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Identification of the Cadaver Remains of Josef Mengele*

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ABSTRACT: In 1985 at the cemetery in Embu near Sao Paulo, Brazil, parts of a skeleton were exhumed, and now these parts have been examined to determine whether they are the remains of the corpse of Dr. Josef Mengele, the camp doctor of the Auschwitz concentration camp. The osteometrical and osteological findings ascertained correspond completely and consistently without contradiction with all the available personal data of Josef Mengele. Through a method of electronic visual mixing for the identification of the skull, it was determined that all the authentic pictures available used for comparison correspond definitely and consistently to the exhumed skull.

KEYWORDS: criminalistics, human identification, musculoskeletal system, superimposition, skull identification, photo superimposition, video technique superimposition

Preliminary Remarks

In 1985 it was suspected that the former camp doctor of the Auschwitz concentration camp, Dr. Josef Mengele, wanted because of suspected mass murder, might have died on 7 Feb. 1979 in Brazil and been buried in the cemetery of Embu/Sao Paulo under the name of Wolfgang Gerhard. The investigations to identify the exhumed cadaver remains have been carried out by request of the Brazilian authorities by Brazilian, American, and German Scientists (see Ref *1*).

Comparative Data on Josef Mengele

Almost all the important comparative data for the identification of the skeleton have been taken from a medical examination sheet of the SS main office for Race and Settlement in 1938.

They are:

Born	26 March 1911
Height	174 cm
Weight	77 kg
Cranial circumference	57 cm
Cranial form	brachycephal
Type of body structure	athletic with pyknic components

*Dedicated to Prof. med. W. Spann, Munich, on the occasion of his 65th birthday. Translation by permission of Schmidt-Roemhild publishing house, Luebeck, *Archiv für Kriminologie*, Vol. 177, No. 5/6, May/June 1986, pp. 129–144.

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In addition, two comparative photographs of Mengele, at that time 27 years of age, showing him frontally and laterally, were at disposal. More essential information about physical characteristics from the 1970s came from the Bossert family, with whom Mengele had lived until his death.

From the anamnesis it is relayed that in 1926–1927 Mengele is supposed to have had sepsis, osteomyelitis, and nephritis. The blood group was not mentioned.

From another document it seems that Mengele is supposed to have had a motorcycle accident as a camp doctor of Auschwitz.

According to witnesses, testimonials, and Mengele's diary entries and letters it is known that the gait of his right leg was not correct as a result of an outward turned leg (over the big toe's ball). Even after a relatively short period of strain (for example, gardening), he is said to have complained of heavy ailments and pain not precisely located.

My Investigations of the Exhumed Bone Material

Duration of Burial

The quality of the bones corresponds to a six-year period of lying in a grave in which the soil is highly decomposed (high contents of ferric oxide in sandy clay soil) such as the cemetery of Embu which is in a tropical climate. The soft material has completely vanished; the outer bone lamella is partly brittle at the bones in varying degrees and partly vanished, so that the spongiosa lies open for instance at most of the vertebrae and at different bones of the extremities, in particular in the area of the epiphyses.

The skull which had been exhumed in an inexpert manner and therefore broken in many pieces has been put together by our team in its essential parts, so that it could be measured and further examined (see Figs. 1–3).

Determination of Sex from the Skull

With the help of the skull Measurements 1 to 9, the sex may be determined by discriminant analysis [*2,3*] (see Table 1).

The results are:

$$3.107 \cdot \text{No. } 1 - 4.643 \cdot \text{No. } 2 + 5.786 \cdot \text{No. } 3$$

$$+ 14.821 \cdot \text{No. } 5 + 1.0 \cdot \text{No. } 6 + 2.714 \cdot \text{No. } 7$$

$$- 5.179 \cdot \text{No. } 8 + 6.071 \cdot \text{No. } 9 = 2871.728$$

The separation value is 2676.39; if the resulting value is above 2799.21 the probability of error is below 5%. The skull measurements allow a clear attribution to male qualities. This is also shown by a comparison of other skull measurements and proportions with known values derived from experience (see Table 2).

Determination of Sex with Bones of the Extremities

With the humerus, femur, and tibia sex attribution according to Steel [*4*] may be made by three discriminant functions (see Table 3).

