

# A Fossilized Human Mandibular Fragment from Kangatotha, Kenya, East Africa

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**ABSTRACT** Working west of Lake Rudolf in 1965 Professor Bryan Patterson found at Kangatotha, among other human specimens yet to be described, a fragment of the corpus of a human mandible bearing three molar teeth. Its C-14 date is 2835 B.C. The mandible is stout, heavily mineralized, and closely similar to others from Ishango on the west shore of Lake Edward found by de Heinzelin earlier. The three teeth are large and also similar to those from Ishango. Cranial and postcranial bones of the Ishango people show them to have been Negroes, and the jaws and teeth fit the same classification. The individual from Kangatotha was also indubitably a Negro.

In 1965 Professor Bryan Patterson of Harvard University led a fossil-collecting expedition to the west side of Lake Rudolf in northern Kenya. At Kangatotha on the Turkwell River in the Turkana District he found, among other human specimens yet to be described, a heavily mineralized fragment of the corpus of a human mandible bearing three permanent molar teeth. The find is assigned a date of  $4800 \pm 100$  B.P. (2835 B.C. on the basis of a C-14 test (Y 1575) made on fresh water shells. In view of the scarcity of human remains from this time period in East Africa, a detailed description of this specimen, along with comparative material from elsewhere, seems to be warranted.

The mandibular fragment is from the right side and has a maximum length of 79 mm (figs. 1-4). In front of the three molars are the sockets of the two premolars and canine, plus the distal half of the socket of the lateral incisor. Behind the third molar the fragment ends at the base of the ascending ramus.

The site as a whole is said to belong to the Makalian Epipleistocene period. The cultural remains include special implements of quartz with which the Ishango people fashioned bone harpoon heads. This industry has been found widely distributed on lake shores and river banks

from Egypt and East Africa to Mali and Sierra Leone (Coon et al., '68). On geological grounds de Heinzelin dated his site at somewhere between 9,000 and 6,000 B.C. Evidence from other sites suggests an even wider range for the duration of the Ishango culture, and there is no reason why people with a comparable culture could not have existed on the banks of the Turkwell River as late as 2835 B.C. The skeletal remains found at Ishango are those of Negroes, and a Negro tribe called the Watta still harpoon hippopotamus in the Shebeli River (Uebe Scebeli) in Somalia and Ethiopia.

F. Twiesselmann ('58) has described five mandibles from Ishango. A, B, C, and D are from the main fossiliferous beds and *a* is from the post-emergence zone. The first four are fully adult because dental eruption was complete. In *a* both third molars are lacking. Twiesselmann states that the alveolar border on each branch of this mandible provides room for eruption, and that the third molar should have acquired its crown and roots before the individual's death; however, the X-ray photographs do not show these structures. Despite their absence the mandible seems to be fully grown both metrically and morphologically. In addition, the first and second molars show considerable wear, as explained below.

