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Finger ridge counts of Venezuelan Yukpa natives

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Abstract

The finger ridge counts of five subtribes of Yukpa natives from Sierra de Perijá (State of Zulia-Venezuela) have been studied. Bilateral asymmetry, sexual dimorphism and differences among subtribes have also been considered. The results obtained indicate a large differentiation in the cases of the Japreria and the Pariri as opposed to the rest of the subtribes, especially when Mahalanobis distances are considered. The results also agree reasonably well with those previously reported for other dermatoglyphic traits.

Keywords : finger ridge counts, Yupka tribe, Mahalanobis distance, principal coordinate analysis.

Résumé

Les comptes de crêtes digitales de cinq sous-tribus d'indigènes Yukpa de la Sierra de Perija (Etat de Zulia-Venezuela) ont été étudiés. L'asymétrie bilatérale, les différences sexuelles et les différences entre sous-tribus ont été examinées. Les résultats obtenus indiquent une grande différenciation des Japreria et des Pariri par rapport aux autres sous-tribus, surtout si on considère les distances de Mahalanobis. Les résultats concordent assez bien avec ceux obtenus auparavant pour d'autres caractères des dermatoglyphes.

Mots-clé : comptes de crêtes digitales, Yukpa, distance de Mahalanobis, analyse en coordonnées principales.

INTRODUCTION

The first report on the dermatoglyphic traits of Venezuelan Yukpa natives is that by Geipel (1955). More recently, detailed analyses on this same subject were carried out by Díaz Ungría (1978) and Díaz Ungría *et al.* (1984, 1986). In these papers several dermatoglyphic features, both digital and palmar, are studied from both the univariate and the multivariate points of view. However, these studies do not include individual finger ridge counts; hence, in this paper we present the finger ridge count characteristics of the Venezuelan Yukpa natives. As in previous reports, we study this tribe not only as a whole, but also characterizing and comparing the five subtribes recorded, namely the Chaparro, Irapa, Macoa, Pariri and Japreria.

The Yukpa tribe belongs to the Carib language family, and all of the subtribes (except the Japreria) speak very similar languages. Mosonyi (personal communication) suggests that, according to linguistic data, the Japreria were isolated from the others some 500 years ago. Figure 1 shows the geographical locations of the subtribes analyzed. When they were surveyed, they inhabited the whole of several river valleys in the Serranía de Valledupar (Sierra de Perijá, State of Zulia-Venezuela) except the Japreria who, at that time, were in the pilot center established by the "Comisión indigenista" of Venezuela on the banks of the Lajas river. This said, they have maintained their biological isolation. At present, the subtribes are located basically in these same places.

The settlement of the Chaparro in the place where they are located is a consequence of the reunion of families coming from a northwestern area called Wasama. The Irapa include several groups, each consisting of a small number of families. It is believed that Irapas have always inhabited the area where they are now settled, although the groups show a large degree of mobility all along the valley. The Macoa subtribe consists of several families that have migrated from a neighbouring population called the Sirapta.

According to the Pariri people themselves this subtribe has its origins in the eastern lowland area, by the shores of Lake Maracaibo. From there, their ancestors migrated to the area where the subtribe is now settled. Finally, the Japreria may have resided for a long time in Cerro Pintado (the headwaters of the Palmar river) before 1961; in that year, the subtribe was removed to the aforementioned pilot center (Díaz Ungría, 1976; Díaz Ungría *et al.*, 1984, 1986).

The isolation that the Venezuelan Yupka show is mainly a consequence of their aggressiveness and the geographical features of the mountainous ecosystem that they inhabit. Nowadays, acculturation tends progressively to reduce their isolation.

Acculturation plays an important role in some of the present-day Amerindian tribes, and the five subtribes studied are affected to different extents : according to the classification of Ribeiro (1957), the Japreria and the Irapa are the subtribes least affected, the Chaparro and the Pariri are slightly affected, and the Macoa are affected the most.

MATERIAL AND METHODS

The fingerprints of 123 Venezuelan Yukpa males and 104 Venezuelan Yukpa females were recorded. The numbers of individuals sampled from each subtribe are given in tables 1 and 2. Sampling errors could affect the results, given the small size of the series (especially the Japreria), although they are representative of the corresponding subtribes.

