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## THE TECHNIQUE OF X-RAYING ANTHROPOLOGICAL STOMATOLOGICAL SKELETON MATERIALS

### INTRODUCTION

So far there existed no method of X-raying a maxilla, mandible, or their fragments in their total extent on a single film. We would like to describe here our new method.

### METHOD AND MATERIALS USED

For the X-raying of jawbones or their fragments we used a Czechoslovak-made Stomax X-ray apparatus and 24×10 cm Belgian-made Agfa Gevaert X-ray film used for panoramatic pictures. Due to the shortage of these films we used also 24×30 cm Czechoslovak-made films cut into 24×10 cm stripes. We put these stripes into envelopes of used Agfa Gevaert films. The fixing of the skeleton materials into the required position was realized with the help of either rolls made of non-contrasting pulp or with large amounts of plasticine, which is more suitable. Plasticine is however contrasting and thus it must not appear on the film.

### THE TECHNIQUE OF X-RAYING

We divide the 24×10 cm film into three fields (A, B, C). The central field for the front part of the maxilla and mandible is narrower (*Fig. 1*). The size of the central field is marked with a cross on the original Agfa film envelopes. During the X-raying it is most suitable to proceed from the left to the right. We shall mark the first lateral field A with a lead letter L. We place the fragments of bones on this field to the centre of the film (fragments, the maxilla and mandible together or separately). At the same time we cover the central B and right C fields with a lead plate or with an empty 13×18

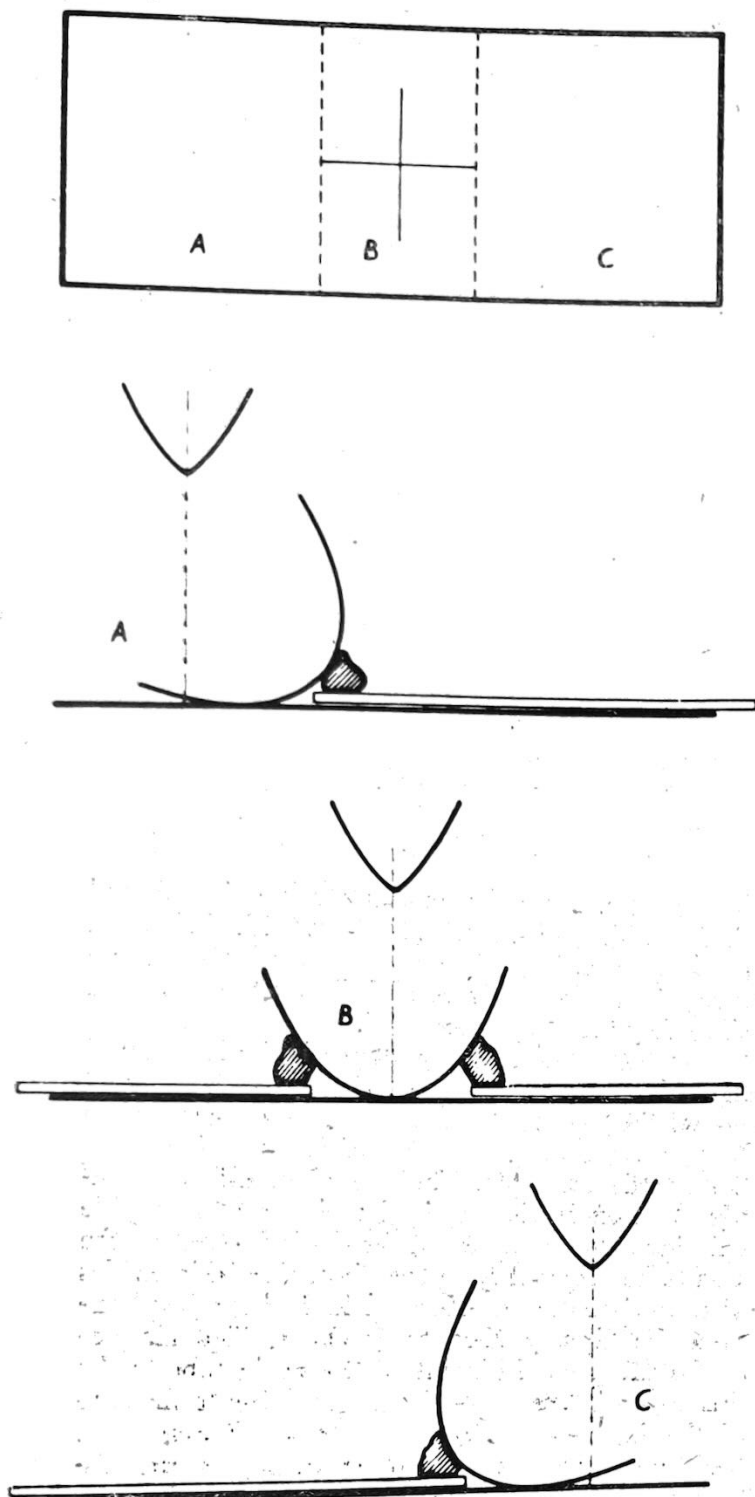
film cassette. After the exposure cover field A and field C with lead plate. Place jaws with their front parts on the field B and expose it. During the exposure of field C fields A and B must be covered since they are already exposed.

