III. HISTORY, CULTURE AND DEMOGRAPHY

Any study of the genetic structure of a population must deal also with cultural variables (Dobzhansky and Boesiger, 1983). Hence the cultural variables of the Bedouin tribes are evaluated according to the following three main aspects:

a) The historical aspect: An attempt is made to arrange the tribes in groups according to their countries of origin and their demographic histories.

b) The cultural aspect: Here we examine the effects, on the genetic makeup of the population, of factors such as mating patterns, immigration of new groups in a tribe's territory and their incorporation into the framework of the established tribes, and emigration from a tribe.

c) The demographic aspect: Size and composition of the population is evaluated, e.g. ethnic origin of various social components, and distribution by age and sex. Separate computations are made for each tribe and in some cases even for small sub-divisions such as sub-tribe, clan, etc. Also considered are rates of fertility and mortality, sex ratio, polygamy, and other variables.

A. HISTORY

Narrative Evidence Of The Origin And Relationships Between South Sinai Bedouin Tribes

The history of the South Sinai Bedouin tribes has yet to be fully clarified. The most reliable sources are probably the weekly reports of the Head of the Santa Katharina monastery in South Sinai. These reports, which have been written virtually ever since the foundation of the monastery at the end of the 6th century (Tsafrir, 1970), have never been made available for scientific scrutiny, owing to opposition of the local monks. Consequently the main source of information on the history of the South Sinai tribes has perforce been the accounts of ethnographers and anthropologists primarily in the previous century (Burckhardt, 1822; Robinson, 1841; Stanley, 1864), as well as "tales" related by the Bedouins themselves, especially those by Sheikh Muhamad Mardi Abu-Le'ham of the Gebeliya tribe (1979, personal communication). The historical and social descriptions presented herein are, however, based primarily on studies by two Israeli investigators, namely, Joseph Ben-David ("The Bedouin Tribes in South Sinai", 1978) and Shabtai Levi ("Medicine, Hygeine and Health among the Bedouins of South Sinai", 1978; "The Bedouin Family in South Sinai", 1979; "Faith and Ritual among Bedouins of South Sinai", 1980).

The southern Sinai peninsula, although a desert area with harsh topographic conditions was inhabited by human populations even in early pre-historic time, according to the archaeological evidence (Bar-Yosef, 1980). Thus,

large settlement sites were found in South Sinai in the Neolithic era (8000-5500 B.C.E.; Bar-Yosef, 1981, 1987), through the Chalcolithic era (4000-3150 B.C.E.; Oren, 1987), as well as in the early Bronze Age (3150-2200 B.C.E.; Beit-Aryeh, 1980), the Byzantine period (324-640 C.E.; Tsafrir, 1970; Finkelstein, 1980), and the early Arab period (640-1291 C.E.; Sharon, 1987). Since the Moslem conquest of Sinai (621 C.E.), Bedouin tribes from the Arabian peninsula began a constant infiltration into South Sinai and in the course of time they either displaced or absorbed the native pagan populations known in the literature by the name "Saracens" (Tsafrir, 1970). In view of the fact that ingress or egress of tribes into or out of South Sinai was a relatively rapid process, and the written testimonies date mainly from relatively recent times, it is uncertain which were the first Bedouin tribes to settle in South Sinai after the Moslem conquest and why they disappeared subsequently (Levi, 1987). Ben-David (1978) does note that one of the first tribes to settle in the region was the "Beni-Suleiman" tribe which achieved ascendancy about 700 years ago. Robinson (1841) also mentions this tribe as one of the early ones in the region and conjectures that it should probably be regarded as a relic of the ancient Saracen population. Burckhardt (1822, p.558), who travelled in the Sinai in the early 19th century, claimed that he encountered traces of this tribe near Et-Tur. He further notes (p.559) that this tribe settled in all of South Sinai following the first Moslem conquests in 638 C.E. but was decimated by the Sawalcha and Aleigat Bedouin tribes which invaded South Sinai from Egypt.

The tribes presently found in South Sinai are the Gebeliya, Sawalcha, Hamada, Aleigat, Beni-Wassal, Muzeina, Haweitat, Gararsha, Awlad Said and Ahali et-Tur. Among the first to arrive were probably the Hamada and the Beni-Wassal tribes (Arensburg et al., 1979). Some consider the Beni-Wassal tribe an offshoot of the Hamada tribe which split off as a consequence of an intratribal clash (Ben-David, 1978). The Bedouin version of the latter has it that the Beni-Wassal clan or khamula (number of extended families that share a common ancestor) joined forces with the Sawalcha tribe in a battle against the Aleigat tribe, but after the Sawalcha were defeated, an armistice agreement included a clause demanding the expulsion of the Beni-Wassal from the mother tribe (Hamada) and their transfer to the territory of the Muzeina tribe, an ally of the Aleigat in the aforementioned battle. Our own opinion is that the Beni-Wassal and the Hamada are probably distinctly separate tribes; they may have had some familial ties in the past but were never a single tribe.

There is evidence in South Sinai (e.g. the graves of sheikhs, palm tracts, etc.) which clearly indicates that the Beni-Wassal tribe was in the not very distant past one of the largest and strongest in South Sinai (Arensburg et al., 1979), whereas the Hamada tribe was always a small group adhering to fixed habitats

and apparently never departing from them. Ben-David (1978) prefers the first version, namely, the one regarding the Beni-Wassal clan (khamula) of the Hamada and offers in support of this preference the fact that even now members of the Beni Wassal tribe are few in number in the South Sinai, being "imprisoned", as it were, in the area of Wadi Taiman which is in the territory of the Muzeina tribe.

The Hamada tribe is probably the most ancient of the current South Sinai tribes. Various traditions link this tribe with the departure of the Israelites from Egypt, claiming that members of this tribe descended from remnants of Pharaoh's army that survived at the Red Sea, becoming slaves of the Israelites during their sojourn in the Sinai desert (Ben-David, 1978; also S. Levi, 1980, personal communication). This "legend" is probably sheer fancy but does suggest the large span of time this tribe has spent in South Sinai. The territorial origin of the Hamada tribe is uncertain. Ben-David (1978) and also Levi (1979, personal communication) maintain that the Hamada probably came from the Arabian peninsula.

The Beni-Wassal tribe is thus a territorial contemporary of the Hamada tribe. The former is mentioned as a small tribe by both Burckhardt (1822) and Robinson (1841). These authors, incidentally, do not mention the Hamada tribe at all. Burckhardt (1822, p.558) notes that the Beni-Wassal tribe originated in the Barbary region (Saudi Arabia) and numbered only 15 families, some of which lived in Upper Egypt. According to Ben-David (1978) it appears that the Beni-Wassal tribe came from Hadhramaut at the southern edge of the Arabian peninsula. One Bedouin saga relates that when Muhammad brought the Islam religion into the Arabian peninsula, the Beni-Wassal tribe at first remained uninvolved, but when its members saw Muhammad win victory after victory they joined him and therefore were called the "Wasali", meaning, "late-joiners". Even today the Beni-Wassal tribe possesses palm trees at Nuweiba and Dahab as well as at Et-Tur, Wadi Thiman and Wadi Isla (see Figs. 1 and 2), which reflects on the original large territorial range of this tribe.

Among the first tribes to settle in South Sinai, the most prominent one was the Sawalcha tribe. According to Burckhardt (1822):

> *The Szowaleha...are the principal tribe, and they boast of having been the first Bedouins who settled in these mountains, under their founder Ayd, two of whose sons, they say, emigrated with their families to the Hedjaz....*(p.557).

This tribe settled in West Sinai and also in various parts of the high mountain area, engaging mainly in commerce and the transport of pedestrians from Egypt to the Santa Katharina monastery. For a long time the Sawalcha were regarded as

the most important and strongest of the South Sinai tribes. Thus Robinson (1841) wrote:

> *The Sowalihah, the largest and most important of all the divisions of these Arabs, and comprising several branches which themselves constitute tribes...* (p.197).

It seems reasonable to assume that the three abovementioned tribes (Hamada, Beni-Wassal and Sawalcha) reached the Sinai between the 8th and 13th centuries (Arensburg et al., 1979). S. Levi, in a personal communication (1979), and Arensburg et al. (1979) maintain that the second wave of Bedouin migration to reach South Sinai (probably between the 13th and 14th centuries) comprised mainly tribesmen of the Ayede and Nefeat. But these tribes did not become acclimated in South Sinai and left the region for Egypt. There are still sites, such as the graves of sheikhs (e.g. that of Sheikh Suleiman, a Nafai of the Nefeat tribe at the mouth of the Meghara-Mukattab wadi or that of Sheikh Saleiman abu-Khijle el-Ayede of the Ayede tribe at Wadi Sakhab) or palm trees like those at Bir Iqna whose original owners were of the Nefeat tribe, which point to the presence and territorial distribution of these two tribes in the past. Some entire families of these two tribes, however, remained in South Sinai, attaching themselves to other tribes but still continuing to retain their original identity (e.g. the family of Ibrahim al Ayede, presently of the Awlad Said tribe).

At the end of the 14th century there was increased migration of Bedouin tribes into South Sinai. The first to arrive then was the Aleigat tribe. According to Ben-David (1978), this tribe came from Ullah, a region and city to the northwest of Khedjaz (Saudi Arabia). Levi (1987) believes that the name of the tribe, when broken into the syllables "Alei" and "gat", implies those who came from the East. The penetration of new tribes into South Sinai that began in the 13th century provoked resistance from the "veteran" tribes in the region, especially the largest of these, namely, the Sawalcha tribe. Thus Bedouin legend tells about a major battle between the Sawalcha and the Aleigat, the outcome of which was the basis for renewed territorial partition of South Sinai among the tribes. The legend is cited in various versions by numerous investigators (Ben-David, 1978). We present it here in abbreviated form because of its importance to an understanding of the historical processes in the region. Thus, according to Ben-David (1978):

> *Shepherds of the Aleigat tribe were accustomed, during periods of drought, to infiltrate into the territory of the older tribes in Sinai in order to obtain pasture for their flocks. These invasions met with disfavor by members of the Sawalcha tribe who one day decided to set an ambush for the Aleigat shepherds. Thus the invading shepherds were set upon by the Sawalcha tribesmen, massacred, and their herds of goats and camels taken*

as spoil. The Aleigat tribesmen then rallied their brethren still residing in Egypt and aid was not far in coming. One dark night, the reinforced Aleigat troops reached the Sawalcha camp (situated near the Watah Pass) and slaughtered every member of that camp. These two events brought about prolonged conflict between the two tribes, and only a treaty made between the Aleigat and the Muzeina finally enabled these two tribes to overcome the Sawalcha tribe and demand a new territorial partition of South Sinai (p.28).

Ben-David (1978) contends that the mentioned battle took place probably in the middle of the 14th century (1338-39). We think that the battle occurred somewhat later, about the end of the 14th or beginning of the 15th century. Our assumption is based on the fact that the Muzeina tribe, which was allied to the Aleigat in the battle, numbered at that time only several dozen individuals and was just starting its settlement in the region. It seems to us unlikely for a tribe in this "beginning" state to join forces with either of the combatants, nor would its joining one or the other side likely affect the outcome of the contest in view of its very small size.

Burckhardt (1822) presents a different view, that the Muzeina tribe was the "cause de combat" in that four families of this tribe arrived from Saudi Arabia (according to Burckhardt these originated from Khedjaz where they constituted a part of a larger tribe, the "beni-Horeb") because of fear of a vendetta, and sought to settle in South Sinai. At first they approached the Sawalcha and asked to join with them. The Sawalcha agreed but posed several conditions, some of which appeared degrading to the Muzeina (e.g. payment of a tithe, giving their women without reciprocity, etc.). Hence the Muzeina turned to the Aleigat tribe. The latter was only too happy to accept new partners and thereby strengthen its position in South Sinai, and so `signed' a "brotherhood treaty" with the Muzeina. This last step angered the Sawalcha and was the reason for the ensuing inter-tribal conflict which terminated in the heavy defeat of the Sawalcha.

Robinson (1841) writes about this same conflict thus:

The whole territory of the Tawarah originally belonged to the Sawalihah and Aleikat, and was equally divided between them; the former having possession of the western part of the peninsula, and the latter of the eastern. During a famine, a war arose between the two tribes, in which the former, in a night-attack near Tur, killed all but seven men of the Aleikat. To celebrate this victory, they assembled around the tomb of Sheikh Salih in wady Esh-Sheikh, and sacrificed a camel. Just at this time, seven men of the Muzeiny came to them from their country, Harb, on the road to the Hejaz, and proposed to settle with them in the peninsula on equal terms,

saying they had fled from home because they had shed blood, and feared the avenger. The Sawalihah replied that if they would come as serfs, they were welcome, if not, they might depart. They chose to depart, and on their way, fell in with the remnant of the Aleikat. Forming a league with these, they together fell upon the Sawalihah at night, as they were assembled among the Turfa-trees to feast upon the camel, and a great slaughter was the consequence. The war continued for many years, but at last peace was made between the contending parties by foreign mediation. The Aleikat now gave the Muzeiny half of their portion of the peninsula and of their general rights and admitted them to intermarriage (pp.198-199).

Another version propounded by S. Levy (1979, personal communication) maintains that the "big battle" was in fact between the Hamada and Nefeat on the one side and the Sawalcha on the other. The assumption of this version is that at the time when the event supposedly took place the Aleigat tribe was still too small, and it is unlikely that it would challenge the Sawalcha tribe which was the strongest of the South Sinai tribes at that time. With time, however, as the Nefeat tribe left South Sinai, the Aleigat tribe supplanted it and invented the story of the battle.

In the present study, no attempt is made to select the most likely version of the battle, its outcome and consequences; rather the battle itself is used to illustrate demographic processes typical of the place and time, such as the infiltration of new tribes, changes in the ownership of territories, departure of tribes, etc.

The second wave of migration of Bedouin tribes into South Sinai commenced apparently at the beginning of the 15th century. The "veteran" tribes (e.g. Hamada, Beni-Wassal, Nefeat and Ayede) loosened their hold on the southern part of the Sinai peninsula, most of their members migrating into North Sinai and Egypt; an example are remnants of the Ayede tribe which are currently concentrated in the region of Port Toufik in Egypt. It is very likely that the departure of these tribes was neither rapid nor a single occurrence. Extended periods of drought may have led to occasional massive emigration from the Sinai, but infiltration of individuals from South Sinai into Egypt must have been a long and continuous process. We know that the Egyptians tried to prevent this process and that one of the major problems facing the first and succeeding Pharaohs was to contain this infiltration of desert dwellers into their settled country, but to no avail (Sharon, 1977). At that time, every piece of land vacated in South Sinai was immediately occupied by members of new tribes, so that there was no return of those which had left the territory.

The Muzeina tribe, since the 19th century, has become one of the most successful in South Sinai. Within a brief span of time it dominated all of southeastern Sinai, from Sharm-esh-Sheikh in the south to Nuweiba in the north. It penetrated to the northern sandstone regions (G'amlot Hemaier) and reached as far as the Et-Tih range, entering the high mountain region and occupying parts of the Tarfat Qiderein and Bir-Iqna ranges. To the west, the Muzeina tribe occupied the flats between the Gulf of Suez and the high mountain facing Et-Tur (Fig. 2).

Other tribes infiltrated the region as well as the Muzeina. Thus the Awlad Said tribe occupied the eastern and southern borders of the high mountain. The hold of this tribe in South Sinai was encouraged by the monks at the Santa Katharina monastery who allowed its members to cultivate the remote orchards of the monastery, particularly those in Wadi Isla, and to protect the Dir-Antush monastery at the foot of Gebel Umm-Gumar which was strategically situated to secure the supply and pilgrimage routes between Et-Tur and the mother monastery. Evidence regarding the geographic origin of the various clans (khamulas; groups of extended families) points to the fact that this tribe comprises a sort of conglomerate of families that had reached South Sinai at different times and had become organized into a new tribal infrastructure.