The methodology used for ridge counting is summarized in Holt (1968). We have taken into account only the maximal counts for each finger. Hence, each individual is characterized by a vector of 10 elements, representing the corresponding finger ridge counts.

Unfortunately, the raw data matrix contained an average of 9 % of missing values per finger in both the male and female series. The higher frequencies of missing values correspond to those of the right and left little fingers of the males, and the left little fingers of the females.

Given the limited size of some of the subtribes as mentioned above, the missing values could be a problem in the carrying out of a number of comparative tests, namely those of multivariate nature. So, before undertaking any other statistical analysis, we carried out a process of missing data estimation by means of the BMDPAM programme from the BMDP package (Dixon, 1983), and using the STEP procedure.

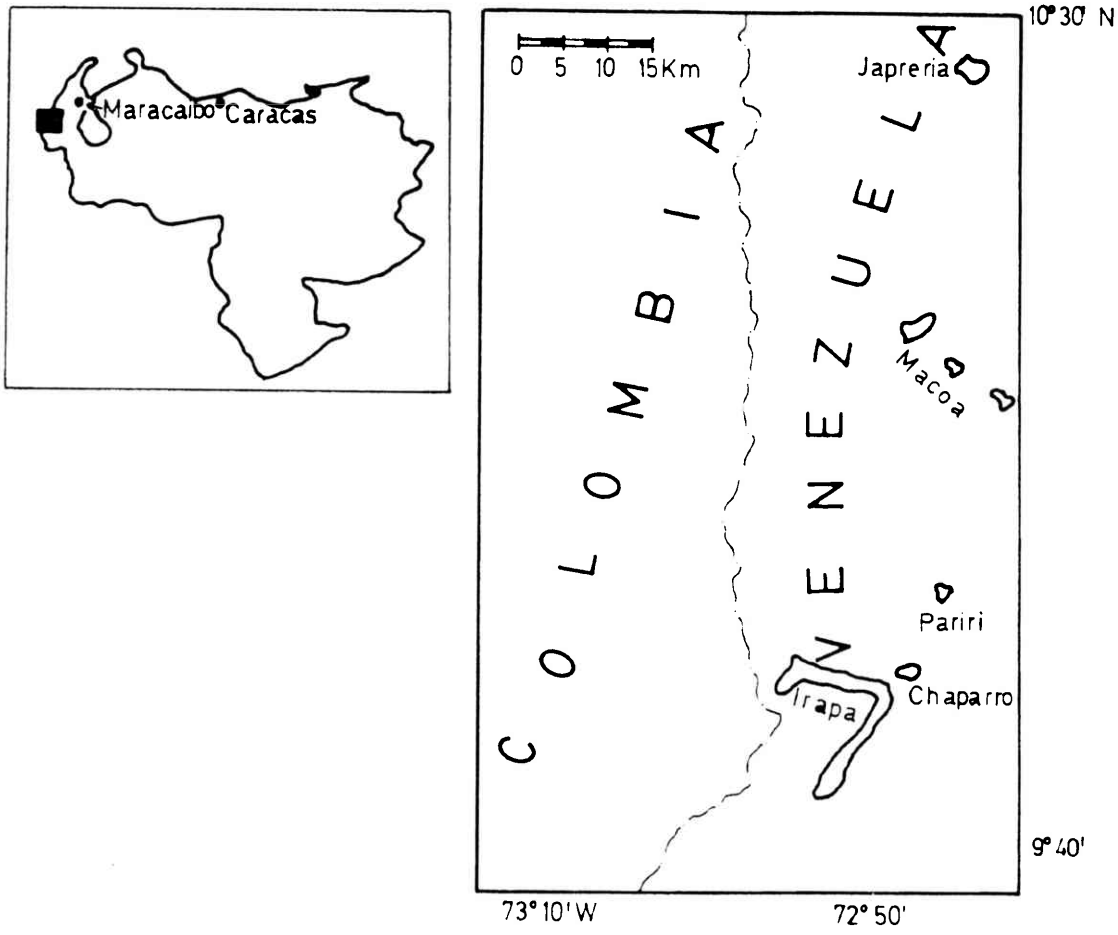

Fig. 1 : Geographical location of the subtribes analyzed. The Japreria appear in their original location.

