
Genetic Studies in Jordan

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XII. Genetic studies in Jordan

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Certain demographic and genetic data were collected among the Druze, Chechen and Arab components of the population in the oasis of Azraq, eastern Jordan, during a short period spent there in 1966. Some of the results obtained during this preliminary survey, including blood groups, stature and weight, dermatoglyphics, skin pigmentation and colour vision deficiency, are presented, and it is hoped that a fuller, definitive survey will, at a later date, be possible. For the greater part, the Arabs have been excluded from the analysis, owing to the small sample size. The Chechen and Druze data are considered within the framework of information, often sporadic, available from other non-Jewish, Middle Eastern populations.

INTRODUCTION

The data reported upon in this paper were obtained by E. Sunderland in 1966 when he visited the oasis of Azraq as a member of the International Jordan Expedition organized under the auspices of the International Biological Programme. Some twenty days were spent in the oasis investigating in preliminary fashion certain demographic and genetic attributes of the population. The oasis supports a sedentary populace comprising some 112 Chechen (Shishan), some 103 Arabs and approximately 1100 Druze. Members of nomadic Beduin tribes occasionally appear in the oasis during tribal migrations through the surrounding districts, but the Bedouin were not studied on this occasion. As has been reported elsewhere (Sunderland 1967), the Chechen are northeastern Caucasians (Luzbetak 1951) called Čečenci by the Russians after the main Chechen town, and they are estimated to number some half million or so individuals in the Soviet Union. Some members of this predominantly Muslim population migrated into the Near East, including areas now incorporated in the state of Jordan, early in the twentieth century, but the great majority of the Chechen still reside in the Soviet Union. A very small fraction of the Jordanian Chechen live in the village of Azraq Shishan but they have many relatives in other villages both in Jordan and in Israel. The Druze are basically Shi'a Muslims whose beliefs also incorporate the deification of the Fatimid ruler Hakim, coupled with mystical and concealed non-Islamic beliefs. The Druze in Azraq constitute a twentieth-century overspill from the much larger settlement in the Djebel Druze area of Syria. Members of this group, with the exception of a single family in Azraq Shishan village, live in Azraq Druze, the only other village in the oasis. The Arab component of the population is also of recent, mainly postwar origin in Azraq and seems to consist of individuals from many parts of the country both contiguous and distant. Arab families, having no manifest tribal allegiance, are found in both Azraq villages. Most of the people in the oasis either practise agriculture by irrigation or extract salt from underground water supplies in parts of the Azraq depression and trade this commodity in many surrounding areas.

THE SURVEY

The number of persons who could be tested was limited by the brief stay of 20 days in the field, which was too short to allow the full confidence of subjects to be gained. It had been intended to return and carry out much larger numbers of tests, but political developments have prevented this. The uniqueness of the data, however, makes it desirable that they should be published despite the smallness of numbers.

Table 1 summarizes the numbers of individuals who participated in the various tests.

TABLE 1. NUMBERS OF PARTICIPANTS

	Druze	Chechen	Arab	total
blood	83	20	11	114
dermatoglyphics	97	22	9	128
skin pigmentation	42	30	33	105
colour blindness	147	59	37	243
stature	116	66	38	220
weight	116	67	40	223

These numbers include males and females, children and adults, consanguineous and affinal kin, as well as totally unrelated persons. All individuals examined were asked for certain personal particulars including name, family relationships and age. Detailed pedigrees were collected for a majority of the villagers but these pedigrees require to be checked, expanded and inter-connected by future detailed study.

Table 2 summarizes the ethnic composition of the villagers of Azraq Shishan.

TABLE 2. ETHNIC COMPOSITION OF THE VILLAGERS OF AZRAQ SHISHAN

ethnic group	male	female	total	percentage
Chechen (Shishan)	57	55	112	48.90
Arab	48	55	103	44.98
Druze	3	3	6	2.62
European (1 Austrian, 3 Ukrainians)	2	2	4	1.75
half Chechen; half white Russian	1	3	4	1.75
totals	111	118	229	100.00

Table 3 provides an age pyramid for the villagers of Azraq Shishan.

The village of Azraq Druze is much bigger than Azraq Shishan. It contains some 120 households and family pedigrees were collected from 81 of them. All but three of the 81 households were Druze; the remainder Arab. The total population is estimated at 1075 of whom 95% are Druze and the other 5% Arab.

Table 4 provides an age pyramid for 593 of the Azraq Druze villagers.

