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The Trabecular Pattern of Bone in Radiographs

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Despite the fact that a radiograph is a two dimensional image of a three dimensional object, radiographs of bones are used to interpret the arrangement of their trabecular patterns (Johnson and Kennedy, 1961).

This image-object relationship has been evaluated in a radiographic study of ox femora. The soft tissues were removed from the proximal ends of 5 specimens and the bones were each cut in the medio-lateral plane into 5 slices. The image of the trabecular pattern on the radiograph of each slice was very different to that of the whole bone. These trabecular patterns are diagramatically represented in Fig. 1.

The disparity of the radiographic images of the slices compared with that of the whole bone suggests that the trabecular pattern as seen on a radiograph of a bone could be the result of:

1 Superimposition of trabeculae coursing in similar directions in different planes giving rise to an appearance of unidirectional trabecular concentrations.

2 Trabeculae coursing in different planes appearing continuous on the two dimensional radiographic image.

3 Two or more sets of trabeculae running in different planes, producing the appearance of trabeculae running in a completely different direction – a Moiré effect (Oster and Nishijima, 1963) (Fig. 2).

Ondanks die feit dat 'n röntgenfoto 'n twee-dimensionele beeld van 'n driedimensionele verwerp is, word röntgenfoto's van bene gebruik om die patroon van hul sponsbeenbalke te bepaal. (Johnson and Kennedy, 1961).

Hierdie beeld-voorwerp verhouding is in 'n röntgenografiese studie van bees dybene bepaal. Die sagte weefsels is van die proksimale-ent van 5 monsters verwyder en elkeen is in 5 dele verdeel in 'n mesio-laterale vlak. Die beeld van die trabekulere patroon op die röntgenfoto van elke deel het verskil van dié van 'n been as geheel. Hierdie trabekulere patrone word diagrammaties voorgestel in Fig. 1.

Die verskil tussen die röntgenografiese voorstelling van die verskillende dele vergelyk met die been as geheel dui aan dat die trabekulere patroon soos voorgestel op die röntgenofoto kan wees as gevolg van:

1 Trabekuli wat oormekaar gerangskik is in dieselfde rigting maar op verskillende vlakke wat 'n voorkoms van trabekulere konsentrasies in 'n enkele rigting voorstel.

2 Trabekuli wat op verskillende vlakke loop en wat 'n aaneenlopende voorkoms in 'n twee-dimensionele röntgenfotobeeld gee.

3 Twee of meer groepe trabekulae wat op verskillende vlakke loop, gee die voorkoms van trabekuli wat in verskillende rigtings loop – 'n Moiré-effek. (Ostler and Nishijima, 1963) (Fig. 2).

