Department of Forensic Medicine, Medical University, Budapest (Director: Prof. S. Ökrös)

DIFFERENTIATION OF AGENTS RESPONSIBLE FOR INJURIES

S. Ökrös

(Received February 1, 1960)

The medical expert called in to examine a case of injury is expected to identify the agent to which it is due. This may be an object, or a substance in solid, liquid or gaseous state, radiating energy (X-ray, radioactive emanation), sometimes even a combination of them. For instance, if a fire-arm contacted with the body is discharged, there are objects (projectile, wad, powder, muzzle) and a gaseous substance (the shot-flame) to produce the wound. Injuries at a boiler explosion may be due to spurting solids, liquids and gases. The lesion is by heat combined with caustic action when a person has fallen into a lime pit, or again by heat combined with mechanical action when he has fallen into an asphalt mixer. Inferences drawn from what has been observed may sometimes be problematic even if, like in most cases, there was one agent only to cause the injury.

The relevant Hungarian Statute (paragraph 39) lays it down as desirable that the examination should establish not only the general type of the object but, if several objects of the same kind have been in play, the exact identity of each. Diagnosis can only be correct if it has been preceded by a thorough examination of the damaged tissues and organs and backed, if necessary, by the results of histological and histochemical investigations. Errors as to the type of injury are sometimes due to misleading lay statements, especially if the expert had failed to expose these as indefensible. For instance, the sight of a linear wound on the head may suggest that the victim has been stabbed or slashed to death and may induce the Coroner to inquire after a pointed or sharp weapon, whereas the medical expert would at once give the case an entirely different aspect by his recognizing the injury as a split wound due to violence by means of a blunt object. Therefore it seems necessary even in the apparently simplest case, to preserve the damaged tissues in a 4 per cent formaldehyde solution until the inquest has been concluded.

The expert is frequently asked not only to ascertain the kind of objects used, but also to give his opinion about the mode in which the violence was done or the mutual position of offender and victim during the act or the inten-

sity of the blow delivered. In most cases it is only the shape of the wound and some other features of it that he can go by to form his opinion.

Stabbed, slashed, bitten, burnt and shot wounds are usually easy to distinguish. Much more difficult is it to draw poper inferences when the causative agent was some blunt instrument; the expert is often put at a loss since these may leave marks very similar in appearence though actually widely different. A blunt object of definite shape and small surface leaves an imprint of more telltale character than a large one with only a small portion of it getting into contact with the body. Ecchymotic stripe wounds for example are suggestive of baton beats and bandlike scarlet cuticular bruises of a run-over. Abrasion marks of a reticular pattern are typical for collision with motor car radiator or tyre. Wounds caused by human bite are examined for the dental curve, the imprint of the masticatory surface, the spaces between the teeth and the occasional tooth gaps. The offender is frequently identified on the evidence of a sample bite compared with the imprint found on the victim's body.

If the blow was delivered with a blunt object of rectangular surface (*e. g.* hammer, blunt side of axe), the superficial injury sometimes does, but must not necessarily, reflect the outline of the instrument. HOLZER rightly states that the damage done by such a blow, especially one sustained by the head, appears on the skin surface mostly as a stelliform split wound, not admitting of any conclusion as to the nature of the instrument. In such a case it may be conclusive to inspect the subcutaneous scalp layers which probably present a well recognizable impression of the assailing part of the weapon, if the impact was strong enough to destroy the subjacent fatty tissues. As a consequence of that destruction, the conical fat lobules on the inner side of the integument become displaced or annihilated, exposing to view the reticular structure of the dense subcutaneous connective tissue within an area corresponding to the intruding surface of the striking object. If it is on a hairy part of the body that the impact was acting, an area of sharp contours and right-angled corners comes to sight, with the low ends of the hair follicles and the hair bulbs characteristically stripped of their covering fatty tissue. Damaged areas bearing either of these typical marks may be angular, round, oval or irregular in outline, depending upon the shape of the intruding object's surface. The examination of such marks has often put me on the right track when I was asked to ascertain the type of instrument responsible for some injury and it seems to me important that the medical expert should know them. The following case histories are illustrative of my point.

Case 1. (Post mortem No. 30, April 18, 1956.) A woman 62 years of age had been found dead by her daughter and son-in-law, with lacerated wounds on her head and neck. Gross inspection of the corpse indicated the head injuries to have been caused with some sharp instrument although the numerous and partly interconnected linear and stellate wounds appeared split rather than

incised. Examination of the scalp revealed on the interior a few oblong areas, 2 cm by 3 cm in size, presenting characteristically denuded hair follicles and bordered by round-surface lobules of fatty tissue (Fig. 1). On the evidence of the type and extent of fat destruction, the injury must have been produced by heavy blows with a weighty blunt object (reverse side of an axe or hatchet) which crushed the lining tissue and laid bare the hair follicles within the compass of its penetrating surface. It turned out that the denunciators themselves had disposed of the old lady, alternately striking her head and neck with the blunt end of an axe which was found hidden in a chest in the same room.

Here, then, we have an instructive case in which the hair-follicle mark helped to throw light upon the crime.

