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## THE ANALYSIS OF PHYSICAL CHARACTERISTICS AND APPLICATION TO PROTO-HISTORICAL AND HISTORICAL PROBLEMS: HASANLU, IRAN

Physical anthropological data can contribute both directly and indirectly to the study of historic problems by documenting migration patterns, population density, demographic features, disease patterns, racial characters, burial pattern, and some ecological adaptations. Warfare, violence, diet and environmental conditions may be reflected in the physical remains of earlier populations.

The descriptive analysis of ancient populations adds to our store of knowledge in its own right. Comparative work with surrounding groups, as well as intrasite variability, provides a broader picture. These morphological comparisons may indicate contact or relative isolation and complement historical, archaeological, or geographical interpretations. Multivariate statistics for computing morphological distance, such as those developed by Campbell (1963), Hiernaux (1964), Rao (1948), Penrose (1954), and Richtmire (1969), are useful analytical tools.

Ancient Iranian populations traditionally have been described and analyzed in an attempt to establish the origin and dispersal of local racial variations throughout the Middle East. Vallouis (1939) summarized much of the early work in the area. Other major works include: Krogman (1937, 1940), Arne (1935), Field (1939, 1956, 1961), and Lebzelter (1931). Recent work by Capieri (1969) and Rathbun (1972) documents the physical characteristics of particular groups and presents statistical analyses of the major populations in the area.

### HASANLU, IRAN: THE CASE STUDY

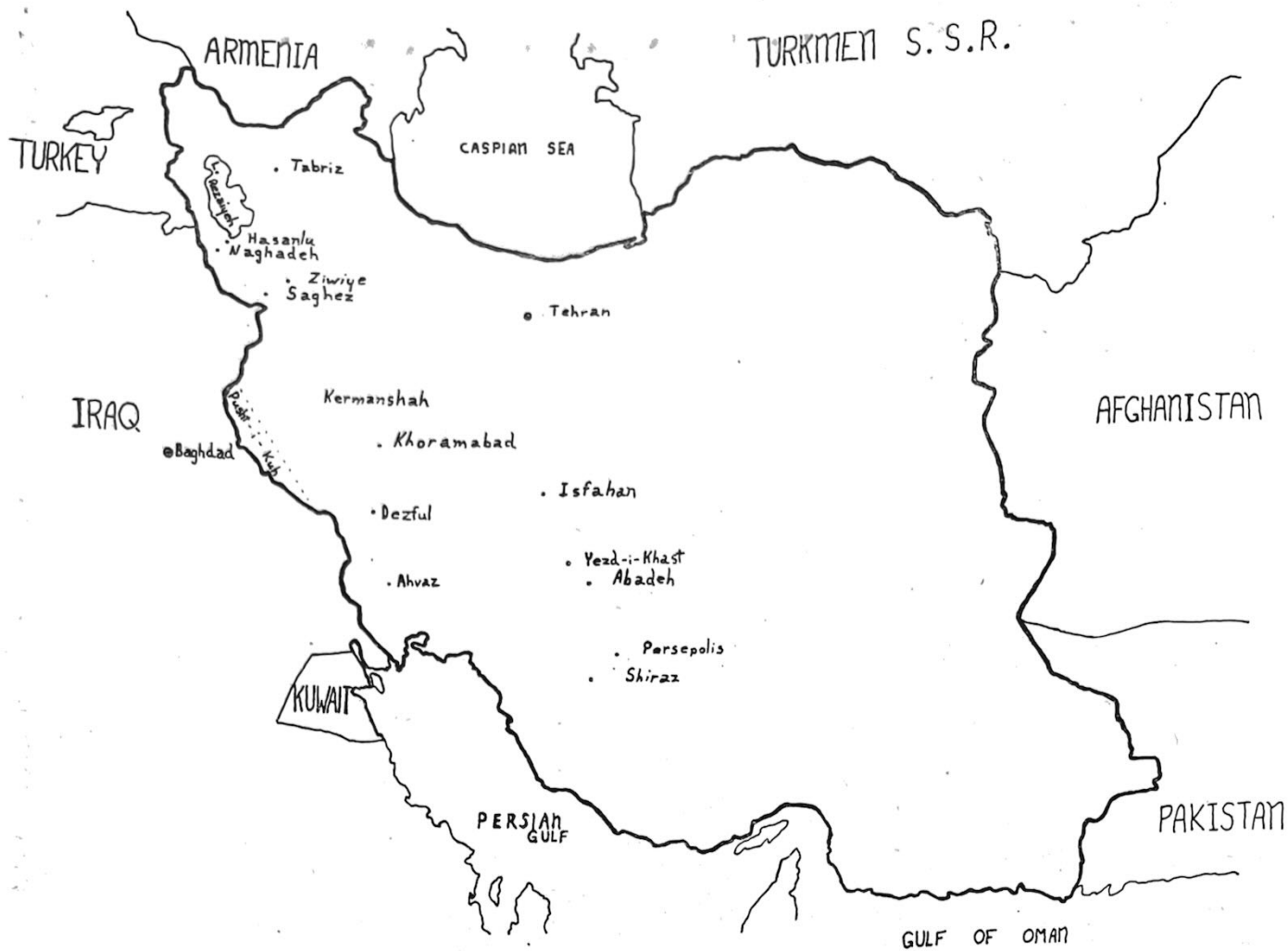
The Hasanlu project was conducted by the University of Pennsylvania Museum, the Metropolitan Museum of Art of New York, and the Archaeological Service of Iran. The primary purpose of the

