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To: Mike Rhodes, Finds Officer, D.U.A.

From: Philip L. Armitage, Archaeological Scientist attached to the D.U.A.

REPORT OF THE STUDY CARRIED OUT ON THE SPECTACLES FROM TRIG LANE, CITY OF LONDON (TL74)

1. OBJECT:
   Description: pair of bone spectacles
   Site: Trig Lane (TL74)
   Context: 274
   Mus.Acc.No.: <2216>
   Date: provisionally dated to mid 15th century AD

2. AIM OF STUDY: To determine the material used in the manufacture of this object

3. METHOD OF EXAMINATION:

3.1) Microscopy at low magnification (×100)

The surface of the object was viewed under a binocular microscope (Beck Binomax 12550) and compared against cut and polished samples of animal bone and elephant ivory. Reference was also made to the work by Penniman (1952).

3.2) Measurement

Measurements (in mm) were taken of the spectacles and comparative material (see note 4.2 below) using dial calipers (Mitutoyo No. 505-635, range 300 mm, with dial graduations of 0.05 mm). Points of measurement on the spectacles are indicated on the enclosed diagram. The values for the maximum thickness (depth) of measurements (1) and (2) were obtained by taking a series of measurements along the arm and around the frame.

4. RESULTS:

4.1) Microscopy

Microscopic examination reveals that the surface of the spectacles is translucent and waxy in appearance with the denser material beneath being a pale yellowish-brown colour reminscent of ivory but without the characteristic wavy cloudy bands. The broken edges of the two frames are of the same pale yellowish-brown colour and do not exhibit the stark white colour and powdery texture usually associated with ivory. Several minute narrow channels penetrate the surface, these are nutrient foramina and are only found in bone (Penniman,1952,31). Although the surface has been smoothed and polished, there are still traces of 'micro-relief' comprising wavy ridges and rough grannular protrusions, features charateristic of bone rather than ivory.

Clearly the spectacles are made from animal bone and not elephant ivory.

4.2) Measurements

There is only one bone element that could have been used in the manufacture of the spectacles, and this is the metacarpal bone from the forelimb of a bull. In fact, two of these bones would have been used (see Figure 2).

No other bone element has a long straight shaft and thick sided walls from which the required shape could be cut.

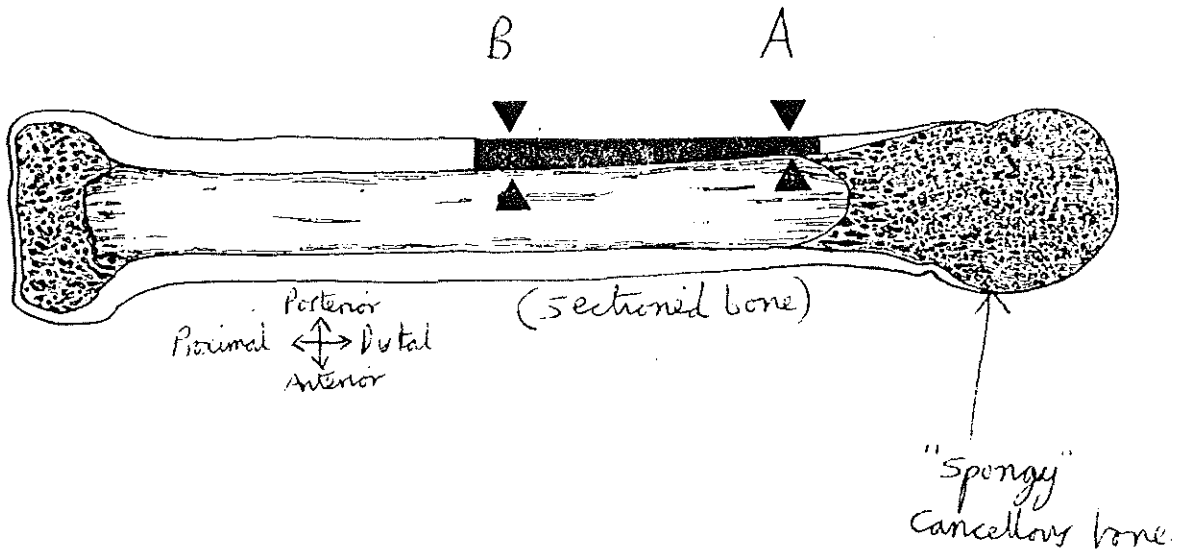
The maximum diameter across the frame of the spectacles was estimated at 37 mm. Out of 200 complete adult metacarpal bones from the 15th century levels, Baynard's Castle, only 5 had shafts with distal widths (measured just above the large distal nutrient ~~foramina~~ foramen) of size greater than 37 mm. These 5 are identified as bulls, whilst the remaining 195 are from cows and castrated males (oxen). It is well known (see Hammond,1940 reptd.1948,85) that the metacarpal bone of the bull is stouter and has a much wider shaft compared to that of either cow or ox, whose shafts are slender and narrow and therefore would have been unsuitable as a raw material for use in the manufacture of the spectacles.

The values for the maximum depths of the arm and frame were 2.45 mm and 2.65 mm respectively. These values fall well within the range in thickness of the posterior wall of 86 cattle metacarpal bones from the late 15th century levels, Baynard's Castle (Table I):-

Table I: Cattle metacarpal bones from Baynard's Castle c.AD 1499. Thickness of the posterior wall as measured on sawn and broken specimens.