	CHAPARRO (N = 21)		PARIRI (N = 35)		IRAPA (N = 33)		MACOA (N = 20)		JAPRERIA (N = 14)		ALL YUKPA (N= 123)	
	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ
R1	15.23	5.41	15.27	7.42	19.06*	4.70	18.08*	4.93	16.29	5.28	16.85*	5.96
R2	8.45	8.09	3.69	6.53	13.79	7.22	11.06	7.44	15.64*	4.53	9.77	8.16
R3	8.39	6.09	7.06	6.56	14.61	3.79	11.96	6.67	15.43	6.41	11.06	6.68
R4	16.16	4.66	12.94	7.52	17.67	4.42	16.37	5.55	19.14	4.96	16.02	6.04
R5	12.19	4.61	10.47	6.37	14.24	3.99	12.14	5.67	12.14	6.87	12.24*	5.57
Total Right	60.42	22.63	49.42	28.97	79.36	16.75	69.61	23.34	78.64	22.37	65.94*	26.13
L1	16.13	5.41	15.44	6.83	19.33*	5.05	17.65*	5.51	15.75	4.26	17.00*	5.80
L2	11.28*	6.11	4.59	6.60	14.54	6.11	9.84	7.92	14.93	5.81	10.43*	7.63
L3	11.53	6.83	8.63	7.36	16.52*	4.70	14.71	7.13	15.56	5.09	13.02*	7.05
L4	16.37	5.56	13.24	7.67	18.74	5.38	17.77	4.91	21.58	5.94	16.93*	6.64
L5	13.19*	4.91	10.79	6.53	14.97	4.38	15.27	3.85	14.23	4.18	13.44*	5.32
Total Left	68.50*	22.98	52.69	29.37	84.10*	18.35	75.24	22.77	82.05	21.49	70.82*	26.57
T.F.R.C.	128.92	44.78	102.10	57.67	163.46*	34.14	144.84	44.23	160.69	43.12	136.76*	51.85

* Variables displaying significant sexual differences at 0.05 level.

Table 1 : Mean finger ridge counts and their standard deviations in Venezuelan Yukpa males.

Once a "complete" data matrix (observed plus estimated data) had been obtained, we compared the various mean finger ridge counts computed from the original data matrix (with the values missing) and from the "complete" data matrix (the missing values replaced by estimates). In no case did the difference reach statistical significance at the 0.05 level. Accordingly, the remaining computations (Student t test, paired t test, one-way anova, Mahalanobis D square distance) were based upon the complete data matrix and carried out at the Computer Center of the Universidad Autónoma de Madrid.

RESULTS AND DISCUSSION

Ridge counts

The mean and standard deviation of the variables analyzed are shown in tables 1 and 2 (males and females, respectively). Since we estimated the various missing values appearing in the samples, the TFRC mean and standard deviation estimates differ slightly from those previously reported (Díaz Ungría *et al.*, 1984).

Considered as a whole, both sexes of the Yukpa tribe follow the usual trends as regards the ranking of finger ridge count mean values, i.e., the thumb and fourth finger show the maximum values, and the index the minimum ones, with little and middle fingers ranking intermediate. Essentially speaking this pattern is maintained in both sexes of the subtribes except with the Japreria, where the minimum values appear on the little fingers.

It is also important to note the very low ridge count appearing on the index and middle fingers of both hands of the Pariri males and females. This is related with the very high frequency of arches appearing in this subtribe (see Díaz Ungría *et al.*, 1986).

As far as the TFRC is concerned, according to the revision published by Garruto et al. (1979), Yukpa males as a whole appear to be very similar to Jivaro, Mapuche, Trio and Xikrin Indian males; Yukpa females appear to be very similar to Belen, Chapiquina, Survi and Trio females. Furthermore, if we take into account further data based on selected samples of 40 and more males published by the abovementioned authors, Yukpa males rank at the upper end of the TFRC range for South American (not Andean) Indian populations.