It is:

$$\text{Humerus DF} = X_1 + 7.317 \cdot X_2 + 2.547 \cdot X_3$$

The separation value for male and female qualities is 839.95.

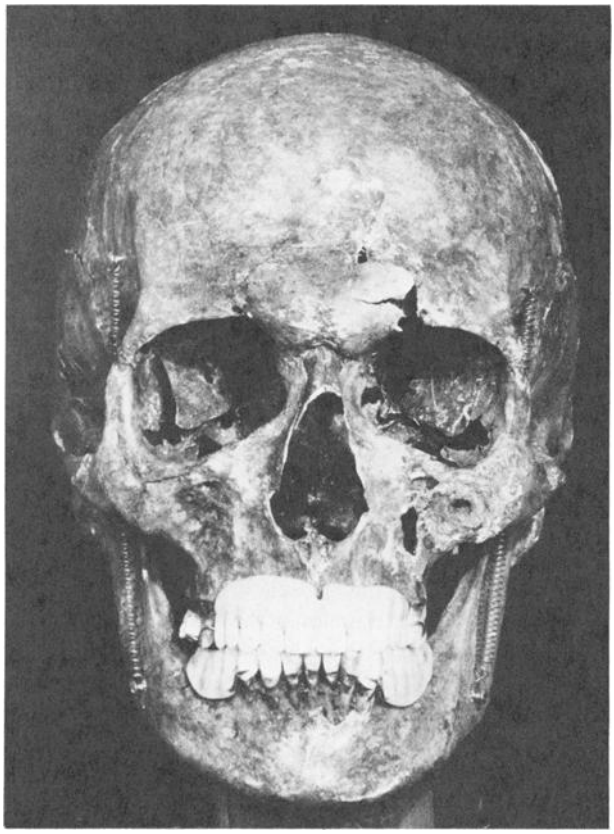

FIG. 1—*Skull of Mengele after exhumation recomposed from numerous single parts. In the frontal view at the processus zygomaticus of the left upper jaw a bone defect with circularly set hair (artifact as a result of dripping water) can be detected.*

$$\text{Femur DF} = 0.1 \cdot X_1 + 1.5189 \cdot X_2 + 3.7731 \cdot X_3$$

The separation value for male and female qualities is 329.0.

$$\text{Tibia DF} = 0.1 \cdot X_1 + 2.5564 \cdot X_2 + 2.1198 \cdot X_3$$

The separation value for male and female qualities is 274.9.

Humerus:	Femur:	Tibia:
X_1 = Measurement 8	X_1 = Measurement 1	X_1 = Measurement 4
X_2 = Measurement 11	X_2 = Measurement 2	X_2 = Measurement 5
X_3 = Measurement 9	X_3 = Measurement 3	X_3 = Measurement 6

According to the respective discriminant function the following sums will result:

	Left	Right
Humerus	925.45	895.635
Femur	385.813	385.4348
Tibia	. . .	311.37

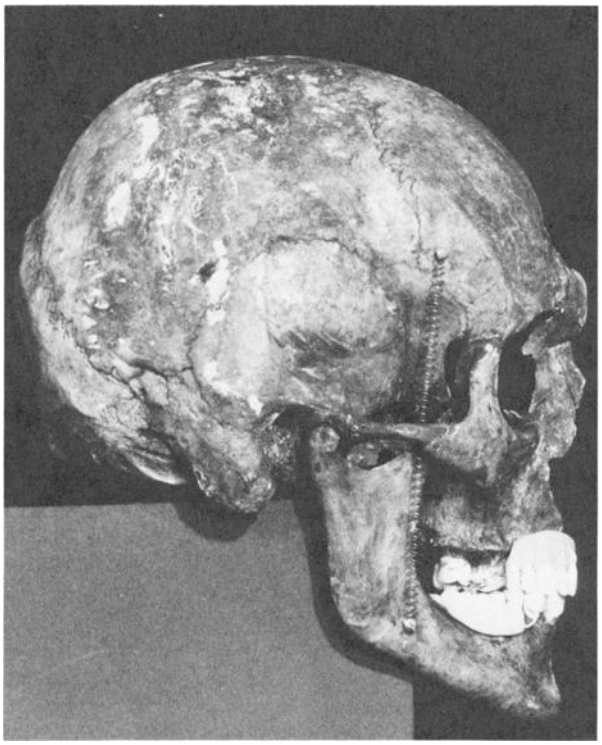

FIG. 2—*Right side view of skull in Fig. 1.*

TABLE 1—*Cranial measures.*[a]