Burckhardt (1822) regarded this tribe as one of the clans of the Sawalcha and notes:

> *The Oulad Said whose Sheikh is at present the second Sheikh of the Towara Arabs...are not as poor as the other tribes, and possess the best valleys of the mountains* (p.557).

Also Robinson (1841) wrote similarly about the Awlad Said tribe. Another tribe settling in South Sinai at that time (14th century) was the Gararsha. Burckhardt (1822) assigns this tribe, as well as the Awlad Said, to the Sawalcha and comments:

> *The Korashy are descendants of a few families of Benei Koreysh, who came here as fugitives from the Hedjaz [Arabia], and settled with whom they are now intimately intermixed* (p.557).

The last tribe to settle in South Sinai was the Haweitat. This tribe receives no mention either by Burckhardt (1822) or by Robinson (1841). Field (1952), however, relates the story of this tribe as he heard it from Sheikh Musah Hussein Salem (of the Awlad Said):

> *...Long before the construction of the Suez Canal, the Haweitat moved westward from the Hedjaz passing into Sinai between Aqaba and Jebel Sharr, that is, along the Wadi Zoba. Before 1914 only about 5% of the Haweitat were in Egypt west of the Canal, and about 10% in Sinai under*

Saad Abu Nar. The remainder were under Alayan Abu Tugaiga, who was replaced by his nephew, Ahmed Ibrahim. The group in Egypt was at Juhur near Galiubiah under Abdul Kerim Shedid, who was succeeded by his son, Ismail Abdul Kerim Shedid. After the battle with Ibn Saud in 1932, the Haweitat streamed westward. About five thousand persons reached Egypt; about a hundred and fifty remained in Sinai (p.127).

Field continues recounting that he was witness to a land dispute between the Haweitat tribe and the more "veteran" tribes of South Sinai. In that instance, the South Sinai tribes (the Gararsha, Sawalcha, Awlad Said, Aleigat, Gebeliya, Muzeina and the Beni-Wassal) lodged a complaint before the Egyptian governor of Sinai who resided in El Arish. Even in present times, the South Sinai tribes are still trying to expel the Haweitat from their midst, refusing to grant its members grazing areas or water holes, as well as refusing to marry with them. Not surprisingly, when the Israeli regional authorities after 1970 wished to dig a well within the territory of this tribe, a delegation of all the Sheikhs of South Sinai petitioned the authorities that digging of such a well not be permitted because, according to them, the Haweitat tribe had no rights in South Sinai, that the latter was merely a visitor in the area (E. Bergman, I.D.F. officer, representative of the Governor of South Sinai in the High Mountain region 1976-1978; personal communication, 1979).

Thus far we have intentionally refrained from integrating the history of the Gebeliya tribe with the common history of all the other tribes, since the Gebeliya tribe, despite being one of the oldest and perhaps even the oldest in the region, is exceptional insofar as its history is concerned. On the beginnings of the Gebeliya, Burckhardt (1822) remarks:

To the true Bedouin tribes above enumerated, are to be added the advena called Djebalye, or the mountaineers. I have stated that when Justinian built the Convent [St Catherine], he sent a party of slaves, originally from the shores of the Black Sea, as menial servants to the priests. These people came here with their wives and were settled by the Convent as guardians of the orchards and date plantations throughout the peninsula (p.562).

Robinson (1841) presents a similar account but with an addendum of great significance to our study. The added information is that within the Gebeliya tribe in South Sinai there was a large group originally from Egypt. At present this offshoot of the tribe is known by the name of Awlad Gindi. According to Robinson:

When Justinian built the Convent, he sent two hundred Walluchian prisoners, and ordered the Governor of Egypt to send two hundred Egyptians, to be the vassals of the Monastery, to serve and protect it (p.200).

Also, according to Robinson (1841, p.200) and Nandris (1981, p.56), the evidence for the existence and complexity of the Gebeliya tribe already appears in the writings of Eutychius, Patriarch of Alexandria, in the 9th century. This Patriarch relates how the Pope's emissary was dispatched along with 100 males and their families from among the Byzantine servants, and another 100 families from Egypt, all of them sent to the Santa Katharina Monastery to guard it. The Gebeliya apparently assumed the Moslem faith at the time of the Caliph Abd-el-Malik (625-705), even though a few members continued to retain the Christian religion until the middle of the 18th century (Burckhardt, 1822, p.564). Nandris (1981) maintains that the population from which the first Gebeliya originated (the Vlah, as recorded in the writings of travellers and explorers) still exists under that name in southern Europe. He writes:

> *The Vlahs or Aromani of Greece are a Latin-speaking and Hellenophille people, related to the Rumanians* (p.57).

It is clear, then, that the first members of the Gebeliya tribe reached South Sinai in the 6th century and as a tribe has survived until the present. This remarkable survival as a cultural entity is attributable to two main factors, namely: (a) intensive economic support by the monastery authorities, which enabled them to withstand severe drought periods; and (b) cultural isolation from the rest of the South Sinai tribes.

Genetical Evidence Of The Origin And Relationships Between South Sinai Bedouin Tribes

According to the historical evidence, we believe that the tribes of South Sinai may be divided into four main biological units: the first includes the Sawalcha, Gararsha and Awlad Said tribes; the second, the Muzeina tribe; the third, the Aleigat and Hamada tribes; and the fourth, the Gebeliya tribe. The Haweitat, Beni-Wassal and Ahali Et-Tur are probably independent biological units. The regional origin of all these tribes, with the exception of the Gebeliya, according to most investigators, is the Arabian peninsula. Yet this view seems to us problematic, in that some of the South Sinai tribes did not arrive directly into Sinai from Saudi Arabia, nor did they arrive as a single homogeneous group. An example is the settlement of the Awlad Said tribe in the Sinai as reported by Ben-David (1978). According to this author, the Abu-Zohar clan was first to reach South Sinai from the Arabian peninsula, whereas the Abu-Alaj clan wandered in the North African dunes before reaching South Sinai from Tunisia. As for the Abu-Amar clan, this group reached South Sinai after a period of peregrination in Egypt and the Abu-Nakhila clan had previously wandered similarly in the Syrian desert. The Abu-Gass branch arrived in South Sinai following its sojourn in the

Hebron region south of Judea, and finally the Basharin clan had been initially in Sudan, and some even relate it to a population of slaves bought by the South Sinai tribes and subsequently set free (Ben-David, 1978, pp.19-21). Assuming this information is essentially reliable, it suggests the possibility that the various tribes had incorporated groups not originally present in the "mother" population. Hardly a tribe in South Sinai had not at one time or another assimilated extraneous families (see, for instance, Figs. 3 and 4, depicting the structure of the Muzeina and Gebeliya tribes).

There can be no doubt that slaves were brought to Sinai from the Sudan, about which we have written documentation.

> Thus "*...But poor as they are, some of them, especially the Gararsheh, possess Negro slaves who look after the camels*" (Palmer, 1871, p.84). And "*...Between three hundred and four hundred Negroes live in Sinai, the majority near Tor. Sheikh Eid commented that forty or more years ago, each big sheikh had Negroes as bodyguards and slaves*" (Field, 1952, p.129).

Such admixtures pose the question whether the individual tribes may be defined as homogeneous biological units. We attempt to answer this question subsequently. First, however, we shall examine the genetic evidence for the origin of, and the interrelations between, the various tribes.

The first studies to examine the frequency of genetic markers in some blood group systems, haptoglobins and transferrins, in Bedouin populations of South Sinai were carried out by Kaufman-Zivelin (1971) and Bonne et al. (1971). The data included the frequency of haptoglobin phenotypes in the Bedouin population of South Sinai, and are shown in Table 2. We should mention that: a) the calculations intentionally excluded immediate relationships such as son and father, siblings, and the like; b) the Aleigat tribe in the sample included also some members (31) of the Hamada tribe; and c)under the category of "Feiran" were included primarily three tribes, namely, Gararsha, Sawalcha and Awlad Said, and it is also likely that some individuals from the Gebeliya, Muzeina and the Haweitat were also represented in it.

Kaufman-Zivelin (1971) concludes that the Gebeliya tribe is distinct from the rest of the mentioned tribes because in it the frequency of the Hp1-1 phenotype is probably close to zero while the frequency of the Hp2-2 attains 63% and is greater than in the other tribes (see Table 2). As for the Hp2-1 heterozygote, the differences between the tribes are less marked. Calculation of the Hp1 gene frequency for the various tribes shows it to be lowest in the Gebeliya (0.19) and highest in the Aleigat (0.51). Kaufman-Zivelin (1971) also computed the observed frequency of the haptoglobin types versus the expected frequency according to the Hardy-Weinberg law for a panmictic population of unlimited size, and without

selection, migration or mutations. She found that discrepancy between the observed and expected frequency occurred only in the Gebeliya tribe.

TABLE 2 Phenotype frequency of haptoglobins and of gene Hp1 in Bedouin populations of South Sinai, by tribe.

	Haptoglobin phenotypes								
	Hp (1-1)		Hp (2-1)		Hp (2-2)		Total	Gene freq Hp1	S.E.
Tribe	N	%	N	%	N	%			
Muzeina	9	7.44	49	40.50	63	52.07	121	0.277	0.028
Gebeliya	-	-	41	36.94	70	63.06	111	0.185	0.026
Feiran*	12	13.48	45	50.56	32	35.96	89	0.388	0.036
Aleigat	21	26.58	38	48.10	20	25.32	79	0.506	0.040
Others*	0	23.26	37	43.02	29	33.72	86	0.448	0.037
Total	62	12.76	210	43.21	214	44.03	486	0.344	0.014

From Kaufman-Zivelin, 1971, p.20

* Included in this group are members of the Sawalcha, Gararsha and Awlad Said tribes

She likewise compared the frequencies of the three phenotypes between tribe pairs (Table 3) and clearly showed that the Gebeliya tribe differs significantly from all the other tribes and also that the Muzeina tribe differs significantly from the Aleigat. As for comparison of the Hp1 gene frequency in tribe pairs (Table 3), in all instances the differences in the gene frequency are statistically significant.

TABLE 3 Chi-square differences in phenotype frequencies of 3 systems: haptoglobin, ABO and P and Hp1 gene frequency between Bedouin tribe pairs in South Sinai.

	TRIBE PAIR					
System	Gebeliya-Muzeina	Gebeliya-Aleigat	Gebeliya-Feiran**	Muzeina-Aleigat	Muzeina-Feiran	Aleigat-Feiran
Haptoglobin	9.67	44.78*	24.22*	20.56*	5.98	5.24
Hp1	5.50*	44.01*	20.40*	21.66*	5.75*	4.78*
ABO	36.17*	25.51*	36.14*	2.26	12.89	6.12
P	23.98*	1.07	0.13	12.37*	12.16	0.01

* Statistical significance = $P<0.05$

From Kaufman-Zivelin, 1971, pp.23-26

** Conglomerate of bedouins from different tribes, mainly Sawalcha and Awlad Said.

Comparison of ABO blood groups. Frequency of the ABO group genes in the various tribes is given in Table 4. As can be seen, the frequency of the q gene is high in the Gebeliya tribe relative to that in the other tribes , whereas in this same tribe the frequency of the p gene is comparatively low. Chi-square differences in the ABO system phenotypes between pairs of Bedouin tribes are considered in Table 3. Here also is seen the "exclusivity" of the Gebeliya from the rest of the tribes. It is also noted that the Muzeina tribe differs in the ABO context from the Feiran group.

TABLE 4 ABO gene frequency in various Bedouin tribes of South Sinai.

Tribe	No. of individuals	p	q	r
Muzeina	132	0.171	0.132	0.698
Gebeliya	112	0.123	0.255	0.621
Feiran	94	0.140	0.055	0.795
Aleigat	82	0.198	0.124	0.678

From Kaufman-Zivelin, 1971, p.25

The P blood group. The frequencies of the p_1 gene in the different tribes are: Muzeina=0.572; Gebeliya=0.309; Feiran=0.373; and Aleigat=0.366. It is here seen that the frequency of the p_1 gene is relatively high in the Muzeina tribe (0.57) compared to that in the other tribes (0.31-0.37). A comparison of the phenotypes in the P system (Table 3) reveals that the Muzeina tribe differs significantly from all the other groups.

Transferrin types. A total of 347 Bedouins (280 males and 67 females) were sampled for this typing, without regard to tribal assignation (Kaufman-Zivelin, 1971). The genetic type of transferrins revealed was TfCC, which in turn indicates the homozygote for gene TfC. Another study by Bonne' et al. (1971) corroborated the results of Kaufman-Zivelin. The frequency of the TfC gene in the combined samples was computed to be 0.999.

Kaufman-Zivelin, in her Bedouin study (1971), attempted to ascertain whether there was any correlation between the frequency of the Hp1 gene in the various tribes and its frequency in the geographic regions from which the tribes purportedly originated. Her data are presented in Table 5. The Hp1 gene frequency in the Muzeina tribe is, according to her data, similar to that in Arab and other Bedouin populations in Israel. In contrast, the Aleigat tribe resembles groups from Sudan, Uganda and Kenya, but manifests no similarity to Ethiopian or Egyptian populations in Hp1 gene frequency. The Feiran tribes (Gararsha,

Sawalcha and Awlad Said) also resemble the Arab and Bedouin populations in Israel as well as Arab populations from Saudi Arabia. The Gebeliya tribe in South Sinai manifests a frequency of the Hp1 gene (0.18) that is much lower than usual in Europe (0.34-0.37) or, excepting Egypt (0.21), in Africa (0.40-0.63). Kaufman-Zivelin also addressed the question as to whether the Gebeliya tribe represents an amalgamation of African and European populations. She picked a large number of genetic markers whose frequency differs in African and European populations, and concluded that both African and European influences are discernible in their (Gebeliya) genetic systems and that deviation from the expected gene frequency, as presented by the two "mother populations", is putatively the result of selection processes or genetic drift. She also concluded that the Gebeliya is the only tribe that stands apart from all the other tribes in Hp1 and that a comparison of its frequency among the Bedouins in South Sinai and neighboring populations strengthens the assumptions regarding the geographic origins of the various tribes, as previously indicated.

TABLE 5 Frequency of the gene Hp1 among diverse groups in different geographic regions.

South Sinai Bedouin^	Hp1 Freq	Other Middle East	Hp1 Freq	East Africa	Hp1 Fre.	Asia	Hp1 Freq.	Europe	Hp1 Fre.
Muzeina (Arabia)	0.28	Bedouins (Israel)	0.34	Uganda	0.63	Iran	0.28	Greece	0.35
Gebeliya (Europe+ Middle East)	0.18	Arabs (Israel)*	0.35	Kenya	0.47	Hadhramaut (S.Arabia) Jews	0.21	Yugoslavia	0.37
Feiran (Arabia)	0.39	-	-	Sudan	0.50	Hadhramaut (S.Arabia) Arabs	0.47	-	-
Aleigat (Arabia)	0.51	-	-	Ethiopia	0.40	-	-	-	-
Total	0.34	-	-	Egypt	0.21	-	-	-	-

From Kaufman-Zivelin, 1971, p.29.

* Collected by different authors, mainly from Morant et al. 1971

^ Places in parentheses refer to geographical origin

TABLE 6 Frequency of various genes in the Bedouin population of South Sinai: Towara* and Gebeliya (Bonne et al., 1971, pp.400-406).