Taking both villages together, 64% of the males and 66.4% of the females are under 20 years of age. Both age pyramids contain data for individuals who were examined for various genetic attributes, as well as for their kin for whom the participators themselves provided information. Thus, very few Druze females participated in any of the survey procedures but, despite this, much information regarding them was volunteered by their male kin. During the time available it proved impossible to obtain any but the more obvious family inter-relationships. However, these relationships are in any event probably fewer than might have been the

TABLE 3. AGE PYRAMID FOR THE VILLAGERS OF AZRAQ SHISHAN

age/years	no. of males	no. of females
80-84	1	0
75-79	1	0
70-74	0	0
65-69	1	0
60-64	1	0
55-59	0	1
50-54	5	1
45-49	4	2
40-44	7	3
35-39	4	5
30-34	2	1
25-29	2	3
20-24	8	8
15-19	9	3
10-14	12	11
5-9	11	14
0-4	10	19
totals	78	71 149

TABLE 4. AGE PYRAMID FOR THE VILLAGERS OF AZRAQ DRUZE

age/years	no. of males	no. of females
75-79	3	0
70-74	0	0
65-69	3	0
60-64	7	2
55-59	5	1
50-54	5	5
45-49	14	7
40-44	16	15
35-39	10	13
30-34	8	20
25-29	13	8
20-24	25	19
15-19	35	29
10-14	56	40
5-9	69	60
0-4	56	49
totals	325	268 593

case had the villages been long-established. The fieldworker was on many occasions informed that few, if any, such inter-relationships occur among the Chechen families in Azraq and again rather few, some of which were noted, occur in the Azraq Druze families. It is noteworthy that the Druze, Chechen and Arab communities each appear to be endogamous. However one Arab in the oasis was married to an Austrian and one Chechen is married to a White Russian.

Digital dermatoglyphics

The genetic data

The digital dermatoglyphics of 88 Druze and 22 Chechen, all males, are described. Prints from larger numbers were collected, but certain of them proved unusable, particularly those of very calloused hands. The ridge counting and computerization were carried out by Dr Elizabeth Coope, the latter on an Elliott 803 computer at the South Eastern Regional Hospital Board, Edinburgh.

Method

Rolled finger prints were taken using 'Kleenprint', and the ridges counted by the method described by Henry (1901). Each ridge crossing a line drawn between external triradius and core was counted, the higher of the two counts of a whorl being used in the analysis. The ten finger counts were summed to give the total ridge count (t.r.c.) for each individual. The patterns were qualitatively classified into the simple divisions of arch, radial loop, ulnar loop and whorl as defined by Henry.

TABLE 5. DIGITAL DERMATOGLYPHICS

Ridge count by digits: unilateral analysis.

finger	mean and s.e.	s.d.	coefficient of variation	Druze (<i>n</i> = 88)		Chechen (<i>n</i> = 22)	
				mean and s.e.	s.d.	mean and s.e.	s.d.
right 1	20.72 ± 0.59	5.55	26.80	21.50 ± 0.94	4.39	20.44	
2	13.85 ± 0.70	6.53	47.17	13.18 ± 1.44	6.74	51.17	
3	12.41 ± 0.70	6.58	53.00	14.45 ± 1.02	4.80	33.19	
4	16.35 ± 0.63	5.88	35.94	17.05 ± 1.10	5.17	30.32	
5	14.51 ± 0.56	5.26	36.27	13.86 ± 1.16	5.46	39.40	
total	77.84 ± 2.62	24.61	31.62	80.05 ± 4.41	20.67	25.82	
left 1	18.61 ± 0.64	5.98	32.12	18.91 ± 0.88	4.10	21.71	
2	13.41 ± 0.71	6.70	49.99	13.09 ± 1.27	5.94	45.34	
3	13.07 ± 0.69	6.48	49.55	15.64 ± 1.15	5.39	34.44	
4	16.70 ± 0.60	5.59	33.45	16.73 ± 0.97	4.54	27.13	
5	14.47 ± 0.54	5.10	35.25	13.45 ± 1.08	5.07	37.67	
total	76.26 ± 2.65	24.90	32.65	77.82 ± 4.16	19.49	25.05	
sample mean	154.10 ± 5.19	48.68	31.59	157.86 ± 8.30	38.95	24.67	

Ridge count by digits: bilateral analysis.