Measure-ment		Measure in mm
1	glabello-occipital length	183
2	maximal breadth	146
3	basion-bregma height	137.5
4	basion-nasion	102
5	maximum bizygomatic breadth	138
6	basion-prosthion	91
7	prosthion-nasion height	68
8	outer palate breadth	66
9	mastoid length	
	left	35 ($\bar{x}$ = 34)
	right	33
10	facial height	124
11	middle face breadth	96
12	horizontal circumference	510
13	median sagittal arch	370
14	distance of the mastoid processes	110
15	maximum breadth of the upper jaw	99
16	length of the lower jaw	86
17	lateral distance of the lower jaw angles	100

[a]Complete measures of the lower jaw see Ref *1*.

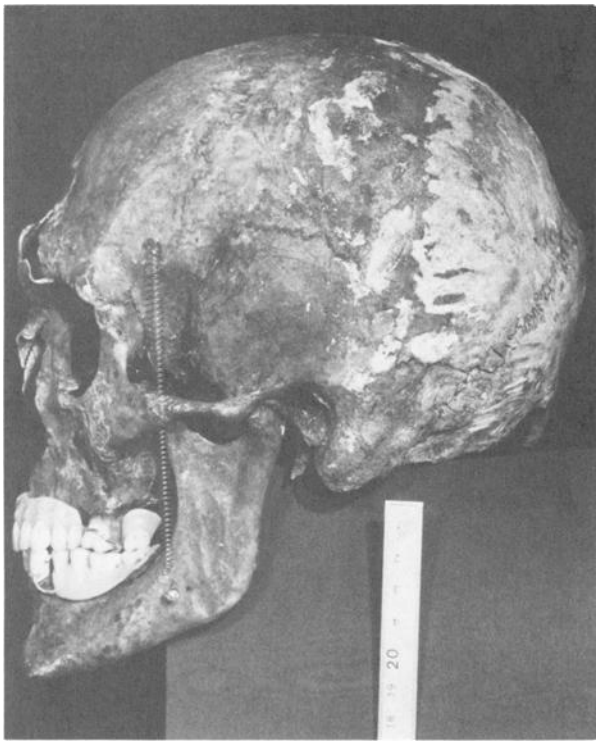

FIG. 3—*Left side view of skull in Fig. 1.*

TABLE 2—*Comparison of other skull measurements and proportions with known values derived from experience.*

Characteristic	Male Qualities, mm	Female Qualities, mm	Measures Taken on the Skull, mm
Facial height	117.5	104.8	124
Middle face height	93.4	87.4	96
Maximum breadth bizygomatic	(123-142)	(120-135)	138
Maximum skull length (ant.-post.)	(186-190)	(170-183)	183
Horizontal circumference	521.4 (499-565)	503.6 (487-540)	510
Basis length of the skull (from the root of the nose to the posterior rim of the for. occ. magn.)	100	94.0	102
Median sagittal arch (from the root of the nose to the posterior rim of the for. occ. magn.)	370.3	347.5	370
Distance of the mastoid processes	breadth, 120-130	short, 110-118	110
Maximum breadth of the upper jaw	90-98	87-92	99
Length of the lower jaw	72-86	70-84	86
Lateral distance of the lower jaw angles	86-102	82-88	100

TABLE 3—*Bone measures of limbs.*

Measurement	Measures in mm	
	Left	Right
FEMUR		
1. Maximum length	491	480
2. Distal epicondylian diameter	92	90.5
3. Transversal diameter of the head	53	53
TIBIA		
4. Maximum length	370	366
5. Maximum diameter at the level of the foramen nutricium	36.5	37
6. Maximum proximal epicondylian breadth	...	85
FIBULA		
7. Maximum length	...	369.5
HUMERUS		
8. Maximum length	339	342
9. Transversal diameter of the head	46	45
10. Longitudinal diameter	53.5	53
11. Epicondylian breadth	64	60
12. Maximum diameter of the humerus in the middle of the diaphysis	25	27
RADIUS		
13. Maximal length	...	246
ULNA		
14. Maximum length	261	264
CLAVICULA		
15. Maximum length	...	159
16. Depth of the sterna bulging	...	18

(For the left tibia, computation was impossible as Measurement 6 could not be taken as a result of postmortal decay of the bone.)