Gene	Towara	Gebeliya	Gene	Towara	Gebeliya
ABO system			Duffy system		
p^1	0.0405	0.1235	Fy^a	0.2689	0.2386
p^{int}	0.0156	-	Fy^b	0.3595	0.1662
p^2	0.1087	-	Fy	0.3715	0.5952
q	0.0936	0.2603			
r	0.7417	0.6163	Gm system		
MN system					
M	0.5173	0.6579	Gm^1	0.2379	0.2603
N	0.4827	0.3421	$Gm^{1,2}$	0.0344	-
JK system			$Gm^{1,10,11}$	0.0168	-
Jk^a	0.4788	0.3215	$Gm^{1,5,10,11}$	0.1557	0.3905
Jk^b	0.5212	0.6785	$Gm^{4,5,10,11}$	0.5552	0.3492
Rh system			Haptoglobin system		
$CDeR^1$	0.2607	0.2421			
$CD^{u}er^{1u}$	0.0046	-	Hp^1	0.4293	0.2105
Cder'	0.0046	-	Hp^2	0.5707	0.7895
$cDER^2$	0.0901	0.1684			
cdEr''	0.0139	-	Acid phosphatase system		
$cD^{u}er^{ou}$	-	0.0169	p^a	0.1332	0.0645
$cDeR^0$	0.1019	0.2601	p^b	0.8643	0.9355
cder	0.5243	0.3126	p^c	0.0025	-
P system			6-phosphogl. dehydrogenase system		
P_1	0.3746	0.2967	PGD^A	0.8508	0.9316
P_2	0.6254	0.7033	PGD^C	0.1468	0.0684
			PGD^H	0.0025	-
V system					
V	0.0407	0.0657	Adenylate kinase system		
v	0.9593	0.9343	AK^1	0.9751	0.9632
			AK^2	0.0249	0.0368
Kell system			Phosphoglucomutase (PGM_1) system		
KJs^b	0.1309	0.1794	$PGM^1{}_1$	0.8500	0.7579
kJs^a	0.0202	0.0654	$PGM^2{}_1$	0.1500	0.2316
kJs^b	0.8489	0.7552	$PGM^7{}_1$	-	0.0105

*All tribes of South Sinai excluding Gebeliya.

Contemporaneously with the study of Kaufman-Zivelin (1971), an extensive study by Bonne' and coworkers (1971) appeared on heritable blood factors in the Bedouin. In all, 297 individuals (280 males and 17 females) were examined (excluding family ties of the first order).

The sample was divided into four main groups, namely, Gebeliya (95), Aleigat (50), Muzeina (53) and the remaining Towara tribes (99). The main findings of that study are given in Table 6. The authors conclude that the Gebeliya tribe differs significantly from the rest in numerous genetic systems and that, with few exceptions, there are no significant differences between the other tribes. This is the reason why the data in Table 6 are given only for the Towara and the Gebeliya.

Bonne' et al. (1971) also note that:

> *In most systems the Towara tribes agree with what is known of other neighbouring peoples, and for the blood groups in the strict sense, they greatly resemble the Arabs of the Arabian peninsula. The main differences are the high frequencies of the Rh complex cde (r) and the genes K and* PGM^{1}_{1}. *The Jebeliya on the other hand, differ very markedly and significantly not only from the other Sinai Bedouins but from all other neighbouring populations... In general, the prominent negroid features observed in the Jebeliya call for a reappraisal of their historical and ethnic background* (p.407).

Yair Ben-David (Eugene Kobyliansky) and his associates (1983) examined the frequency of the T autosomal dominant gene among a number of Bedouin tribes (Table 7). The ability to taste the compound phenylthiocarbamide (PTC) is generally attributed to a dominant, autosomal gene, called T, whose recessive allele is t. Homozygote dominants (TT) and heterozygous (Tt) individuals are able to taste PTC whereas the recessive homozygote individuals (tt) are unable to do so.

TABLE 7 Frequency of gene T in Bedouin tribes of South Sinai.

Tribe	N	T
Gebeliya	92	.4583
Awlad Said	23	.4892
Muzeina	170	.3537
Hamada	23	.2482
Aleigat	46	.2482
Gararsha	68	.1775

From Ben-David et al., 1983, p.199

The statistical significance of the differences in this respect between the tribes is given in Table 8. The results show that the Gebeliya tribe differs significantly from all the tribes with which it was compared with one exception, the Awlad Said. The Muzeina tribe also differed from all the other tribes, without any exception. Furthermore, the high frequency of the T gene encountered in the Gebeliya tribe is typical also for many African societies (see Mourant et al., 1976).

TABLE 8 Chi square differences in frequency of gene T between paired South Sinai Bedouin tribes

Paired tribes	χ^2
Gebeliya-Muzeina	12.2***
Gebeliya-Hamada	6.6**
Gebeliya-Aleigat	13.1***
Gebeliya-Gararsha	26.3***
Gebeliya-Awlad Said	0.4
Muzeina-Hamada	9.3**
Muzeina-Aleigat	10.4**
Muzeina-Gararsha	21.3***
Muzeina-Awlad Said	10.3***
Hamada-Aleigat	1.1
Hamada-Gararsha	0.6
Hamada-Awlad Said	5.6*
Aleigat-Gararsha	0.6
Aleigat-Awlad Said	7.7**
Gararsha-Awlad Said	16.8***

From Y. Ben-David et al., 1983, p.58)

* 5% significance level

**1% significance level

***0.1% significance level

Significance of genetic studies. All the investigators of Bedouins whose studies on blood groups are here represented, emphasize that their material was problematic mainly because of the sampling procedure and size of sample, and caution against drawing broader firm conclusions. Nevertheless we believe such data can and should be considered, albeit with due caution, especially when correlated with other biological and morphological data. The biologic data that we have presented show that:

a) the Aleigat and Hamada tribes are related; in genetic systems like sensitivity to PTC, P blood group system and such, they show almost complete identity and can therefore be treated as one group;

b) the Muzeina tribe may be regarded as an independent biological unit because it does not show genetic proximity (albeit judged by blood markers only) even to the Aleigat tribe with which it purportedly had maintained marital relationships;

c) the Gebeliya tribe also appears to be an independent biological unit which, like the Muzeina tribe, shows little or no genetic relatedness to any of the other tribes in South Sinai. Unlike the Muzeina, however, it displays extreme variability in some of the genetic systems. This variability, or `instability', stems probably from the fact that previous field investigators failed to discriminate between the Awlad Gindi sub-tribe whose origin is probably Egyptian, and the other sub-tribes which originated from Bedouin tribes of the Arabian peninsula, perhaps even from surviving slaves brought by Justinian to the Santa Katharina monastery from Europe in the 6th century.

We should note that the biological data here presented concur in part with the socio-historical information available, as previously indicated.

The frequencies of the genotypes of the blood groups do not show any deviation from the Hardy-Weinberg law, with one exception, in spite of the fact that we are dealing here with small populations with non-random matings. The one exception is the Gebeliya tribe, although the reason for this is not clear. Why a "genetic balance", expressed by blood group systems, appears to be maintained within the South Sinai Bedouin groups, will be considered subsequently.

B. ETHNOGRAPHY

Social Structure

There are three large "social units" among Bedouins: a)"tribal suprastructure"; b)"tribal affiliation"; and c)"tribe". In the majority of Bedouin groups in northern Sinai and in Israel, the biological ties between and within the tribes find expression in the tribal suprastrucure organization. The tribes of South Sinai, however, diverge somewhat in this respect. While they all belong to one super-tribe organization (Safef in Arabic), known as the Towara ("Tor" in Arabic meaning a mountain, thus designating the topographic nature of South Sinai), the ties between the tribes are based mainly on common and defined geographic localization and not on any "blood" relationship such as is customary at the tribal suprastructure level in most Bedouin groups (Marx, 1974; Ben-David,

1978). Baily (1977, p.246) notes that "*the tribal suprastructure is the nationality of the Bedouins*"

The inception of most of the major Bedouin tribal suprastructures in Sinai and the Israeli Negev started with a limited number of tribes which initially consolidated in the Arabian peninsula and then migrated north and northwest into settled land. In the course of this migration, moving from one region to another, the group of tribes assimilated local families, factions and at times even entire tribes, to form an expanded tribal suprastructure. The founding of the majority of large tribal suprastructures of Bedouins in Sinai and the Negev was in the Arabian peninsula. For example, the Jabrat tribal suprastructure originated in the Lif Wadi in the Hejaz district, Arabia (Muhsam, 1966), whence it migrated through the Arava to Sinai, reaching the coastal area near El-Arish. A large faction of this tribal suprastructure continued its migration into the boundaries of Israel.

The Tarabin tribal suprastructure originated in the Turaba region in the center of the Arabian peninsula (Muhsam, 1966) and commenced its migration into Sinai later than did the Jibarat, although its route largely coincided with that of the Jibarat. Actually, the Tarabin, owing to its large size, started "pushing" small tribes belonging to the Jibarat in the direction of Israel, ultimately displacing the tribes of the Jibarat from their residence in the El-Arish region.

The Azazme tribal suprastructure originated in north Hejaz, Arabia (Muhsam, 1966) and reached its present location in the Israeli Negev by coming directly through the Arava and North Sinai. The Tayaha tribal suprastructure also originated in the Arabian peninsula. It settled first in Central Sinai and later various tribes of this tribal suprastructure penetrated into North Sinai and the Israeli Negev. The Towara suprastructure, which includes most of the Bedouin tribes of South Sinai, unlike the other large tribal suprastructures was formed by a conglomerate of discrete tribes with no genealogical or historical ties between them. The Towara in South Sinai had been organized to form a united body, powerful enough to counterbalance the other tribal suprastructures, especially the Tayaha which sought to encroach on its living spaces. However, apart from the latter common purpose, the Towara exerted no influence on occurrences between and within tribes in the South Sinai.

In South Sinai there also exists a "framework" of tribal affiliation or alliance, which is an organization between tribes within the tribal suprastructure. A similar organization exists also among the Negev Bedouins. Baily (1977) called the latter organization "El-Baten" or the El-Fahed". In the South Sinai affiliation, the ties between tribes are primarily on a socio-political level; in the Israeli Negev affiliation, however, the ties are essentially blood relationships, through a

common ancestor. According to Baily (1977), the role of the latter tribal affiliation is to form a framework for social intercourse, such as inter-tribal marriages, or cooperation in pilgrimages to the graves commonly considered holy, usually tombs of sheikhs known for their "supernatural" powers, and also for economic cooperation (particularly in smuggling activities). The South Sinai tribal affiliations are called after the leading tribe in the group: the Sawalcha affiliation includes also the Awlad Said and Gararsha tribes, and the Aleigat affiliation includes also the Muzeina and Hamada tribes. The Gebeliya, Haweitat and Beni-Wassal tribes are not included within either coalition. The present tribal affiliations are not completely parallel with the biological units determined earlier on the basis of the different historical background of each tribe.

The third-ranking social unit from the standpoint of size is the tribe, or El-Ashira. According to Baily (1977) a tribe forms in one of two ways: 1) A sub-tribe increases in size and demands independence from the mother tribe in order to advance its special interests; 2) A certain group assimilates other groups and together these come to comprise a tribe. Marx (1974) has this to say about the Israeli Negev Bedouin tribe:

> *The most extensive political group at present is the tribe (ashira; plu. ashair) and the sub-tribe (ruba; plu. rub'oa). The tribe was formerly the group that made battle. Today it is the administrative unit. At the head of such a group stands an elected leader, called the Sheikh...the Sheikh is now the primary mediator between the sub-tribes and the authorities - a fact which lends him considerable power...the tribe also had an appreciable degree of continuity, and this is apparent from the fact that this is the smallest group in the customary genealogies which describe the relationships between all the tribes of the tribal suprastructure. The tribe is not a group possessed of land properties and its boundaries are not so clearly demarcated as those of branches, but generally one can say that the groups which comprise the tribe own adjacent lands which are utilized as areas of grazing* (p.58).

According to Kapra and Bar-Yosef (1978):

> *The tribe is the unit which guards the grazing land and the water sources needed for its sustenance against the other tribes. Hence the affinity of the Bedouin for his tribe, which safeguards his life and actual survival in the desert* (p.109).

It would seem that both these definitions, taken together, epitomize the role of the tribe in the general Bedouin society. The tribes of South Sinai, however, differ in important respects from the tribes of the Negev or North Sinai. Marx (1974), for instance, notes that the typical Bedouin tribe in the Negev includes individuals from different ethnic, geographic and economic backgrounds whom he assigns into three categories: a) Bedouins who dominate the tribe, albeit not always the majority in the tribe, and who consider themselves Arab; b) the group of Fellahin, a derivative term for those living in cultivated regions on the outskirts of the desert; c) the groups of slaves (Ab'ad), descendants of Negro slaves formerly the property of Bedouins.

Among the tribes of South Sinai the above division does not exist, and although elements of the last two categories occur within the various tribes, their relative numerical strength within the tribe is negligible. Too, each social framework within the Bedouin society in South Sinai is a biological entity.

The social structures of the Muzeina and Gebeliya tribes have been methodically studied by us, and we shall therefore refer to them in our presentation of the various social units of which the tribe is comprised, and of the biological ties between these units.

The tribe, for which the accepted Arab term in South Sinai is "qabila", is composed of several sub-tribes for which the Arab term is "ruba", meaning a quarter; this etymological division of four is really fictitious because each tribe is composed of a different number of rubas (Muhsam, 1966; Marx, 1974). The ruba (here also alternately termed a sub-tribe) is composed, according to Baily (1977) of:

> *groups of Hams [`blood feud' group], the majority of which are related to a common ancestor in the distant past, more than five generations ago; the makeup of the ruba is not static; groups may join it or leave it, according to their interests* (p.245).

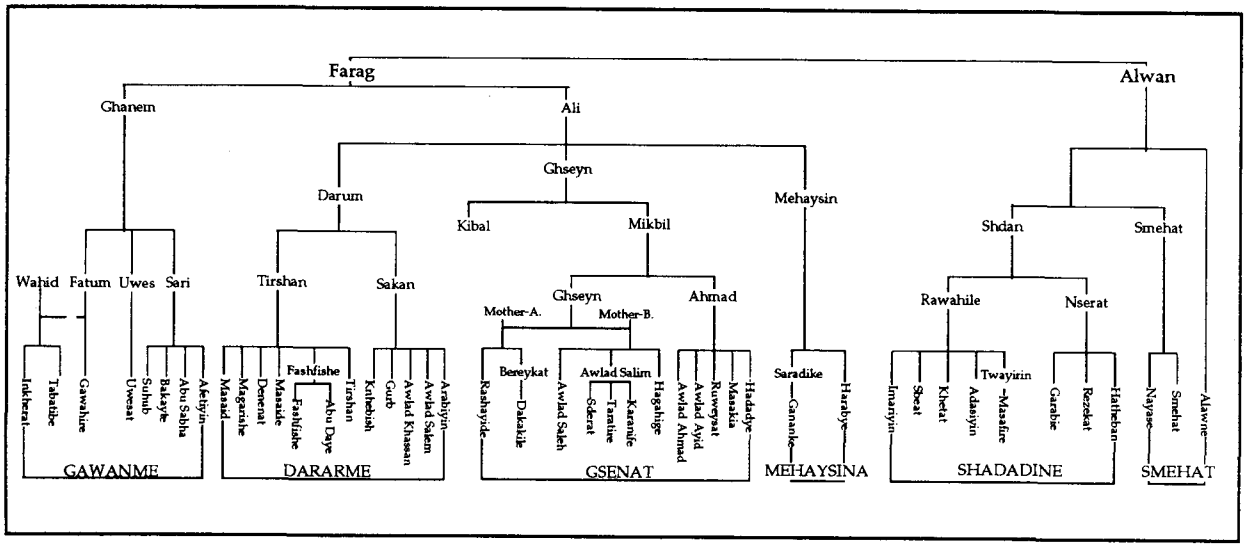
Marx (1974) comments on the rubas of the Negev tribes thus:

> *The largest ruba in the tribe is in most cases also the most aggressive, and from it is elected the Sheikh, or head of the tribe. The latter lends the ruba great influence, both in its internal tribal policies as well as in its dealings with the authorities. Thus, usually, the ruba of the Sheikh has more land than the other rubas and this enables it to attract to itself numerous affiliates and thereby become much larger than the other rubas* (pp.59-60).

In the same connection, Kapra and Bar-Yosef (1978) note that

> *the ruba comprises a `pressure' group of families and units having common interests and standing together against groups of opposed interests within the same tribe* (p.109).