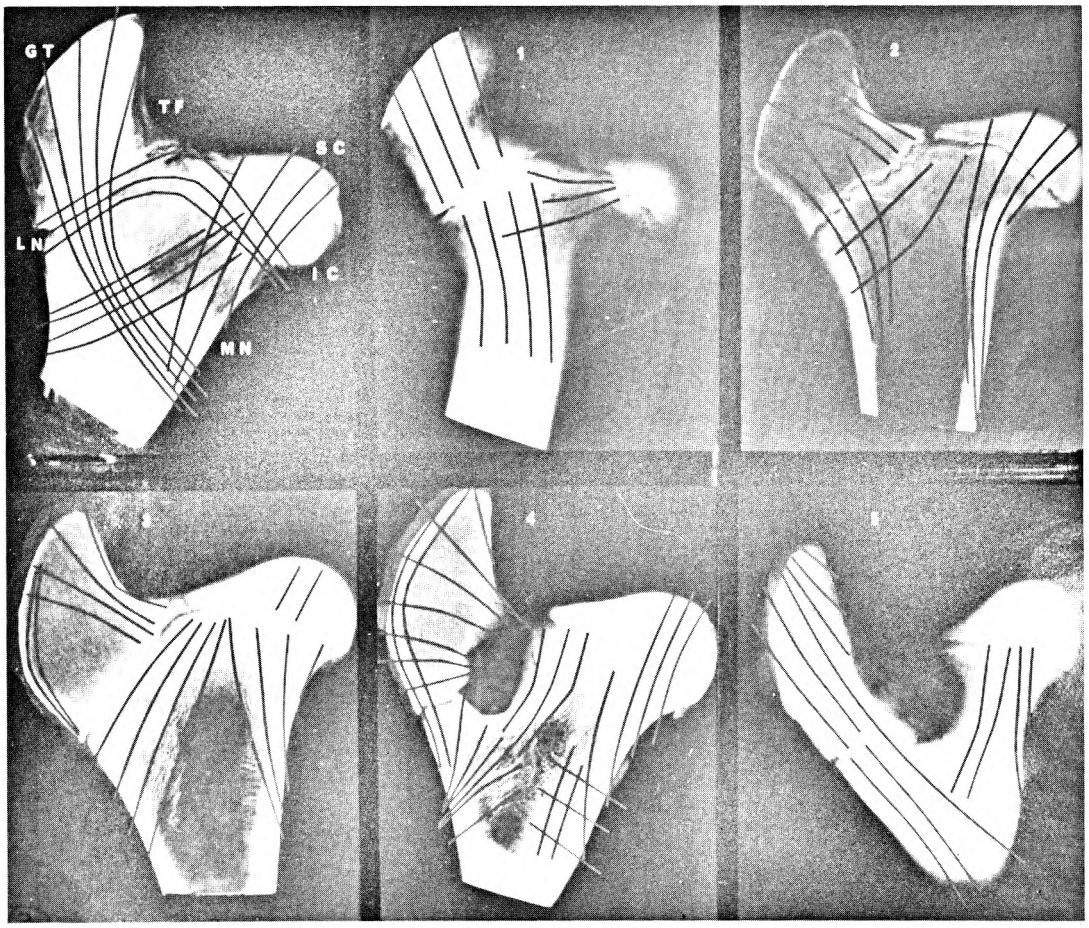

FIGURE 1. Diagrammatic representation of the trabecular pattern of the whole bone (top left) and of each of the slices (numbered 1 - 5.)

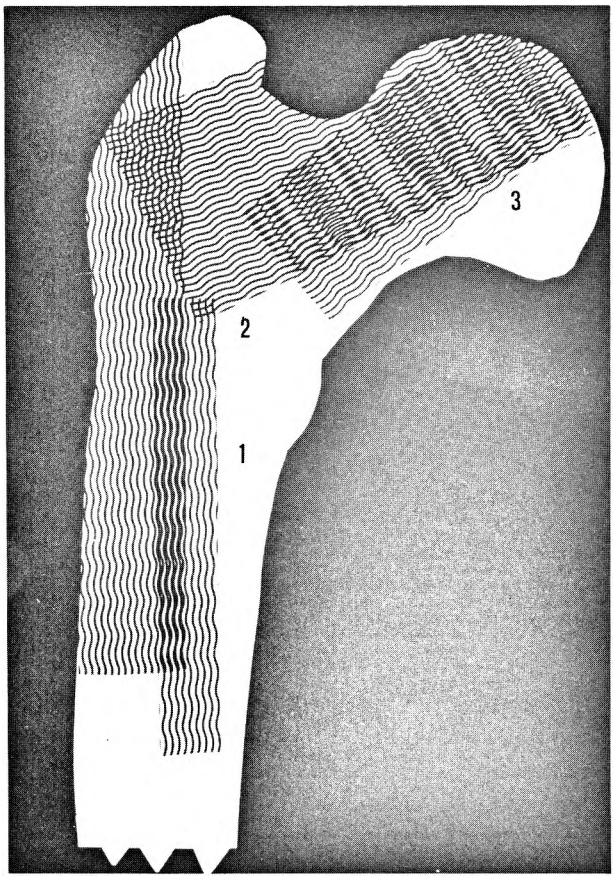

FIGURE 2. A diagrammatic representation of the effects of the superimposition of trabeculae:

1 Superimposition of trabeculae in different planes giving rise to an appearance of trabecular concentrations.

2 The apparent continuation of trabeculae which course in different planes.

3 A Moiré Effect.

REFERENCES

1 Johnson, W.H. & Kennedy, J.A. (1961) *Radiographic Anatomy of the Human Skeleton*, Ch. 1, pp. 1 - 2. Edinburgh & London: Livingstone.

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