combined effort was to elucidate the protohistoric period in southern Azerbaijan, a time which corresponds to the first appearance of the Medes and Persians in western Iran during the first half of the first millenium B.C. As a physical anthropologist, I was asked to help excavate and analyze the 154 skeletons excavated from 1957 to 1964. This analysis of the skeletal material was designed to supplement basic data for the archaeological, historical, and geographical analyses of the general area and Hasanlu in particular.

The study of the skeletal population includes: (1) basic descriptions of the human skeletal remains from each cultural period (including standard metrical and morphological features as well as pathologies and dental characteristics), (2) a description of the burial customs, (3) a comparative study of individuals recovered from seven cultural periods, and (4) a comparative study with other ancient Iranian populations to indicate possible affinities. For exact methodology and procedures see Bass (1964) and Rathbun (1972).

### GEOGRAPHICAL SETTING

The site, Hasanlu, is a citadel "tepe" located on the outskirts of the contemporary (farming) village of Turki-speaking peasant (farmers). The village and site are about 10 kilometers northeast of the small Turko-Kurdish town of Nagadeh in Azerbaijan province in Northwest Iran. Hasanlu and Nagadeh are in the center of the valley basin of the Qadar River in the general region known as "Solduz" just south of Lake Urmia. The valley is separated from the salt lake by a low range of hills and is at an altitude of 4,900 ft. It is bordered on the west by the Zagros Mountains and on the south by the rugged mountains of Kurdistan.



Although the area is relatively isolated geographically, trade routes extend from Iraq in the west down the Rowanduz Gorge and Kel-i-shin passes and along the Qadar River to the east. The area is also crossed north-south by trade routes from the Caucasus region through Rezaiyeh to Kurdistan. Geographical factors have played a role in the development of the area for some time. According to Dyson (1966: 413-414); "This geographical position thus provides the first element in the cultural dynamics of the area: a partial isolation with a consequent tendency toward a local cultural development, yet full exposure to intrusions from the four directions, the north and east being somewhat more open than the west."

#### CULTURAL AND HISTORICAL CONTEXT

From the archaeological research in the area and the known history, we know that Azerbaijan has been under shifting political and military influences of twenty-four separate groups since the ninth century B.C. The majority of the influential groups came from either the north or the east (Dyson, 1966: 414-15).

During the major occupations of the early first millennium B.C. the area to the south of Lake Urmia was primarily inhabited by tribal groups which later were organized into a monarchical system under Assyrian influence. From historical records it seems that the population lived in a pattern similar to the modern Kurds, with an economy based on both agriculture and animal husbandry. The settled population occupied the lower valleys in small villages associated with fortified citadels, while other segments of the population lived in tents, at least during the summer when flocks and herds were taken to the high summer pastures.

From historical documents, it is seen that the Mannaens, who controlled the Solduz valley, were constantly on the defensive against their Assyrian and Urartian neighbors. By 600 B.C. they had been absorbed into the new kingdom of the Medes which was centered around Hamadan to the southeast. During the first millennium Indo-European-speaking tribes also began to settle in Azerbaijan. Cultural influences derived from the northwest, northeast, and southeast were present in the area during this period (Dyson, 1966: 416).

The archaeological evidence from the Citadel Mound and the surrounding outer town at Hasanlu

TABLE 1.

*Chronology for Skeletal Material*

Period	Time	Individuals
I	present	3
II	ca. 400 B.C.	3
III	500 B. C. to 600 B. C.	13
IV	800 B. C. to 900 B. C.	112
V	1,000 B. C. to 1,200 B. C.	16
VII	ca. 3,500 B. C.	4
IX	ca. 5,000 B. C.	3

provides additional information on developments in the area. The cultural sequence extends from the latest "Islamic" period down to Neolithic levels of early sixth millennium B.C. The relative chronology of Hasanlu, based on archaeological evidence, indicates influences from central and western Iran and from Mesopotamia during the Button Base Phase (Period V, 1,000 — 1,200 B.C.). The ceramic styles are similar to Tepe Sialk A, Tepe Giyan I, Geoy Tepe B in Iran and to the sites of Nuzi and Assur in Mesopotamia (Dyson, 1966: 418).

During Period IV (Gray Ware Phase, 800—900 B.C.), influences from Assyria in the west and from central Iran to the east can be detected in the art styles on cylinder seals and luxury items. The common ceramic material during this period, which is characterized by burnishing, gray-black color, and a distinctive vessel shaped with a long pouring spout, is similar to materials from Tepe Sialk B in central Iran. Smaller metal objects, such as horse trappings, also relate Hasanlu to Sialk B to the east. Although there are external influences during this period, there are indications that a somewhat locally specialized culture existed at Hasanlu as reflected by pottery styles (Dyson 1966: 418—419).