FIGURE 3: Genealogical Tree of the Muzeina Tribe*

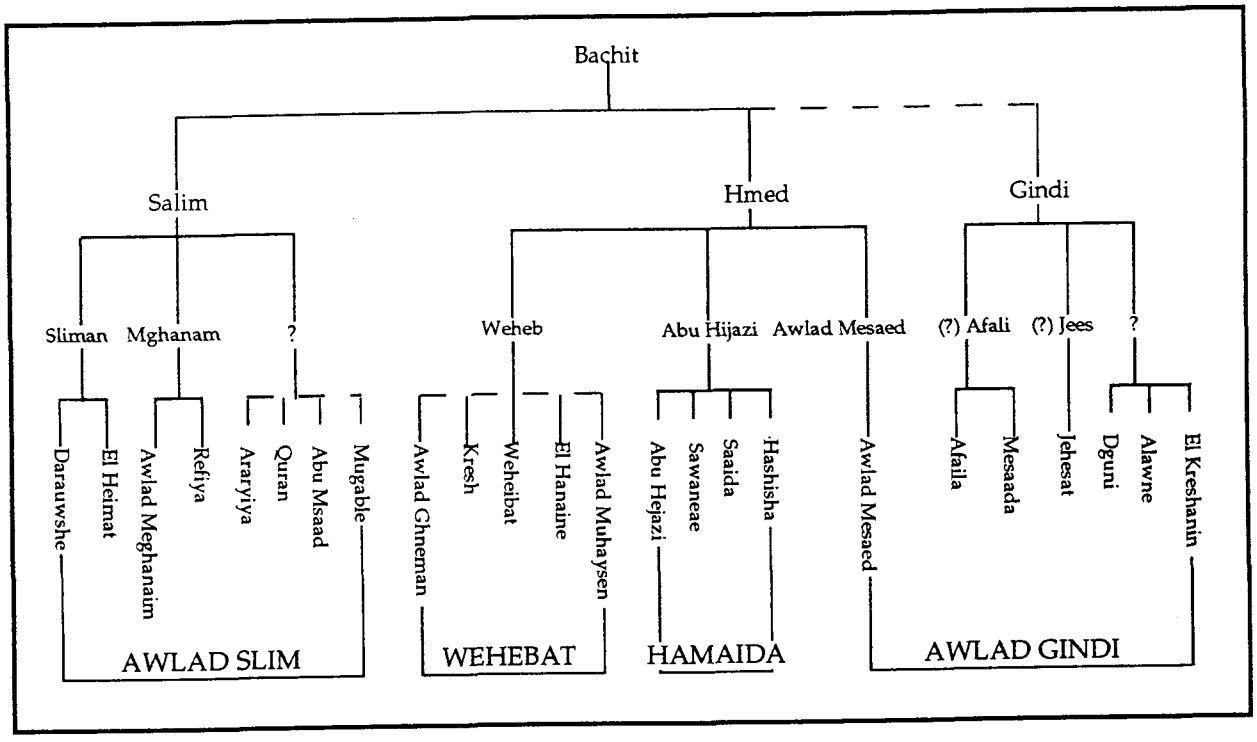


* The Muzeina tribe is comprised of six sub-tribes (horizontal names, bottom), four of which are organized within the Farag clan and two in the Alwan clan (horizontal names, top). The numbers of extended families (vertical names) varies greatly between sub-tribes. Some sub-tribes include also assimilated families (dashed lines).

Prof. Ben David and his research assistants taking dental casts from Bedouin children in Dahab.

In the tribes of South Sinai, as we shall see, the ruba is a well-defined biological unit, in the Muzeina tribe headed by a Sheikh or by an Omdah (another term for a tribal leader, identical in all respects to sheikh) in the Gebeliya tribe. Within the Muzeina (Fig. 3) we distinguish six sub-tribes, namely, the Gawanme, Dararme, Gsenat, Mehaysina, Shadadine and Smehat, all apparently deriving from the same founding ancestor. In the Gebeliya (Fig. 4), however, we find only four sub-tribes, namely, the Awlad Salim, Wehebat, Hamaida and Awlad Gindi, of which only the last does not relate directly to the tribe's genealogy.

FIGURE 4: Genealogical Tree of the Gebeliya Tribe*



* The Gebeliya tribe is comprised of 4 sub-tribes (horizontal names, bottom), three of which have a common ancestor (Bachit). The Awlad Gindi is an affiliated sub-tribe.

Muhsam (1966) in his extensive study of Bedouin tribes in the Israeli Negev notes that:

> *There are 93 tribes in the Beersheba Sub-District; these tribes are grouped into seven wider units called gabail (singular: gabila). Each tribe is composed of several sections called ruba. Most of the individual families forming a ruba belong to one clan or `hamula', only some of the larger rubas are divided into several clans. But in all cases, the ruba is distinguished by the fact that most of its members are related to one*

another by descent. The unrelated families in a ruba arose from tenants who, by marriage with members of the ruba, and by the acquisition of land, became themselves members of the ruba. It may be pointed out that individual families of various rubas within the tribe may be related to one another by kinship (p.25).

Muhsam's comments on the Negev Bedouin are applicable also for the majority of the South Sinai tribes insofar as the sub-tribe (ruba) is concerned.

Each sub-tribe or ruba is composed of several clans (khamula) which usually stem from a common ancestor. The Dararme sub-tribe of the Muzeina tribe is comprised of two clans - the Tirshan and the Sakhan (Fig. 3), whereas the Gawanme sub-tribe of the same tribe comprises four clans, three of which, the Sowariya (Sari), Fatiyma (Fatum) and Gwesat (Uwes), claim a common ancestor whereas the fourth, Wahid, derives from ancestors which became affiliated to the Gawanme sub-tribe. The clan has no clear-cut designation in the Arab language and the best one can do is employ the term Far'a or khamula, a term not prevalent among the tribes of South Sinai. The clans themselves are made up of smaller social units, namely, the "extended families", or in Arabic the Aeila. At times, the concept of a `father-house' substitutes for the concept of an extended family.

The extended Bedouin family is a social suprastructure whose actual existence and role are the subject of controversy among various investigators. For instance, Baily (1977, p.243) writes that the extended family is composed of a male, his wives and all his children, including the married sons and their wives. He further notes that:

this framework exists only when the father of the family is successful and prosperous, thereby exerting his authority on his sons even after they had married.

Kapra and Bar-Yosef (1978), on the other hand, define the extended Bedouin family as:

This is actually an extended economic suprastructure (meaning broader than the mere family) whose limits are not fixed. It usually includes family relatives and affiliate neighbors which maintain extensive or limited economical relations ranging from a full sharing in all incomes and expenses to a common ownership of a certain piece of property (p.109)

The Sakan clan (Dararme sub-tribe of the Muzeina tribe) is composed of five extended families, namely, the Khnebish, Gurb, Awlad Khassan, Awlad Salem and Arabiyin. The Mghanam clan (Awlad Salim sub-tribe of the Gebeliya tribe) is comprised of two extended families - the Awlad Mghanaim and the Refiya.

The social structure of the extended family is made up of a variable number of biological families; in Arabic these are called Beit. Marx (1974), writing on the Negev Bedouin family states:

> *The group within whose framework the economic activities take place is mostly the family, whether in its limited or extended form* (p.57).

In this connection Kapra and Bar-Yosef (1978) write on the South Sinai Bedouins that:

> *The basic economic unit in every Bedouin society is the limited family comprised of a male, his wives and his unmarried children. This is an economic framework within which each member of the family plays a certain role. The father is the leader of the family upon whom rest the duties of provision and security. The mother is responsible for all other tasks, i.e., housekeeping, raising of the children and upkeep of the family livestock* (p.109).

Baily (1977, p.243) assigns two roles to the Bedouin family in general, namely, (1) to constitute an economic framework within which the Bedouin man organizes his estate, with himself serving as "foreman" while his wife and children supply the "manpower". The wealth of the Bedouin is dependent on the success of this unit or framework. And (2) to constitute a framework for the production of male progeny that can serve as the enforcers in any blood feud.

The genealogical ties between such biological families are unravelled with the aid of the Hams records (see next chapter for details). The extended family is thus the framework that supervises the daily routine, migratory activities, and lodgings. The nuclear family, a more basic unit, is also the elementary socio-economic unit within the Bedouin society, but the lowest supervisory framework is the extended family.

The advantage of the extended family as the supervisory framework within the tribe is emphasized by Ben-David (1981) thus:

> *The fact that the extended family comprises a single migratory unit provides an economic advantage for both animal husbandry and horticulture, for these tasks cannot be undertaken by a single person. Moreover, nowadays the young of the family hire out for pay and are thus absent from their home for prolonged periods of time. It is the family elder, remaining in the encampment, who protects the children and tends to the livestock* (p.29).

All the Towara tribes have incorporated "external" families in the course of their history.

The Muzeina tribe (Fig. 3), according to our data, contains six incorporated or adopted families, although there may be one or two more. The assimilated families in the Muzeina tribe are the :

a) Tabatibe and Inkherat (sub-tribe Gawanme), which are believed to be descended from a common Muzeina ancestor but not from one of the original founding fathers of the tribe;

b) Hadadye (sub-tribe Gsenat), a family whose founder originally was from the Saradga tribe in North Sinai who married a woman of the Muzeina and preferred to remain in the Muzeina tribe;

c) Hagahige (sub-tribe Gsenat) who descended from the Beni-Wassal tribe that became affiliated with the Muzeina;

d) Twayirin (sub-tribe Shadadine), originating in Saudia; and finally

e) Adasiyin (sub-tribe Shadadine) who are considered to be Tarabins who have retained their integrity within the framework of the Muzeina tribe.

It should be noted that entry of a "foreign" family into the Muzeina tribe must be by common consent of all the clans.

The Hams are frequently regarded as part of the social structure of the tribe, much the same as the ruba, the extended family, and the like. In our opinion, the Hams is mainly a judicial body , albeit based on biological ties between its individual members, and not a tribal social body such as previously described. According to Ben-David (1981) the Hams and the extended family are two congruent frameworks:

> *The `Aeila' is the framework of the extended family. Its members are endowed with greater degrees of identity and consolidation than in all the frameworks above it, and it is also characterized by the consanguinity of its members. The members of an extended family are descended from a common grandfather or at least a common great-grandfather, that is, their common ancestry traces back to three or four generations. Therefore they must belong to the same Hams* (p.29).

The Muzeina tribe. Confusion in priority of publication that often happens when a number of investigators study the same subject at the same time, has happened to us with respect to the South Sinai tribes. Thus Ben-David's (1981) monograph entitled "Gebeliya - a Bedouin Tribe in the Shade of a Monastery" has introduced the history of the Gebeliya tribe before we were able to publish our own account on the same tribe. Therefore we shall concentrate in the present publication primarily on the social structure of the Muzeina tribe and shall touch upon the Gebeliya tribe only when necessary.

Sources. The social structure of the Muzeina tribe in all its intricacies is not known even to many of the elder members of the tribe. One may find a person

within this tribe who knows only about the origin of the population adjacent to him (e.g. the extended families in his own sub-tribe) and another who can provide details on the biological ties between the sub-tribes as well, although members of the latter type are very scarce and are found only among the elders. From various versions we have heard in the tribe, it is clear that there is no single or uniform account of the Muzeina tribal genealogy. As might perhaps be expected, the more remote the required genealogy, the more varied the accounts of the informers. Yet the differences are not so extreme as to prevent the formulation of what appears to be an acceptable overall account of the genealogical tree of the Muzeina tribe. Once we had detailed information for all six sub-tribes separately, we could combine them into a composite picture, which is given in Fig. 3.

The genealogical map of the Muzeina tribe reveals that there are differences in the degree of esteem relegated to the various sub-tribes and even to some families within them. Thus the tribe divides into three main groups, namely, the Beni Ghanem (Gawanme sub-tribe), Beni Ali (Dararme, Gsenat and Mehaysina sub-tribes) and Beni Alwan (Smehat and Shadadine sub-tribes).The largest and strongest of the three is the Beni Ali. Following is the Beni Ghanem, whose eponym was purportedly the cousin of the founder of the first group (see Fig. 3). At the bottom of the hierarchy are the Beni Alwan , who are indicated in the genealogical map as descendants of the founding father Aliyan (Alwan), brother of Farag the founding father of the Beni Ali and Beni Ghanem.

Regarding the hierarchy between the sub-tribes of the Gebeliya tribe and its significance (which also applies to the Muzeina sub-tribes), Ben-David remarks (1981):

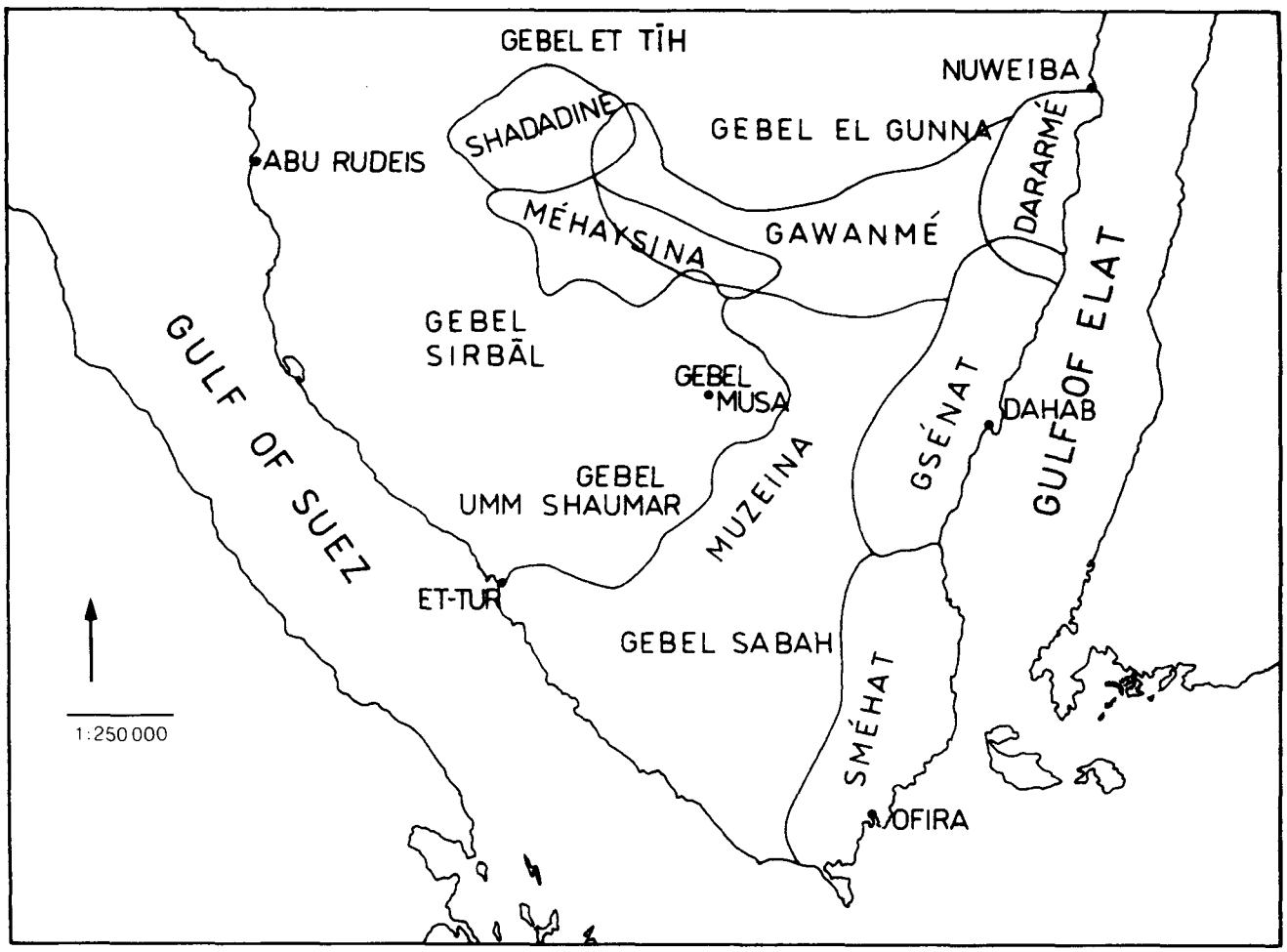
> *As in the intertribal relation, where each tribe claims, for one reason or another, ascendancy over the other tribes, so also in the Gebeliya tribe, a particular sub-tribe will claim ascendancy over the other sub-tribes* (p.32).