The next time I was consulted in a case of murder it was a hair-follicle mark of similar appearance with edges again meeting under right angles that made me assume an axe of 36 mm by 38 mm striking surface as the weapon responsible for the crack on the victim's skull.

A cranial hair-follicle mark of oval, round or spread-out rather than angular shape points at collision with a blunt large-surface object or an embossed one, resulting in injury and crushing the scalp supported by the bony skull vault. A significantly shaped oval mark was seen in *Case 2.* (Post mortem No. 812, April 15, 1959.) A woman aged 57 had fallen off the back-seat of a motorcycle and bumped her head against the road. She had lost consciousness and died within 27 minutes after admission to a hospital. On the rear hairy scalp, a little to the left, there was a deep 7 cm long Y-shaped split wound reaching to the bone; with spots of epidermal abrasion at the edges (Fig. 2a). The interior of the scalp below the wound edge presented an area, about 3 cm by 3.5 cm in size, with significantly denuded hair follicles of delicate velvety brush-like appearance (b), the corresponding surface underneath exhibiting the detached mass of hemispherically rounded fatty tissue (c).

In this case the vaulted arch of the skull dashing against the smooth surface of the asphalt road accounted for the oval form of the hair-follicle area (b) which bore the brunt of the impact. Speaking in general terms it seems legitimate to state that in opposition to the superficial features of injury by a blunt object (Y-shaped split wound, etc.) which offer little or no ground for inferences, the interior of the hairy scalp, subjected to examination for the uncovered hair follicles it is likely to present, may be expected to impart some information as to the shape of the damaging object, even if the latter was many times larger than the wound.

Very similar is the experience I have gained with hair follicles in other parts of the body. *Case 3.* (Post mortem No. 1814, September 1, 1959.) A man 47 years of age had been squeezed in between two motor trucks, in the upright position. He died 4 hours after the ambulance had brought him to the hospital. In the pubic region a transversal fringed cleft was revelaed in the skin, 15 cm

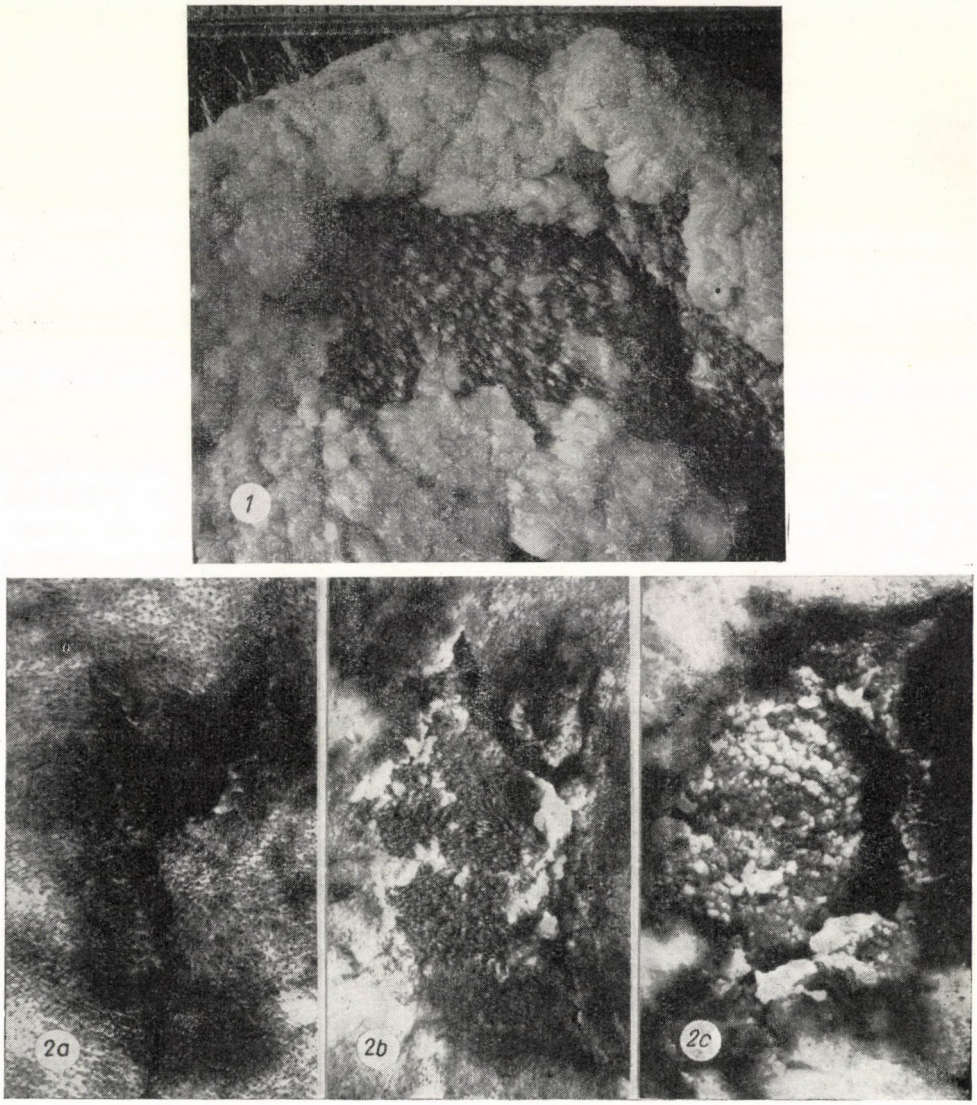
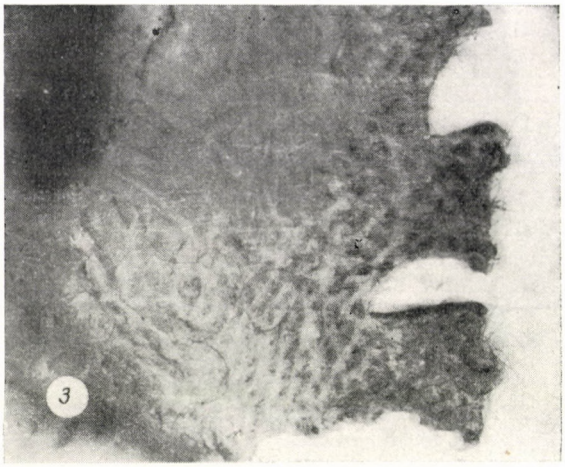


