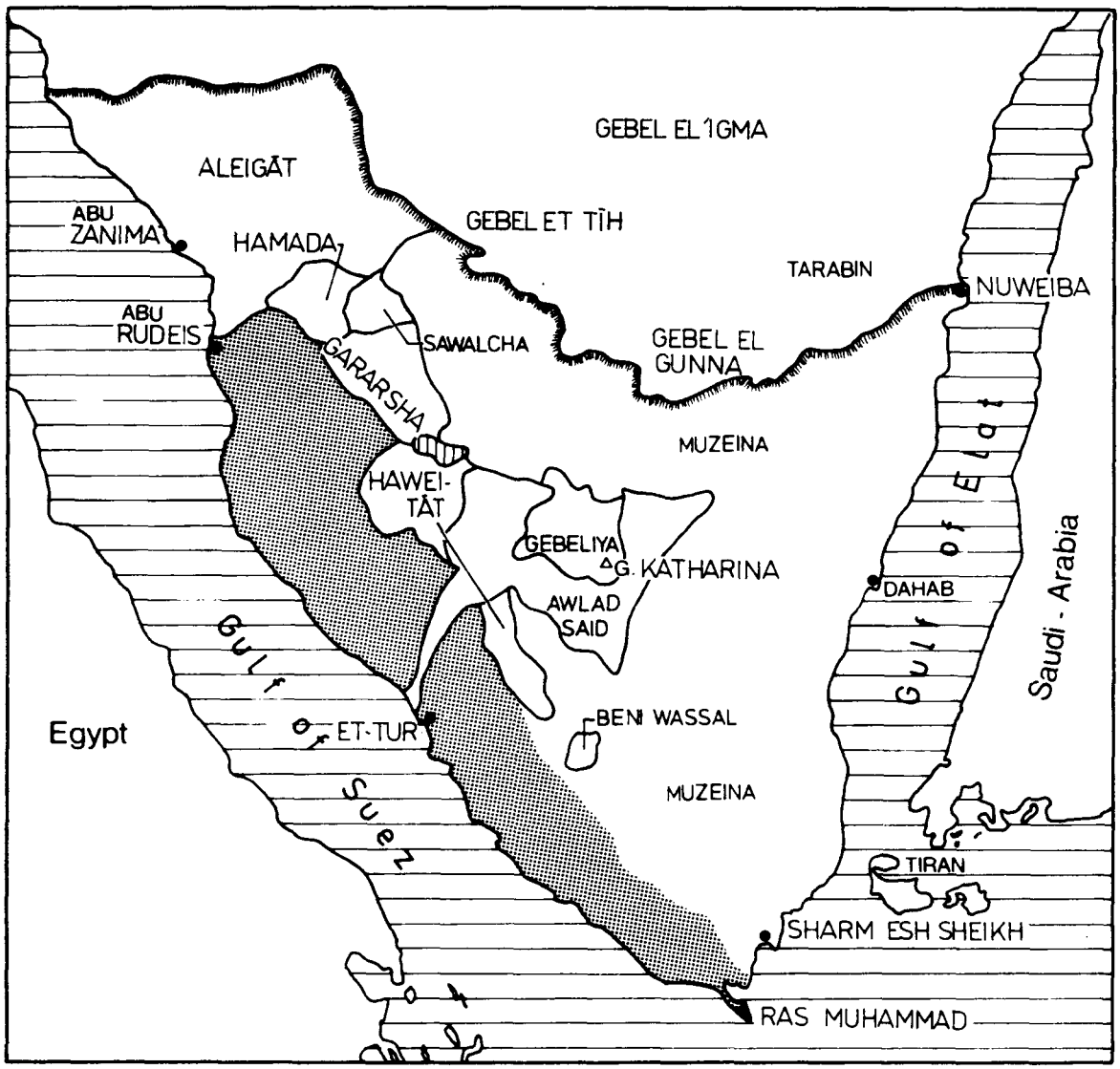
II. THE POPULATION EXAMINED

Throughout the South Sinai peninsula are scattered 10 Bedouin tribes (Fig. 2), a total of about 10,500 individuals . Three of these tribes not dealt with here either because their numbers were very small (Beni-Wassal and Ahali Et-Tur) or because they were a small fraction of a much larger tribe inhabiting the central part of the Sinai (Tarabin). The seven major tribes of the region are united under a single administrative body known as "Towara".

FIGURE 2: Territorial Distribution of the Bedouin Tribes in South Sinai



Stippled area - demarcates the most arid zone in the Sinai, not claimed by any tribe.