Excavations at Dinkha Tepe, 15 miles west of Hasanlu, have added to our knowledge about the early Iron Age in Azerbaijan. The cultural similarity between Hasanlu and Dinkha and their respective valleys may result from a lack of natural barriers separating the valleys. The grave contents at Dinkha exactly parallel the objects found at Hasanlu in Periods IV and V. Burial practices are different, however, with the burials at Dinkha commonly being

tombs, whereas at Hasanlu simple primary interment was practiced. The ceramic grave goods are identical in shape at the two sites, but there is a slight preference at Dinkha for the use of red rather than gray wares.

The earlier Bronze Age cultural remains from Dinkha and the Solduz Valley provide the basis for the statement by Muscarella (1968: 196).

*... the culture of the Solduz and Ushnu valleys, from the southern shores of Lake Rezaiyeh to the Iraq border, was generally uniform in the late Bronze Age: the area's cultural relationship with the west, with central Anatolia, north Syria, and northern Mesopotamia, was very close... We know the newcomers who entered the region in the late second millennium changed the cultural pattern of the area drastically, and introduced a gray ware that characterized the Iron Age in western Iran... they seem to have been an indigenous Iranian culture with apparent ties further east in the Gurgan region, by the southeast shore of the Caspian."*

## DEMOGRAPHIC FEATURES

Accurate death rates and demographic data for the total population at Hasanlu are complicated by the number of skeletons recovered from the Citadel Mound that were not burials. Many individuals were trapped in collapsing buildings during the sacking of the fortified citadel around 800 B.C. The summary statistics are presented in Table 2.

When only skeletons from the cemetery area are considered, the majority of the females died at an earlier age than the males. This pattern may be partially due to higher mortality rates for females during childbirth in their younger years. The majority of subadults died during infancy. Infant death from a variety of infections is indicated.

The age at death for adults at Hasanlu is comparable to the population at Tepe Hissar where Krogman (1940: 9) found the average age at death for males was 30 years and for females between 25 and 28 years of age. However, most of the subadults died within the 5—10 year age range. The similar pattern at Hasanlu and Tepe Hissar varies

TABLE 2.

*Age and Sex Distribution of the Skeletons from the Hasanlu Cultural Periods*

Period	Males			Females			Subadults			Total
	18—25	26—35	36+	18—25	26—35	36+	0—2	3—12	13—17	
I	2	—	1	—	—	—	—	—	—	3
II	1	—	1	—	—	1	—	—	—	3
III	1	6	—	1	2	1	—	2	—	13
IV	19	19	19	12	9	5	13	9	7	112
V	2	2	3	2	1	4	—	2	—	16
VII	—	—	1	—	1	1	—	—	1	4
IX	—	—	—	2	—	—	—	1	—	3
TOTALS	25	27	25	17	13	12	13	14	8	154

slightly from that at Nippur in Mesopotamia where Swindler (1956:6) found that the average age at death for males was 27-30 and 29-31 for females.

## BURIAL PATTERNS

The burial patterns at Hasanlu were determined from excavations in the cemetery area of the Outer Town. A total of 65 individual skeletons and 285 cultural artifacts were recovered during the 1964 field season. The majority of the individuals were from Period IV, but individual graves from the other periods were excavated and the pattern was consistent through time.

The terminology and classification utilized here is adapted from Sprague (1968:479-85). The typical burial pattern at Hasanlu was a simple inhumation of a single articulated individual. The body was usually in a flexed position and deposited on the side with one arm extended and the other flexed with the hand in from the face. The body was oriented with the head to the east and the face straight ahead.

The burial patterns at Hasanlu appear to be similar for both sexes and all age groupings. Eighty percent of the skeletons in the cemetery had cultural artifacts associated with them. The standard item for Period V was a gray-ware drinking vessel, and a spouted pouring jar in Period IV. The artifacts were found in various relationships to the skeletons but pottery vessels were found most often at the head of the individual. Little variation as to sex or age and type of vessel occurs, but slightly more pottery, especially small jars, was found with the females.

Large straight metal pins, probably used to fasten clothing, were at the shoulders of the female skeletons. Beads, earrings, finger and toe rings, necklaces and ornaments were found more often with females. Metal projectile points were found almost exclusively with male skeletons. Dyson (1966:423-24) suggests that the bronze daggers, spears, iron maceheads, and flat bronze arrowheads indicate that professional soldiers occupied the Citadel. Beads of glass, shell, stone, bone, and gold were found over the upper skeletons of both sexes. In several instances, beads were the only artifacts found with subadult skeletons, although pottery vessels were common with subadults. Infants were less likely to have cultural artifacts associated in the grave.