Fig. 1. Oblong hair-follicle mark on the interior of the hairy scalp

Fig. 2. a) Y-shaped split wound of the scalp — b) Oval hair-follicle mark — c) Mass of fatty tissue detached from the scalp underneath the hair-follicle area

in length, with edges of coarsely ragged character. On the interior of the cutis below the upper wound margin an area of 6 cm by 3 cm was recognizable as the centre of the mighty blunt impact which had utterly destroyed the subjacent fatty layer, expelling the conical fat lobulet from the foveate depressions of the connective tissue, so that the reticular structure of the latter has become



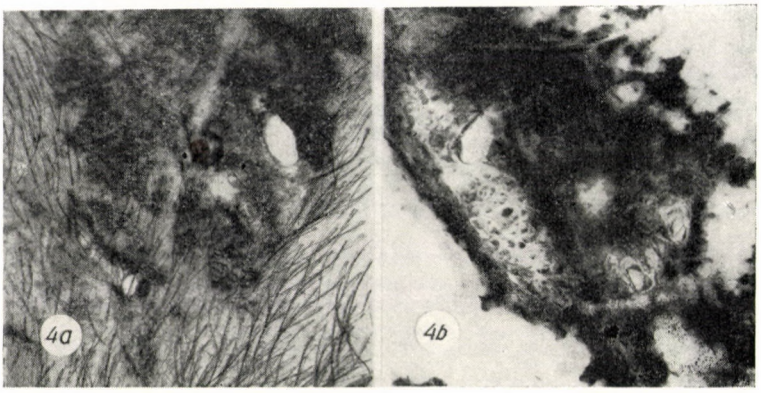


Fig. 3. Reticular structure, appearing ragged owing to injury, on the inner surface of the compact and fibrous subcutaneous connective tissue

Fig. 4. Stripes of ragged reticular areas with haemorrhagic infiltrations of the fatty tissue around them. Skin repeatedly perforated by bone splinters

visible, and liberating the pubic hair follicles together with the hair bulbs in the depths of the small pits (Fig. 3).

The pressure impact delivered by the large surface of the lorry bumper crushed the bony frame of the pelvis and disrupted the skin above the pubic region. The hair-follicle mark and the ragged, reticular appearance of the damaged connective tissue with a clear-cut straight upper margin were to a certain measure informative of the quality of the intruding object's surface, although not enough to reveal its individual character as a bumper, since various other large, straight-edged objects if bumping with great force against the body could have done the same type of injury.

If in the site of superficial injury by a blunt object there are neither head nor body-hairs to give away the nature of the damaging instrument, the state

of the dense and fibrous subcutaneous connective tissue may allow some inference. The ragged appearance owing to destruction, varying in extent and form, of the structure of the conical fat lobules on the interior surface was frequently observed in accidents involving run-over by train, car, horse-drawn vehicle and after death due to fall from high scaffolding, etc.

The same kind of mark on the interior surface of the subcutaneous connective tissue is oblong or oval in shape if the blow has been delivered with a baton, a club or an object of similar character. *Case 4.* (Post mortem No. 61, July 2, 1942.) A boy 18 years of age had fallen into a thresher drum and suffered immediate death owing to severe internal injuries. The right shank presented a series of brownish-red transversal skin contusion stripes of one finger's breadth. There was a comminuted fracture of the tibia with the skin perforated by several bone splinters. Haemorrhagic infiltration in stripes was seen in the severely damaged fatty tissue underneath the skin covering the tibia, with round-edged areas measuring 1 cm by 5 cm on the fat-deprived internal surface which actually bore imprints of the rod-shaped inner parts of the thresher drum but the like of which could have been produced by violent beats with any other stick or baton. Fig. 4 shows one stripe of the contiguous shank injuries with the skin perforated by bone splinters (a) and a corresponding oval area of rough structure on the internal surface of the subcutaneous dense fibrous connective tissue (b).