As regards the five subtribes, both the male and female Irapa and Japreria series demonstrate the highest mean TFRC values, while Chaparro and Pariri males and females show the lowest; the Macoa are intermediate.

	CHAPARRO (N = 21)		PARIRI (N = 28)		IRAPA (N = 24)		MACOA (N = 22)		JAPRERIA (N = 19)		ALL YUKPA (N= 104)	
	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ	$\bar{X}$	σ
R1	12.95	6.34	12.77	5.81	14.28	4.09	13.27	6.31	12.89	5.37	13.27	5.57
R2	6.66	6.12	2.11	4.56	14.22	6.02	9.38	6.97	11.22	3.19	8.15	7.18
R3	8.65	6.64	6.01	4.72	12.79	3.73	12.11	6.77	12.00	3.87	9.92	5.99
R4	13.61	6.87	11.02	7.70	17.04	5.31	16.59	5.73	18.78	3.77	14.78	6.80
R5	9.56	4.82	8.68	5.45	13.25	4.47	11.05	5.67	10.89	3.76	10.60	5.23
Total right	51.42	23.83	40.59	22.07	71.57	18.36	62.40	23.92	65.78	9.55	56.72	24.06
L1	13.85	5.28	12.88	6.29	14.33	5.05	12.74	6.28	13.56	4.75	13.44	5.63
L2	6.97	5.66	2.19	4.08	13.86	4.92	9.46	6.37	13.33	2.29	8.35	6.70
L3	9.86	7.05	6.14	6.39	13.29	4.54	12.68	6.25	14.67	3.74	10.66	6.60
L4	12.35	7.34	11.10	6.99	16.15	4.85	16.65	5.44	21.22	5.89	14.57	6.85
L5	8.57	4.70	8.55	5.37	13.95	3.53	13.09	6.92	10.89	4.20	10.96	5.61
Total left	51.59	24.43	40.87	21.83	71.58	18.49	64.62	27.10	73.67	16.85	57.98	25.51
T.F.R.C.	103.01	47.35	81.45	42.95	143.16	36.33	127.02	49.99	139.44	25.44	114.70	48.75

Table 2 : Mean finger ridge counts and their standard deviations in Venezuelan Yukpa females.

Bilateral asymmetry

Table 3 summarizes the asymmetry (right minus left) of finger ridge counts. To test whether the differences between the mean finger ridge counts of homologous fingers are significantly different from the theoretical value (zero), a one-sample (or paired) t-test was carried out.

Considering the Yukpa as a whole, all the fingers on the left hand tend, on average, to have higher count than their homologous on the right hand. However, it is only in the male series that some of these values reach statistical significance at the 0.05 level. These correspond to those of the middle, fourth and little fingers. Furthermore, the difference between the sums of the five right ridge counts and the five left ones is about -5 ridges in males and -1 ridge in females. Again, these differences are only significant in males.

For the subtribes, significant differences are only observable for pairs of fingers in the male series. According to previous studies on this topic (Holt, 1954; Jantz, 1979; Harvey et al., 1980; Martín et al., 1986) the thumb and, possibly, the index fingers of both sexes display significant bilateral differences in finger ridge counts. In this context, the results obtained here are very noticeable because of : 1) females, whether the tribe is considered as a whole or by subtribe, do not show any significant asymmetry (only with the Japreria does the total ridge count of the right hand significantly differ from that of the left hand); 2) the fingers showing significant asymmetry in males are neither the thumb nor the index (except with the Chaparro whose index and middle fingers show any significant asymmetry).

Sexual differences

In general, the male series show mean finger ridge counts higher than the corresponding ones for females (compare tables 1 and 2). However, the subtribes differ in the fingers showing significant sexual dimorphism. The Irapa is the subtribe that accumulates more variables showing significant sexual differences for ridge counts (5 out of 13 variables); on the other hand, the Pariri do not show any significant sexual differences for ridge counts.

When we consider the tribe as a whole, almost all the variables show significant sexual differences at the 0.05 level. Only the ridge counts for the index, middle and fourth fingers of the right hand do not show any significant differences between males and females.