The sums made up for all the examined extremities' bones, therefore, allow the clear respective attribution to the male sex.

An examination of the pelvis could not be made because at the time of examination the pelvis bones had not yet been readjusted.

Assessment of the Body Height from the Length Measured of the Extremities Bones

Formulae of assessment developed by Lorke et al. [5] for measurements taken of the bones of the extremities of European males have been applied. The known assessment formulae by Trotter and Gleser [6] were not taken into consideration for the underlying case because they had been developed from the measurements of white male American skeletons.

The assessment formula stated by Lorke et al. with the least average remaining error for the assessment of the body height takes the length measure of femur and tibia into account, according to Measurements 1 and 4 (see Table 3).

It is:

$$KH = 58.89 + 1.797 \times \text{No. } 1 + 0.757 \times \text{No. } 4$$
(measures in cm)

With the measure of the left lower extremity a body height of 175.1 cm is computed at an average remaining error of 3.6 cm. Using the bone measurements of the right leg results in 172.9 cm at a remaining error of 3.6 cm.

If compared, the addition of the bone measurements of the left and the right lower extremities shows a difference of 1.5 cm in length. This explains the differently computed body height measurement. The average of the two results makes a body height of exactly 174 cm. This result corresponds with Mengele's length measured in the medical examination sheet of 1938.

Assessment of the Biological Life Age Reached

Hansen [7] and Schranz [8] have given experience values for the age correlation of the extension of the medulla cavity and the bone structure of femur and humerus.

After these values derived from experience, the femur had an estimated biological age of 60 to 69 years lived and the humerus an estimated biological age of 61 to 74.

Individual Particularities in Various Single Bones

On the skull at the processus zygomaticus of the upper jaw on the left side a defect of an almost regular hectogonal shape of 4- by 4-mm size with a spectacular circular rust brown discoloration and circular situated hair remains was found. This alteration, in our opinion, was postmortal and a result of water dripping in the coffin, possibly also by impression of a coffin window fixing device (see Fig. 1).

This opinion was confirmed by a histological examination of a bone section of this area which we were given by Dechy.[2] We were able to show in conformity with Ortner and Putschar [9], Ortner,[3] Kerley,[4] and Snow[5] that there was no bone solidification nor bone neoplasm as a result of chronic inflammations or the formation of a fistula in his lifetime contrary to Dechy's opinion (see Fig. 5). The finding he presented from a cross section of the bone defect as a skeletal bone solidification (see Fig. 4), in our opinion was—as taken from the decalcified dissect (see Fig. 5)—an artifact resulting from the deposit of substances contained in the dripping water in the grave.

The circumferential measurement of 51 cm measured on the skull above the glabella and the protuberantia supraorbitalis with a tape measure stands against a circumference of 57 cm measured on the live person. No more than 54 cm is the new circumference measurement of the skull taken even after a layer of modelling wax has been applied to the skull at six positions in order to reconstitute the soft part layer, so that there still seems to be a certain discrepancy which Snow[5] in particular has pointed out.

If it is taken into account that not the examining doctor but obviously Mengele himself has entered the skull circumferential measurements into the medical examination sheet, it does not seem to be unrealistic that when entering 57 cm this excessive measure was given voluntarily as it corresponded to practical necessities, in particular as the size of the steel helmet was chosen accordingly. Another explanation for the larger measurement could be that possibly at the time the circumferential measurement of the head was taken over the glabella

[2]S. Dechy, personal communication, 1986.
[3]D. J. Ortner, personal communication, 1986.
[4]E. Kerley, personal communication, 1986.
[5]C. Snow, personal communication, 1986.