Changes in hair structure due to electrocution by lightning

Lightning as the cause of death or injury is fairly easily ascertained by autopsy or an inspection of the scene, especially if there were eyewitnesses to confirm the findings. The place usually shows unmistakable traces of the lightning stroke such as destruction of objects and trees, splintered fracture of branches, deep linear furrow on the tree trunk, small pellets of fulgurite on the earth, sometimes remainders of fire aflame. The struck survivor sooner or later regains consciousness but will be unable to recollect things except the impression of having been dazzled by glaring brightness. Marks traceable on the wounded or killed may include tears or rents of the clothing, melting of metallic objects carried in pockets, peculiar scorching, charring and fusion of hairs and curiously patterned lightning marks on the skin. It has occasionally been recorded that the impact of the stroke had flung the victim away. Rarely, when the lightning stroke came down in a meadowy tract of land with no damaged trees standing about as mementos, the body itself may not present any conspicuous mark either except a barely distinguishable circumscribed area of scorched body hairs as the only sign to indicate the nature of the injury suffered.

The question is important from the diagnostical point of view only as death from lightning, if ascertained as such, rules out any suspicion of foul play. There may be severe internal injuries such as heart rupture, severe contusion, concussion of the brain, maiming of extremities etc. In some cases, two of which are described below, I have observed peculiar microscopic changes in the head and pubic hairs, remarkable for the dissimilarity in appearance to scorch injuries due either to burns by flame or to arc-light or electric spark discharge.

Case 5. (Post mortem No. 38, June 5, 1957.) A man aged 43 years had been killed by lightning while driving a horse-cart. Inspection of his felt hat showed a 5 cm long rent with ragged edges. Necropsy revealed scorching and fusing of hairs chiefly in the nuchal region, a fulguration skin mark 10 cm long on the right chest, an epidermal injury of half a palm size and brownish-red in colour on the right side of the trunk. The blood was uncoagulated.

Microscopy revealed some straight hairs showing slightly swollen portions of a dark-brown colour, with an oblique or transverse line demarcating the sound from the charred portion. Circumscribed tumescences and air bubbles were absent. Other parched hairs were coiled or irregularly curled. Elsewhere again there were cindery and extremely fragile fusions of hair, with the surface frayed (Fig. 5). A conspicuous feature of repeated occurrence was that under the influence of electric energy the tapering charred hair tips had twisted around the lower sound hair portions, adhering to the latter as single or multiple ringlets practically irremovable and breaking up on the slightest touch.

Case 6. (Post mortem No. 41, July 20, 1957.) A woman, 56 years of age, while gathering hay, had been struck to death by lightning during a storm. Inspection found a cross-shaped cleft with ragged margin, 18 cm by 20 cm across the middle of her kerchief which otherwise showed no traces of burning. The pubic hairs and sporadically the hair on her head were singed. There were no fulguration skin marks on the corpse; the blood was uncoagulated. The other findings were normal.

Microscopic examination of the pubic hairs revealed much the same type of annular processes as was seen in the preceding case, with hair fragments charred to dark-brown, coiled once or several times around the deeper unburnt portion. These ringlets were again thinner than the hair stems and crumbled between the fingers trying to displace them. In addition many hairs presented pearl-like bulges varying in size, some of them replete with, others void of, minute air bubbles, with the filament itself here and there thickened and charred. Some of the pubic hairs were fused and scorched showing an uneven frayed surface resembling that of the head hair.

From these two cases it seems evident that the described ringlets whose mechanism of formation is yet to be discovered are characteristic as a by-product of electrocution by lightning. It is doubtful whether this ringlet has