	CHAPARRO		PARIRI		IRAPA		MACOA		JAPRERIA		ALL YUKPA	
	$\bar{X}$	VAR	$\bar{X}$	VAR	$\bar{X}$	VAR	$\bar{X}$	VAR	$\bar{X}$	VAR	$\bar{X}$	VAR
males												
R1-L1	-0.91	23.44	-0.17	39.53	-0.27	9.83	0.43	25.51	0.54	20.16	-0.15	23.77
R2-L2	-2.83*	23.42	-0.91	11.29	-0.75	20.36	1.22	29.39	0.71	48.37	-0.66	23.68
R3-L3	-3.14*	19.37	-1.57*	9.24	-1.81*	6.46	-2.74*	12.02	-0.13	8.44	-1.96*	10.98
R4-L4	-0.21	15.12	-0.30	14.42	-1.07	18.75	-1.40	16.43	-2.44~	18.35	-0.91*	16.43
R5-L5	-1.00	8.35	-0.32	9.72	-0.73	6.54	-3.13*	22.03	-2.09	18.84	-1.20*	12.22
right-left	-8.08*	75.03	-3.27*	77.17	-4.74	69.14	-5.63*	170.00	-3.41	63.36	-4.88*	88.13
females												
R1-L1	-0.89	16.12	-0.12	21.24	-0.06	9.41	0.53	16.57	-0.67	31.00	-0.17	16.82
R2-L2	-0.31	18.70	-0.08	17.02	0.36	18.32	-0.08	16.56	-2.11	12.36	-0.20	16.92
R3-L3	-1.21	13.26	-0.13	17.87	-0.50	10.01	-0.56	24.33	-2.67	25.25	-0.74	16.91
R4-L4	-1.26	19.98	-0.08	24.69	0.89	24.14	-0.06	31.84	-2.44	24.03	0.21	25.09
R5-L5	-0.99	11.80	0.13	18.08	-0.70	12.97	-2.04	26.67	0.00	10.25	-0.36	16.98
right-left	-0.17	86.93	-0.28	82.50	-0.01	37.53	-2.22	114.12	-7.89*	103.36	-1.26	83.09

* asymmetry significantly different from 0 at 0.05 level.
~ asymmetry close to the critical value at 0.05 level.

Table 3 : Bilateral asymmetry of finger ridge counts in Venezuelan Yukpa males and females.

Differences among subtribes

For each variable, table 4 shows the ratio (in percentages) of the between-groups component of the variance to the total variance. The source of these figures derives from the corresponding one-way analysis of variance. The table also indicates when these anova furnish significant results at the 0.05 significance level.

	Males (%)	Females (%)
R1	7.82*	1.09
R2	22.30*	38.95*
R3	25.86*	21.76*
R4	12.64*	16.02*
R5	6.39	10.67*
Total Right	22.42*	24.52*
L1	7.56~	1.29
L2	28.91*	45.06*
L3	21.03*	21.94*
L4	16.94*	20.57*
L5	11.59*	18.37*
Total Left	22.76*	24.89*
T.F.R.C.	23.23*	25.37*

* The asterisk means a significant F ratio in the corresponding one-way anova at 0.05 level.
~ F ratio close to the 0.05 signification level.

Table 4 : Percentage of the total dispersion accounted for by the between groups component of the variance for each variable $[SS_B \times 100/(SS_B + SS_W)]$.

It is clear that almost all the variables show significant differences among the subtribes. Only the R1 and L1 mean ridge count values in females and L1 in males do not differ among the subtribes from a statistical point of view.

However, the percentage of the total variation accounted for by the between-groups component is different from one variable to another; together with the summary variables (total ridge count for the right and left hands, TFRC), index and middle fingers in both sexes show the largest percentages. At all events, these are generally not so high, although they can be ascribed almost totally to genetic origins because of the reduced importance of environmental factors on the expression of the size of a finger pattern (ridge count).

These last two points (the significant F ratio and the relatively low percentage of the SSb/SS tot quotient) could imply that the significant differences among mean values of the variables compared are restricted to a small number of populations.

