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INTRODUCTORY REMARKS

The amount and value of anthropological information which may be advantaged in the following of ethnogenetic processes depend on such factors as:

a) statistical representativeness of a sample derived from a general population which may be a nation, nationality, tribe, genus or any other human grouping of a given size and distribution of items;
b) selection of most diagnostic traits used in the applied taxonomic procedure;
c) methods of a description of intra- and interpopulation variability;
d) taxonomic procedure of ordering and classifying a set of uniformely described units, logically bound with a given concept of race;
e) width and scope of taxonomic comparisons;
f) degree of intersubjectivity and logical correctness of all the applied methods, procedures and inference of conclusions.

There exists enormously rich literature dealing with the origin and racial differentiation of Amerindians. Unfortunately, it brought, in general, a hopeless chaos of oppinions and speculations, instead of to clarify the subject. This may be easily seen from excellent reviews published by J. Birdsell (1951) or J. Comas (1965). According to the present author, this unpleasant state of affairs has been mainly determined by the fact that many anthropologists prefer to speculate verbally then to collect and synthetize well documented materials. Oftenly, a plain unawareness of a mutual play of the mentioned above factors pointed under a-f may be also demonstrated (A. Wierciński, 1968).

Therefore, it seems useful to precise, in some details, the methodological standpoint of the present author, with omitting the apparent factor mentioned under point a) which is pure statistical question, sometimes, too exaggerated.

Ad b). Proper selecting of a minimum set of traits should consider their degree of heritability reciprocally related to ecosensistivity (J. Hiermaux, 1963 and A. Wierciński, 1970), possibly intersubjective their appreciation and a resistance on both, a small pressure of natural selection and genetic drift. If so, there should be excluded all the traits of a simple mode of inheritance like serological characteristics (L. Oschinsky, 1959 A. de Diaz Ungria 1962 and A. Wierciński, 1966 or lastly

J. Schwidetzky, 1966) what does not mean that they can not be conveniently used in marking some authomatic processes or isolating mechanisms. So then, there remain highly heritable classic cephalometric indices, a good number of anthroposcopic variations (especially, the cephaloscopic ones), intersubjectively assessed by use of suitable scales or schemes and, somewhat more ecosensitive – stature. They are, more or less, polygenic but this is rather for a good than for a bad.

Most unfortunately, the American authors dealing with the living Amerindians did not publish such anthroposcopically informative descriptions in the form of individual data, with a few outstanding exceptions (for example, Gifford's publication, 1926).

Ad c). The general variability matrix of the human species which consists of a number of various subgroup matrices may be described in various reduced ways:

1) vectors of arithmetic means: $\bar{x}_1, \bar{x}_2, \ldots \bar{x}_k$ and standard deviations: $\sigma_1, \sigma_2, \ldots \sigma_k$, relative frequencies of individuals placed in categories of qualitative or quantitative traits: $f_1, f_2, \ldots f_n$ or, relative frequencies of genes: $p_1, p_2, \ldots p_i$ calculated for simply inherited features (common procedure of the adherents of the populationistic concept of race);
2) matrices of c-cubes with coordinated frequencies of *f*-individuals when such trait is divided into c-categories or vectors of relative frequencies of individuals assigned to a set of racial types: *A*, *B*, *C*, ... *Z* (common procedure of the Polish Anthropological School).

Of course, there exist some other methods of reduced descriptions.

Most unfortunately, the variability of the living Amerindians is usually presented in the form of single trait analysis based on descriptions listed under point 1. One of the outstanding examples of multivariate analysis represents exhaustive publication of J. Faulhaber (1955).

Ad d). Any formally correct, intraspecific taxonomy of man must be based on a given concept of intragroup homogeneity. Frequently, two such concepts are in a use: a) homogeneity based on the principle of relative similarity and, b) homogeneity based on a statistical representativeness of a sample in relation to a general population. Logically, both concepts may overlap partially each other. In the first case, intragroup variability of the distinguished taxonomic units must be always smaller than the intergroup differences. The second concept does not need to perform this condition but only it demands an insignificant level of probability in statistical testing. First concept is clearly based on a given appreciation of a taxonomic distance (sometimes called also: biological distance) which should be applied to a total set of traits to obtain informative results. The taxonomic distance may be subjectively assessed by an able morphologist or intersubjectively, for example, in the form of D^2 of Mahalonobis, C_H^2 of Penrosc, Δ_g of Hiernaux, *DD* of Czekanowski or $(DD)^2$ of Henzel etc. etc.