Of extraordinary importance is the focusing of the central ray (CR). The CR is usually focused perpendicular to the centre of the field to be X-rayed. It goes orthoradially, i.e. parallelly with the interdental septa. The use of modified eccentric (distoexcentric) projection is recommendable only in narrow jaws, when the CR is focused on the arch to be X-rayed from the distal side. This enables us to project the non-X-rayed half of the jaw bone from the already X-rayed jawbone. The distance of the CR from the point of the conic tube to the film varies between 8–25 cm, according to the type of the jawbone or fragments to be X-rayed. On X-raying fragments it is better to use shorter distances, thus we shall obtain more contrasting pictures at a considerably lower radiation level. We used 8 cm distance at 0.3–0.4 mAs exposure. On X-raying the upper or lower jaw we used 13 cm distance with 0.5 mAs exposure. On X-raying a maxilla connected with the skull the CR was 25 cm from the point of the tube and the time of exposure varied between 0.8–1.5 mAs. These optimum values allow us to develop the film in the classical way, i.e. for 5–6 minutes. With Belgian-made films the time of exposition is almost 50% shorter.

#### *I. X-raying of Fragments*

Place bone fragments to the centre of the field to be X-rayed. The CR is focused perpendicularly and orthoradially at the centre of the field. If

FIG. 1: A schematic picture of the technique of X-raying anthropological skeletal materials. More details in the text.



the fragments contain also parts of front teeth divide the film into two fields. X-ray molars and premolars on field I, covering field II. Then cover exposed field I with a lead plate and X-ray front parts on field II.

## II. X-raying of the Mandible

Place lower jaw on the left onto field I marked with lead letter L so that the bottom part of the mandible be parallel with the bottom margin of the film. At the same time cover fields II and III. Fix

mandible with pulp or plasticine so that the distance of the last molar and canine tooth from the film were equal. After exposure cover fields I and III with a lead plate. Place front part of the mandible on field II so that both canine teeth were at the same distance from the film. After exposure cover fields I and II with a lead plate and X-ray the right half of the mandible similarly as you did it with the left one.

## III. X-raying of the Maxilla

The technique of X-raying the upper jaw is a bit complicated due to complicated fixation, possible only through the use of plasticine. In order to separate the non-X-rayed part of the jaw from the X-rayed one the palate must be declined from the surface of the film by at least 25–30°. The occlusive line of the teeth is parallel to the margin of the film and the last molar and canine tooth should be equidistant from the field. On X-raying the incisors on the second field the CR runs parallelly with the palatal suture. The CR is focused perpendicularly to the centre of the field and orthoradially.

Both the mandible and maxilla are often broken. The fragments should be carefully fixed and joined with plasticine. The fragments must be put together in the correct way, so that the X-ray picture may correspond to the original shape of the jaw.

## IV. X-raying of the Mandible together with the Maxilla

The procedure of X-raying both jawbones at the same time is the same as the process of X-raying a single jawbone. Place the two jawbones on the film so that the occlusive levels of the teeth are as close to each other as possible and in the centre of the film. The CR is focused perpendicularly and orthoradially on the centre of the field.

## V. X-raying of the Maxilla Connected with the Skull

The most important thing here is to decline sufficiently the palate from the film surface (by 25–35 degrees). The distance of CR is 25 cm and the time of exposure between 0,9–1,4 mAs, according to the size of the skull.