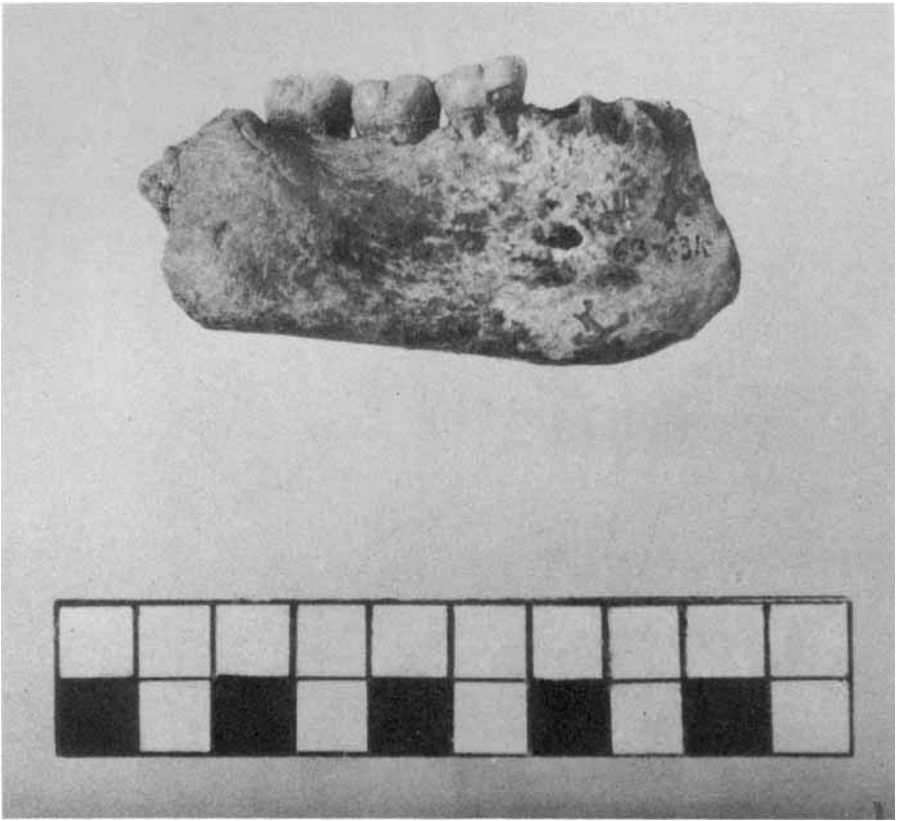


Fig. 1 Kangatotha mandible, lateral aspect. Scale 1:1.

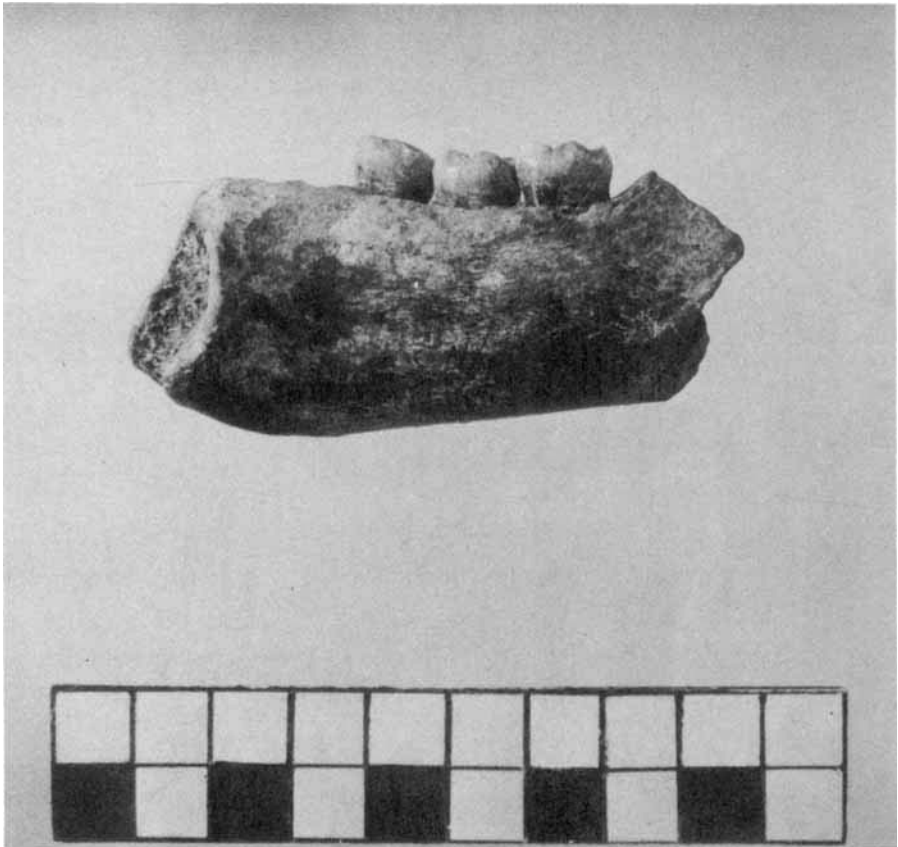


Fig. 2 Kangatotha mandible, lingual aspect. Scale 1:1.