The relationship between pairs of populations when a set of variables is considered can be approached by means of some kind of distance index. We thus used the Mahalanobis D^2 to study the "dermatoglyphic" distances between pairs of subtribes as well as the distances between the sexes of a given subtribe. These results appear in table 5. Only the ten finger ridge counts were used to compute the distances.

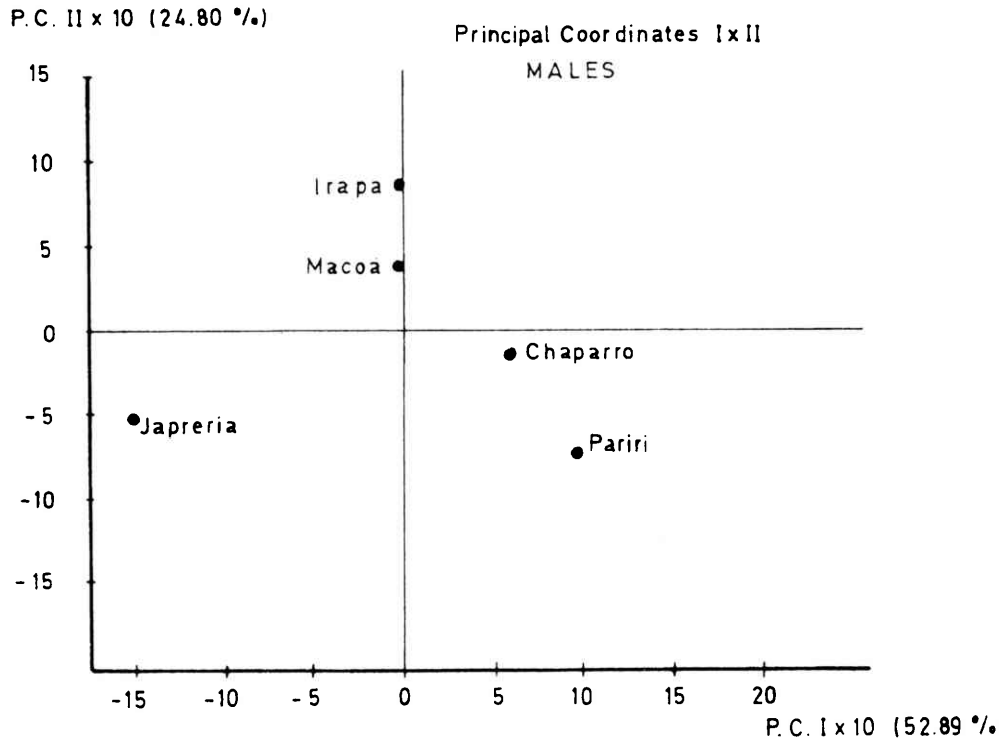

Fig. 2 : Plot of the males of the five Yukpa subtribes within the map of the first two principal coordinates.