## RESULTS OF THE OBSERVATION

For X-raying the stomatological skeleton remains either panoramic radiograph or intraoral dental X-ray pictures were used and from these pictures was the status composed in a rather complicated way. The panoramic radiograph is turned out by the



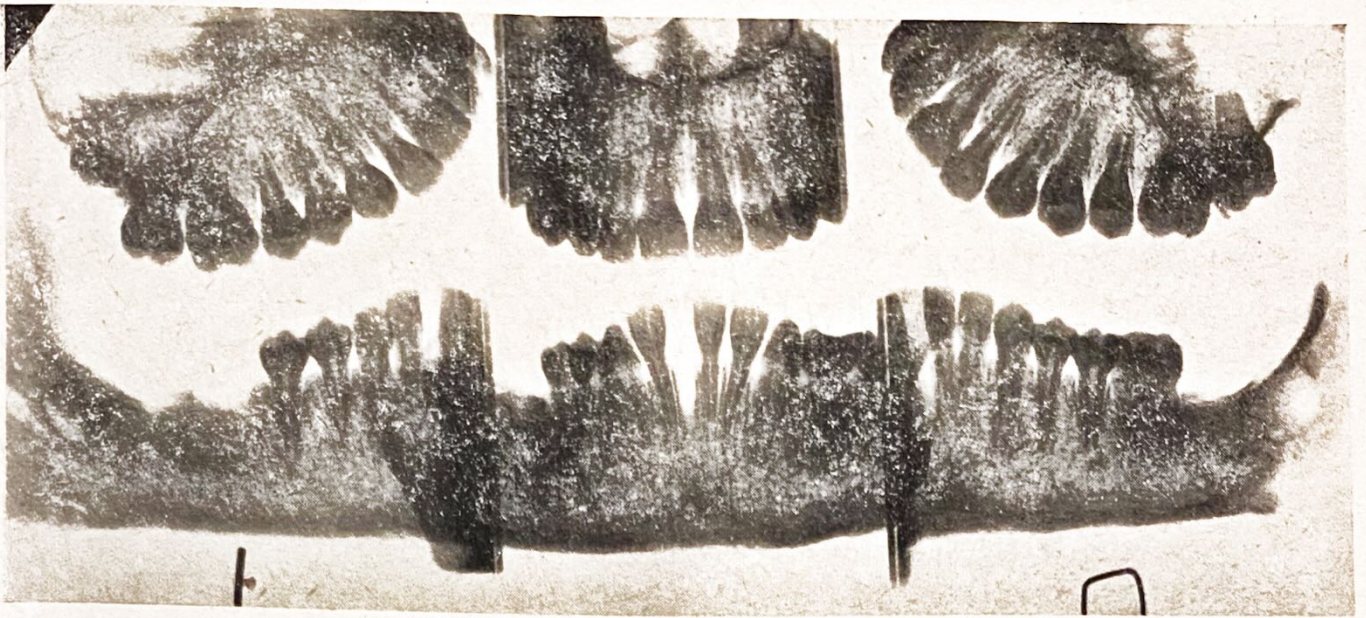


FIG. 2: Samples of pictures: a b.



West German Siemens Co. under the brand-names Panoramix or Panorex, enabling the X-raying of the upper or lower jaw separately. It enables also special X-ray examination, but the teeth, especially the distal ones are both in the patients and skeleton finds rather enlarged and distorted. The apparatus cannot be used for X-raying skeleton finds. The fixing of the bones and film is very complicated and time-consuming, if the X-raying is to be realized by a single laborant. It cannot be used for the X-raying of broken jaws. The problem of fixing is in certain clinics solved so that the bones and the

film are held by one laborant. The operation thus requires two men, one for the holding of the bones and film under the tube and the other at the control of the apparatus. The operator is in this way exposed also to harmful radiation and this method cannot be used for X-raying large bones. Since this apparatus X-rays the upper and lower jaws separately, the X-raying requires twice as much film and also more time. The rotating Ortopantomograph is also unsuitable for our purpose, it takes a panoramic picture of both the upper and lower jaw at the same time.



## CONCLUSION

The above described method of X-raying enables us to take X-ray pictures of stomatological materials with the help of common dental and other X-ray apparatuses. It eliminates harmful radiation

for the operator. It can be applied at considerably low radiation doses and yields pictures of excellent quality. Thus our method is more economical and more advantageous than the hitherto used methods.

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