## PHYSICAL CHARACTERISTICS

Although a discussion of the racial affinities of Hasanlu populations was not the major purpose of this research, it does appear that during the late Bronze and early Iron Age they were similar to the widespread Mediterranean groups in Central and Eastern Iran as described by Krogman (1940). A nonstatistical comparison with other Iranian sites suggests close affinities with Tepe Hissar III, Tepe Sialk I and II, Geoy Tepe, early Shah Tepe in Iran and with Nippur in Iraq. Cultural similarities exist

at Tepe Hissar and Tepe Sialk, but at these sites there was an influx of divergent populations in later times.

The accompanying tables (3 and 4) present the mean values for a number of metric features of three major Hasanlu cultural periods, other Iranian sites, one Mesopotamian and one Anatolian site of approximately the same time period. The comparative material includes: Geoy Tepe (Cave: 1951), Tepe Hissar III (Krogman: 1940), Tepe Sialk (Vallois: 1939), Tepe Giyan (Vallois: 1935), Shah Tepe (Fürst: 1939), Hamadan (Lebzelter: 1931), Nippur (Swindler: 1956), and Alishar Hüyük (Krogman: 1937).

## MALES

The male morphological configuration at Hasanlu remained relatively stable through time. The majority of the males were dolichoeranic, but the skulls from earlier Period V were slightly longer, wider, and lower than those of the other two periods and, in general, were larger and more robust. In Periods IV and V the occiput was usually protruding although some individuals had rounded occiputs. The forehead was wider, longer, and more often sloping for males from Period V.

At Hasanlu the mean values of the three major populations differ slightly, but the range of variation within Period IV is large enough to include the other two periods. The major differences include wider and shorter faces for Period V males, while Period III males had long faces and in Period IV the face was long and the narrowest of all. Many males in Period IV had malars with a pointed appearance produced by a lateral ridge on the main body. Square chins often occurred among males in Period V, while in Period IV both square and pointed chins were displayed, and in Period III the chins were most often pointed.

The shape of the nose at Hasanlu correlated with the general shape of the face. Period V males had the widest, shortest faces and a chamaerrhine nasal index. Males in Periods IV and III had long, narrow faces and long, narrow noses. The nasal shape in Period IV was narrow and projecting with a high bridge, but was not typically hooked in appearance.

Period IV is interesting in that two major configurations seem to be present. The major variation is size, but the proportions of the two sub-groups are very close. The differences are visible in both the cranial and post-cranial skeleton. The major differences seem to be primarily due to robusticity and gross size, because most of the features not directly tied to robusticity are very similar. The major features of the two configurations are:

- a) One is more gracile with a long, narrow skull with a protruding occiput. The face is long and narrow with a leptorrhine nose and square orbits. The chin is most often pointed and a ridge on the malars gives a pointed appearance to the cheek. Muscle markings are distinct but without extensive shelving or nodular formation.

TABLE 3.

## Cranial and Facial Measurements and Indices for Males at Hasanlu and other Middle East Sites

Measurement	Has. III		Has. IV		Has. V		Geoy		Hissar III		Sialk I		Sialk II		Giyān	
	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean
Max. Length	6	187.16	34	188.75	4	191.25	3	190.83	51	186.25	5	198.00	3	189.30	1	178.00
Max. Breadth	5	135.40	28	132.29	4	138.00	3	140.33	51	133.12	5	134.00	3	141.70	1	137.00
Ba. -Br. Ht.	3	133.33	11	135.89	2	134.00	3	133.33	42	132.93	—	—	—	—	1	129.50
Min. Frontal	2	93.00	33	90.03	3	97.00	3	90.50	51	94.51	—	—	—	—	1	89.00
Bizygomatic	3	126.66	18	121.21	4	133.25	3	131.26	43	124.95	4	134.20	3	131.30	1	123.00
Bigonial	1	91.66	22	93.27	2	102.00	1	94.00	35	91.09	4	92.80	2	94.00	1	92.00
Upper Face	5	73.80	28	69.58	3	67.67	3	66.50	49	69.14	5	55.00	3	73.00	1	55.00
Nasal Ht.	5	53.20	30	51.76	3	53.00	3	49.66	48	50.50	—	—	—	—	1	41.00
Nasal Breadth	2	24.00	29	23.07	3	28.33	3	26.83	44	24.82	—	—	—	—	1	24.50
Sag. Arc	2	360.50	13	371.17	1	379.00	—	—	49	375.29	4	305.40	—	—	1	367.00
Na. -Br. Arc	2	124.00	21	123.56	1	128.00	3	130.16	51	126.53	—	—	—	—	1	125.00
Br. -La. Arc	2	122.00	19	131.56	2	128.00	3	131.66	51	131.49	—	—	—	—	1	123.00
La. -Opis. Arc	2	117.50	9	117.28	1	118.00	3	127.66	49	127.66	—	—	—	—	1	119.00
Indices																
Cranial	5	72.33	27	70.52	4	72.27	3	73.56	51	71.65	5	67.60	3	74.80	1	76.90
Cran. Module	3	152.00	10	151.92	2	152.31	3	154.83*	42	150.77*	—	—	—	—	1	148.16*
Mean Ht.	2	82.03	10	84.34	2	81.20	3	80.52*	42	83.28	—	—	—	—	1	82.28*
Length Ht.	2	71.49	11	71.97	2	70.55	3	69.85	42	71.79	5	59.90	3	60.10	1	72.70
Breadth Ht.	2	96.94	10	99.16	3	95.36	3	95.01	42	99.64	5	88.20	3	83.00	1	94.50
Fronto-Parietal	5	68.69	26	67.89	3	70.15	3	64.49*	50	71.06	5	70.80	3	71.50	1	64.90
Upper Face	3	60.12	16	56.25	3	51.80	3	50.66	42	54.94	4	55.20	3	55.50	1	44.70
Total Face	2	97.56	11	94.39	1	84.21	—	—	26	91.61	3	93.10	2	93.00	1	78.80
Nasal	2	45.80	28	44.75	3	53.46	3	54.06	44	49.41	4	48.20	3	49.70	1	59.70
Orbital	2	82.14	29	84.82	3	76.58	3	83.70	488	79.34	4	85.00	3	71.70	1	80.20
Cran. -Fac.	2	93.78	15	91.42	4	96.56	3	96.24	43	94.13	4	100.15*	3	92.66*	1	89.78