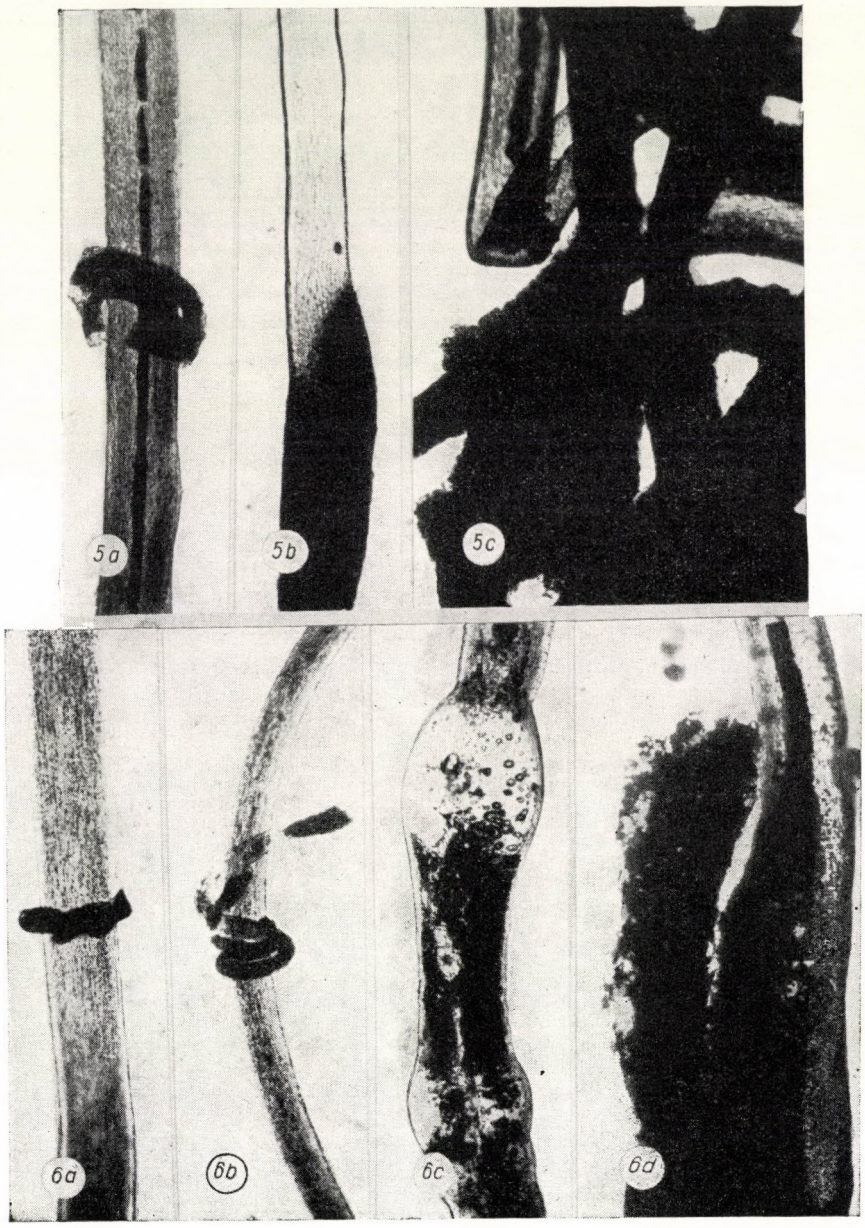


Fig. 5. Microscopic changes of hairs due to lightning stroke (highpower magnification) **a)** Charred ringlet on sound hair — b) Distinct line demarcating sound from charred hair portion — c) Fusion of hairs with the surface frayed in some places

Fig. 6. a) Single ringlet — b) Multiple ringlets — c) Circumscribed tumescence of the hair, with minute air bubbles in the upper portion — d) Hair fusion showing frayed surface

been formed from the curling-up end of the hair on which it is seen or from an adjacent one. Importance attaches to the rest of the symptoms such as sharp lines of demarcation between intact and charred portions, circumscribed spheroid swellings sometimes pervaded by tiny gas bubbles not spreading towards the adjacent medullary parts; these are all suggestive of lightning stroke in distinction to injuries by blazing fire which are known to carbonify the hair all over its contact with the flame and to make it swell and fill with bubbles towards the non-damaged portions.

Fire-arm wounds

Shots fired into a corpse with the same weapon under the same conditions have furnished evidence that entry wounds vary in size from one region of the body to the other.

The expert asked to examine a shot wound is expected to define not only direction and range of the shot but also the type of fire-arm used. In this he is guided by various different motives such as imprints on the skin due to contact with the muzzle, inspection of the weapons seized as exhibits, etc. Accordingly the work is shared between the medical expert who is to establish the character of the wound by subjecting it to gross and microscopic examination, and the fire-arms expert on whom it is incumbent to identify from actual traces of powder, wad and projectile the type of weapon responsible for the injury and to tell of a given fire-arm when it was last discharged and whether it could have produced the wound found on the body. The bullet recovered from the body or the scene of crime bears marks individual to the rifled weapon that fired it. The expert can, by comparison of the crime bullet with trial bullets from the suspect weapon, tell whether or not it is from the latter that the shot was discharged, since the innumerable scratches scored on the metal projectile jacket by the ridges and grooves inside the barrel are repeated every time a round is fired from it.

In shot wounds the size of the entry hole and occasional imprints around it due to contact with the muzzle, or rather to a rebound of the skin, are the safest marks for the inspecting expert to determine the type of weapon and its calibre. A 7.65 Frommer pistol for instance stamps the pattern of an eight on the skin. A twin-barrel shot-gun fired in contact with the body surface is likely to leave a narrow semi-circular or horseshoe-shaped skin contusion as the impression of the non-discharged barrel, close to the entry wound caused by the discharged one. Owing to dispersal of the lead shot, the exit wound is much larger than the entry wound and the skin around it exhibits a multitude of minute holes due to stray pellets lying outside the main bunch of shot (Fig. 7). In Figure 8 the contact wound from a Mauser carbine is seen with the imprint of the sighting knob and the surrounding protective ring clearly outlined