Most of the tribes originally came from the Arabian peninsula, although a few are linked traditionally to Egypt and North Africa, and one derives partly

from the southeastern part of the European continent. All the Bedouins of South Sinai are Moslem and make a living primarily from labor outside their territorial base in industrial areas in Israel and Egypt, as well as from raising sheep and camels, fishing, smuggling, and engaging in a primitive type of agriculture.

The main features of the Bedouins in South Sinai are:

(a) Isolation. Topographic barriers, such as the Tih escarpment in the north, the Gulf of Elat in the east, the Gulf of Suez in the west, and the Red Sea in the south, coupled with efforts of the tribes themselves to retain their cultural uniqueness, have ensured virtual biological isolation of the tribes from the surrounding societies.

(b) Mating Patterns. Consanguineous marriages, especially between first cousins are preferred within the Bedouin population of South Sinai. Thus in decreasing order of preference in selection of a mate is the extended family (first cousins) or Hams (blood feud group), clan, or blocks of extended families (social units among Bedouins which have no precise anthropological term; among settled Arabs they are known as "khamulas"), sub-tribe and tribe.

Marriages outside the tribal frame are very limited, as will be noted subsequently.

(c) Uniform Environment. The Bedouin residents of South Sinai live in an environment which is uniform in many respects, to wit: an arid climate; an economy primarily based on "outside" labor and traditional occupations, as noted earlier; education which comprises, at best, two or three years of elementary schooling; health care which includes medical services provided from 1967 to 1982 by the Israeli civil administration, prior to which there was reliance only on traditional tribal medical practices.

The Bedouin population in South Sinai lacks any social or religious stratification, thus being largely egalitarian.

(d) Population Size. Most of the tribes in South Sinai number between 500 and 1000 members, thus comprising relatively small social groups. Prior to the Israeli presence in 1967, the various tribal infrastructures tended to be even smaller, being delimited largely by the nature and "carrying capacity" of the area. Improvement in socioeconomic conditions and health status generally after 1967 led to increases in population size.

(e) Political Instability. In the first half of the present century the area of South Sinai passed through many conquests - by Turks, British, Egyptians, Israelis, Egyptians again, Israelis again, and most recently Egyptians for the third time. The penultimate shift of power to Israeli jurisdiction, commencing in 1967, brought about large changes in the social, medical, economic and cultural

infrastructures of the Bedouins. This latter upheaval had a direct as well as an indirect bearing on the lives of the Bedouins, initiating a shift to better living standards heretofore not known to them. In many respects the new standards reshaped Bedouin ways of living, thinking, and working (see Marx, 1974, 1984; Pervolotzky and Pervolotzky, 1979).

(f) Tribal Population. The Bedouin individual is born into a certain tribal framework to which he remains firmly linked throughout his/her life. This framework or infrastructure, albeit devoid of military, judicial, or any other official or authoritarian backing, does provide for the personal, economic and legal safety of its members. The individual member, in turn, bears a responsibility towards his/her group, based on an `honor system' rather than on any codified or organized set of rules.

The number of boys examined in the present study, by tribal group and age, is given in Table 1.

TABLE 1 Number of South Sinai Bedouin boys examined, by tribal group*, and total number of boys, by age.

Tribe	No. of boys examined	Age	Total no. of boys examined
Gebeliya	72	4	10
Sawalcha	12	5	43
Hamada	27	6	105
Aleigat	39	7	103
Beni-Wassal	6	8	76
Muzeina	267	9	41
Haweitat	31	10	40
Gararsha	73	11	48
Awlad Said	26	12	46
Tarabin**	10	13	51
Total	563	Total	563

* The Ahali et-Tur tribe is not presented, but is included in the description of history of south Sinai bedouin tribes.

** Most of the tribe is located in the central and northern parts of Sinai.

Tests And/Or Examinations

Measurements (1-9) taken by anthropometer, unless otherwise specified, were:

1) Stature: The vertical distance from the horizontal standing plane to vertex. The examinee stands with heels together, body erect and head facing to the

front in the Frankfurt plane. The measuring instrument is against the body of the examinee, with the horizontal arm of the instrument resting against the head.

(2) Suprasternal height: The vertical distance from the horizontal standing plane to the lowest point in the suprasternal notch.

(3) Iliospinal anterior height: The vertical distance from the horizontal standing plane to the most projecting median point of the upper anterior iliospinal level.