The matrix of distances reflects a degree of all the mutual similarities and dissimilarities in a series of taxonomically investigated data. This matrix should be

according to the principle of relative similarity in order to receive the taxonomic units. It ought to be emphasized that there do not exist formal restrictions, as to applying the geometrically conceived distance to human individuals or to their groups, i.e. a homogeneity based on relative similarity may function well both at the populationistic or the individual levels of differentiation. Thus, both individual or populational taxonomy can be received on the basis of strictly the same formal assumptions and procedures.

Most unfortunately, there is almost a complete lack of taxonomic studies on the living Amerindians with well precised method of reordering the distances. As one of a few examples, the Schwidetzky's study on Maya may be mentioned (incl. in J. Comas, 1966).

Ad e/. It is rather apparent that the results of a taxonomic analysis greatly depend on a width and scope of comparisons. A very good example provides the taxonomy of Amerindians which, up to this date, rather rarely have been considered in a world-wide scale, with exception of the question of their affinities to great racial stocks. Many authors prefer to deal with the limited territorially comparisons what may frequently lead to non-informative results. However, a very wide array of comparisons may bear a danger that some convergent types will be regarded as genealogically linked. The probability of such errors is decreasing proportionally to an increase of the number of diagnostic traits, simultaneously considered.

Ad f). Logical correctness of taxonomic procedures and suitable inferences are not always observed by different authors. Also, very disadvantagoeus is assessing the anthroposcopic variations in pure verbal descriptions. A share of this subjective element, however, may be easily decreased by use of conveniently coded scales or drawn schemes.

Most unfortunately, also in this case, the actual publications of the Amerindian living materials do not include the latter descriptions, with exception of eye and hair colour.

Summing up all these remarks, the present author sees a need for a repeated taxonomic analysis of autochtonic populations in Americas even, if would be based on already published data.

MATERIAL AND METHODS APPLIED

The material analysed in the present paper descends from Mexico, the country which has been well surveyed anthropometrically. It consists of the average populational types (a.p. – types) of 67 living territorial groups published or republished in the exhaustive studies of J. Faulhaber (1955) and J. Comas (1965). There have been selected only 5 metric traits (stature, bizygomatic diameter, cephalic index, face index and nose index) since they had been investigated in all the groups considered being, at the same time, very diagnostic traits in the sense mentioned above. Some of the series cited by Comas were omitted here owing to their too small volumes

(like, for example – Lacandones). The Spanish transcription of names was preserved to avoid possible misunderstandings.

Firstly, there were calculated the linear intergroup coefficients of correlation to see their weight in the taxonomic analysis. The taxonomic interpopulation differentiation of all the 67 a.p. – types was appreciated on the basis of the matrix of simple sums of $(DD)^2$ distances of Henzel calculated for each pair of items. Worthy of mention here are the studies of Hiernaux (1964) and Huizinga (1962 and 1964) which showed very light correlation of the results obtained by use of simplest DD of Czekanowski and other less sophisticeted distances with D^2 of Mahalonobis. The matrix of $\Sigma (DD)^2$ was reordered by use of dendrites' method of the Polish Anthropological School (so called Wrocław Taxonomy) which connects by straight broken line all the shortest distances. The dendrite was divided into m – natural parts to prepare the criterias of division of similarities between the analysed series. Then, the symmetrical diagram of shortest distances of Czekanowski was constructed to demonstrate graphically the places of concentration of the ressembling each other series which might by considered formally as points in multidimensional space.

The content of particular diagraphic groupings was preciesed in the light of individualistic concept of race by use of the Reference Points Method of Wanke, expressed by the equation:

$$a_x = \frac{f}{(a_1 - p_1)^2 + (a_2 - p_2)^2 + \ldots + (a_k - p_k)^2}$$

where: a_x denotes relative similarity of a population p to an element xx in a total set of considered traits, a_k is mean characteristics of an element X in a trait k, p_k is population mean in a trait k and f denotes a factor bringing the equation into 1 or 100%.

LINEAR CORRELATIONS AND SEGREGGATING VALUES OF TRAITS

Table 1 yields the values of intergroup coefficients of linear correlation r between all the possible pairs of traits. It may be seen that pure functional dependencies may play their role in the combinations face breadth x cephalic index, face breadth x face index inclusive spurious correlation, cephalic index x face index, face index x nose index and stature x face index. However, since the significant r at the P-level of 0.01 must be higher than 0.31, the expected share of functional dependence in cephalic ind. x face index did not appear, as well as, between bizygomatic breadth and stature. At the same time, there are moderately strong correlations between such variables as: stature x cephalic index and cephalic index x nose index. In the remaining significantly correlated variables surely the functional dependencies play their role but not only. Thus, in general, the territorial series from Mexico tend