finger	mean and s.e.	s.d.	coefficient of variation	Druze (<i>n</i> = 88)		Chechen (<i>n</i> = 22)	
				mean and s.e.	s.d.	mean and s.e.	s.d.
right 1	31.50 ± 1.33	12.51	39.73	29.82 ± 2.24	10.53	35.30	
2	20.17 ± 1.26	11.78	58.38	19.50 ± 2.65	12.41	63.65	
3	16.69 ± 1.29	12.09	72.40	19.09 ± 2.12	9.93	52.03	
4	24.09 ± 1.24	11.67	48.44	23.68 ± 2.32	10.88	45.95	
5	17.42 ± 0.96	9.02	51.76	14.45 ± 1.39	6.53	45.18	
total	109.87 ± 5.14	48.20	43.87	106.55 ± 9.18	43.04	40.40	
left 1	27.10 ± 1.35	12.62	46.57	24.55 ± 2.44	11.46	46.70	
2	19.24 ± 1.27	11.90	61.88	17.59 ± 2.39	11.22	63.75	
3	17.65 ± 1.28	12.02	68.13	20.64 ± 2.44	11.45	55.48	
4	23.30 ± 1.22	11.45	49.13	23.82 ± 2.31	10.82	45.43	
5	16.73 ± 0.90	8.43	50.38	14.14 ± 1.48	6.94	49.07	
total	104.01 ± 4.91	46.02	44.24	100.73 ± 8.70	40.81	40.51	
sample mean	213.89 ± 9.86	92.45	43.22	207.27 ± 17.44	81.79	39.46	

RESULTS AND DISCUSSION

Quantitative data

Individual finger means, standard errors, standard deviations and coefficients of variation are given in table 5. Means and standard deviations are also given for right and left hands and for ulnar and radial counts.

Chechen and Druze samples have similar mean t.r.c. values of 157.86 and 154.10 respectively. The Druze have a considerably higher standard deviation of 48.68 as against the Chechen 38.95, who would thus appear to be the more inbred. Both samples are less variable than samples from western European populations.

In both samples and on both hands, fingers 1 and 4 have the highest mean ridge counts with fingers 3 and 2 (Druze) and 2 and 5 (Chechen) having the lowest mean ridge counts. Fingers 2 and 3 (Druze) and 2 (Chechen) tend to be the most variable, and fingers 5 (Druze) and 1 (Chechen) the least variable.

There is a marked difference between the Druze and Chechen when corresponding digits on the right and left hands are examined, such as r. 3 and l. 3 and r. 1 and l. 1 for example. The mean ridge counts for digits r. 3 and l. 3 are: Druze 12.41 and 13.07 and Chechen 14.45 and 15.64. The figures for digits r. 1 and l. 1 are, Druze 20.72 and 18.61 and Chechen 21.50 and 18.91. The standard deviations for fingers are also somewhat different between samples. Digits r. 1 and l. 1, for instance, have standard deviations of 5.58 and 5.98 among the Druze and of 4.39 and 4.10 among the Chechen.

The Chechen have a higher count on right hands in 11 cases, and on left hands in the remaining 11 cases. Among the Druze, there is a higher proportion of right hands with higher counts, (49), as against 34 individuals with higher counts on left hands, and five with equal counts on both hands.

In both samples, the right-hand mean ridge count is higher than the left hand, the difference being most marked in the sample of Chechen. Right hands also tend to be the most markedly variable among the Chechen.

TABLE 6. RIDGE COUNTS FOR PATTERN TYPES

finger	arch	radial loop		ulnar loop		whorl	
		mean	s.d.	mean	s.d.	mean	s.d.
Druze ($n = 88$)							
right 1	0	0	0	17.86	5.73	38.86	7.47
2	0	11.31	6.82	10.68	4.18	28.39	8.10
3	0	7.00	0	10.80	5.08	31.14	9.16
4	0	4.00	7.07	13.75	5.84	31.04	8.44
5	0	0	0	12.97	4.90	27.96	6.69
left 1	0	0	0	16.70	6.11	37.33	6.32
2	0	12.29	6.35	10.73	4.99	27.93	8.58
3	0	7.00	4.32	12.69	4.89	31.59	8.34
4	0	0	0	13.88	5.74	31.15	8.76
5	0	0	0	13.28	4.81	29.26	6.67
sample	0	10.78	6.45	13.33	5.56	31.97	8.79
Chechen ($n = 22$)							
right 1	0	0	0	20.30	5.25	37.75	6.17
2	0	3.00	0	11.88	5.94	30.09	5.07
3	0	0	0	13.00	4.33	29.75	7.55
4	0	0	0	12.89	4.54	31.15	6.76
5	0	0	0	13.67	5.52	31.00	0.00
left 1	0	0	0	17.60	3.78	39.43	6.90
2	0	6.00	2.65	11.27	5.26	30.63	4.63
3	0	4.00	0	13.77	4.27	33.87	5.89
4	0	0	0	13.80	4.52	32.17	6.29
5	0	0	0	13.05	4.81	37.00	0.00
sample	0	5.00	2.35	14.11	5.25	33.00	6.71

The ulnar mean ridge count is greater than the radial in Chechen and in Druze.