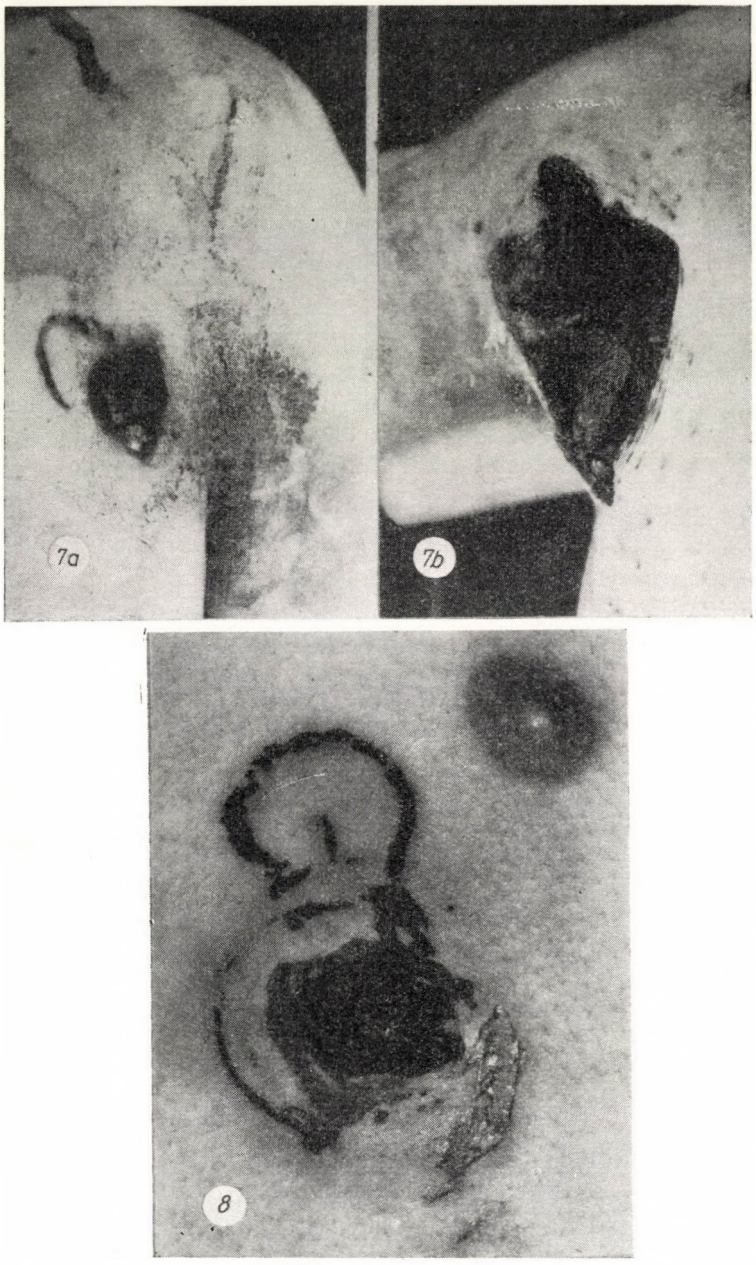


Fig. 7. a) Entry wound on left chest with horse-shoe shaped imprint due to rebound of skin against twin-barrel shot-gun fired in contact with body — b) Wide exit wound above arm-pit with many minute holes around it, through which lead-shots have burst forth

Fig. 8. Conctact wound on left chest due to discharge from carbine. The split skin in the centre of the upper imprinted mark indicates contact with the sighting knob

near it. AVGHEYEV, POPOV, WERKGARTNER, GARSCHE, HAUSBRANDT and others, investigating the mechanism operative in producing the described contact marks, have found that a sudden hypodermic expansion of the explosive gases makes the skin rebound and forces it with great power against the muzzle. The intensity of the imprinted mark probably depends upon the muzzle-to-skin distance, on the quantity of gas produced by the discharge and the skin resiliency in the particular body region. HAUSBRANDT found such a mark in a case where the weapon had been discharged at 1.5 mm from the skin. Paler than in contact discharge but still distinct was the mark on the thigh skin in the trial shots we had fired from a 7.65 Frommer pistol at 5 mm distance.

If there is no imprinted mark to guide the expert, he may fairly well estimate the weapon's calibre by the size of the entry hole, especially of one through a flat bone. For instance the diameter of a hole in the skull vault is but a few tenths of a millimetre smaller than the projectile that has passed through it so that a certain resistance will be felt on introducing into it the bullet or the corresponding portion of a measuring gauge.

Less indicative of the barrel gauge are entry wounds on the skin surface which greatly differ in size depending upon the body region they have been inflicted upon with the same fire-arm under identical conditions. In contact wounds where the momentum of the bullet was extremely great the destroyed skin area approximately agrees in size with the weapon's calibre. In wounds with entry holes usually smaller in diameter than the projectile, the surrounding skin abrasion may convey an idea of the bullet size. The passage cut by a missile through a soft part may vary in diameter depending upon the contractibility of tissues in the particular organ and upon their fluid content. Such a passage may amount to many times the diameter of the missile in striated muscles or to a fraction of it in tissues less capable of contraction (*e.g.* tendous, intervertebral fibrocartilage, yellow ligament).

Inspection of shot wounds usually raises the question how to determine the calibre of the fire-arm. The experience that entry wounds due to the same weapon fired from the same distance vary in size depending upon the skin structure in the particular body region, induced us to study these variations in size when the projectile has only damaged soft parts without its passing through flat bones. In the disinterment of corpses from a common grave it has been observed that the diameters of the entry wounds on neck, chest, abdomen and extremities of 73 victims ranged from 3 mm to 6 mm although they all had been killed, as stated by witnesses, at close range with the same weapon. Notwithstanding that the corpses were unearthed six months after their burial, the skins were fairly well-preserved and permitted accurate measurement of the entry holes.