FIG. 4—*Cross section through the bone defect in the left upper jaw through magnifying glass (ground specimen). At the bottom of the opening in the bone are peel-like layers of depositions of the dripping water substances.*

including the protuberantia supraorbitalis, which was particularly prominent in Mengele (see Ref *10*), as can be seen from the comparative photo.[6]

On the right side of the pelvis the hip joint shows an obvious deformation and an exostosis at the cranial crest of the joint as well as traces of an old fracture line carrying degenerative deformations. This finding could explain Mengele's ataxic gait of the right leg, observed in his old age. The deformations of the bone could have been the result of a depressed fracture (motorcycle accident?) (compare Fig. 6).

Marked degenerative bone deformations as a result of old age have been found in the third and fourth lumbar vertebrae (see Fig. 7). They would give a plausible explanation to Mengele's complaints after physical labor.

Photographic Skull Comparison by Electronic Photo Superimposition

The examinations were made by the known technique [*11–16*].

The skull has been compared with the two authentic comparative photos of Mengele at the age of 27 and three selected photos of him at an age over 60.[7]

The skull has been marked in the photographic plane at the contour giving areas with marks of the soft tissue corresponding to the respective age and type of body structure.

With the exact positioning of the skull corresponding to the head position on the photograph in the electronic superimposition, complete conformity has been found to exist con-

[6]This reference I owe to C. Snow (footnote 5).

[7]Other and partly better comparative photos have been shown in the media, see *Die Bunte*, 1985, Tabloid 26, but were not available.

FIG. 5—*Thin cut of the decalcified bone from the rim of the bone defect in the upper jaw magnified through lens. The deposition detectable in Fig. 4 has disintegrated; no pathological bone deformation.*

cerning all recognizable proportions of the head, face, eyes, nose, and mouth (see Figs. 8 to 18). The outline of the soft tissue layer model on the skull was congruent with the facial contours lying in the photographic plane.

Topographic reference points served as the positions of the corners of the eyes, the opening of the auditory canal, the insertion of the nose wing, the stomoschisis, and the lower edge of the chin as well as several points in the median-sagittal plane.

Any possible comparison made of the topography of individual facial regions with the bone morphology showed that the special features in the bone morphology, for example, the very prominent supraorbital tori or an exostosis at the back part of the head, were detectable as having formed the configuration of the skull at the matching regions.

Results and Discussions

The examinations of the exhumed skeletal remains have shown that they are the remains of a male cadaver having reached an age of 60 to 74 years and a size of about 174 cm at the time of his death. It has been computed and is assumed that the circumference of the head measured 54 cm.

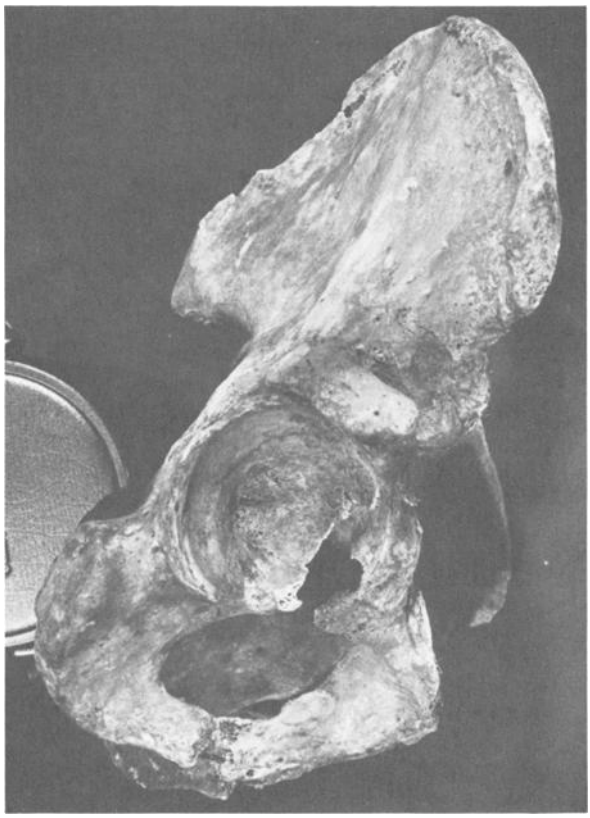

FIG. 6—*Right acetabulum after an old fracture with exostosis at the cranial ambon and advanced degenerative transformations.*

These data are identical with the body features of Mengele and the assumption that his death was in 1979. The opinion that only the inevitable range of variation in the various methods applied to assess the sex, age, and size must lead to doubts in the present case [*17*] is mistaken; for it is an undisputable positive fact that the assessed data are consistent with the individual data gathered from Mengele, notwithstanding that theoretically these basic data could just as well apply to any other individual. But the question was not to find out whether the identity features discerned apply to some other individual, but definitely to one certain individual.

