it was loaded, but there was a sudden accidental discharge and the girl was wounded. He had been afraid to notify the police of the accident or summon assistance, as he was not entitled to possess the gun. He had nursed the injured girl at home until she died after about a week. Considering himself in a worse position than ever, he had then disposed of the body in the disused well. The facts deduced from the examination of the pelvic bones, therefore, agreed precisely in all the essential details with the actual facts of the case.