Size variations of entry wound in various body regions due to rounds fired from a 6 mm target-shooting Flobert pistol

	S	K	F	T
Group I				
Heel	1	1	1.2	0.2
Foot	3.7	3.7	3.9	0.2
Ankle, front	2.6	2.3	2.9	0.6
Knee	3.2	2.5	3.2	0.7
Palm	1.5	1.5	2.4	0.9
Elbow	2	2	2.9	0.9
Waist, middle	3.5	2.8	3.7	0.9
Group II				
Elbow pit	3.7	2.7	4	1.3
Shank, front	3.9	2.5	3.9	1.4
Forearm, back	3.7	2.2	3.8	1.6
Forearm, front	4	2.6	4.3	1.7
Back of hand	3.7	2.6	4.3	1.7
Chest, middle	4.3	2.8	4.6	1.8
Abdomen, middle	3	2.4	4.3	1.9
Group III				
Arm, side	3.5	2	4.1	2.1
Scalp	3.7	2.4	4.6	2.2
Back, middle	2.6	2.1	4.5	2.2
Ankle, front	3.1	1.8	4.1	2.3
Scrotum	2.6	1.5	3.8	2.3
Buttocks	1.7	1.7	4.1	2.4
Thigh side	3.8	2.1	4.5	2.4
Thigh inside	3.7	2	4.4	2.4
Waist, middle	2.4	1.4	3.9	2.9
Arm, front	3.2	2.3	4.8	2.5
Chest	4.2	2	4.6	2.6
Neck, front	3.4	2.6	5	2.8
Thigh back	3.2	1.7	4.5	2.8
Scapula	3.2	1.4	4.3	2.9
Group IV				
Popliteal space	2.8	1.5	4.5	3
Arm, inside	4	2.2	5.4	3.2
Neck, back	2.5	1.2	4.5	3.3
Axilla	4.5	2	5.3	3.3
Shank, back	4	1.2	4.5	3.3
Arm, back	2.9	0.8	4.2	3.4
Prepuce	2.8	1.4	5.2	3.8
Groin	2.4	1.6	5.5	3.9

S = *In situ*
K = Excised skin portion
F = Maximum stretch of skin portion
T = Degree of skin expansibility

We fired rounds from a 6 mm target-shooting Flobert pistol to inflict wounds at 10 cm distance on various parts of a corpse and used a pair of precision compasses and a conical rod gauge to measure the entry holes first *in situ*, thereafter in the contracted state, finally in strongly expanded condition of the excised and detached skin portions. The results of these experiments are divided into four groups, according to the part of the body in which the difference between the hole sizes in the contracted and stretched-out skin portion was less than 1 mm, and exceeded 1 mm, 2 mm and 3 mm. The dimensions measured *in situ* are given in the first column.

The tabulated data testify that the expansibility of the skin varies inversely with the density and resistance of the connective tissue and with the thickness of the epidermal and keratinous layers. The expansion ratio of the skin of the heel, for instance, was just slightly more than zero, in contrast to nearly 4 mm of that of the inguinal skin. These differences in skin structure and expansion ratio sufficiently account for the differences in size of the entry wounds and must be duly taken into consideration whenever the projectile diameter or the barrel gauge of a fire-arm is to be inferred. A further point meriting attention is that not even on the structurally loosest skin portion did the holes attain the 6 mm dimension of the barrel calibre.

*

Wounds are frequently soiled by some remaining fragments of the assailing weapon which stick to the gap or its environment and must be removed by marginal excision, if necessary, lest the contaminating substance become a source of infection and impair the normal healing process. From the forensic point of view, such impurities are of extreme significance and may in fact greatly contribute to discovering the responsible object. Numerous cases in the literature are illustrative of this point. HABERDA reported to have identified enamel fragments of a milk jug and HOLZER found glass splinters and brick dust in the wound. In other cases there were traces of lubricant, wood splinters, oil sooth, iron rust, etc. to betray the nature of the instrument. DEMETER saw lead impurities at the entry of a shot wound and tiny fragments of it at the exit. The 1958 Statute of the Hungarian Ministry of Health which orders all such remnants on excised wound portions to be examined, is intended to establish a close co-operation between the clinician and the medico-legal expert with a view to facilitating the instrument to be determined in each criminal inquest.

Summary

A few typical marks of injury, found to be greatly conclusive in determining the nature of the damaging agent, have been described.

1. Hair follicle marks which mostly present themselves on the interior of the scalp as a result of violence suffered from a blunt instrument, destroying the subcutaneous fatty tissue

and laying bare the lower hair follicle ends. The damaged area may be round, oval, angular in outline, or of the shape of a strip depending on the form of that part of the agent which has come into contact with the body.

2. Ragged marks suggestive of forcible penetration of a blunt instrument which displaced or annihilated the conical fat lobules on the inner side of the compact and fibrous connective tissue, exposing to view the reticular foveate structure. The impression reproduces the form of the assailing part of the weapon.

3. Microscopic hair lesions typical of electrocution by lightning. Under the influence of the electric stroke, charred hair tips in the form of ringlets become twisted around sound hair portions.

Intimate cooperation between clinicians and medico-legal experts must be strived at. to facilitate determination of the crime object.