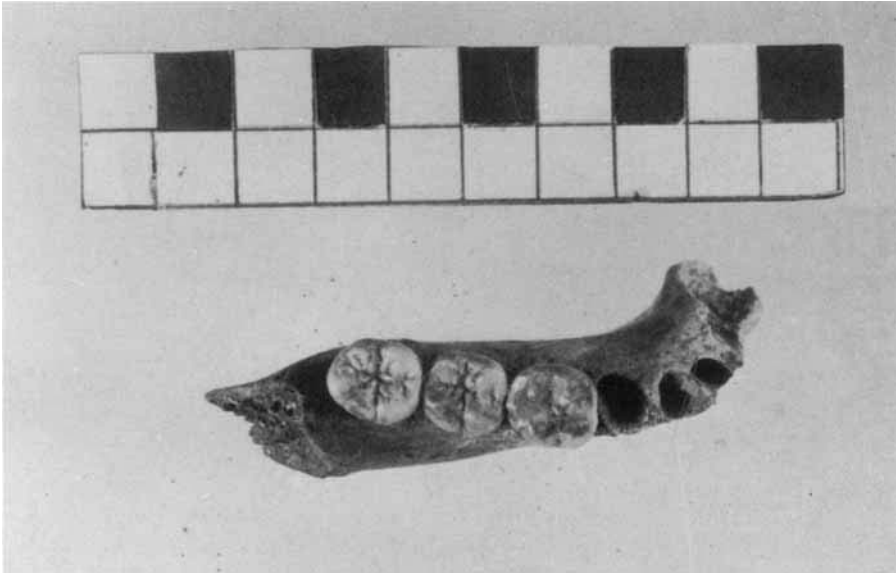


Fig. 3 Kangatotha mandible, alveolar margin. Scale 1:1.

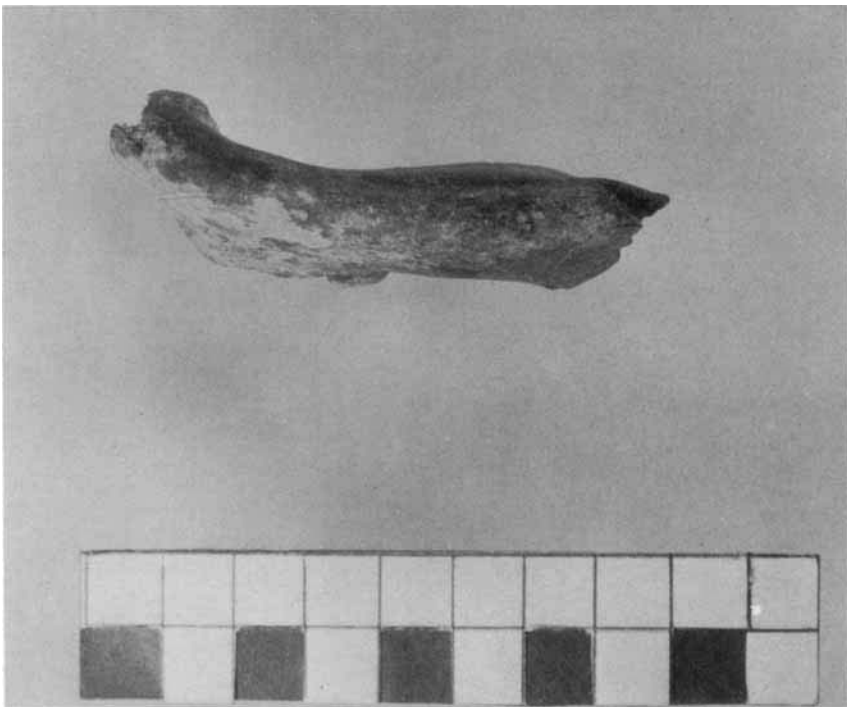


Fig. 4 Kangatotha mandible, inferior border. Scale 1:1.

TABLE 1  
*Measurements (in mm) and angles of the corpus*

	Kang. <sup>1</sup>	Ish <sup>2</sup> A	Ish B	Ish D	Ish a
Specific gravity	2.04	1.05	2.3	1.8	1.32
Thickness at M <sub>2</sub> -M <sub>3</sub>	16.9	22	21-22	18	22
Height at M <sub>2</sub> -M <sub>3</sub>	27.3	32	33	29	28
Height-thickness index	61.9	68.8	51.5	62.1	78.6
Symphysial height	32 (?)			36 <sup>3</sup>	30 <sup>3</sup>
Symphysial (chin) angle	90°(?)			90° <sup>3</sup>	100°
Corpus angle at M <sub>2</sub> -M <sub>3</sub>	81°(?)	82°ca.(?) <sup>3</sup>		90°	86°

<sup>1</sup> Kang. is the Kangatotha mandible, present study.

<sup>2</sup> Ish refers to the Ishango specimens of Twiesselmann ('58).

<sup>3</sup> Indicates that the measurements were made on Twiesselmann's illustrations, i.e., exact line drawings to a scale of 1:1.

There is no reason why we should not list Ishango *a* with the others in our metrical tables.

Metrical data for the Kangatotha fragment and for comparable parts of four of the five Ishango mandibles are given in table 1. Ishango C was excluded because it is too fragmentary to be measured. The only constant comparable to the others is its specific gravity, 1.9. Some of the measurements used were improvised by Twiesselmann to fit his fragmentary material and special problems; others are standard measurements specified by R. Martin. The measurements of corpus thickness and height taken at the level of the nutrient foramen, as specified by Martin, were 13.2 mm and 34 mm respectively, on the Kangatotha specimen.