The large territorial spread of the Muzeina tribe (Fig. 5) enables it to control five main living resources, to wit:

a) grazing land around the high mountains and the open plains of 'Ein Khudrah (Gawanme territory), Bikat Baraka (Gsenat and Gawanme territory), Ilu-el-Agramiya (Mehaysina territory) and part of the ramlot sandstone area (Shadadine territory);
b) fishing regions along the Gulfs of Elat and Suez;
c) `smugglers' trail'.All the smuggling routes from Saudi Arabia and Jordan to Egypt pass through the territory of this tribe and consequently cooperation and consent of the tribe is mandatory;
d) proximity to urban settlements which provide job opportunities;

e) majority of tourism into South Sinai, excluding the pilgrims, must pass through the territory of the tribe.

FIGURE 5: Territorial Distribution in South Sinai of the Muzeina Sub-tribes.



Needless to say, these great economic advantages deriving from the territorial hold of the tribe have rendered it the strongest and largest of all the South Sinai tribes. The Muzeina sub-tribes Gsenat and Dararme reside along the Gulf of Elat and their borders extend eastwards from Nuweiba in the north to Ras et Tantur in the south and westwards, from the region of 'Ein Khudrah in the north to Gebel Feirani in the south. The Dararme have settled mainly at Neviot (Nuweiba) and emerge for spring grazing into the wadis that open into their territory, such as the Sa'ada, Samaghi, Hibeig and Rasasa. The Gsenat reside at Dahab and set out for grazing into the wadis of Umaiyed Dahab, Kenai and others. The Mehaysina reside partly in the region of Dahab and Nuweiba but mainly in the region of Ein-el-Akhdar. The Gawanme hardly have any contact with the Gulf of Elat, being scattered along Wadi Sa'al up to Sheikh Faranji. The Shadadine locate to the south of Gebel Raqaba and Zibalia and in the wadis of

Ma'in and Agir; a small faction of this sub-tribe is encountered in Wadi Nasb as an enclave within the territories of the other sub-tribes and an additional faction is concentrated at Dahab. The Smehat are settled along the southern coast of the Gulf of Elat (Fig. 5).

The "Hams"

A basic tool for studying marriage patterns among the Bedouins of South Sinai

The Hams, or blood-feud group, as a social unit has been mentioned previously. A fuller discussion of the scope of this social unit follows. The infrastructure which serves as a foundation for the evaluation of marital patterns within the Muzeina tribe is the Hams. The Hams in all Bedouin societies of the Near East is in fact a judicial framework which encompasses all the descendants of the single founding father as far back as five generations (Fig. 6). Kapra and Bar-Yosef (1978) note that:

> *The hamula or Hams is a group which, according to the Bedouins, protects the life, integrity and property of the individual from possible harm incurred by others. What characterizes this framework is the collective responsibility which activates the males of the group to punitive measures. Thus, once a member of the group is harmed, the other members of the Hams must punish every male member of the Hams responsible for the injury. The Hams includes all the progeny of the ancestor that had lived five generations ago, whence the origin of the name Hams which literally means `five'* (p.109).

On the same subject Marx (1974) comments

> *The term Hams (five), does not in fact refer to a recognized social group, i.e., the Khamula, but merely to those males in it who derive from a common ancestor that had lived five generations previously* (p.59).

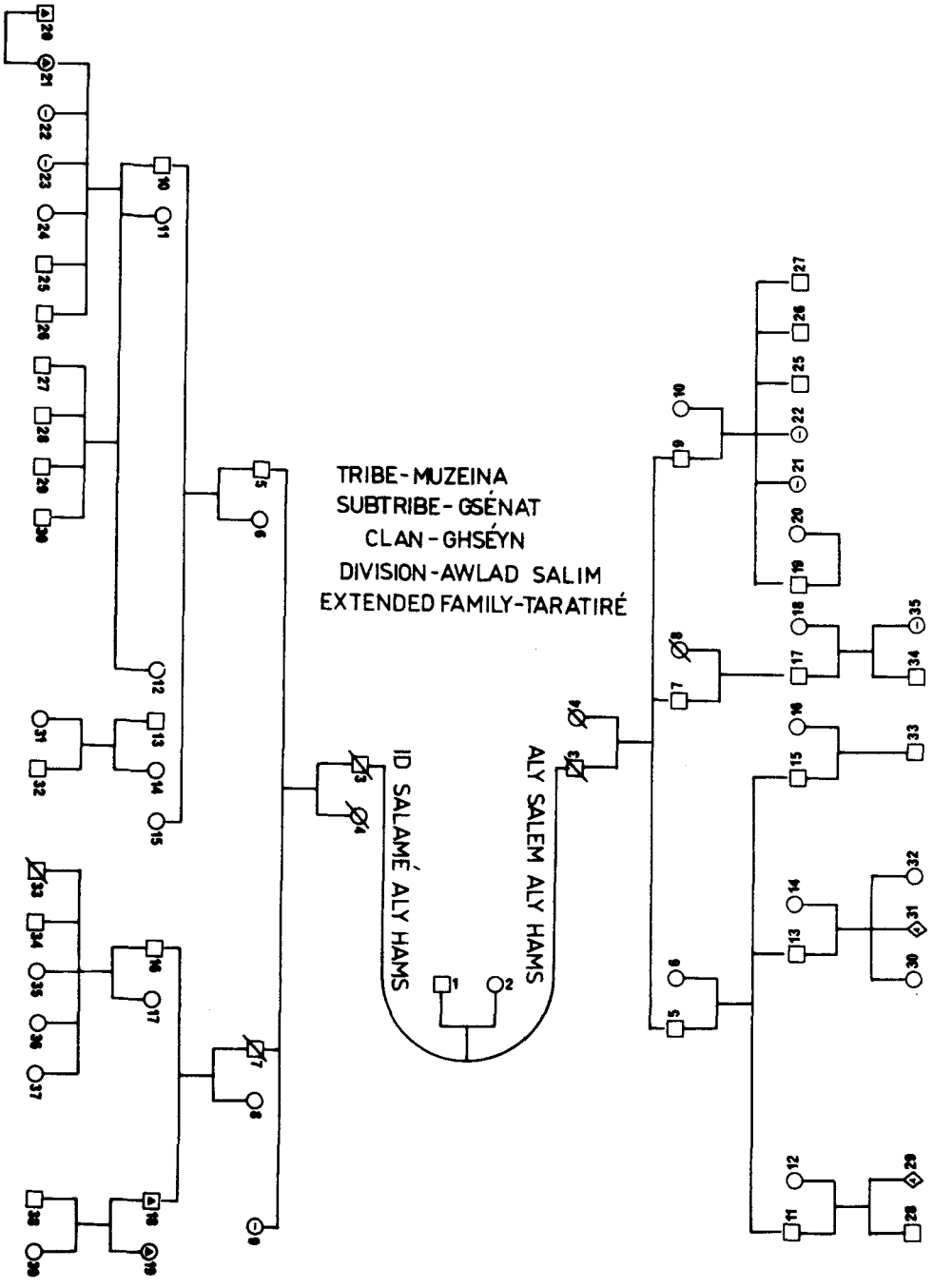
And according to Ben-David (1981):

> *The Farah is sometimes identical to the Hams framework, which is a basic protective framework concerned also with the settlement of blood feuds. The Hams contains within itself all the progeny of a great-great-grandfather (tracing back to five generations). One cannot imagine the existence of a Bedouin who does not belong to a particular Hams, for then he would be exposed to mortal danger, to property damage and to dishonoring of his family without his being able to protect himself or give battle. Therefore, the more males a Hams contains, the stronger it is* (p.28).

There is consensus among the majority of investigators that the Hams framework includes all the descendants of a common ancestor that lived five

generations previously (Fig. 6). It is only in the sixth generation that the Hams (blood feud group) undergoes subdivision into sub-units.

FIGURE 6: A Scheme Describing the Process of Splitting of a Hams. All the living members appearing in the genealogical tree comprise a "Blood Feud Group". The members of the next generation will already form two such groups, that of Id Salem Aly and Aly Salem Aly- An Example from the Muzeina Tribe.



The probands are marked with triangles.

The number of new sub-units that arise depends on the number of ancestors living in the second generation. Thus if there was only a single ancestor in the second generation, there will be no splitting and all the individuals of the sixth generation will still belong to the same "blood feud" group. When there are two ancestors in the second generation, there will arise two separate blood feud groups in the sixth generation. The number of blood feud groups in the seventh generation will depend on the number of ancestors in the third generation, and so on. Each generation counts back five generations and all individuals tracing back to this genealogical depth are members of the same blood feud group.

The branchings from the fifth generation on have an additive nature, that is, the number of branches increases from generation to generation. Yet, when an individual from the early generations fails to sire at least one son, his blood feud group becomes extinct.

Reasons for Hams (blood feud group) Divisions

One of the most interesting questions is why blood feud groups consist only of members who are related through a common ancestor who lived no more than five generations ago. It may be assumed that the larger the blood feud group, the greater the security of its members. Then why limit its size? The general response given to this question among the Bedouins of South Sinai is, first, that it is almost impossible to memorize all the descendants of more than five generations, as well as all the genealogical ties among them; and second, that it is impossible to have control or influence over large numbers of individuals scattered throughout a large area.

We suggest an additional reason for the division of the Hams, namely: an economic one - several of Bedouin families usually camp together. The basis for such organization is their Hams or extended family affiliation. Since the potential number of families which may camp together is limited by those related within five generations, the camps are relatively small, usually between 3-7 tents. Therefore, over-exploitation of grazing areas and water sources is avoided, new families are forced to search for new living areas, and hence enlarge the territiory of the tribe, and the limitation of camp size helps ensure its mobility in a nomadic lifestyle. Another interesting aspect related to the formation of small inbred groups is its biological advantage. Shmalghousen, already in 1946, claimed that isolates play a major role in evolution, and that under panmictic conditions, it is very difficult to preserve advantageous gene combinations. Positive combinations can increase in number and be preserved only in small populations with high consanguinity. Social behavior that encourages inbreeding, leading to the formation of autonomic groups, serves as one of the

most important mechanisms which reduce panmixia. According to the same principle, disadvantageous combinations are very quickly eliminated from the group. Hence, the process of Hams division and social behavior which encourages marriages within certain groups ensures the continuity of the isolated nature of the Bedouin, with all the biological advantages derived from this situation.

Intra-Group Marriages: Endogamy

In analyzing the biology of a population, one needs to take into account the social effects inherent in the selection of a mate. According to Ben-David in this regard (1978):

> *By Bedouin laws in South Sinai, it is the inalienable right of a man to marry his cousin, that is, the daughter of his uncle on his father's side...this custom is ancient and its purpose is to safeguard the familial nature of the tribe as well as its unity* (p.123).

Similarly Perevolotzky (1979) comments that:

> *Bedouin law and tradition recognize the right of priority (`abda') which a man has on his female cousin* (p.56). And according to Levi (1979):
>
> *Marriage into the family is still predominant in Bedouin society. The rule is that a girl is intended for her male cousin on her father's side* (p.56).

Marriage of first cousins is required in most Bedouin societies of the Middle East and is based on both economic and social considerations. The main purpose of such marriages is to enhance the power of a group within the tribe. The concept of "power" has two primary connotations in the Bedouin society, the first of which is property (camels, herds of sheep and goats, etc.) and the second is numerical strength of the group. Since, however, marriages of first cousins are not always possible for lack of a partner, the tendency is to select a mate who is as closely related as possible to the father's family. This tendency is clearly evident from Table 9.

The preference of consanguineous marriages within the society stands in stark contrast to customs in other societies, where intermarriages of relatives below the rank of third cousins are, for example, forbidden by the Catholic faith (Masterson, 1970). According to data presented by Muhsam (1966) on Bedouin of the Israeli Negev, 97.6% of marriages occur within the framework of the tribal suprastructure; in the South Sinai, according to Nir's data (1987) it is 97%, and according to our data, 96.5% (average for all ten tribes). In the Negev Bedouins, 86.1% of the marriages are within the framework of the tribe, wherease in the South Sinai Bedouins (average, all tribes together) this value is 92% according to our data (97% in the Muzeina tribe!), and 86% according to Nir (1987). Data

provided by Marx (1974) reveal that among the Bedouins of the Negev the number of individuals marrying within the blood feud group attains at times 60%, a "high" not encountered among the Bedouins of the Sinai. Marx, however, distinguishes between the various marital patterns on the basis of socio-economic considerations whereas we do so on the basis of biological considerations. For example, we rate marriages according to genealogical depth of the common ancestor of the couple, i.e., first cousin marriages - two generations, etc.

TABLE 9: Frequency of marital patterns within the Muzeina tribe in the last four generations.

	Generation[1]							
	G_{12}		G_{13}		G_{14}		G_{15}	
Marriage within:	n[2]	%	n	%	n	%	n	%
Hams	n.d.[3]	n.d.	n.d.	n.d.	8	3.8	43	14.6
Extended family	n.d.	n.d.	15	18.3	43	20.5	60	20.4
Clan	2	6.3	24	29.3	96	45.7	99	33.7
Sub-tribe	n.d.	n.d.	4	4.9	27	12.9	25	8.5
Tribe	2	6.2	7	8.5	23	10.9	44	15.0
Tribal supra-structure	n.d.	n.d.	2	2.4	7	3.3	10	3.4
Unknown	28	87.5	30	36.6	6	2.9	13	4.4
TOTAL	32	100	82	100	210	100	294	100

[1] G_{12} - great-great-grandfather generation

G_{13} - great-grandfather generation

G_{14}- grandfather generation

G_{15} - parents generation

G_{16} - the present generation. Since it is comprised mostly of children and youth, it is not represented in the table.

[2] n = number of families examined

[3] n.d. = no data

Hence, different categories of marital patterns are incorporated by Marx into the framework of the blood feud group, which accounts for the high frequency of marriages within this framework. According to Marx (1974) the rate of intermarriages between first cousins on the father's side among the Negev Bedouins is 11.7%. This value is close to what we encountered among the Sinai

Bedouins. Nir (1987) mentioned a lower frequency of first-cousin marriages among South Sinai Bedouins (8%). Nevertheless Marx (1974) notes that:

> *to my mind, one cannot talk about the existence of endogamy among the Negev Bedouin. Endogamy is predicated on intermarriage within a defined social group...in the Bedouin society, apart from the taboo on incest, there is no law that commands marrying within or outside a particular group* (p.187).

Marx proceeds to show that some three-fifths of all possible intermarriages do take place between cousins, and he notes that this is a very high rate considering all the expected obstacles and strictures (e.g. the desire of young people to choose their own mates). According to the data of Schull and Neel (1965) on various population groups within the Japanese society which encourage inbreeding, the percentage of consanguineous marriages of various sorts ranges from less than 2% to a high of 31%; first cousin intermarriages ranged from less than 1% to 15%. When we compare these latter data with those cited for the Bedouins, we realize that the Bedouin tribes which have so high a frequency of consanguinity constitute an unusually good research model for evaluation of the relationship between endogamy in small groups and biological variables in the group.

C. DEMOGRAPHY

The demographic data collected by various investigators relating to historical periods of the Bedouin tribes in South Sinai are generally rough estimates. The first orderly census was made only in 1968 by the Israeli authorities, and even the data of this census could not be fully reliable. The difficulty in taking an adequate Bedouin census resides in the structure of the their society, their way of life, and their beliefs. In this connection Muhsam (1966, p.9) wrote:

> *With respect to the Arab nomads, the Bedouins, it is widely agreed that their pride and illiteracy, their suspicion and extravagance - and the very combination of these contradictory characteristics - make it almost impossible to enumerate them.*

According to the available historical demography of the South Sinai (e.g. Burckhardt 1822, Shoucair 1916, Murray 1935, Field 1952, Baily and Peled 1974, Ben David 1978, Nir 1987) it seems that over a period of more than 150 years (1800-1968), the Bedouin population in South Sinai merely doubled in size. This rate of increase, albeit a rough estimate, probably reflects the population change for all the tribes combined. Clearly in the course of this long period probably some tribes enlarged numerically, others declined, and still others that remained

virtually unchanged in size. Such disparities among the various tribes are dependent not only on biological factors, such as fertility and mortality, but also and perhaps even primarily on emigrations of parts of tribes outside the territory of Southern Sinai, mainly to Egypt. The reasons for such migratory movements from South Sinai could be episodes of drought and famine, outbreaks of plague, and/or greater economic opportunities elsewhere. Consequently the formulation of growth curves for the combined Towara tribes in South Sinai that would presumably demonstrate demographic changes in time, can have little or no meaning.