Finger ridge count means and standard deviations for pattern type (radial loop, ulnar loop, whorl), vary considerably both between and within the samples (table 6).

Usually finger 1 carries the largest loops and whorls and finger 2 the patterns with the fewest ridges. Patterns are usually larger among the Chechen, as would be expected from the higher mean t.r.c., but tend to be more variable in size among the Druze who have the higher standard deviation for the t.r.c.

Qualitative data

Table 7 shows pattern numbers and percentage frequencies. Ulnar loops are the most common pattern, followed by whorls, whilst radial loops and arches are relatively infrequent especially among the Chechen.

TABLE 7. PATTERN TYPE NO. AND % FREQUENCY

finger	arch		radial loop		ulnar loop		whorl	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Druze (<i>n</i> = 88)								
right 1	1	1.14	0	0	29	32.95	58	65.91
2	4	4.55	16	18.18	19	21.59	49	55.68
3	4	4.55	2	2.27	54	61.36	28	31.82
4	1	1.14	1	1.14	32	36.36	54	61.36
5	1	1.14	0	0	60	68.18	27	30.68
total right hand	11	2.50	19	4.32	194	44.09	216	49.09
left 1	2	2.27	0	0	40	45.45	46	52.27
2	6	6.82	14	15.91	22	25.00	46	52.27
3	7	7.95	4	4.55	48	54.55	29	32.95
4	0	0	0	0	40	45.45	48	54.55
5	0	0	0	0	69	78.41	19	21.59
total left hand	15	3.41	18	4.09	219	49.77	188	42.73
sample total	26	2.95	37	4.20	413	46.93	404	45.91
Chechen (<i>n</i> = 22)								
right 1	0	0	0	0	10	45.45	12	54.55
2	2	9.09	1	4.55	8	36.36	11	50.00
3	0	0	0	0	14	63.64	8	36.36
4	0	0	0	0	9	40.91	13	59.09
5	0	0	0	0	21	95.45	1	4.55
total right hand	2	1.82	1	0.91	62	56.36	45	40.91
left 1	0	0	0	0	15	68.18	7	31.82
2	0	0	3	13.64	11	50.00	8	36.36
3	0	0	1	4.55	13	59.09	8	36.36
4	0	0	0	0	10	45.45	12	54.55
5	0	0	0	0	21	95.45	1	4.55
total left hand	0	0	4	3.64	70	63.64	36	32.73
sample total	2	0.91	5	2.27	132	60.00	81	36.82

Ulnar loops predominate on fingers r. 3 and r. 5 and on l. 1, l. 2, l. 3 and l. 5 (Chechen) and on l. 1 and r. 3 and 5 (Druze), with whorls predominating on fingers r. 1, 2 and 4 (Druze and Chechen) and on l. 1, 2 and 4 (Druze) and l. 4 (Chechen). Radial loops are commonest on fingers r. 2 and l. 2 and arches occur on r. 1 to r. 5 and l. 1 to l. 3 (Druze) but only occur on finger r. 2 in the Chechen sample. In neither sample are these radial loop or arch patterns frequent. There is a tendency for ulnar loops to cluster on left hands.

GENETIC STUDIES IN JORDAN

213

TABLE 8. MEANS AND VARIANCES OF REFLECTANCES AT 425 nm, 545 nm AND 685 nm FOR THE AZRAQ GROUPS

males	n	forehead						medial aspect of upper arm						mean age (years)	
		425 nm		545 nm		685 nm		425 nm		545 nm		685 nm			
		mean	variance	mean	variance	mean	variance	mean	variance	mean	variance	mean	variance	mean	variance
Chechen	23	17.5	13.6	22.6	13.5	52.5	34.1	27.4	22.1	33.6	25.4	55.0	15.7	20.4	
Druze	42	13.7	15.1	20.2	17.3	48.5	25.6	22.5	26.3	30.0	22.3	52.8	19.1	17.0	
Arab villagers	12	11.6	7.9	16.8	24.9	44.2	48.1	20.3	9.6	27.6	18.0	51.5	9.3	15.2	
non-village Arabs	18	13.8	8.1	18.9	10.0	47.1	27.5	22.4	28.2	30.4	26.7	52.7	19.8	27.0	
all Arabs combined	30	12.9	9.0	18.0	16.4	45.9	36.5	21.6	21.2	29.3	24.9	52.2	15.6	22.3	
females															
Chechen	7	17.1	29.0	24.1	37.7	50.9	54.2	21.2	16.8	29.1	30.3	51.9	32.3	9.3	
Arab villagers	3	11.2	1.1	17.0	3.0	46.3	1.3	16.7	5.8	24.2	9.3	48.0	4.0	8.3	