Point of measurement[1]	N	M	Range	SD	SE
(A) Just above the large distal nutrient foramina	61	3.24	1.90 - 4.45	0.55	0.07
(B) Midpoint on shaft	25	5.43	3.50 - 7.45	0.96	0.19

1. Points of measurement



5. SUGGESTED STAGES IN THE MANUFACTURE OF THE SPECTACLES:

1) The shaft was removed from the unwanted proximal and distal ends, by sawing completely through the bone just below the large distal nutrient foramina and below the proximal epiphysis. (Fig. 2, shaded portion)

2) Posterior wall of the shaft removed and the internal and external surfaces ground down to the required thickness, and then polished.

3) Outline of the spectacles marked on the surface and then cut out.

REFERENCES:

Hammond, J. (1940 reptd. 1948). Farm Animals: Their Breeding, Growth and Inheritance. London: Edward Arnold & Co.

Penniman, T.K. (1953). Pictures of Ivory and Other Animal Teeth, Bone and Antler. Pitt Rivers Museum University of Oxford, Occasional Paper on Technology No.5.

Points of measurement:-

Designation on diag.	Description
(1)	Thickness (depth) of arm
(2)	Thickness (depth) of frame
(3)	Width across frame (estimated from projection of the circumference)

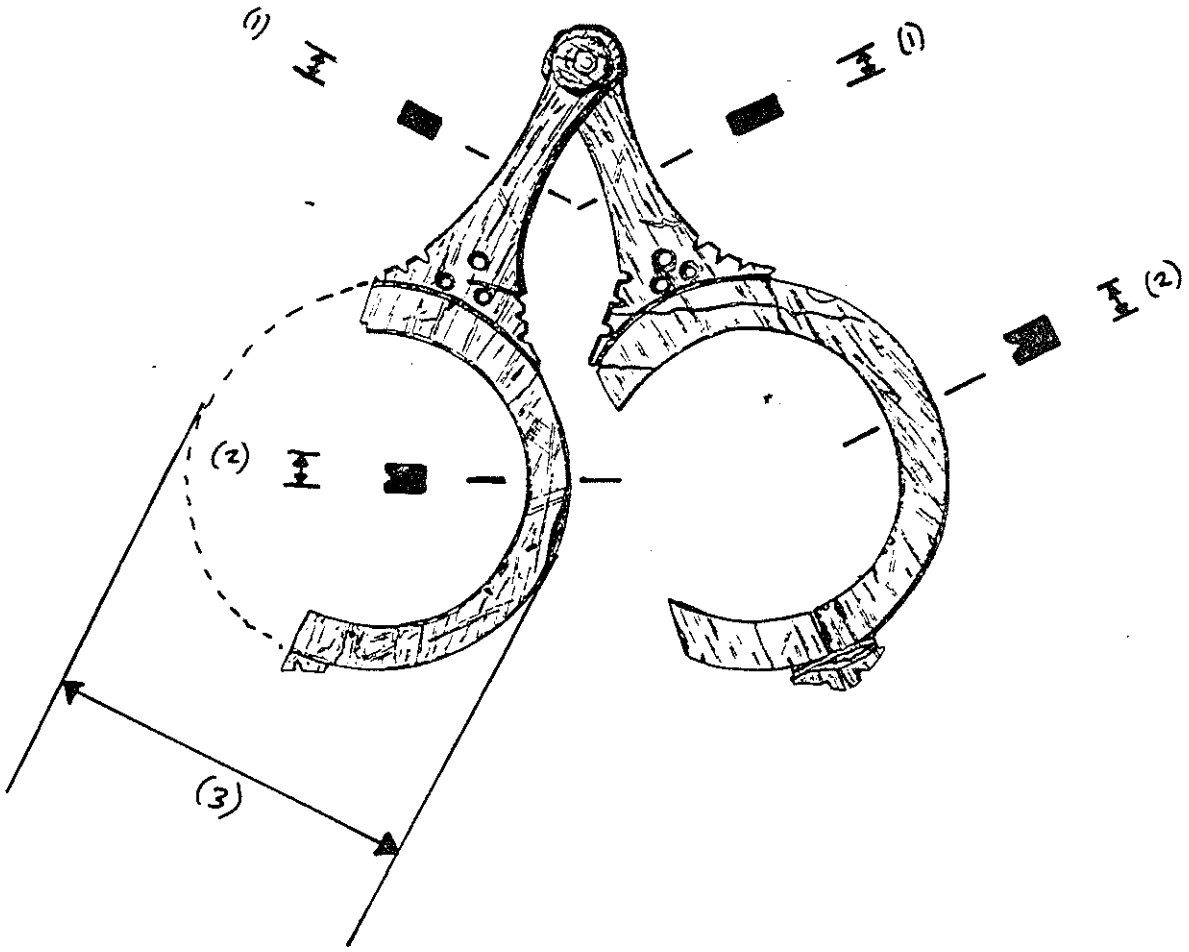


Figure 2: Diagram to show how one of the frames of the Trig Lane spectacles was hand cut from the posterior surface of a bull metacarpal bone.