The degree of probability that the exhumed bones belong to Josef Mengele by the evidence of the bone findings and the individual basic data is further increased by the proven consistency of more individual data. These not only comprise the odontological findings [*1*], but also individual particularities such as identified pathological bone deformations, which have to be compatible with the biography of the deceased, as it is in the present case. One further instance to increase the probability of identity is the fact that no findings disputing the biography have been discovered.

Electronic photo comparison of comparative photographs and the skull supplies an almost unassessable abundance of individual data which may be compared or combined with each other. In the underlying case the respective examinations were made under optimum

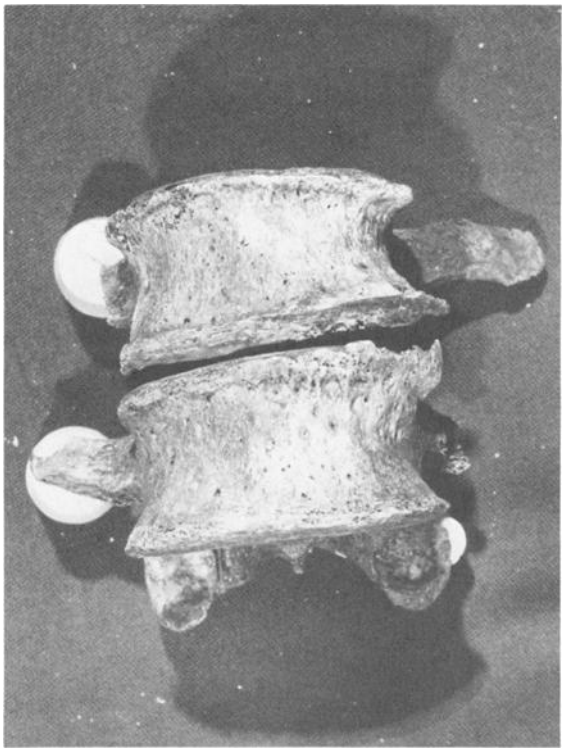

FIG. 7—*Third and fourth lumbar vertebral bodies with considerable degenerative transformations.*

conditions because several comparative photographs perfect in quality, taken from different angles, authentic, and suiting the purpose and an integral, not deformed skull were available. These were the perfect conditions to use the method to detect whether or not a skull matches a comparative photograph which is the proof of identity [*11,12,15,16,18-24*].

By virtue of the clear evidence of all the findings taken together there is no room for doubts that the exhumed skeletal parts are the remains of the corpse of Josef Mengele.

Final Remark

Teixeira [*25*] has raised the question as to who was the first to develop skull identification by the video superimposition technique and answered it himself in quoting a publication by Koelmeyer [*23*] as the first paper published on the subject. But he has ignored the fact that this author himself refers to Brown et al. [*26*] as the one who gave him the idea, which Brown[8] confirmed. Brown, Hollamby, Clarke, and Reynolds [*27*] have published about the video technique independently from each other in 1978 for the first time, two years after Helmer and Grüner [*11,12*].

[8]K. A. Brown, personal communication, 1985.