Examination of the qualitative and quantitative data reveals marked differences between the characteristics of the Druze and Chechen samples. These differences were significant at the 0.5 % level for pattern type, ($\chi^2 = 13.9795$ with 3 d.f.). The differences in t.r.c. did not reach significance at the 5 % level. Roberts & Coope (1972) found a similar discrepancy in significance levels between quantitative and qualitative data in their South Midlands survey, where highly significant differences between areas were revealed using pattern type but not by using t.r.c.

Skin colour

This has elsewhere been reported upon in some detail (Sunderland 1967) but may usefully be briefly considered in the present context. An E.E.L. (Evans Electro Selenium Ltd) spectrophotometer was used to obtain the data which are summarized in table 8.

At each wavelength the percentage reflectance values for the Chechen males are higher than the equivalent Druze values and these in turn are higher than the values for the combined-Arab series (Azraq Arab villagers and some other non-village Arabs). All the differences between the Chechen and the Druze, comparing logarithmic transformations of the data at 425 nm, untransformed reflectance values at 545 nm and antilogarithmic transformations at 685 nm (see Sunderland (1967) for details), are significant at the 5 % probability level or less. The differences between the Chechen and the combined-Arab series are significant at the 1 % probability level or less. The Druze, while readily distinguishable as darker than the Chechen are not clearly differentiated in this respect from the Arabs.

Interesting comparative data are presented by Lourie (1973, this volume).

Colour vision

No anomaloscope was available and the tests were therefore carried out using the Ishihara test cards.

TABLE 9. COLOUR VISION IN THE AZRAQ GROUPS

	males			females			total no. of males and females tested
	no. tested	no. colour blind	% colour blind	no. tested	no. colour blind	% colour blind	
Druze	146	19†	13.01	1	0	0	147
Chechen	32	2‡	6.25	27	0	0	59
Arab	24	1	4.17	13	0	0	37
totals	202	22	—	41	0	0	243

† Including five sets of two brothers and the parallel cousin of one of those sets.

‡ Two brothers.

Only eight of those individuals with some type of colour vision deficiency were able to read the type of numerals used in the Ishihara test cards. The others, and indeed the great majority of all the participators, used the plates for the illiterate, consisting of variously coloured patterns, in the second part of the Ishihara test charts. It is therefore a little difficult to generalize, but one may say that each of the 22 'colour blind' males certainly has real colour vision deficiency, usually red-green. The Druze males have the very high frequency of 13.01 % colour blind. It is interesting to note that Kalmus *et al.* (1961) report an incidence of 10.1 % colour blind males in a sample of 337 Israeli Druze. This figure is much higher than that in any other Israeli sample for which data are reported in that paper.

Blood groups†

Blood samples were collected by fingerpricking 114 individuals. Particular requests were made by the Azraq Druze villagers that the volume of blood taken in each case should be very small. The specimens were placed in cooled containers and flown to Beirut where blood grouping was carried out at the Anthropological Blood Grouping Laboratory of the American University. Since the quantities of red cells available in certain cases were very small testing was not always possible using all available antisera. However, in most cases grouping was done with antisera specific for the following antigens:

A, A₁, B, H, C, c, D, E, e, M, N, S, s, P₁, Fy^a K, k.

In all, 83 Druze, 20 Chechen and 11 Arabs provided blood specimens. The major results are summarized in the following tables, the Arabs having been excluded owing to the very small sample size.

TABLE 10. THE ABO BLOOD GROUP

group	no. observed	
	Druze	Chechen
O	27.00	11
A ₁	†22.35	3
A ₂	†10.65	1
B	10.00	3
A ₁ B	† 1.25	1
A ₂ B	† 3.75	1
total	75.00	20

	gene frequencies	
	Druze	Chechen
A ₁	17.38	19.20
A ₂	12.60	
B	10.51	12.48
O	59.51	68.16
	100.00	99.84

† Note: two A and one AB specimens were not tested for A₁.