(4) Tibial height: The vertical distance from the horizontal standing plane to the inner top of the tibial condyle.

(5) Acromial height: The vertical distance from the horizontal standing plane to the low end of the outermost extremity of the acromion process.

(6) Radial height: The vertical distance from the horizontal standing plane to the outer upper limit of the radial bone.

(7) Styloradial height: The vertical distance from the horizontal standing plane to the lower external limit of the radial bone. (8) Dactylion height: The vertical distance from the horizontal standing plane to the bottom end of the dactylion.

(9) Sitting height (1) The distance from the horizontal sitting plane to the top of the head. The examinee sits on a bench, body erect. Head is in the Frankfurt plane. The anthropometer is held vertically and in contact with the back [see trait "32" - sitting height(2).

(10) Foot breadth: Measure of the widest part of the foot. Measurement made by sliding caliper.

(11) Foot length: The distance between the heel and the tip of the longest toe. Measurement made by sliding caliper.

(12) Head length: Maximum length, in the sagittal plane: glabella-occipital diameter of the vault. Measurement made by spreading caliper.

(13) Head breadth: Maximum breadth. Measurement made by spreading caliper.

(14) Bizygomatic breadth: The maximal distance between zygomatic arches. Measurement made by spreading caliper.

(15) Bigonial breadth: The maximal distance between the external aspects of the angles of the mandible. Measurement made by spreading caliper.

(16) Total facial height (nasion-gnathion): The distance from the center of the nasal root to the underside tip of the chin. Mouth must be kept closed in normal occlusion. Measurement made by sliding caliper.

(17) Upper arm skinfold: A skinfold is taken in the median back part of the arm in a straight line with the elbow. The fold must be vertical. Measurement

made by special spreading caliper of a constant pressure (Lange skinfold caliper).

(18) Subscapular skinfold: The skinfold is lifted from underneath the angle of the scapula. The fold must be vertical. Measurement made by special spreading caliper of a constant pressure (Lange skinfold caliper).

(19) Biacromial breadth: The distance between the external edges of the acromial process. Measurement made by spreading caliper.

(20) Biiliac breadth: The distance between the most prominent median points of the frontal upper projections of the ilium. Measurement made by spreading caliper.

(21) Chest circumference: The horizontal girth of the chest at the end of a normal expiration. Measurement taken at the height of the nipples at right angle to body axis. Measurement made by measuring tape.

(22) Body weight: Boy is clad in shorts only.

(23) Grip strength of left hand: Examinee grabs the measuring instrument (Jamar adjustable dynamometer; Asimow Engineering Company) with left hand and presses as strongly as he can. The pressure must be continuous. Examinee is allowed two attempts, of which the highest reading is taken into account. During the gripping action the free hand is held behind the body.

(24) Grip strength of right hand: As described for left hand.

Derived measurements

(25) Total arm length: The difference between the acromial height (5) and the dactylion height (8).

(26) Upper body height: The difference between the stature (1) and the suprasternal height (2).

(27) Upper leg length: The difference between the iliospinal anterior height (3) and the tibial height (4).

(28) Upper arm length: The difference between the acromial height (5) and the radial height (6).

(29) Lower arm length: The difference between the radial height (6) and the styloradial height (7).

(30) Hand length: The difference between the styloradial height (7) and the dactylion height (8).

(31) Trunk length: The difference between the suprasternal height (2) and the iliospinal anterior height (3).

(32) Sitting height (2): The difference between the stature (1) and the iliospinal anterior height (3). Attention should be drawn to the difference between this variable and the similar-sounding, but directly measured sitting height.

Indices

(33) The ratio of weight to stature cubed: weight(gr)x100 /stature(cm)^3

(34) The ratio of weight to stature squared: weight(kg)x100 /stature(cm)^2

(35) The ratio of total upper arm length to stature:
total upper arm length(cm) x 100/stature(cm)

(36) The ratio of sitting height to stature: Sitting height(cm)x100/ stature(cm)

(37) The ratio of foot breadth to foot length:
foot breadth(cm)x100/ foot length(cm)

(38) The ratio of head breadth to head length:
head breadth(cm)/head length(cm) x 100

(39) The ratio of body breadth at shoulder level to the body height:
biacromial breadth(cm)x100/height(cm)

(40) The ratio of body breadth at waist level to stature:
biiliac breadth (cm)x100/stature (cm)

(41) The ratio of chest circumference to stature:
chest circumference (cm)x100/stature (cm)