FIG. 8—*J. Mengele aged 27 years.*

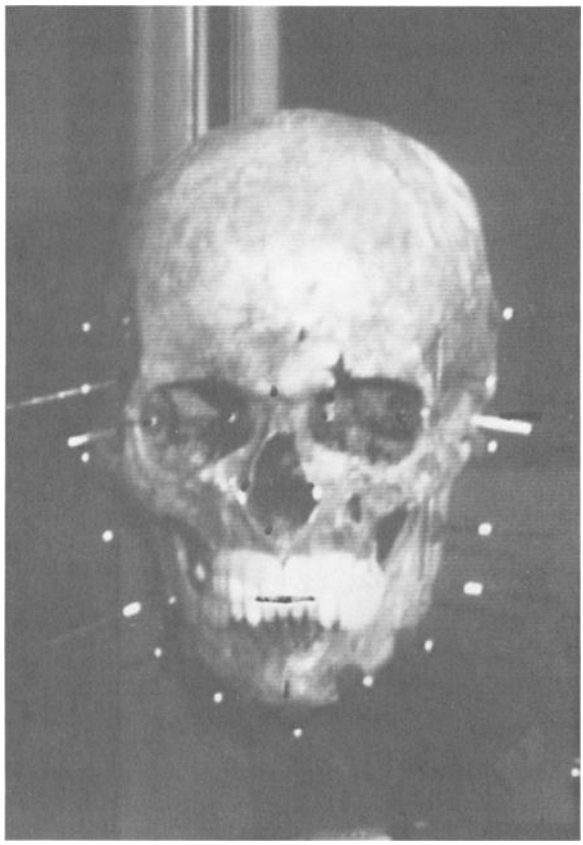

FIG. 9—*Skull in position as in comparative photograph in Fig. 8 marked with soft tissue layer marks.*

FIG. 10—*Video superimposition of the skull and of the comparative photograph.*

FIG. 11—*Example of electronic sectional still of the skull and comparative photograph with obviously identical topography in the eyes' area.*

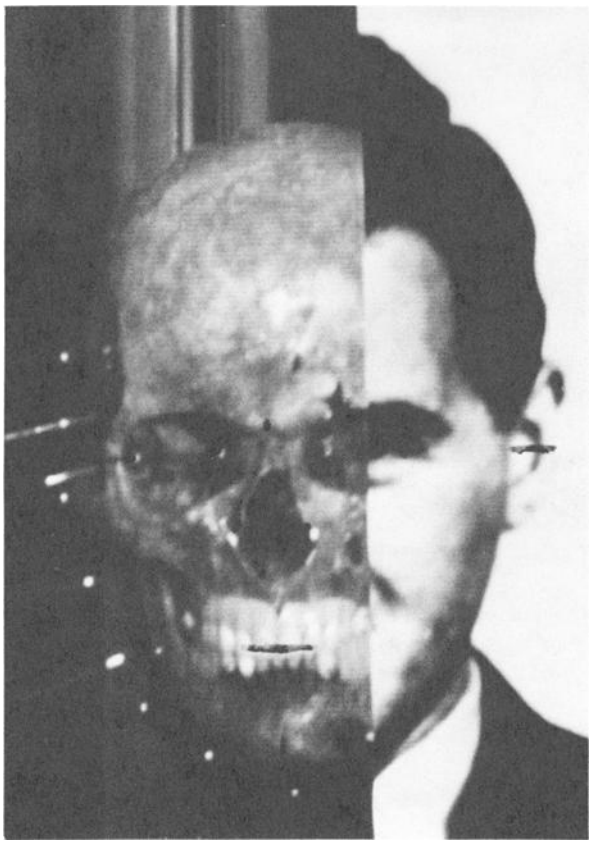

FIG. 12—*Example of electronic sectional still of the skull and comparative photograph with obviously identical topography in the eyes' area.*

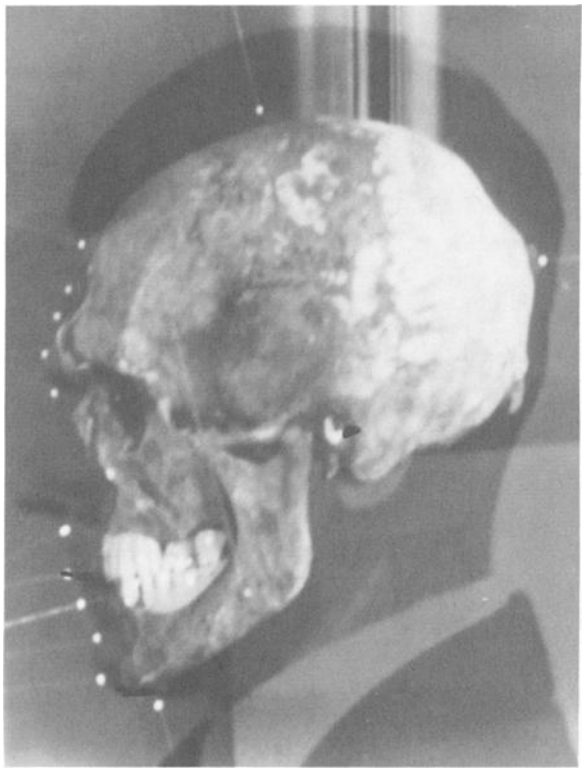

FIG. 13—*J. Mengele aged 27 years; example of electronic superimposition and sectional still where numerous features of the topography of the profile are identical in detail.*