The information given in table 1 indicates that in all measurements, indices, and angles the Kangatotha specimen falls either within or close to the range for the four from Ishango. Kangatotha shows less robusticity of ridging on the lingual face of the corpus than do most of the others. This apparent difference may be a function of age, masticatory stress or both.

In table 2 are given the dimensions of the three permanent molar teeth of Kangatotha in comparison with the corresponding teeth of three Ishango mandibles, a series of 83 teeth from the jaws of modern South African Bantu-speaking Negroes (Shaw, '31), and the exceptionally large lower molars of two living American Negroes (Keene, '67). In the case of Ishango B, Twiesselmann did not measure the crown diameters of these

teeth because they were too badly worn; instead he measured the length and breadth dimensions of the necks of the teeth at the level where the enamel begins. In order to reconstruct the original crown dimensions I have determined the ratios between neck diameters and crown diameters of the relatively unworn Ishango *a* for M<sub>1</sub> and M<sub>2</sub> and those of the completely unworn Kangatotha M<sub>3</sub>. The figures in the Ishango B column were arrived at by projection in this way, and they may be seen to resemble those of the other three Ishango mandibles and of Kangatotha.

In a metrical sense, the three Kangatotha teeth could have belonged to a member of the Ishango population. These molars are large, the third being a little larger than the first, and the second being the smallest. The third and the first are longer than they are wide. The Kangatotha and Ishango molars, like their mandibles, are as large and robust as those of Pleistocene fossil men in general, as Twiesselmann has shown in his graphs; their constants also fall within the range of a modern South African Negro series, but all five sets of molars are smaller than those of two living American Negro men, which fall within the *Australopithecus africanus* range.

The Kangatotha individual died, we suspect, shortly after the eruption of the third molar, because the crown of that tooth is in mint condition. The age at death could have been between 16 and 20. The second molar shows a slight degree of wear on the anterior cusps and the first molar is a little more heavily

TABLE 2  
Measurements (in mm) and area (mm<sup>2</sup>) of the lower right molar teeth

	Kang.	Ishango				S. African Bantu			Amer. Negroes	
		A	B	C	a	No.	Mean	Range	CK	JJ
Length, total molar row	36.0	(36.5)	33.5							
M <sub>1</sub> Length	12.1		11.5		13.0	83	11.0	10.0-12.5		14.0
Breadth	11.5		11.2		11.9	73	10.5	9.5-12.0		12.8
Crown "area"	139.2		128.8		157.4		115.5			179.2
Crown height	6.8		6.0		7.0					
Neck length			9.0		11.7					
Neck breadth			9.4		10.8					
M <sub>2</sub> Length	10.9	13.5	11.9		14.1	83	11.0	9.5-13.0		15.4
Breadth	11.2	13.0	10.4		12.2	72	10.3	9.5-12.0		13.2
Crown "area"	122.1	175.5	123.8		172.0		133.3			203.3
Crown height	6.9	6.1 +			6.0		6.5			
Neck length			9.4		11.1					
Neck breadth			10.2		12.0					
M <sub>3</sub> Length	12.5		10.7	(11.0)		66	11.1	9.5-12.5	14.5	12.0
Breadth	11.2		10.1	(12.0)		65	10.4	9.0-12.0	12.5	
Crown "area"	140.0		108.1	(132.0)			115.4		181.2	
Crown height	7.2						6.5			
Neck length	10.5		9.0							
Neck breadth	10.0		9.0							

Note: Figures in parentheses are approximations.  
 Crown area is the product of length and breadth or what area would be if the tooth were perfectly rectangular.  
 + indicates that the crown was worn and had thus been higher.  
 Kang. is the Kangatotha mandible, present study.  
 Ishango refers to the specimens of Fwieselmann ('58).  
 S. African Bantu are modern Negroes measured by Shaw ('31).  
 CK and JJ are two American Negroes measured by Keene ('67).