Ruffié & Taleb (1965) and Taleb & Ruffié (1968) have given the results of extensive blood group surveys of both Jordan and Lebanon. Again Mourant (1954) has reported that the frequency of the *A* gene falls steadily in the Middle East southwards from Turkey. Aksoy, Ikin, Mourant & Lehmann (1958) state that the value for the *A* gene exceeds 30% in most of Turkey, falling somewhat eastwards and, in particular, southwards, though, as Nassif (1953) reports, the *A* gene frequency in Lebanon is 31%. In Iran the frequency is approximately 22% while in Arabia it is of the order of 15% over considerable areas. Edholm (1966) quotes values of 19.5–21% for the *A* gene in many parts of North Africa. The Druze frequency of 29.98% in the present study falls appropriately within this broad spectrum, a spectrum clearly portrayed in maps and diagrams by Tills (1969, 1970). Mourant, Kopeć & Domaniewska-Sobczak (1958) give the following gene frequencies for the Druze of Lebanon: *p* 27.86, *q* 16.46 and *r* 55.68. The Chechen value of 19.20% is either due to random fluctuation in a small

† The authors wish to thank Dr A. Kopeć for assistance with this section.

sample or else is truly typical of gene p values in peoples of the Caucasus. Mourant *et al.* (1958) quote p values for Caucasus peoples as follows: Adzhartsi 19.30, Georgians 18.12, Guritsi 17.41, Imeritini 19.38, Lezgini 19.01, Mingreltsi 18.34 and Osetini 19.54. Other groups in the Caucasus have higher p gene values.

TABLE 11. THE RHESUS BLOOD GROUPS

	rhesus positive	rhesus negative	total	phenotypes (%)	
				rhesus positive	rhesus negative
Druze	70	10	80	87.50	12.50
Chechen	13	7	20	65.00	35.00
			Druze no.		Chechen no.
phenotype			observed		observed
†CCDEe			1.11		0.00
‡CCDee			28.21		3.00
†CcDEe			8.89		3.00
‡CcDee			22.79		2.00
Ccddee			1.00		2.00
ccDEE			0.00		1.00
ccDEe			7.00		3.00
ccDee			2.00		0.00
ccddee			7.00		5.00
			78.00		19.00

frequencies of gene complexes

	Druze
<i>CDE</i>	1.02
<i>CDe</i>	55.07
<i>Cde</i>	2.49
<i>cDE</i>	9.89
<i>cDe</i>	3.69
<i>cde</i>	27.84
	100.00

All D negatives were checked for Dⁿ antigen.

All C positives were tested against C^w.

† One CDE not tested for c or e.

‡ Four CDee not tested for c.

The Druze q gene frequency is 10.51 %; that of the Chechen 12.48. Edholm (1966) quotes values of 9 to 12.5 % for North African Arabs; Aksoy *et al.* (1958) give figures of 10 to 15 % for much of Turkey and Nassif (1953) gives 8 % for a large sample consisting of members of most of the religious groups in Lebanon. In Iran the q frequencies range from 15 to 23 % whilst in Southern Arabia certain groups have values below 5 %. Mourant *et al.* (1958) quote q gene frequencies among Caucasus populations ranging from 3.32 % (Adzhartsi) to 15.33 % (Ingush).

Tills (1970) reports that 'Populations inhabiting the Arabian peninsula differ markedly from their northern neighbours in having a much higher frequency for the O gene'. Thus Mourant *et al.* (1958) quote an r gene value of 75.24 for Yemenite Arabs whilst Maranjian, Ikin, Mourant & Lehmann (1966) report O gene frequencies of 73.00 for the Shi'ah townsmen of eastern Saudi Arabia; 73.17 for the Sunni townsmen of eastern Saudi Arabia; 73.50 for the Sunni townsmen of the Najd, Saudi Arabia; 74.25 for Sunni townsmen of the Hejaz; 84.46 for the Sunni townsmen of Asir and Najran, and 72.45 for Bedouin of Saudi Arabia. However,

in the Fertile Crescent the ABO frequencies are similar to those of Europe and Western Asia generally. The *O* gene value for the Druze of Azraq, 59.51 is representative of this latter region (Nablus Arabs 57.36 – see Mourant *et al.* 1958), whilst the *O* gene value for the small Chechen sample, 68.16 %, is much more akin to the *O* gene values reported by Mourant *et al.* for the Caucasus, which, in a number of populations exceed 70.00 %.

Thus in general terms the present data for the Druze and the Chechen are in accord with the known ethnic affiliations of these groups and the reported gene frequencies fit into the broad distribution patterns for the ABO system in the Near East and contiguous regions.

