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Police Science Technical Abstracts and Notes

POLICE SCIENCE TECHNICAL ABSTRACTS AND NOTES

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The Effects of Heat on the Histological Structure of Bone

An article bearing the above title appears in the January-March, 1941 issue of *The Police Journal* (London).[1] The author, Dr. Gilbert Forbes, Lecturer in Forensic Medicine at the University of Sheffield, undertook the study of the effects of heat upon bone structure because of the difficulties encountered in the examination of charred specimens, especially when only a few fragments are presented for examination. Portions of bone were heated with a Bunsen flame for varying lengths of time, from twenty-five seconds to ten minutes, decalcified in nitric acid, sectioned and stained. It was found that after exposure to the flame for three minutes the specimen could not be decalcified and simply disintegrated in the acid. With regard to the structural changes in specimens of compact adult bone, the author describes his observations as follows: "The first effect of exposure to heat is a great increase in prominence of the canaliculi in the bone. This is probably the earliest phase in the disruption of the lamellar structure. Following this appearance the lamellae become coarsely granular in structure and the lacunae begin to disappear. With the increase in granularity of the lamellae the canaliculi disappear altogether. The obliteration of the lacunae occurs in stages. They may appear distorted and flattened or of normal size but filled with granular debris similar to that seen where the lamellae have disintegrated. The lacunae are ultimately seen as hazy shadowy outlines barely discernible in a uniformly granular matrix. Meanwhile the lamellar formation in the Haversian systems gradually disappears till no sign of this feature is left at all. At this stage the matrix is shown simply as a uniformly flat finely granular structureless mass with a few indistinct scattered lacunae here and there." The author reports also that bone becomes structureless long before complete charring is achieved and that if small fragments only are available for examination, and gross anatomical features are absent. the only possible procedure remaining is chemical analysis. The latter will prove, of course, only that the specimen contains mineral substances in the same proportions normally found in bone.

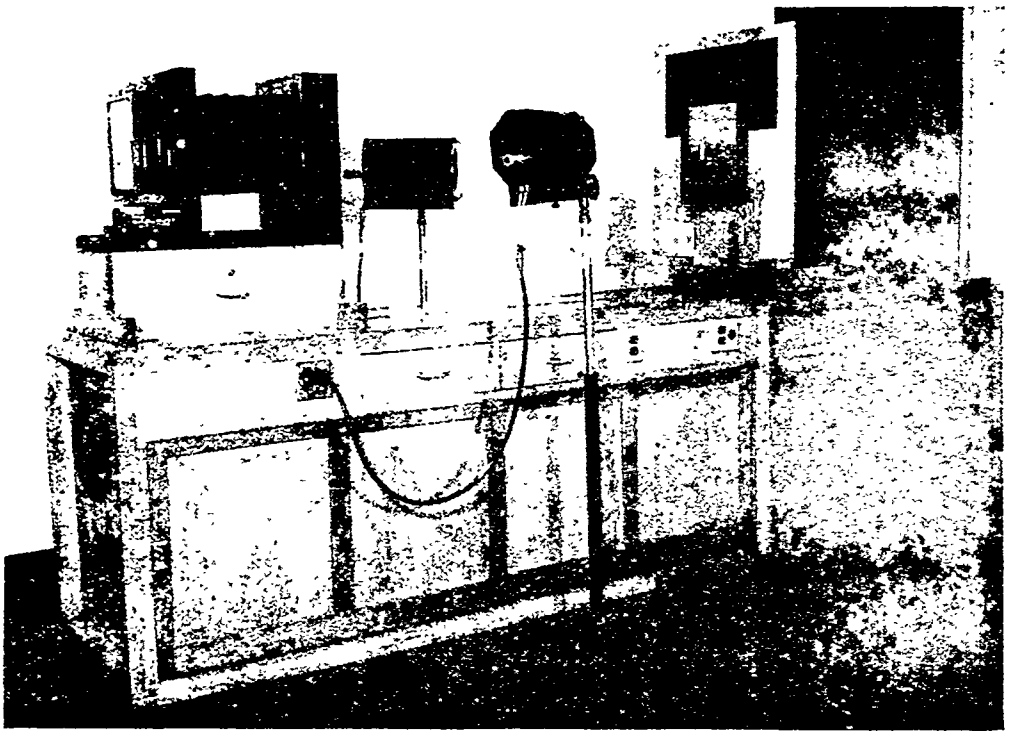
The author describes at some length the various histological techniques of preparing bone specimens, and recommends procedures to be followed in making a study of bone structure. For the preparation of *cancellous* bone, the specimen is fixed in 10 per cent aqueous neutral formaldehyde for 48 hours, decalcified in Mullers fluid plus 1 per cent nitric acid, and washed in running water for 24 hours. The washed blocks are dehydrated in "Dioxan" (diethylene dioxide), the fluid being changed twice at intervals of two hours. The blocks are then impregnated in paraffin for about 30 hours. Specimens of *compact* bone are fixed in 10 per cent formaldehyde, decalcified in 5 per cent nitric acid in water and washed in 5 per cent sodium sulphate for 24 hours. The block is then washed in running water for 48 hours and cut at 15 to 20 μ with a freezing microtome. The sections are either stained with Orange-G and mounted in glycerin jelly or stained with Gallein and Phosphotungstic Acid and mounted in Canada balsam.