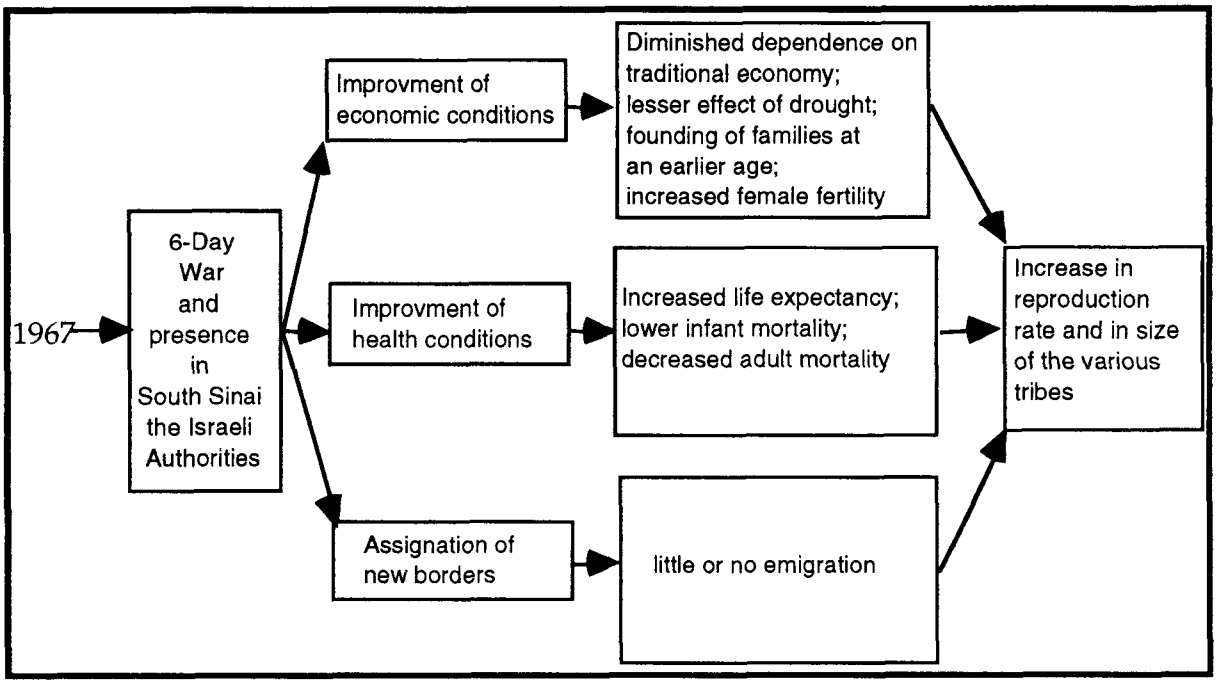
What one can say on the basis of the historical demographic data (see Nir 1987) is that three trends are suggested: first, that there are/were tribes which are/were continuously in the process of diminishing (e.g. the Sawalcha); second, that there are/were tribes that retained relative stability in size (possibly with a slight tendency to diminish), e.g. the Aleigat, Hamada and Beni-Wassal; and third, that there are/were tribes in relatively rapid stages of enlargement (e.g. the Muzeina and Gebeliya). For some of the tribes the demographic trend over time is simply not clear owing to a paucity of data (e.g. the Awlad Said and the Gararsha). To illustrate the changeable nature of the demography of the South Sinai tribes, we resort to the following exponential model:
$N_{(t)} = N_{(o)}\, r^{n-1}$, where $N_{(t)}$ = current population size, $N_{(o)}$ = past population size, r = rate of reproduction, and n = number of generations. If $N_{(t)}$ = 5358, the total number of Bedouins in South Sinai in the late sixties (according to a military census taken by Ben-David, 1978) and $N_{(o)}$ = 4000, the corresponding total in the early 19th century (according to Burckhardt, 1822), the growth rate of the population, comprising of the birth rate plus total immigration minus the death rate and emigration, will be: $r_1 = \mathrm{Ln}[N_{(t)} / N_{(o)}]/t = \mathrm{Ln}[5358/4000]/146 = 0.00200$. Thus, the entire Bedouin population of South Sinai would have increased during the past 146 years by 0.2% annually, and at this rate it would have taken them 244 years to double their population. The reasons for such a low growth rate, it may be worth repeating, are emigration, high infant mortality, outbreaks of intertribal homicide, disease, etc. Population growth rates, however, changed drastically from the sixties onward. Assuming $N_{(o)}$ = 5358 as estimated by military census for 1968 (Ben-David, 1978), and $N_{(t)}$ = 10, 663 (Nir 1987) by census for 1979, then the growth rate becomes $r_2 = 0.0625$, or an increase of 6.3% per year during this period, in contrast to the previous growth rate of only 0.2% annually. At this new growth rate the population would double itself in less than 20 years. Indeed Nir (1987) recently remarked that in 14 years of Israeli presence in South Sinai, the number of offspring doubled in Dahab, one of the major settlements of the Muzeina tribe.

If we compute the growth rate for each tribe separately and for two periods of time, namely, from 1935 to 1968, which we may designate as the pre-Israeli period, relying on 1929 data (Murray, 1935) and on 1968 data by Ben-David (1978), and from 1968 to 1979 which is conveniently designated the Israeli presence period, as per data based on two censuses carried out by the Israeli Defense Forces (IDF), we get a clear-cut and continuously increasing trend from 1929 to 1968 in the Gebeliya tribe, a slight increment in the Awlad Said, and a trend to decline in size in the Aleigat and Sawalcha tribes. In 1968 and there after, however, there was a distinct increase in population in all four tribes (Nir 1987).

The demographic differences between the Gebeliya and the Aleigat, besides those related to reliability of the census, stem from the change in the political status of South Sinai, starting in 1967. Until that year there had been substantial emigration of residents from South Sinai in the direction of Egypt, mainly members of the Sawalcha, Aleigat and Gararsha tribes (Ben-David, 1978; Arensburg et al., 1979). Since the natural growth rate in most tribes could not overtake the emigration rate, these tribes dwindled numerically. Following the Arab-Israeli 1967 (6-Day) War, the border between Egypt and South Sinai was sealed by Israel, the Bedouin emigration rate dropped to almost zero, and the tribes began to increase in size again. Factors contributing to renewed population growth among the Bedouin tribes as a result of the Israeli presence were clearly: a) improved local economic conditions, which in turn meant better nutrition and probably implied enhanced fertility and prolongation of the fertile period, lowered infant mortality and increased life expectancy; and b) improvement in the available medical services, which meant the diminution and control of former diseases and reduced mortality due usually to viral infections, especially in infants.

A diagram indicating the factors responsible for the demographic changes that occurred in South Sinai since 1967, is given as Fig. 7.

FIGURE 7: Flow Chart Demonstrating the Main Factors Associated with Demographic Changes in South Sinai After 1967.



Demography In The Social Frameworks Of The Bedouin Society (Tribal Suprastructure)

The social frameworks of the South Sinai tribes have already been discussed with respect to their ethnographic relevance. In the present section the emphasis is placed on demographic considerations.

The large tribal suprastructures of the Negev are the Tarabin (25 tribes numbering 33,062 individuals) and the Tayaha (29 tribes numbering 27,063 individuals). Compared to these groups, the South Sinai Towara tribal suprastructure is rather small, the maximum estimation in 1976 being about 10,000 individuals in 10 tribes.

The growth rate of a tribal suprastructure per year between 1929-1968 was about 0.9% (based on the data appearing in Table 10). It should be emphasized, however, that this growth rate is valid only for the period to which the data refer and does not represent a fixed value extending back into the historical past. Furthermore, this growth rate does not represent only the mean fertility and mortality in the population of a tribal suprastructure but also refers to assimilation into or departure from it of families, clans and sometimes entire tribes.

TABLE 10 Numerical growth and rate of growth of the Towara tribal suprastructure in South Sinai in the early 20th century compared to other tribal suprastructures of Bedouin tribes in the Negev.

Tribal Supra-structure	Numerical growth		Population growth rate per year (%) 1931-1946
Sinai/Years	**1929**	**1968**	**r**
Towara	4864[1]	6,888[2]	0.9
Negev[3]/Years	**1931**	**1946**	**r**
Azazma	8,661	16,505	4.3
Tarabin	16,330	33,062	4.7
Tayaha	14,163	27,063	4.3
Hanajira	3,756	7,281	4.4
Ijbarat	4,432	8,274	4.2

1.Murray (1935).

2.Levi (1970) from Nir, 1987

3 Muhsam, 1966 - data for Negev Bedouins

In the Towara tribes in South Sinai the number of individuals ranges between 151 and 1099 per sub-tribe. In the Muzeina, for instance, the Mehaysina is the smallest sub-tribe, with 261 members, while the Dararme is the largest, with 785 members (Table 11).

The number of extended families also differs among the tribes. In the Muzeina tribe we counted 45 extended families (see Fig. 3) whereas in the smaller Gebeliya tribe there were 24 (see Fig. 4).

There are extended families which number scores of members, at times upwards of 100 individuals, whereas very small extended families may be comprised of few individuals, sometimes even less than 10.

In the South Sinai tribes the number of nuclear families per tribe ranges from 88 in the smallest tribe, namely the Haweitat, to 880 in the largest tribe, the Muzeina; the number of families per sub-tribe ranges from 71 in the smallest sub-tribe of the Muzeina to 267 in the largest sub-tribe of this tribe (see Table 11).

It may be noted that in the extended family of the Muzeina tribe, one distinguishes on the average 3-4 separate blood feud groups, in extreme cases only one blood feud group or as many as ten blood feud groups. According to data presented by Ben-David (1981), the Gebeliya tribe averages 5-6 blood feud groups per extended family.

TABLE 11 Number of Bedouin families and individuals in the Towara of South Sinai in the early 1970's, by tribe and sub-tribe[1].

Tribe[2]	Sub-tribe	No. of individuals	No. of nuclear families
Ahali et-Tur	n.d.	183	56
Awlad Said		746	253
	Zehairat	419	144
	Awamrah	327	109
Gebeliya	n.d.	1155	349
Haweitat	n.d.	258	88
Hamada	n.d.	427	126
Muzeina		2886	880
	Dararme	785	267
	Gerabat	319	102
	Tsakhana	697	189
	Mehaysina	261	74
	Gawanme	277	71
	Shadadine	547	177
Aleigat		2213	585
	Awlad Salim	755	199
	Aleigat Et-Tur	151	48
	Zmiyalin El-Baara	1099	275
	Zmiyalin et-Ramla	208	63
Sawalcha	n.d.	401	119
Gararsha		1121	328
	Netsayirat	187	52
	Netsayira	491	132
	Awlad Badar	443	144

1 According to Baily and Peled (1974)

The data are not identical with our own. The same is true also for the division into clans. However, these are the only demographic data published for the number of individuals and families in the sub-tribes of South Sinai.

2 Beni Wassal not included

n.d. = no data

Distribution Of The Bedouins By Age And Sex

Despite the major censuses taken in the Sinai in 1968 and in 1975-6 by the Israeli authorities, there are no exact data on the age distribution within the Bedouin tribes of South Sinai. The demographer Muhsam (1966), who studied the demography of the Negev Bedouins, states in this connection:

> *The main reason for these difficulties lies in the fact that the Bedouin themselves do not know their age. In the present study it was therefore attempted to relate as far as possible the year of birth of a person to any major event of known date; but this attempt succeeded only in very rare cases. Furthermore, even if a Bedouin knew his own age and could be persuaded to communicate it to an enumerator who had previously gained his confidence, he would remain most reluctant to let the enumerator know the age of other members of his family, in particular of his wife and his daughters* (p.37).

Admittedly, Muhsam's comments refer to 1966, and pertain to demographic data collected 20 years previously, but in many respects they are still applicable. Thus Ben-David (1978), who presents the data of the 1968 Bedouin census in South Sinai, clearly notes that various portions of the age pyramid appear "abnormal" insofar as a "normal" human population is concerned. He cites, as an example, the very low rate of mortality among individuals ranging from 15 to 44 years of age, and believes that this is a distortion attributable to incompleteness of the census. The age pyramids for Bedouin groups from the Sinai, according to Ben-David, and from the Negev according to Muhsam, show that a major part of Bedouin in the South Sinai (44%) and in the Negev (49%) is concentrated in the low age group of 0-14 years (see Table 12). The same trend is true also in Arab villages in Israel (Muhsam, 1966). On the other hand, in European populations for the years 1930-1939, a period comparable to that during which Muhsam collected his data, the proportion of this age group in the total population is about one-third of the population, e.g. some 30% among the Italians, 32% in Poland, 35% in Rumania. In some European populations the percentage of this age group is even smaller, comprising an average of one-quarter of the population, e.g. 24% in France, 24% in England, 23% in Germany. In the U.S.A., the proportion of this age group, 0-14 years, is approximately 30%. In the Indian sub-continent it is 25%. In Egypt it approaches 39% and in South American countries it is about 37% (Jong, 1972).

In the South Sinai and Negev Bedouins, after age group 0-14 the relative proportion of each age group diminishes drastically (Table 12), a trend in contrast to that of corresponding age groups in other populations. For instance, in the

Israeli population, according to data of the Central Bureau of Statistics for 1978, about 13% of the males and females occur within the age group of 45-59 years whereas among the Sinai Bedouins the equivalent percentage is only about 6% and in the Negev Bedouins it is even less, only about 4%. The males of 60+ years in the South Sinai and Negev Bedouin populations comprise only 2.0-2.7% while in the Israeli male population they are 12.3%. Relatively much fewer South Sinai Bedouins live to old age, probably due to their harsh environment.

TABLE 12 Percentage distribution of the Bedouin in South Sinai[1] and the Israeli Negev[2], by age and sex .

Age group	Males		Females		Both sexes		sex ratio	
	Sinai	Negev	Sinai	Negev	Sinai	Negev	Sinai	Negev
0-14	23.1	25.0	20.8	24.5	43.9	49.5	111	102
15-29	10.7	11.1	9.2	11.1	19.9	22.2	116	100
30-44	9.8	8.2	9.9	7.8	19.7	16.0	99	105
45-59	7.9	4.2	4.6	4.0	12.5	8.2	172	105
60+	2.7	2.0	1.3	2.1	4.0	4.1	207	95
TOTAL	54.2	50.5	45.8	49.5	100.0	100.0	118	102

1 Ben-David, 1978

2 Muhsam, 1966

Bodenheimer (1958) claims that from the biological viewpoint a population is divisible into three fixed age groups, namely, the pre-fertile, fertile, and post-fertile periods. In the "young" populations in general the age distribution yields a pyramid in which a relatively large number of individuals are both in the pre-fertile and fertile stages, a situation that prevails among the Bedouins of the South Sinai. Such a structure of the total age pyramid may suggest a rapid rate of reproduction of a population. Yet this possibility is abrogated among the Bedouins by factors such as a short average life expectancy, frequent migrations, and other causes which we shall elaborate on subsequently.

Fertility Patterns

Jong (1972) has observed that:

There are no more important social or biological events in personal history than birth and death, and there are no aspects of human behaviour

more significant for the survival of a society than fertility and mortality patterns (p.32).