For 78 Druze the *cde(r)* frequency is 27.84. Bajatzadeh and Walter (1969) report a *cde*

TABLE 12. THE MNSs BLOOD GROUPS

phenotype	no. observed	
	Druze	Chechen
MMSS	† 4.50	‡ 0.00
MMSs	† 16.50	‡ 5.00
MMss	6.00	2.00
MNSS	† 2.84	0.00
MNSs	† 24.16	4.00
MNss	7.00	7.00
NNSS	† 1.56	‡ 0.00
NNSs	† 12.44	‡ 1.00
NNss	3.00	0.00
	78.00	19.00

frequencies of gene complexes	
	Druze
<i>MS</i>	26.45
<i>M_s</i>	30.04
<i>NS</i>	19.02
<i>N_s</i>	24.48
	99.99

† Druze 7MMS, 8MNS, 5NNS not tested for s.

‡ Chechen 3MMS, 1NNS not tested for s.

frequency of 32.3 in a total sample of 530 Iranians. It is reported (Mourant in Goldschmidt 1963) that the rhesus groups show small differences between the Mediterranean area and India although there is a tendency for frequencies of the *cde* gene complex and of rhesus negatives to be lower and of *CDe* and rhesus positives to be higher in India than in the Mediterranean area. Some of the lowest rhesus negative frequencies in the region are found in Lebanon and in Southern Arabia the latter ranging from 18.99 to 29.89 (Maranjian *et al.* 1966). No detailed consideration of the present small samples is attempted here. The information is simply presented as preliminary material.

The *M* gene frequencies in countries near the Mediterranean are very similar to those to the east of the region and in India, though there the frequency often exceeds 60 %. The frequency of the gene *M* in central and southern Arabia (63.07 to 77.81 %, Maranjian *et al.* 1966) is higher than in most of the other populations for which there are data, the exceptions being the Amerindians, Sardinians and some Eskimo (Mourant 1954). On the other hand, the *M* frequency in the Mediterranean is often below 60 % and even below 55 % in places. In Turkey and Lebanon the *M* frequency is very much as in Europe whilst the frequency is higher in Syria, Iraq and Iran. The present Druze value, 56.49 % thus indicates close affinities with the

Levant-Turkey group rather than with more easterly and southerly populations. The Chechen values are in accord with the higher values found in areas eastwards of the Levant and Turkey. The *S* gene frequency of the Druze (45.47 %) is higher than in any contiguous groups reported by Tills (1969) or Maranjian *et al.* (1966); 32.31 to 43.91 % though a value of 50 % is shown for Iraq in the former. The Chechen figure (31.18 %) is similar to a value of 30 % reported for southern Turkey as well as to values of 35 and 36 % in central Iran (see Tills 1969).

TABLE 13. THE P BLOOD GROUPS

	P+	P-	totals	phenotypes (%)	
				P+	P-
Druze	70	8	78	89.74	10.26
Chechen	15	3	18	83.33	16.67

Druze gene frequencies: P_1 67.97; P_2 32.03.

Chechen gene frequencies: P_1 59.17; P_2 40.83.

Ruffié & Taleb (1965) report a P+ phenotype frequency of 71.54 % in a Lebanese Druze sample. Other Lebanese communities are reported to have P+ values ranging from 67.35 % (Armenian Orthodox) to 74.78 % (Greek Catholics).

TABLE 14. THE DUFFY BLOOD GROUPS

	Fy ^a +	Fy ^a -	totals	phenotypes (%)	
				Fy (a+)	Fy (-)
Druze	47	21	68	69.12	30.88
Chechen	13	6	19	68.42	31.58

Druze gene frequencies: Fy^a 44.43 %; $Fy^b + Fy$ 55.57 %.

Chechen gene frequencies: Fy^a 43.54 %; $Fy^b + Fy$ 56.46 %.

Edholm (1966) states that the Fy^a gene frequency in Turkey compares with European values of 42 to 48 % whilst the values are higher in Iran (58 %) and in India (70 %). Thus the values for both Druze and Chechen seem to fall within the expected 'European' values.

TABLE 15. THE KELL BLOOD GROUPS

	Kell+	Kell-	totals	phenotypes (%)	
				Kell+	Kell-
Druze	3	50	53	5.66	94.34
Chechen	0	10	10	0.00	100.00

Druze gene frequencies: k 97.13 %; K 2.87 %.

Chechen gene frequencies: k 100.00 %; K 0.00 %.

In Europe the K gene frequency rarely exceeds 6 % and often falls below 4 % and it is even lower in parts of Turkey, Iraq and Iran. The gene is probably absent in mongoloids and very rare in negroes, whilst the highest reported frequencies of the K gene are found in Arabia, with values in some areas exceeding 10 % (Maranjian *et al.* 1966). Thus the K gene frequency for Sunni townsmen of the Najd, Saudi Arabia is 10.25 % and for the Bedouin of Saudi Arabia 10.56 %. The Chechen and Druze data are broadly in accord with values reported for Europe and for the Near East other than the Arabian peninsula, both for the Kell antigens and more generally for the other blood groups discussed.