\* Computed from the Original Tables for this Study.

TABLE 3.

(Continued)

Measurement	Shah I		Shah II		Shah III		Hamadan*		Nippur		Copper		Alizar Huyuk Bronze		Hittite	
	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean
Max. Length	11	173.60	4	189.90	3	187.00	5	177.00	23	193.78	6	182.10	2	180.50	8	182.90
Max. Breadth	11	146.70	4	141.00	3	137.00	3	137.60	5	136.60	16	130.50	2	142.50	8	144.60
Ba. -Br. Ht.	8	134.40	1	122.00	—	—	5	136.20	19	136.74	6	136.40	2	136.00	8	125.90
Min. Frontal	11	96.80	2	96.30	3	95.00	5	96.00	26	96.69	6	91.30	2	100.50	8	99.80
Bizygomatic	12	133.92	1	123.00	—	—	4	125.00	22	133.32	6	124.40	2	135.50	8	129.80
Bigonial	7	103.00	—	—	—	—	—	—	19	95.63	—	—	—	—	—	—
Upper Face	12	71.70	1	70.00	—	—	3	62.00	23	68.91	—	—	—	—	—	—
Nasal Ht.	12	53.30	1	49.00	—	—	4	48.20	22	53.62	6	46.00	—	—	8	49.00
Nasal Breadth	12	24.50	1	23.00	—	—	4	25.00	24	26.71	6	24.90	2	26.00	8	26.10
Sag. Arc	8	349.62	2	379.00	1	353.00	—	—	19	392.89	—	—	—	—	—	—
Na. -Br. Arc	11	124.30	3	127.00	2	123.50	5	126.20	—	—	—	—	—	—	—	—
Br. -La. Arc	11	122.18	4	119.80	3	127.70	5	128.00	—	—	—	—	—	—	—	—
La. -Cpis. Arc	8	169.88	2	130.50	1	108.00	5	96.40	—	—	—	—	—	—	—	—
Indices																
Cranial	11	84.70	4	74.30	3	73.40	5	77.53	22	70.86	6	74.20	2	79.10	8	79.20
Cran. Module	8	151.57*	1	150.93*	—	—	5	149.93	19	155.81*	6	149.66*	2	153.00*	8	151.30*
Mean Ht.	8	82.28*	1	73.76*	—	—	5	86.86*	19	82.70*	6	87.27*	2	84.21*	8	76.88*
Length Ht.	8	78.40	1	63.90	—	—	5	77.23	20	70.25	6	77.70	2	77.70	8	68.10
Breadth Ht.	8	93.30	1	89.70	—	—	5	99.71	19	98.79	6	100.30	2	93.20	8	87.10
Fronto-Parietal	11	66.10	1	66.80	3	69.20	5	87.67	22	70.68	6	69.96*	2	70.53*	8	69.02*
Upper Face	5	53.00	1	56.90	—	—	4	49.87	20	52.38	6	56.00	2	43.80	8	52.90
Total Face	7	89.90	1	94.30	—	—	1	86.18	20	89.45	—	—	—	—	—	—
Nasal	12	47.05	1	46.90	—	—	4	51.90	20	51.10	6	51.30	2	53.10	8	50.20
Orbital	12	84.60	1	83.82	—	—	4	81.82	19	80.41	6	87.10	2	94.40	8	81.40
Cran. -Fac.	11	91.29*	1	87.23*	—	—	4	91.37	21	98.09	6	92.20	2	95.10	8	89.72

\* Computed from the Original Tables for this Study.

TABLE 4.