We now consider these social-biological events among the Bedouins. There are a number of indices, reflecting fertility in a population which can be used in comparative studies. In western societies the calculation of such indices is a relatively simple matter. For the nomad Bedouin society, however, the formulation of fertility indices is a complex and complicated task which can at best yield an estimate rather than a precise value owing to incomplete information. The three indices which we applied to the Bedouin society were:

(a) Crude Birth Rate (CBR), or number of births per 1000 individuals of a population per year. This is of course a relatively crude index which is not sensitive to changes in the age and sex group structure within the population.

(b) General Fertility Rate (GFR), which is an index of the number of births per year per 1000 potentially fertile females (15-45 years old). This index is sensitive because it takes into account the sex and age composition of the population.

(c) Total Fertility Rate (TFR), which is an estimate of the number of children which a group of 1000 women could potentially produce if they all lived through their reproductive years.

Computation of CBR. The number of individuals in the Muzeina tribe, according to a 1976 census, was 3000. Of this total, 44% were children 0-14 years old, or 96 at each age, assuming approximately an equal number of children having been born each year. This number would of course represent only the children surviving. If we now add to this number the mortality rate among children in their first year, which reaches 18.8% (Table 13), then we obtain 118 children per annum. Dividing this number by the population size, we obtain as CBR approximately 38.7 live progeny per 1000 individuals of population. Ben-David (1978), who made an analogous computation for all the Bedouin tribes of South Sinai, based on the data of the 1968 census and on a mortality rate approaching 45% (of all children from 0-14 years), obtained also a CBR of 40 live births per year per 1000 individuals. According to our data, a rough estimate of the CBR for the Bedouin population in South Sinai in 1980, the time of our survey, was approximately 38 live births per 1000 individuals.

Computation of the GFR. The number of males to females in the Muzeina tribe was 1650 vs. 1350. Of the latter, 513 (38%) were women in the potentially fertile ages of 15-45 years. Therefore the GFR value is 228.9, estimated as annual birth rate (122) divided by number of fertile women (533) multiplied by 1000.

TABLE 13 Number of living, and deceased children after first year of life at various age intervals of mothers in the Muzeina tribe, 1980*; both sexes, based on 97 families.

	Age group of mothers						
	15-19	20-24	25-29	30-34	35-39	40-44	Total children
Number of children							
Living	10	72	50	81	44	75	332
Dead	1	5	11	20	16	24	77
Total born	11	77	61	101	60	99	409
Percent dead	9.1	6.5	18.0	19.8	26.7	24.2	18.8

*Reported by fathers.

Computation of the TFR. This index was computed by summing the age-specific fertility rates for all ages and multiplying by the range into which the ages are grouped. The estimated value for the TFR among South Sinai Bedouins was 6980.

We find that the fertility rates (DBR, GFR, TFR) in the Bedouin society of South Sinai are relatively high compared to those in populations of industrialized countries, but are comparable with those in neibouring Arab countries, or third world countries (Table 14).

TABLE 14 Fertility rates in South Sinai Bedouin society compared to those in other populations*.

	Fertility indices		
Population	CBR	GFR	TFR
Sinai Bedouin	38.7	228.9	6980
Saudi Arabia	42.3	180.7	5824
Israel	27.9	121.0	4101
Kuwait	40.3	174.2	5207
China	39.3	156.6	4926
Mexico	45.0	196.7	6268
Belgium	17.0	75.3	2565
Poland	26.3	103.1	3324

*All data are from Jong (1972, pp.40-45), except for Sinai Bedouin

CBR=crude birth rate; GFR=general fertility rate; TFR=total fertility rate

The fertility in the Bedouin society, on the basis of the data presented in Table 15 shows that by the time of menopause (age 45+) the Sinai Bedouin woman has had an average of 5.5 living children, the Negev Bedouin woman, 5.80 children, and the Arab village woman, 6.04 children.

The average fertility period of the South Sinai Bedouin female is about 18 (range 16-44 years), with overall fecundity of almost seven children (Table 15). The average birth interval of a married Bedouin woman in South Sinai is 2.4 ± 0.4 years. In the Bedouin populations of the Negev, the duration of the fertile period in women is 18.6 years, live births occur every 2.5 years, and the overall fecundity is 7.5 children per woman (Muhsam, 1966). Thus, it seems that the fertility indices in the

TABLE 15 Mean number of living children per family, compared with total births in Bedouins of South Sinai compared with like data among Bedouins in the Israeli Negev and Israeli Arabs.

Age of mother	South Sinai Bedouins[1]		Negev Bedouins		Arab villages[2]	
	Living children	Total births/ mother	Living children	Total births/ mother	Living children	Total births/ mother
15-19	1.42	1.54	1.52	1.67	1.36	1.59
20-24	2.32	2.47	1.88	2.27	2.30	2.96
25-29	2.94	3.46	2.95	3.60	3.70	4.97
30-34	4.26	5.10	3.98	5.09	5.10	7.15
35-39	5.50	6.98	4.47	6.16	5.78	8.26
40-44	n.d.	n.d.	5.80	7.53	6.04	8.78

1 Data for the South Sinai Bedouins are organized and analyzed according to fathers' questionnaires

2 Data from Muhsam, 1966

Bedouin society remain high throughout all age groups till almost the end of the fertile period. From a demographic standpoint, the Bedouin society in this respect belongs to the category of "Broad-peak Type" (Jong, 1972).

We also found that among young Bedouin fathers (21-35 years), the mean marrying age had been about 20 years, and in later age groups (36-45), it was about 26 years, calculated according to the age of the first child). These data suggest a change in the marrying age of males after the year 1967, during the Israeli presence in the territory.

Apparently a more rapid accumulation of property occurred after 1967 which enabled earlier marriage by South Sinai Bedouins, and conseqeuntly a greater mean number of children per family.

Mortality Patterns. Regrettably, we were unable to compute any mortality indices (Crude Death Rate and Infant Mortality Rate) that could be comparable with those for other groups. From 55 families, where the mothers were relatively young (15-29 years) 13 reported on at least one dead child, with the number of boys almost double the number of girls. In 42 families where the mothers were much older (35-44 years), 35 families already reported on at least one dead child in the family, the ratio between male and female remaining the same.

The mortality curve for the Bedouins in South Sinai, like that for many other populations, is U-shaped. Thus, among the Bedouins the mortality rates in the low age groups (0-14 years) are exceptionally high, but thereafter (15+ years) the rates decline rapidly, remaining relatively low till the end of the third decade of life when they rise sharply again albeit not to the same extent as in the early ages.

Generally the mortality patterns for males and females are not identical in most regions. For instance, in the "advanced" countries at present, male mortality rates exceed the female rates. In many so-called developing countries, however, female mortality rates still exceed that of the males (Jong, 1972). Bedouin society, the male mortality rate exceeds that of the females. Ben-David (1978) claimed that in the older age groups (45 years and over) the situation is reversed.

Regulation Of Fertility

In the following we shall attempt to review the main factors which, we believe, influenced fertility in the Bedouins of South Sinai. We shall also present the primary demographic data linked with these factors.

Some major factors which affect fertility are assigned into two groups:

a) Biological factors such as general health status, certain genetic diseases, sterility, period of lactation and length of the reproductive period.
b) Social factors such as age at marriage, divorce, absence of mates, death of mate, remarriage, polygamy, religion, use of contraceptives, abortions etc..

In the present study we concentrated mainly on social factors although the biological factors are also considered.

a) Biological factors

The state of health among South Sinai Bedouins has until recently received relatively little attention (Levi, 1978). Nonetheless, the available data suffice to emphasize how important this factor was in regulation of Bedouin population size in South Sinai before 1967. Major plagues, about which we have the testimony of travellers as well as an abundance of native folklore (Levi, 1987), accounted for a very slow total increase of population in time, even diminishing it markedly at intervals. Infants who became ill or mothers who contracted a postpartum infection, were in most cases doomed to death. The harsh living conditions - cold winters in a wind-exposed tent, and hot summers with little shelter, coupled with a meager and inadequate diet, rendered the population, particularly the young, prone to numerous diseases. Undoubtedly, poor nutrition and harsh living conditions also induced lengthening of the lactation period in women, and hence the overall fertile span was shortened (Frisch, 1977).

Traditional folk medicine could provide little of the medical needs, relying as it did mainly on magic, cauterization and use of herbal concoctions (Ring et al., 1983; Nathan et al., 1982). Regrettably, we lack valid data on morbidity rates and causes among the Bedouins of South Sinai. Examination of some medical records in the clinics of Dahab and Santa Katharina did not supply us with adequate information.

b) Social factors

The replies to a questionnaire among the South Sinai Bedouins indicated that the mean marrying age was about 23 years for a male and 17.5 years for a female. Nir (1987) found that the marrying age for females ranged from 16 to 18 years, and for males between 23 and 25 years in this same population. According to Muhsam (1966), among the Negev Bedouins, some 50% of the men were married by the age of 20 and 75% were married by age 24 (mean 22.4 years); among Negev Bedouin women, 50% were already married by age 17 and 80% were married by age 19 (mean 18.4 years).

The age difference between South Sinai Bedouin males and females at the time of marriage was between 2-6 years; for Negev Bedouins it was about 4 years (Muhsam, 1966). Yet there are some males who marry at a relatively advanced age, and sometimes they do so with young women despite the general social disfavor of marriages between an older man and a young woman. Thus Ben-David (1978) notes,

> *The marriage of young women by old or mature men is not a daily occurrence because the Bedouin are alert to the fact that `abandoning a young maiden in the hands of an elder of dubitable fecundity' (to use their words) is rather unesthetic* (p.124).

Of interest is that relatively few males (less than 4%) marry women older than themselves.

The early marrying age of females in the Bedouin society theoretically enables them to produce more progeny during their fertile period. There is some question as to whether a correlation exists between marrying age (except in later years), either of males or females, and fertility (Revelle, 1968). Most studies, however, suggest that there is no such correlation (Benedict, 1972). The reason for these may be due to the different "type" of social population structure.

In regard to polygamy, by Moslem law each Bedouin male can marry up to four women. Yet a Bedouin man with three or four wives is rare (Muhsam, 1966). On the basis of genealogical records, we found varying rates of polygamy throughout the studied generations, with a general trend towards diminution of the polygamy rate in time. We have also found, as expected, that frequency of polygamy increased with the husband's age. The mean rate of polygamy obtained for the total population, based on questionnaire data, was 15%, which is close to that computed from genealogical trees - 12.1% (Table 16).

Ben-David (1978) reported 17% polygamous families in the South Sinai bedouins. Nir (1987), on the basis of 1900 families, reported a 12.25% polygamy rate: 10.15% husbands with two wives, 1.68% with three wives and 0.42% with four wives, and maintained that only sheiks or wealthy and well-known men possessed more than two wives. Nir also gives the rate of polygamy in the various tribes: Aleigat 21.3%; Haweitat 12.9%; Gebeliya 7.5%; Sawalcha 21.1%; Awlad Said 11.1%; Hamada 5.5%; Gararsha 15.0%; and Muzeina 8.6%. The general trend from these data is that the larger the tribe the less the frequency of polygamous families. i.e., 8.6% within the Muzeina (3056 members) vs. 21.1% in the Sawalcha (401 members). Levi (1979) notes that of 81 examined polygamous families, 67 were bigamous, 10 trigamous and 4 quadrigamous.

Taking all the Negev Bedouin tribes together, the mean percentage of polygamous (actually bigamous) husbands in the late 1940's was 7.7, with a range of 4.4-15.5% (Muhsam, 1966). Marx (1974) who also worked on the Bedouin of the Negev, has maintained that polygamy is relatively rare among Bedouins, citing 9.2% for the Abou-Juoad tribe of the Negev, emphasizing that among the Sheikhs, polygamy was not uncommon, especially when compared to the overall Bedouin population in the Negev. It must be emphasized, however, that all these percentages represent marital status at a single point in time. Thus a Bedouin who may be polygamous, could divorce a wife and revert to monogamy, and later marry another woman and become polygamous again. Hence polygamy among Bedouin men may be regarded as a "flexible" state. For instance, although the rate of polygamy never exceeds 15% at any one time (Ben-David, 1978; Levi,

1979; Nir, 1987; and present study), according to our questionnaire, almost 35% of married males over the age of 45 reported having children from at least two women.

In the South Sinai the mean age at which the Bedouin males acquire a second wife is 31 years. Muhsam (1966) estimates this age for Negev tribes as 35.8 years. He further calculates the mean age difference between a husband and his second wife to be 14.5 years, and the age difference between the first and second wife, about 10 years. The demographic data in this respect, for both Negev and South Sinai Bedouins, are quite similar, so that the Bedouin male is likely to be some 11-14 years older at the time of his second than at his first marriage and usually his second wife is a woman not much older than was his first wife at her marriage.

Muhsam (1966) found that in polygamous marriages, only 80% of the husbands were older than their first wife whereas in monogamous marriages the corresponding value was over 90%. He attributes these findings to the fact that in many cases Bedouin males were required to marry the widow of their deceased older brothers. Such `forced' marriages could lead to a situation where the first marriage of a younger brother might well be with an older woman, and consequently "trigger" the young brother to acquire a second, youthful wife.

Levi (1979) maintains that the primary advantage of polygamy is that it enables the male to produce many offspring, thus enhancing the "physical" strength of the family. Muhsam (1966), on the other hand, claimed that polygamy lends an economic benefit to the Bedouin male in that it enables him, in times of drought and aridity, to split up his herds and send them to different watering holes, each under the responsibility of one of his wives.

TABLE 16 The average percentage of polygamous families in two last parent generations (G14; G15) of South Sinai Bedouins[1](based on 287 families, Muzeina tribe).

Generation[2]	Hams	Extended family	Clan	Sub-tribe	Tribe	Tribal supra structure	TOTAL
G14+G15	0(8)[3]	5(58)	9(120)	4(31)	8(30)	5(9)	31(256)
% Polygamous	0.0	8.6	7.5	12.9	26.7	55.5	12.1

1 According to tribal social structure of South Sinai Bedouin Hams blood feud group records

2 G14=grandparents; G15=parents

3 Numbers in parentheses refer to total number of families per social unit of the tribe.

We found a negative correlation between husband and wife kinship and polygamy, namely, the closer the kinship between husband and wife, such as being first cousins (marriages within the Hams), the less the likelihood that the husband would acquire an additional wife (Table 16). We cannot yet offer an explanation for this fact; the implications of this observation will be considered subsequently.

Fertility in polygamous families: An important albeit controversial issue is whether polygamy exerts an effect on the fertility of an individual woman. Theoretically, these should have no effect for according to Bedouin tradition, a husband with more than one wife must share his nights equally among all his wives, each night with only one wife, without favoring one wife over another.

Second marriages ,however, frequently result from inability of the first wife to produce many, or any, offspring. Benedict (1972) cited such "reasons" for the inverse correlation between polygamy and fertility. Most investigators concerned with the question, concur that polygamy is negatively correlated with fertility (see Benedict, 1972). The fact that the large study of Nag (1962) on factors influencing fertility in non-industrialized societies in various countries, fails to find any correlation between polygamy and fertility, is attributable generally to the manner in which Nag carried out his comparisons, namely, that he compared polygamous and monogamous societies whereas he should have compared polygamous and monogamous women of the same society. Indeed most studies done in the latter fashion (e.g. that of Dorjahn, 1958, and also the present study) reveal an inverse correlation between polygamy and fertility. However, the observed results are not statistically significant and therefore perhaps should be regarded with caution.

It is of interest that Muhsam (1966) noted that in Negev Bedouin polygamous families, sterility occurred more among first wives than in the monogamous families. However, his data also indicated that the percentage of infertile second wives was greater than that among first wives in polygamous families, something we did not encounter among the South Sinai Bedouins.

A further significant finding by us was that among the South Sinai Bedouins polygamous marriages were less fecund than monogamous marriages. Thus we found, on the basis of Hams records of 12 families that the average number of living children per wife in a polygamous family was 3.5 (the same for first and second wife). According to our questionnaire data (based on 15 polygamous families), the average number per wife was 4.0 (for both the first and second wife). In the monogamous family,however,the average number of children per wife was 5.5. Hence the disparity in fertility between monogamous

and polygamous families, relating to live progeny is on the order of about a 36% differential. According to the data of Muhsam (1966, p.93), the difference was even greater in this regard, 32%, assuming no difference in child mortality within the two groups and that the age distributions of the wives in the two groups are comparable.