GENETIC STUDIES IN JORDAN

age group	0-4	5-9	10-14	15-19	20-24	25-29	30-34	35-39	40-44	45-49	50-54	55-59	60-64	65-69	70-74	75-79	80-84	total nos. tested
stature/cm																		
Arab males																		
<i>n</i>	2	5	9	3	—	—	1	1	—	1	—	1	1	—	—	—	—	24
mean	84.0	122.0	139.0	166.5	—	—	157.5	162.0	—	173.0	—	160.0	163.0	—	—	—	—	—
Chechen males																		
<i>n</i>	4	7	10	5	1	—	1	3	1	2	1	1	—	—	—	1	1	38
mean	96.3	109.1	144.5	167.7	166.0	—	170.4	168.6	178.5	165.2	162.5	169.0	—	—	—	158.7	166.2	—
Druze males																		
<i>n</i>	—	28	40	13	7	5	—	2	6	7	2	3	2	—	—	1	—	116
mean	—	120.6	139.9	161.2	170.9	169.9	—	170.5	167.5	167.9	163.2	164.7	167.5	—	—	153.5	—	—
all males																		
<i>n</i>	6	40	59	21	8	5	2	6	7	10	3	5	3	—	—	2	1	178
mean	92.2	118.7	140.5	163.5	170.3	169.9	164.0	168.1	169.1	167.8	162.9	164.6	166.0	—	—	156.1	166.2	—
Arab females																		
<i>n</i>	—	6	2	1	2	—	2	1	—	—	—	—	—	—	—	—	—	14
mean	—	118.3	137.8	150.4	153.5	—	160.5	153.6	—	—	—	—	—	—	—	—	—	—
Chechen females																		
<i>n</i>	5	7	4	4	1	2	2	2	—	—	1	—	—	—	—	—	—	28
mean	83.8	123.0	140.1	161.3	155.0	158.8	163.2	156.4	—	—	148.5	—	—	—	—	—	—	—
all females																		
<i>n</i>	5	13	6	5	3	2	4	3	—	—	1	—	—	—	—	—	—	42
mean	83.8	120.8	139.3	159.1	154.0	158.8	161.9	155.5	—	—	148.5	—	—	—	—	—	—	—
mass/kg																		
Arab males																		
<i>n</i>	2	5	9	3	—	—	1	1	—	1	—	1	1	—	—	—	—	24
mean	12.8	22.9	33.3	62.7	—	—	50.0	63.0	—	69.0	—	78.0	72.0	—	—	—	—	—
Chechen males																		
<i>n</i>	4	7	10	5	1	—	1	3	1	2	1	1	—	—	—	1	1	38
mean	18.0	21.1	37.8	58.3	56.0	—	62.5	83.1	63.5	69.1	75.0	71.0	—	—	—	62.0	80.0	—
Druze males																		
<i>n</i>	—	28	40	13	7	5	—	2	6	7	2	3	2	—	—	1	—	116
mean	—	23.9	34.6	52.6	65.9	67.5	—	68.6	74.9	73.3	58.3	80.7	70.6	—	—	58.7	—	—
all males																		
<i>n</i>	6	40	59	21	8	5	2	6	7	10	3	5	3	—	—	2	1	178
mean	16.3	23.3	35.1	55.4	64.7	67.5	56.3	74.9	73.2	72.0	63.8	78.2	71.1	—	—	60.4	80.0	—
Arab females																		
<i>n</i>	2	6	2	1	2	—	2	1	—	—	—	—	—	—	—	—	—	16
mean	6.0	24.0	39.5	60.5	62.0	—	83.0	65.0	—	—	—	—	—	—	—	—	—	—
Chechen females																		
<i>n</i>	6	7	4	4	1	2	2	2	—	—	1	—	—	—	—	—	—	29
mean	12.3	25.9	39.6	63.6	51.0	54.5	75.0	62.0	—	—	63.0	—	—	—	—	—	—	—
all females																		
<i>n</i>	8	13	6	5	3	2	4	3	—	—	1	—	—	—	—	—	—	45
mean	10.8	25.0	39.5	63.0	58.3	54.5	79.0	63.0	—	—	63.0	—	—	—	—	—	—	—

Stature and weight

The data collected have been tabulated by Sunderland in the I.B.P./C.T. report (1967). The tabulation is reproduced in this paper (table 16).

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