## Cranial and Facial Measurements and Indices of Females at Hasanlu and Other Middle East Sites

Measurement	Has. III		Has. IV		Has. V		Geoy		Hissar III		Sialk I		Sialk II		Giyan	
	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean
Max. Length	3	180.67	18	181.42	5	185.33	2	183.25	32	180.33	3	190.30	4	178.00	1	169.50
Max. Breadth	3	134.00	15	134.18	2	135.50	2	132.50	32	131.58	3	131.30	4	130.80	1	133.00
Ba. -Br. Ht.	3	125.50	4	129.16	—	—	2	132.75	31	129.26	—	—	—	—	1	118.50
Min. Frontal	2	93.00	16	93.64	3	95.00	2	82.25	32	92.45	—	—	—	—	1	92.00
Bizygomatic	2	120.00	10	118.92	—	—	2	115.50	27	120.56	2	129.00	1	126.00	1	117.00
Bigonial	2	84.00	9	93.52	1	125.00	1	76.00	27	88.04	2	94.00	1	90.00	1	82.00
Upper Face	2	63.50	14	67.75	3	67.33	2	72.75	32	66.47	2	69.50	1	68.00	1	66.00
Nasal Ht.	2	47.00	14	50.56	3	47.67	3	51.75	32	48.59	—	—	—	—	1	24.00
Nasal Breadth	2	26.00	13	24.06	4	27.25	2	25.25	32	23.84	—	—	—	—	1	24.00
Sag. Arc	—	—	6	368.83	—	—	—	—	32	368.18	2	375.00	—	—	1	356.00
Na. -Br. Arc	1	126.00	9	126.89	1	122.00	2	123.25	32	125.94	—	—	—	—	1	118.70
Br. -La. Arc	1	127.00	8	127.25	—	—	2	124.75	32	128.09	—	—	—	—	1	121.70
La. -Opis. Arc	—	—	6	115.00	—	—	2	131.25	32	115.15	—	—	—	—	1	107.00
Indices																
Cranial	3	74.10	15	74.12	2	72.45	2	72.30	32	72.97	3	68.97	4	73.40	1	78.40
Cran. Module	2	147.00	4	147.11	—	—	2	149.50*	31	147.06	—	—	—	—	1	140.33*
Mean Ht.	2	79.57	4	82.74	—	—	2	84.08*	31	82.88*	—	—	—	—	1	87.16*
Length Ht.	2	68.77	4	71.38	—	—	2	71.84	21	71.87	3	59.50	4	60.10	1	78.81
Breadth Ht.	2	94.38	4	98.58	—	—	2	100.18	31	98.26	3	85.50	3	84.20	1	89.00
Fronto-Parietal	2	74.38	15	69.93	1	67.91	2	62.08*	23	70.33	3	74.10	4	68.80	1	69.10
Upper Face	2	52.92	10	56.99	—	—	2	62.75	28	55.31	2	53.80	1	53.90	1	56.40
Total Face	2	93.33	8	95.38	—	—	—	—	22	90.98	2	90.30	1	90.40	1	95.70
Nasal	2	55.44	12	47.71	2	56.00	2	49.57	32	50.37	1	52.10	1	51.00	1	50.00
Orbital	3	79.60	13	83.48	2	74.77	2	74.77	31	80.12	2	82.00	1	77.50	1	82.80
Cran. Fac.	1	91.60	8	89.23	—	—	2	87.16	27	91.74	2	98.25*	1	96.33*	1	87.97*

\* Computed from the original tables for this study.

TABLE 4.

(Continued)

Measurement	Shah I		Shah II		Shah III		Hamadan*		Nippur		Alisar Huyuk		Hittite	
	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean	N.	Mean
Max. Length	5	167.60	1	184.00	1	176.00x	3	165.00	11	181.64	1	177.00	3	174.30
Max. Breadth	5	140.60	1	142.00	1	140.00	3	133.33	12	133.25	1	137.00	3	141.00
Ba. -Br. Ht.	4	126.30	—	—	1	129.00	3	130.00	8	134.50	—	—	3	121.50
Min. Frontal	5	94.20	1	94.00	1	92.00	3	93.30	11	93.09	1	93.60	3	96.70
Bizygomatic	5	126.20	—	—	1	117.00	3	118.00	9	124.33	1	113.00	3	125.00
Bigonial	2	95.00	—	—	—	—	—	—	12	88.91	—	—	—	—
Upper Face	5	66.80	—	—	1	63.00	2	64.00	11	63.73	—	—	—	—
Nasal Ht.	5	50.20	—	—	1	43.00	2	50.00	13	49.85	1	48.80	3	52.30
Nasal Breadth	5	25.80	—	—	1	22.00	2	28.00	14	25.21	—	—	3	24.00
Sag. Arc	2	361.50	—	—	1	371.00	—	—	5	379.60	—	—	—	—
Na. -Br. Arc	4	124.50	1	127.00	1	129.00	3	117.70	—	—	—	—	—	—
Br. -La. Arc	4	123.20	1	125.00	1	124.00	3	121.70	—	—	—	—	—	—
La. -Opis. Arc	3	111.33	—	—	1	118.00	3	85.70	—	—	—	—	—	—
Indices														
Cranial	5	84.10	1	77.20	1	79.50	3	80.73	12	73.67	1	77.40	3	80.90
Cran. Module	4	144.83*	—	—	1	148.33*	3	142.78	8	149.80*	—	—	3	145.60
Mean Ht.	4	81.96*	—	—	1	81.64	3	87.16	8	85.43	—	—	3	77.06
Length Ht.	4	74.20	—	—	1	73.30	3	78.81	10	72.30	—	—	3	70.40
Breadth Ht.	4	90.40	—	—	1	92.10	3	97.59	10	99.30	—	—	3	86.10
Fronto-Parietal	5	67.00	1	63.20	1	65.70	3	84.33	11	69.73	1	68.25	3	68.58
Upper Face	5	53.00	—	—	1	53.80	2	54.26	11	50.64	—	—	3	49.60
Total Face	2	89.10	—	—	—	—	2	91.60	11	90.73	—	—	—	—
Nasal	5	47.46	—	—	1	51.20	2	56.00	13	50.08	—	—	3	50.00
Orbital	5	85.30	—	—	1	80.60	2	86.06	13	84.46	1	83.80	3	89.20
Cran. -Fac.	5	89.76	—	—	1	83.57	2	89.38	10	92.30	1	82.50	3	91.20