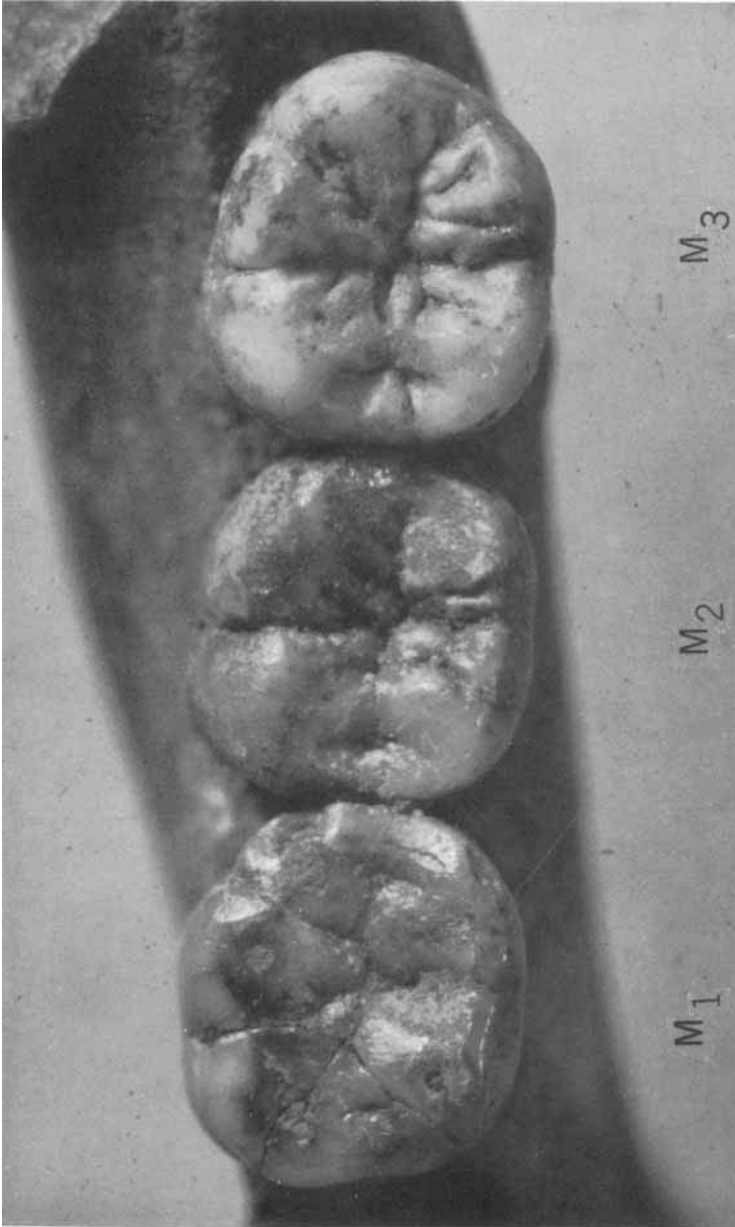


Fig. 5 Kangarootha mandible, molar teeth. Scale 4.2:1.

worn over its entire surface, more on the labial than on the lingual side. All of the Ishango molars including the first and second molars of Ishango *a* are more heavily worn.

The latter's first molar is worn down to its pulp cavity, and its second molar is worn more than the first molar of Kangatotha. Under these circumstances it seems unlikely that Ishango *a* was younger at death than Kangatotha.

The cusp patterns of the Kangatotha molars are:  $M_1 = Y - 5$ ;  $M_2 = +5$ ; and  $M_3 = Y - 5$ . All three have anterior foveas, and  $M_3$  in particular shows a moderate degree of wrinkling. Of the Ishango teeth only those of *a* are little enough worn to permit an accurate comparison. The right  $M_1$  of Ishango *a* has six cusps, but whether in Y or + cannot be determined. The left  $M_1$  has +5.  $M_2$  looks more like a third molar in that it has poorly defined cusps and much wrinkling on either side of an antero-posterior median groove; if the occlusal surface were not somewhat worn its wrinkling might be more apparent. The same is true of the  $M_2$  of the left side, which is separated from its neighboring  $M_1$  by a gap of 1.2 mm.

#### CONCLUSION

A fragment of the right corpus of a human mandible bearing three molar teeth found at Kangatotha, near Lake Rudolf, Kenya dates from  $2835 \pm 100$

B.C. The stout and heavily mineralized mandible is closely similar to others found earlier by de Heinzelin at Ishango on the west shore of Lake Edward. The three large Kangatotha teeth are also similar to those from Ishango. Cranial and postcranial bones of the Ishango people show them to have been Mesolithic Negroes, and their jaws and teeth fit the same classification. The individual from Kangatotha was also indubitably a Negro, which evidence places Negroes along the banks of lakes and rivers in East Africa well before the invasions which brought modern Sudanic-speaking and Bantu-speaking tribes into that region.

#### ACKNOWLEDGMENTS

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