REFERENCES

1. Avgyejev, M. I.: 1951. — 2. Berg, S.: 1931. Dtsch. Z. ges. gerichtl. Med. **17,** 133. — 3. Fossel, M.: 1953. Dtsch. Z. ges. gerichtl. Med. **42,** 66. — 4. Garsche, R.: 1935. Arch. Kriminol. **97,** 120. — 5. Haberda, A.: 1919. Lehrbuch der gerichtlichen Medizin. Urban et Schwarzenberg. Wien. — 1930. Beiträge gerichtl. Med. **10,** 1. — 6. Hausbrandt, F.: 1943. Dtsch. Z. ges. gerichtl. Med. **37,** 161. — 7. Holzer, F. J.: 1948/49. Dtsch. Z. ges. gerichtl. Med. **39,** 35. — 8. Ipsen, K.: 1912. Vjschr. gerichtl. Med. **43,** Suppl. H. 229. — 9. Liebegott, G.: 1948/49. Dtsch. Z. ges. gerichtl. Med. **39,** 356. — 10. Lochte, T. u. Brauckhoff, H.: 1948/49. Dtsch. Z. ges. Gerichtl. Med. **39,** 567. — 11. Ökrös, S.: 1953. Ann. Méd. Lég. **33,** 110. — 12. Paltauf, A.: 1914. Vjschr. gerichtl. Med. **48,** 332. — 13. Popov, I. V.: 1950. — 14. Puppe, G.: cit. Holzer. — 15. Rayssky, M. J.: 1953. — 16. Remund, M.: 1931. Gerichtliche medizinische Probleme bei Autounfällen. S. Karger. Basel. — 17. Walcher, K.: 1931. Dtsch. Z. ges. gerichtl. Med. **17,** 337. — 18. Weirich, G.: cit. Holzer. — 19. Werkgartner, A.: 1924. Beitr. gerichtl. Med. **6,** 148; 1935. Beitr. gerichtl. Med. **13,** 1938. Beitr. gerichtl. Med. **14,** 66. — 20. Ziemke, E.: 1921. Vjschr. gerichtl. Med. **61,** 185.

ДАННЫЕ К ОПРЕДЕЛЕНИЮ ПРИЧИНЯЮЩЕГО ТРАВМУ ПРЕДМЕТА

Ш. ЭКРЭШ

Автор обращает внимание на следующие признаки повреждений, предоставляющие опорные точки для более точного определения причиняющего травму предмета:

1. На области с признаками волосяных мешочков, возникающие, как правило, на действие тупого усилия во внутренней части кожи головы таким образом, что жировая ткань головы разрушается и нижняя часть волосяных мешочков обнажается. В зависимости от части предмета, соприкасающегося с телом эти области могут быть круглыми, овальными, угловатыми и полосатыми.

2. Сетчатый признак, который возникает на действие тупого усилия таким образом, что вкрепленные в нижнюю часть подкожной плотной волокнистой соединительной ткани конусы жировой ткани разрушаются, вырываются, вследствие чего обращенная к жировой ткани соединительная ткань получает сетчатую структуру. Форма сетчатого признака соответствует проекции причинявшей повреждение детали предмета.

3. Выявляемое в микроскопе кольцевое образование на волосяном покрове лиц, пораженных молнией; на отдельных волосах и волосках видны обвивающиеся обугленные части волос и волосков, которые представляют один из диагностических признаков поражения молнией.

4. В интересах успешности определения предмета автор считает необходимым более тесное сотрудничество лечащих врачей и врачебных экспертов.

BEITRÄGE ZUR FESTSTELLUNG DES DIE SCHÄDIGUNG VERURSACHENDEN GEGENSTANDES

S. ÖKRÖS

Verfasser verweist auf folgende Schädigungsanzeichen, die einen Anhaltspunkt zur näheren Bestimmung des die Schädigung verursachenden Gegenstandes liefern können:

1. Die Gebiete mit Haarbalganzeichen, die in der Regel durch die Einwirkung von stumpfer Kraft im Inneren der Kopfhaut entstehen, undzwar in der Weise, daß das Fettgewebe der Kopfhaut zerstört und der untere Teil der Haarfollikel freigelegt wird. Diese Gebiete können rund, oval, winkelförmig oder streifenförmig sein, entsprechend dem mit dem Körper in Berührung tretenden Teil des Gegenstandes.

2. Die netzförmigen Zeichen, die auf Einwirkung von stumpfer Kraft entstehen, undzwar durch Zerstörung, Herausreißen der im unteren Teil des dichten faserigen subkutanen Bindegewebes eingebetteten Fettgewebskegeln, wodurch der zum Fettgewebe gelegene Teil des Bindegewebes eine netzförmige, holperige Struktur erhält. Die Form des netzförmigen Zeichens entspricht der Projektion des die Schädigung verursachenden Teiles des Gegenstandes.

3. Mikroskopische Ringbildung der Behaarung bei von Blitzschlag getroffenen Personen; auf einzelnen Härchen und Haaren sind sich herumschlingende verkohlte Teile von Haaren bzw. Härchen zu sehen, die eines der diagnostischen Zeichen des Blitzschlages darstellen.

4. Eine engere Zusammenarbeit der Ärzte und Sachverständigen ist erwünscht.

Prof. Dr. Sándor Ökrös, Budapest, IX. Üllői ut 93. Hungary.