b) The other type is generally more robust with a more rounded occiput and lower, more sloping frontal bone. The face appears slightly wider and the nose is still long, but slightly wider than that of the group in this period. The major difference is in gross size.

It may be suggested that in Period IV the robust individuals were the basic population and that there was an emergence of a more gracile component of the population. It is also possible that the gracile individuals represent a slightly different group that emigrated into the area. These possible interpretations are opposite of the conditions at Tepe Hissar where the more gracile type was considered basic with the larger more rugged segment of the population viewed as emergent or intrusive (Krogman: 1940:36). At Tepe Hissar, as at Hasanlu, the proportions of the two cranial configurations were very similar, with the major differences in gross size and ruggedness. It is interesting to note that in later times at Tepe Hissar, Tepe Sialk and Shah Tepe the population became predominantly brachycranial while at Hasanlu the population remained dolicho-cranial and essentially Mediterranean in configuration.

The existence of a Mediterranean variety at Kish (Buxton and Rice: 1931) and at Nippur in Iraq (Swindler: 1956) and the Copper Age and Post-Hittite populations at Alishar Huyuk (Krogman: 1937) attests to the spread of a gracile population and suggests relationships with Iran in the early second millennium B.C. Since cultural influences from the west and east are seen at Hasanlu during Period IV, it is possible that gene flow was also occurring. In the main, the populations at Hasanlu fit into the general population picture presently known from Western Iran. The males seem to be more similar to those from Geoy Tepe, Tepe Sialk, Tepe Giyan and Tepe Hissar III in Iran and to Nippur in Iraq. The Hasanlu males differ slightly from those at Shah Tepe II and III and Hamadan, and seem more distinct from those at Shah Tepe I and the Bronze and Hittite populations at Alishar Huyuk in Anatolia.

#### FEMALES

The female populations were also relatively stable. Intra-site variation for females followed the trends described for the males. They differed from the males in the usual patterns of sexual dimorphic size and gracility, but the proportions were very similar. The female skulls were slightly shorter, wider, and had a wider, more globular forehead. The face was generally narrower and more pointed than in the males, but the nasal index was wider, especially in Periods III and V.

Period V females appear more robust and rugged than those in the other cultural periods. It should be remembered, however, that the sample sizes of the three populations are quite different and the contrasts may be within the range of variation of Period IV. Shorter facial length, especially the upper face, was distin-

ctive for Period III females. The most striking variation among the females was the general nasal proportions. Chamaerhine classifications were most common for Periods III and V, while mesorrhine classifications predominated in Period IV. Both males and females in Period V displayed wide noses, while in Period III the males had narrow noses and the females had wider ones.

In Period IV the female tendency toward the display of two major varieties was not as strong as among the males. Some females were robust and large, but the majority were gracile and of the basic Mediterranean configuration seen by Krogman at Tepe Hissar. It is interesting to note that a few of the females from Period IV were very similar to the individuals at Kish described by Buxton and Rice (1931) as Eurafrikan. These individuals at Hasanlu exhibited the single bossed frontal, slight alveolar prognathism, and relatively wide and low nasal profile. The close similarities of Period IV females with those from Nippur in Iraq also suggest some mutual influence between Mesopotamia and the Iranian Plateau. The basic configuration at Hasanlu, however, was similar to other groups in western Iran during the late second millennium B.C.