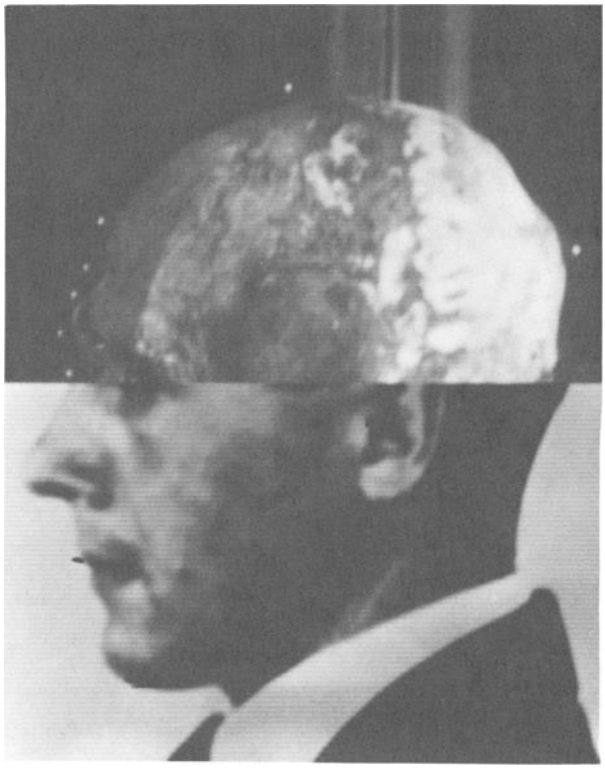

FIG. 14—*J. Mengele aged 27 years; example of electronic superimposition and sectional still where numerous features of the topography of the profile are identical in detail.*

FIG. 15—*J. Mengele aged about 65 years.*

FIG. 16—*Complete identity of all features of the skull and the comparative photograph in the electronic superimposition still.*

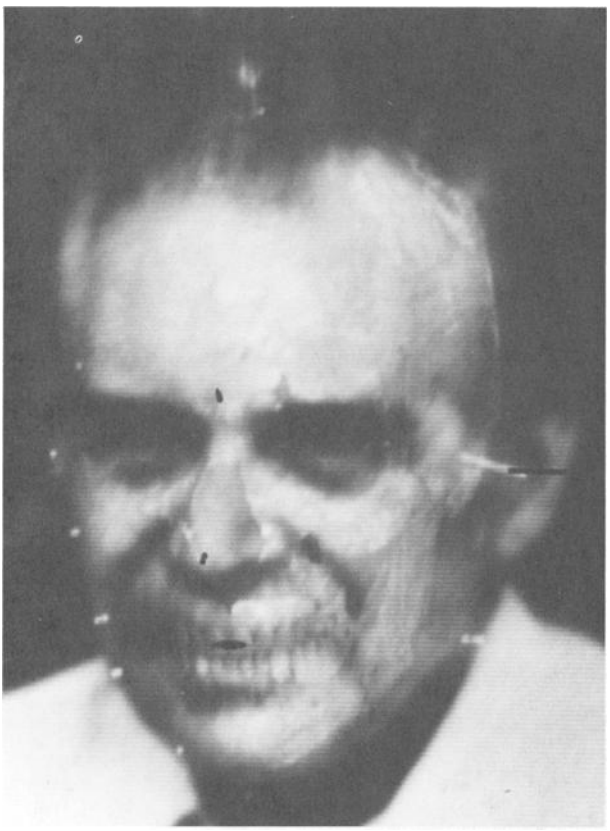

FIG. 17—*J. Mengele aged about 65 years (trimmed negative area from a group photograph); imposition allows the definite attribution to the skull to the comparative photograph.*

FIG. 18—*J. Mengele aged about 65 years; complete identity of all characteristic features of the skull and the comparative photograph showing a three-quarter face by means of electronic superimposition.*

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