[1] Forbes. Gilbert, "The Effects of Heat on the Histological Structure of Bone." The Police Journal, 14 (1):50-61 (1941)

A Copying Camera Base

Ordway Hilton

The copying camera base recently designed by members of the staff of the Chicago Police Science Crime Detection Laboratory embodies a number of features which may be of interest to document examiners and technicians of other laboratories. (See accompanying illustration). Some of these features have been helpful in reducing the time and effort consumed in adjusting the subject. Others were incorporated to increase the number of uses of the camera and to utilize storage space most efficiently.



The copying camera base in use at the Chicago Police Scientific Crime Detection Laboratory. (Cabinet work and installation by WPA. Illinois Art and Craft Project.)

Copy Board and Carriage: The copy board is mounted on the carriage by means of a single bolt through its center, thus allowing a rotational movement of the entire board. The vertical adjustment of the copy frame is accomplished by raising and lowering the supporting ledge or bracket which is held in place by means of two wing nuts and square head bolts running through vertical slots in the board. The copy frame is held against the board by means of a magnetic system. A sheet of steel[1] covering approximately the upper half of the board is permanently screwed in position. Mounted on each copy frame are two Alnico permanent magnets[2]—one in the center of the short dimension and the other in the middle of the long side. With such an arrangement the frame can be placed in either of two positions and moved readily in a horizontal direction.

[1] In order to prevent rusting the cold rolled steel sheet was Parkerized. This treatment has little effect upon the magnetic qualities of the metal and the resulting dull black finish has the added advantage of reducing undesirable reflections.

[2] Obtainable from Central Scientific Co., 1700 Irving Park Blvd., Chicago, Illinois (catalog number 78326B).

To assist in preliminary alignment the vertical and horizontal center lines are marked off on the copy board and the center of each copy frame is also indicated.

The position of the carriage, which runs on tracks, is controlled by means of a wheel mounted below the ground glass of the camera. To aid in locating the preliminary position of an object to be copied at a desired enlargement or reduction, an illuminated indicator is mounted on the side of the carriage. This indicator consists of a brass frame supporting a wire "hair-line" and a mirror so arranged that the "hair-line" can be viewed from behind the camera. The common points of enlargement and reduction are indicated by means of brass plates located along the top of the base. The "hair-line" is illuminated by a flashlight bulb mounted on the frame and operated by a switch adjacent to the control wheel.

Camera Mount: The camera mount is a box-like arrangement fixed in position at the front of the base. The height is such that the center of the camera lens[3] is on a line with the center of the copy board and the ground glass is at eye level. The space below the camera is used for a lens drawer in which extra lenses, together with the focusing lens, are stored.

Electrical Outlets and Illumination: The principal illumination for most copy work is a pair of spot lights, but occasionally other types of illumination are desired, such as photofloods or fluorescent lights. So that it is unnecessary to disconnect the spot lights when other types of illumination are used, special outlets are provided for these with each spot on a separate DC circuit,[4] one circuit to either side of the base, while another pair of DC circuits are provided for photoflood illumination and other electrical needs. In order to eliminate the use of extension cords there are two sets of outlets on each of the four circuits, one near the front of the camera and the other near the center of the base. In addition all four circuits are fed through a single master switch, thus allowing several lights which are connected to different circuits to be turned on or off simultaneously.

Since alternating current is necessary to operate the fluorescent tubes used, the base is also wired with an AC circuit, the outlets being located on either side near the center. This likewise makes possible the use of mercury vapor lamps for ultraviolet photography.

For convenience all the electrical switches are placed on the end of the base directly below the ground glass of the camera.

Storage Space: The lower portion of the base is taken up with storage space. At the far end is a hinged bin for storage of sheets of photographic cardboard. One section is designed for storage of cameras and light filters. In the section directly below the camera are a series of vertical slides in which the copy frames and extra ground glass backs[5] are stored, while the remainder of this section is used for storage of photofloods and other type reflectors. In addition a set of hangers for long extension cords is provided.

Supplementary Apparatus: A fluorescent light rack has been constructed for the camera. This supports two reflectors in a horizontal position, one above and the other below the lens. Each reflector is designed to take two 20 watt tubes (24 inches in length). The rack is mounted on rollers to ride on the same tracks as the copy board and carriage, thus allowing for variation in light to object distances. The entire support can be dismounted and stored when not in use.

The copy board is equipped with an attachment for holding books consisting of a pair of demountable cross rods and a supplementary supporting ledge with a six inch lip.

A special "L"-shaped box equipped with a double glass front to hold the document was designed for transmitted light photographs. Illumination originating from a spot light source at the side opening of the box is reflected through the document by means of a mirror.

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[3] The camera used at this Laboratory is an 8 x 10 view camera.

[4] The laboratory is located in a direct current district and a motor generator is used to supply alternating current.

[5] Besides the 8 x 10 ground glass, the camera is equipped with 5 x 7 and 3¼ x 4¼ backs.