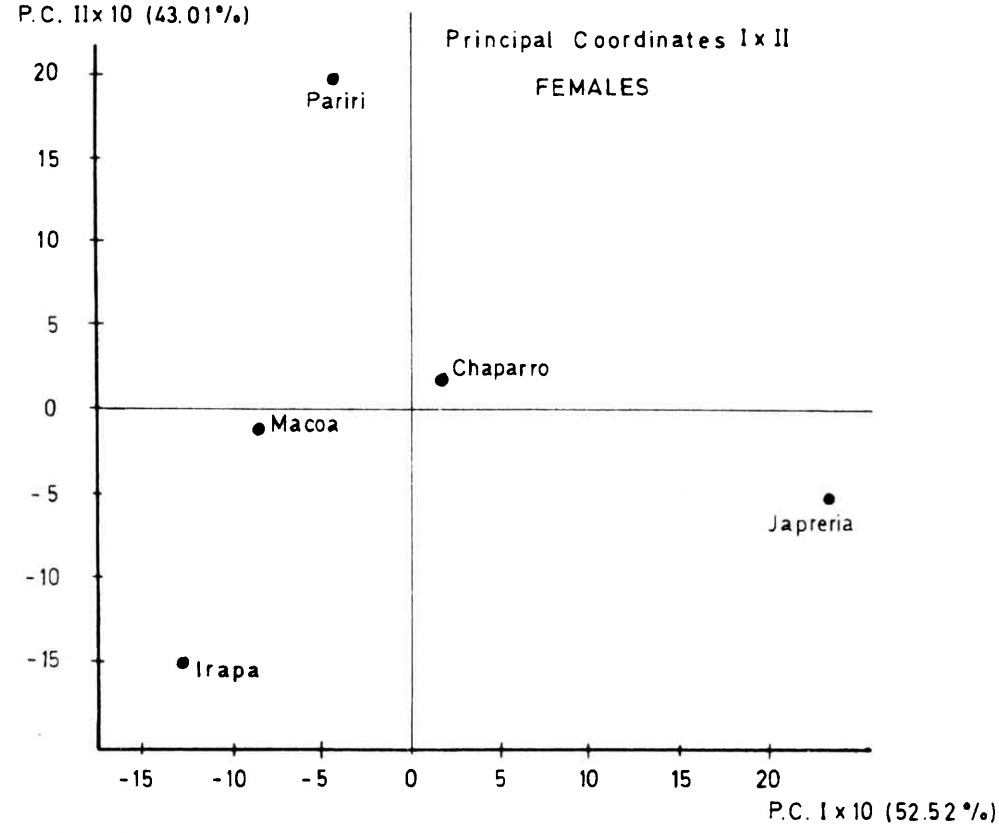

Fig. 3 : Plot of the females of the five Yukpa subtribes within the map of the first two principal coordinates.

		MALES				
		Chaparro	Pariri	Irapa	Macoa	Japreria
FEMALES	Chaparro	2.259	1.888*	2.133*	2.598~	5.189**
	Pariri	1.562	0.453	3.839**	2.645**	6.539***
	Irapa	3.592**	12.198***	1.990*	1.536	4.359**
	Macoa	2.204	3.964***	1.991	1.851	3.798~
	Japreria	4.326	13.904***	14.158***	9.187**	5.840

*$p \leq 0.05$; **$p \leq 0.01$; ***$p \leq 0.001$
~Distance close to the critical value at 0.05 level.

Table 5 : Mahalanobis distances among subtribes. Top triangle : males. Bottom triangle : females. The distances between the males and females of the same subtribe appear in the diagonal. Computations based upon ten finger ridge counts.

As expected, the distances between the sexes of the same subtribe are not significant with the exception of that observed between Irapa males and females. According to table 5, the distances between the male series are lower in magnitude than the corresponding ones in females, but the number of pairs of subtribes displaying significant distances are rather similar in both sexes (7 out of 10 in males, and 6 out of 10 in females). Some points of interest appear from the inspection of this table. For instance, Japreria and Pariri males and females tend to show the maximum distances not only between each other, but also between each other and the other subtribes. Also, those pairs of subtribes whose distances are not significant tend to be the same in the male and female series (e.g. Macoa–Irapa, Macoa–Chaparro).

To obtain a graphic vision of the main relationships among subtribes in both male and female series, we have submitted the corresponding distance matrices to a principal coordinate analysis (Gower, 1972).

Figures 2 and 3 depict the positions of the subtribes within the map of the first two principal coordinates. These account for 77 % and 95 % of the total dispersion of the distance matrix for males and females, respectively.

In none of these figures do clear clusters appear, especially in the case of females, where a great dispersion among subtribes is observed. Only in the case of the Irapa and the Macoa is there a tendency for the male series to be closer. In fact, the distances between these subtribes are not significant (see table 5).

The results obtained suggest a heterogeneity within the Yukpa tribe, with the Japreria, the Pariri, and, to a lesser extent, the Irapa, being more differenciated subtribes. This agrees with the results obtained from anova analyses referred to above.

As has already been mentioned, the small sample size for some of the subtribes may condition the results, but these do agree reasonably well with those obtained for other dermatoglyphic traits (Díaz Ungría et al., 1984, 1986) and with the origins of the Japreria and the Pariri : the Japreria were isolated for a long time as their language suggests, and the Pariri migrated from the shores of Lake Maracaibo to the Sierra de Perijá. The remaining subtribes came from the zones that were inhabited when the survey took place, or from closeby surrounding areas.

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