(42) The ratio of weight to stature: weight(kg)x100/stature(cm)

Other

(43) Body surface area: 0.425 weight(kg) x 0.725 height(cm) x 71.84 (After Harisson et al. 1977)

(44) The ratio of body surface area to weight: body surface area(cm)/weight(kg)

(45) The ratio of weight to body surface area: weight(kg)/body surface area(cm)

(46) Energy intake per defined activity*: KJ = 0.047 x weight(kg) + 1.02

Measurements, usually taken in a vacant classroom or a clinic room, were made solely by a member of the anthropological team. Each measurer was assisted by a colleague who recorded the results. Measurements were taken on the left side and in the morning hours. Before measuring, a questionnaire was filled out for each child. Questions included vital statistics (immediately confirmed by the teacher or a local person familiar with the data needed). Special emphasis was given to the study of the genealogy of the examinee, given by his parents or one of his relatives. On completion of the measuring, each child was palmprinted and fingerprinted (Kobyliansky et al 1983,1986), then asked to provide saliva samples (Kobyliansky et al 1983); finally a gypsum imprinting of his dentition was taken (Raviv 1986, Menula 1986, Rubin 1987, Hershkovitz et al 1992, 1993, Ben David-Kobyliansky 1992)..

Demographic Questionnaire

The demographic data here presented have been collected largely by our own research team. Pertinent data from other studies, however, have also been included. The latter are from Muhsam (1966), Publication of the Central Bureau of Statistics, 1980, "Causes of Death in 1978", and Pnina (1978), on the Bedouins of the Negev; Ben-David (1978), Baily and Peled (1974), on the Bedouins of Sinai; and demographic data on the Bedouins of Sinai collected by the Ministry of Interior and compiled into the booklet "Distribution of the Population in the Territories" (West Bank, Gaza strip and Sinai peninsula) published in 1980.

(1) Adult questionnaire

In the course of the present study, more than 600 Bedouin adults (mainly males) were interviewed. For each, a detailed "curriculum vitae" form was filled out by the interviewer who spoke Arabic and was familiar with Bedouin customs and culture, thus minimizing "fake" answers, misunderstandings, or "leading questions". The questions were:

1. Names of person, father and grandfather
2. Name of tribe
3. Name of sub-tribe(s)
4. Name of extended family
5. Age of person examined
6. Birthplace
7. Marital status
8. Age of spouse
9. Number of children, their sex and age
10. If married to more than one woman, their ages and number of children by each spouse
11. Number of brothers and their ages
12. Number of sisters and their ages

(2) Children questionnaire

Children were also questioned. Their answers to the interviewer`s queries were confirmed by conversation with teacher or caretaker in the school. At times we relied also on information provided by adults of the tribe that were present during the child's interview. The questions put to the surveyed children (mainly boys) were:

1. Name of child, of father and of grandfather
2. Name of tribe
3. Name of sub-tribe

4. Name of family/extended family
5. Place of residence
6. Age
7. Names of brothers and their ages
8. Names of sisters and their ages
9. If there is more than one wife of the father, their names, age and the names of all their children
10. Did he have siblings in the school, or siblings who were also participating in the present study.

(3) The Hams (blood feud group) records

In the course of our investigation we traced more than 55 genealogical lines (about 3,000 individuals). These lines went back five generations, in some cases even seven and eight generations. Our recording included all data on "blood ties" in genealogical depth, and these data were verified by other individuals within the clan. Owing to the judicial significance of the blood feud group (see chapter on "Social Structure"), each Bedouin knows the group to which he belongs, and there was no problem in his response on this score, yet verification was deemed desirable. Most of the genealogies were taken by S. Levi who for many years had been engaged in the study of the Bedouins and their culture, and which helped to check the accuracy of the responses.

We may note that practically the only reliable sources for demographic data that proved useful in solving biological questions that arose in the course of the present study were the genealogical trees of the blood feud groups.

Two additional comments are in order. First, the data gleaned from the children's questionnaires are somewhat selective in that they derive from information obtained from males only, and only of families with at least one male child whose age was at least 5 years at the time of the research. Hence families that were childless or families having daughters only are not adequately represented in our sample. Second, our demographic data on the Bedouins of South Sinai were compared only with pre-1948 data on Bedouins in the Negev, thereby excluding possible effects of cultural changes in the demographic makeup of the Israeli Negev Bedouins following the establishment of the State of Israel. Since growth and development of children largely depends on parents and society, the possible influence of both factors is presented and discussed in the next chapter.