Divorce: By divorced individuals we here mean those who were married but then separated without having remarried by the time of our survey, and who retained custody of the children (the relevance of the latter criterion will be discussed later). The act of "divorcing" is prevalent in Bedouin society, yet is not reflected in the demographic data (Ben-David 1978). Levi (1979) noted that in a sample of 70 Bedouin families from South Sinai, he encountered 17% of remarried women, and he suspected that this percentage must even be as high as 30% in other parts of the Sinai where economic conditions were less stable. According to Ben-David (1978), among South Sinai female Bedouins aged 15-39 there were hardly any in a "divorced" status, whereas at age 40 and over the average was 5.3%. Among the Negev Bedouins, according to Muhsam (1966), the percentages for the corresponding age groups were 0.46% and 0.72%. Two main reasons account for the "disappearance" of divorcees from statistical tables, based on official population censuses. First, a divorced woman, if still considered to be in her fertile period, soon finds another husband because of a great paucity of women in the South Sinai Bedouin society; each woman who becomes "available" is virtually immediately `abducted' by one of the males in the tribe. Second, divorced women return to their parents' house, if they do not remarry, and receive anew the status of a daughter. In such cases, the head of the family, when queried by census takers, declares the divorced daughter as merely his daughter without giving her past marital history. The divorce rate generally becomes higher, albeit very minimally so, starting in the older age groups (40+ years), when the women are past their fertility period.

There is a tendency among most investigators to link marital instability with low fertility (Benedict, 1972). In this connection it is noteworthy that marriages in the Bedouin society are rather unstable. While the right of divorce is given to both husband and wife, the woman needs to apply to the judicial authorities of the tribe and to justify her request for divorce, whereas the man can "expel" the wife relatively easily, without explanation and usually without "legal" hearings. All he must do is exclaim, *I now divorce thee!* (Levi, 1979).

The reasons for divorce in Bedouin society are numerous, for example including infidelity, delinquency in housekeeping, infertility. Recompense to the

woman divorced is negligible, yet is fixed and inherent within Bedouin law. Children, if there are any, will always be granted to the husband.

There may be a relationship between frequency of divorce and the desire of an adult male to have children. Thus a man who does not have children with a first wife will divorce her, or take a second wife, and if the second wife does not conceive, he may also divorce her, and remarry a third or even a fourth time. Hence, if the fault for infertiity does not reside in him, he will ultimately succeed in having offspring. A Bedouin man without children is considered "as good as dead", for he is then cast to the fringes of society, his influence in the social framework of the tribe becomes minimal, and his physical and economic safety become dependent on others.

Widowhood. Widowers or widows are designated as individuals who had been married but lost their mate by death, did not remarry, and were acting as head of a family.

In South Sinai Bedouin society, as is the case for the Negev Bedouins, the rate of widowhood increases in the age groups. From 0.0% in the Sinai Bedouin (less than 0.1% among the Negev Bedouin), at the age group of 15- 19 years, to 4.2% (7.3% among the Negev Bedouin) at the age group of 50-59. In both the South Sinai Bedouins and the Negev Bedouins, the number of widowers is relatively small compared with the number of widows (Muhsam, 1966; Ben-David, 1978). The latter attributes this to the fact that the widowed male does not long remain widowed, that he attempts to accumulate the financial means for obtaining a new wife, regardless of his age, and especially if he has children by the deceased wife. In contrast, a mature widow, that is, one past her fertile period who usually also lacks property, has less chance of remarrying.

Looking at the social aspect of widowhood on a global scale, they range from total prohibition of remarriage, for example the widow in certain Indian societies, to compulsory remarryiage with an obligation of the new husband to impregnate the widow in some African societies (Benedict, 1972). The Bedouin society inclines more toward the latter, demanding that the fertile widow remarry and return to the reproductive pool of the society. Thus most widows in the South Sinai Bedouin society do remarry; indeed the younger they are at widowhood the greater their chances for a rapid remarriage.

Contraception and Abortion. In the Bedouin society, as in other societies, there are various techniques for preventing conception, most of them based on imbibing herbal concoctions (Benedict, 1972).

Levi (1979) mentions three main traditional contraceptive techniques among the South Sinai Bedouins: 1)an abundant consumption of cowpeas; 2)drinking tea containing carnation thorns for 40 days; and 3) drinking water heated by a hot iron twice daily, preferably in the morning. The validity of these methods has never been examined by medical researchers and their utility is doubtful. With the entrance of Israel into the region in 1967, there has been an increase in the use of contraceptive pills.

It is noteworthy that it is usually older wives who have given birth to several children who are the ones generally using contraceptive measures, and not young wives without, or with only a few, children. The method of coitus interruptus is prevalent in many simple societies as a contraceptive measure (Benedict, 1972) but apparently is rarely practiced among the South Sinai Bedouin.

Abortions are condoned in Bedouin society only in special cases. Levi (1979) mentions two important instances where abortion may be carried out, first, in cases where a Bedouin wife becomes pregnant by another man while her husband is away; and second, in cases where young girls have had pre-marital sexual relations leading to pregnancy and are liable to be condemned to death by members of their own family unless abortion is performed. We doubt that the two mentioned factors cited by Levi significantly affect the fertility rate in Bedouin society, and in any case, no information is available regarding the rates of abortion among South Sinai Bedouins.

The technique of abortion among the South Sinai women, according to Levi (1979, p.23), is a mixture of various herbs, leaves, roots and stones, ground and mixed with water which the woman drinks until she aborts.

Usually, however, undesired pregnancies find their solution by having the responsible male by custom virtually "forced" to marry the pregnant female.

In sum, contraception and abortion were not effective in preventing the fertility potential in South Sinai Bedouin society. Factors that until recently prevented substantial growth of the population have been primarily malnutrition and poor health. A paucity of physicians and lack of medical care on the one hand, and poor economic conditions on the other, led to a very high mortality of infants, at times almost 25% according to our data and 45% according to Ben-David (1978, p.120). At present, a lack of physicians and adequate medical care still prevail, yet the ancient and still prevalent linking of family size with prestige promotes maximal reproduction under existing circumstances.

Curtailment in growth of the Bedouin society is thus dependent largely on external factors. The present social and economic infrastructure is conducive to

propagation and therefore one may expect the Bedouin population to grow at an accelerated rate until new restraining factors arise.

Sex Ratio

The ratio of males to females in a generation is a vital measure of the demographic composition in a population. The average sex ratio of human births is approximately 105 (Cavalli-Sforza and Bodmer, 1971). Data on the sex ratio in the South Sinai Bedouin population in the 1960's and 1970's have been provided by Ben-David (1978, p.116). According to his data, unusual phenomena occur, the sex ratio changing dramatically with the age (Table 12). The mean sex ratio for all age groups combined was 118.3. According to Nir (1987), the sex ratio for the South Sinai Bedouins, all ages, was 109.

Ben-David has noted that the sex ratio among Sinai Bedouins differed completely from that reported in the literature, especially for Western societies, where the number of males is larger at birth but equals the number of females at about age 5, and thereafter diminishes with age relative to the number of females.

The data collected by us pertaining to sex ratios are similar to those obtained by Ben-David. From Hams (blood feud group) records we learn that in the parent generation (G15, ages ca. 18-44 years), the sex ratio average was 128.1 and in the offspring generation (G16, ages ca. 0-17 years) it was 106.9 (Table 17). The differences in sex ratio between the two generations (G15 and G16) may at least partially be attributed to an artificial disappearance of females from the Hams records in the fifteenth generation, i.e., those who did not reach adulthood and marry. According to Bed-David's (1978) data, the sex ratio in the G16 generation was 111.0, and in G15, 108. In our study we tried to overcome the tendency of the Bedouins to "eliminate" females from their reports, as already mentioned by Muhsam (1966), Ben-David (1978) and Nir (1987), by cross-checking the data with different resources.

Thus, the high male/female ratio referred to by Ben-David for Bedouin tribes of South Sinai is supported also by our data.

The data on sex ratio among Bedouins of the Negev prior to Israel statehood, according to Muhsam (1966), indicated a mean of 102 in favor of males for all age groups combined. The sex ratio in infancy (0-1 year) was 106.

In the Jewish population of the 70's, (based on the 1978 census), the changes in the sex ratio values with age are almost the inverse of those for the South Sinai Bedouin population. The sex ratio at birth was 105.9.

TABLE 17 Mean number of children per family and sex ratio in parental (G15) and offspring (G16) generations in accordance with relatedness of the parents.

Social group	Parent Generation (G15)					Offspring Generation (G16)			
	N*	$\bar{x}$	S.E.	Sex ratio	Percent childless families**	N	$\bar{x}$	S.E.	Sex ratio
Hams	6	3.50	0.88	128	16.7	28	2.67	0.36	110
Extended Family	34	3.73	0.39	122	15.0	46	2.84	0.25	115
Clan	94	4.34	0.23	117	4.0	72	3.31	0.21	105
Sub-tribe	26	3.61	0.40	146	7.1	15	2.66	0.52	85
Tribe	23	0.82	0.39	167	4.2	29	3.75	0.38	107
Tribal Super-structure	6	4.50	0.99	121	0.0	-	-	-	-
TOTAL	189	4.0	-	128.1	6.9	190	3.1	-	106.9

* N = number of families

** Data not given for G16 generation as reproductive period has not yet ended

The factors that could have been responsible for the great disparity between the sexes in the Bedouin population will now be considered.

Evolutionary explanation of sex ratio biases. The sex ratio, why more males than females are born and survive, or vice versa, in general has perplexed biologists even in previous centuries. Thus Darwin, in "The Descent of Man", devotes an entire chapter to this topic and to its link with natural selection. He wrote (Darwin, 1872):

> *I formerly thought that when a tendency to produce the two sexes in equal numbers was advantageous to the species, it would follow from natural selection, but I now see that the whole problem is so intricate that it is safer to leave its solution for the future* (p.611).

It is an axiom of evolutionary theory that parents will allocate resources to offspring of different sexes in order to maximize parental reproductive fitness. Three hypotheses have been proposed to explain parental predisposition: a) Fisher's hypothesis (Fisher, 1930) of equal parental investment at the end of the period of dependence; b) Trivers and Willard's (1973) hypothesis of parental predisposition depends of child sex, in terms of resources available to them and the effects of those resources on the offspring's reproductive success, and c) the hypothesis of local male/resources competition/enhancement, which stresses the contributions offspring make to the reproductive success of their parents and/or siblings and the reproductive costs imposed on parents and/or siblings by

competition (Hamilton, 1964; Clark, 1978; Sieff, 1990). These hypotheses are not mutually exclusive and may apply simultaneously (Sieff, 1990).

Interestingly, it is indeed the above mentioned hypothesis which appear to offer the best explanation for the finding derived from the data of the Israeli Central Bureau of Statistics on Jewish and non-Jewish infant mortality (Zadka, 1978). Thus the mortality rates at the age of 0-6 days per 1000 live births in 1977 were 8.0 for Jews and 11.6 for non-Jews, whereas the mortality rates after the infants left the hospital, at age 1-11 months were 4.0 among Jews and 14.7 among non-Jews. Likely enough socio-economic reasons were largely responsible for the disparate rates at the later ages, albeit there might also have been a low "investment" in children in general as well as a preference for one of the sexes (males?) in particular. For example, in 1978, the live birth sex ratio for Jews was 105.9, and for non-Jews, 102.8 (Zadka, 1978). The sex ratio for infant deaths for ages less than one month was 141 for Jews and 117 for non-Jews; for infants 1-11 months, it was 120.0 for Jews and 103.8 for non-Jews (data calculated from special series No.638, published by the Central Bureau of Statistics, 1978). The low death sex ratio among non-Jewish populations indicates a slightly higher mortality rate among females.

Among the many variables associated with statistically significant biases in the human sex ratio at birth are war and post-war periods (MacMahon and Pugh, 1953); socio-economic status and conditions (Teitelbaum, 1970); relative ages of father and mother (Novitski and Kimball, 1958); family size (Jalavisto, 1952); inbreeding (Schull and Neel, 1965); as well as many others such as birth order, handedness of parents, smoking, and time of fertilization (for review see James, 1987). The magnitude of bias, however, is generally small. For example, the average sex ratio for women who smoke is 101.0, whereas that for offspring of non-smoking women is 103.3. In several traditional societies, a high sex ratio was found, e.g. 128 for Yanomamo infants (Chagnon et al., 1979) and 117 for the Cuirn foragers of Venezuela (Hurtado and Hill, 1987). This high sex ratio reflects secondary sex ratio rather than female-biased infanticide (Sieff, 1990).

Most of the above-mentioned factors (summarized by Teitelbaum, 1970; and recently by James, 1987; Blaffer Hrdy, 1987; and Sieff, 1990), although correlated with sex ratio, do not explain it. Recently Geodakyan and Geodakyan (1985), based on a large study on different species, proposed that intensive sexual activity of males, fresh sperm and aged eggs are factors leading to an increase in the number of males. Hence, in a population practicing polygamy even at low rates, as the Bedouins, the sex ratio is expected to increase: male sexual activity increases, while that of females decreases. It is interesting to note that many kings and sheiks who possessed large numbers of spouses had more sons than

daughters. For example, Ramses II (1317-1251 B.C.E.), one of the famous Egyptian kings, had 74 wives, who gave him 111 sons and only 68 daughters.

Possible explanations for the high sex ratio among South Sinai Bedouins.

In our opinion the explanation for the high male to female sex ratio in the Bedouin population may reside mainly in its correlation with a) mating type of parents; and b) contribution of the male offsprings to family resources.

Consanguineous marriages. Evidence regarding the correlation between the sex ratio and marital pattern, that is, inbreeding and outbreeding, has been cited by a number of authors (Schull, 1958; Schull and Neel, 1965; Kirby et al., 1967). The first attempt to understand this correlation was made by Hook (1969). He formulated a theory which relies on the demonstration of various types of first-cousin marriages and is based on the concept of X-heterosis.

Hook and Schull (1973) assumed that if X-heterosis is significant, it should affect female mortality rate both during the gestation period and postnatally. They collected data on one of the islands of Japan (Hirado) and their findings, based on 565 married couples of first cousins, confirmed their basic assumption.

For the purpose of illustration, they present the following datum: the proportion of males and females among neonates born to the X-inbred parental group was 736 males and 661 females, resulting in a sex ratio of 111, and among neonates born to the X-outbred parents, 547 males and 611 females, or a sex ratio of 89. It follows that in a population such as the Bedouin, where first-cousin marriages have been preferred over many generations, the female offspring will be much more vulnerable than the male offspring due to the effect of X-heterosis. Looking again at the data appearing in Table 17 (for the 16 generation only, see next paragraph), we see that the most X-inbred groups in the Bedouin society (blood feud group or extended family, according to marital pattern) manifest a higher sex ratio (110 and 115, respectively) than do the more outbred groups (clan, sub-tribe and tribe with sex ratios of 105, 85 and 107, respectively). The data furnish us, albeit indirectly, with support for the noted trend. Thus the number of families in the parent generation (G15) with no children at all is higher in the X-inbred groups (blood feud group and extended families, 16.7% and 15%, respectively) than in the outbred groups: clan (4.2%), sub-tribe (7.1%), tribe (4.2%) and tribal suprastructure (0.0%) (Table 17).

It must be noted that the reliability of the information obtained for the different categories may be questionable, biased by the method of data collection, namely, by genealogical records. Young females can easilty disappear from records of past generations, especially if they were not married or died before marriageable age, thus significantly influencing the sex ratio (for this reason, the data on the sex ratio for the G15 generation which appear in Table 17, are

suspicious, especially for remote tribal units such as the subtribe and the tribe). However, this is not the case for married males, who will always be included in such records. Therefore, we have taken the liberty of selectively using the data related to past generations.

Bedouins in Santa Katherina