#### DENTITION

A total of 1,447 teeth from all adult crania at Hasanlu were examined and measured. The methodology followed Moorrees (1957) and Anderson (1962). Surprisingly little work has been done on the dentition of other Southwest Asian populations so comparative data are limited. In general the dentition at Hasanlu is similar to Caucasoid groups of Europe as reported by Dahlberg (1951), but the teeth of the Iron Age inhabitants of Hasanlu were slightly smaller. Dental attrition was marked, and caries with abscessing commonly occurred. In this respect, the Hasanlu population was similar to Tepe Hissar III (Krogman: 1940) and to Geoy Tepe (Cave: 1951). It may be of interest to note that the degree of dental attrition at Hasanlu was not as pronounced as at Nippur as reported by Swindler (1956). The degree of attrition among the populations at Hasanlu probably lies with the type of diet and food processing techniques. The combination of high degree of grit in the diet from stone grinding of grain and a high carbohydrate intake contributed to carious lesions, abscessing and tooth loss.

#### SKELETAL PATHOLOGY

The study of ancient disease as reflected in the skeleton may reflect the type of diet, environmental stresses, general health of the population, sexual division of labor, or knowledge of medical treatment techniques. Although many diseases leave no evidence on the dried bone, an effort to describe and analyze pathological changes is needed.

At Hasanlu 48 males (62%), 23 females (55%), and 12 subadults (34%) exhibited pathological changes. The major types of maladies detected we-

re: alveolar abscessing, osteoarthritic changes of the joints and spinal column, osteitis, healed fractures, bone growths or exostoses, and evidence of trauma and abscessing to the upper limbs and clavicles.

Alveolar abscessing was the most common pathology present. This condition among the adults seems to be the result of general periodontal infection as indicated by resorption of the alveolus and through infection of the pulp cavity associated with considerable tooth wear of the posterior dentition. Both attrition and diet seem to be contributing factors to a high rate of alveolar abscessing.

Evidence of bone inflammation such as pitting, pinpoint lesions, and swelling of the diaphysis is present for 15 males, 5 females, and 11 subadults. Osteitis may result from an extension into the bone from an adjacent soft tissue infection, from generalized disease (yaws, syphilis, fungi infections, etc.) or from trauma (Morse: 1969, Brothwell: 1963, 1967). It is interesting to note that males more often showed evidence of diaphyseal swelling of the lower limbs, while females more often exhibited pin point lesions on the skull and the upper limbs. Some pitting and small lesions occurred on the frontal bone and face of the males. Osteitis on the subadult skeletons occurred most frequently around the ear and suggests middle ear infection (McKenzie and Brothwell: 1967:464-73).

Trauma, as indicated by healed fractures, was more common for males. The long bones were most involved, but the mandible and nose were occasionally traumatized. Two of the fractures were spectacular, with considerably twisted and mis-shaped joints and bones.

Bony exostoses occurred with equal frequency for both sexes — 15 percent of the males and 14 percent of the females. The growths varied in size and were found through the skeleton with no detectable pattern.

Arthritic changes in the skeletal material were found most frequently on the vertebrae and at the shoulder. The changes of the vertebrae ranged from slight lipping of the bodies to complete fusion of the adjoining bones. Evidence of traumatic arthritis, probably resulting from work related activities, was evident at the shoulder joints and the clavicle-manubrium articulation. One instance of rheumatoid arthritis was noted. Slight lipping of the vertebral bodies was almost universal for all adults over 25 years of age.

Miscellaneous pathological changes were detectable for 7 males, 6 females, and 1 subadult. This category included abscess formation from localized infections, aseptic necrosis, anomalous foramen in the gladiolus of the sternum, cribra orbitalia, and a button or ivory osteoma.

#### SUMMARY

A total of 154 human skeletons from 7 cultural periods at Hasanlu, Iran, were examined. Although there was considerable variation, the populations remained relatively stable and homogeneous over a long period of time. They were basically of the Mediterranean sub-variety of the Caucasoid classification as described by Krogman (1940:16). Although the females reflected differences due to sexual dimorphism, the proportions were similar to the males. Intrasite variation indicated a tendency toward increased gracility for both sexes in the later Iron Age, although the earlier more robust and rugged configuration continued to be found in the later periods. The two major varieties were quite similar in proportions with the major difference of size and ruggedness. An individual examination of the skeletons reflected this variation, for it was masked in the metrical analysis.

The dentition of the population was modern in every respect and reflected a basic gracility. The major dental pathologies were carious lesions and tooth loss from alveolar abscessing resulting from both caries and attrition. Common pathological changes included osteoarthritis, osteitis, healed fractures, exostoses and trauma to the upper limbs and clavicles.

The comparison of the physical characteristics of the inhabitants of Hasanlu with other Iranian sites reveals similarity among the general prehistoric populations presently known from Western Iran. These findings support the work of Mario Cappieri (1969) who argues for a wide spread distribution of similar Mediterranean populations throughout Southwest Asia during the Bronze and Iron Ages.

The analysis of the physical characteristics of the inhabitants of Hasanlu also supports the geographical and cultural evidence for a partial isolation of the area with a tendency toward local development, but with similarities relating to the general traditions of Central and Western Iran and less strongly to Mesopotamia during the second millennium B.C.



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2



3



1. The skull III C<sub>1</sub> and mandible.

2. The skull of a child "1970".

3. The skull No III P 1970.



4



4. The skull F1 No 40-III.

5



5. Deliberately broken femur bone (1965).