Table 1

The coefficients of intergroup linear correlation in Mexican territorial series

Trait	A	B	C	D	E
A. Bizygomatic breadth	1.00	+0.12	+0.38	−0.40	+0.19
B. Stature		1.00	−0.38	+0.30	+0.01
C. Cephalic index			1.00	−0.04	−0.38
D. Face index				1.00	−0.56
E. Nose index					1.00

to show broadening of bizygomatic diameter with shortening the head, and shortening the face. With the increase of the stature, the head becomes longer and face higher. With the shortening of the head, nose tends to become narrower and, the shorter face – the broader nose. If the assumption is right that not only functional dependencies influence the significant values of r. the latter may be related also to proportional changes of the racial elements which structure particular territorial series. On one hand, it could be a component with low stature, dolichocephaly, narrow bizygomatic diameter, very short face and very broad nose. As an other opposite, besides of the element with high stature, mesocephaly, high face, narrow nose and broad bizygomatic diameter, there might appear also brachycephalic components with shorter face and broader nose associated, as well as, with the broad bizygomatic diameter. i.e. perhaps belonging to the Yellow variety. The characteristics of the first component could correspond well to the definition of the Ainuid race which roughly may be related to the Amurian race of Birdsell. In fact, the present author's investigations on Precolumbian series of crania from Mexico revealed the presence, besides of the Ainuid race also such elements of the Yellow variety as the Pacific and Mongoloid races and a half-White and half-Yellow Laponoid race. So then, it may be reasonably assumed that the same racial elements take part in the structures of the living Amerindian tribes in Mexico.

Now, worthy of considering would be the question of segreggating values of the 5 selected traits. This value must be proportional to the size of absolute differences (DD distances) which occur in all the 2211 pairs of comparisons for one trait among 67 items. Therefore, the mean DD has been accepted as the convenient measure. The table 2 includes DD values for all the 5 traits. It may be seen that the nose index reveals relatively the highest intergroup differentiation what demonstrates again its well known diagnostic value. However, the DD of all the remaining traits are of the same rank, and differences do not exceed 2.5 unit. If so, any normalisation of the considered traits in diagraphic analysis was not necessary. It should be also mentioned that the values of DD are simply related to the values of standard deviations and, so, they may be recognized too as measures of the variance of the traits.

Table 2

The mean DD distances for particular traits showing their segreggating values in the diagram

Trait	DD
Bizygomatic diameter	3.53
Stature	4.55
Cephalic index	3.11
Face index	4.47
Nose index	5.67

THE RESULTS OF DIAGRAPHIC ANALYSIS

The matrix of $\Sigma_5^1 (DD)^2$ distances between all the possible pairs of territorial series from Mexico was recordered according to the first shortest distances. Consequently, most resembling each other series became close neighbours. The division of the received dendrite into m-natural parts according to the principle of the relative similarity gave the upper limit of similarity. The corresponding figure for $\Sigma_5^1 (DD)^2$ equals here to 58. Thus the symmetrical diagram of Czekanowski has been constructed where first degree of greatest similarity ranges from 0 to 19 (black squares), second degree – square and third degree – from 42 to 58. The received diagram (fig. 1) shows the division into 14 groups and two more isolated a.p. – types which graphically represent the places of concentration of points in multidimensional space. The groups were numbered from I to XIV. Some of them (groups V-IX and IX-XI) revealed close mutual connexions, i.e. they constituted two larger complexes of groups of a.p. – types. Also some a.p. – types placed themselves in a clearly intermediate intergroup positions. First glance at the arithmetic means of 5 considered traits written on the right side of the diagram respectively, show that diagraphic groups consist of very resembling each other a.p. – types.

Thus, group I comprises 2 series of Kanjobales (No 1 and 2) characterised by the narrowest bizygomatic diameter, very low stature, elongated head, very high face and moderately narrow nose. The group II consists of one Papago series measured by Gabel and two Nahuas series from Morelos (No 3 - 5). They differ from the previous group by definitely broader bizygomatic diameter, medium high stature, mesocephaly and more pronounced leptorrhiny. This group is slightly related to the group III embodying various mestizo series from Vera Cruz and two Nahuas series from Chiapa in Guerrero and Huatusco in Vera Cruz (No 6 - 12). They have again rather narrow bizygomatic diameter, lower stature, mesocephaly, a little shorter face and medium broad nose. The group IV shows intermediate position between group III and V. It yields 3 Maya series: Mam, Tzotziles from Zincantan and Tzeltales from Amatenango (No 12 - 14). They are characterised by narrow bizygomatic diameter,

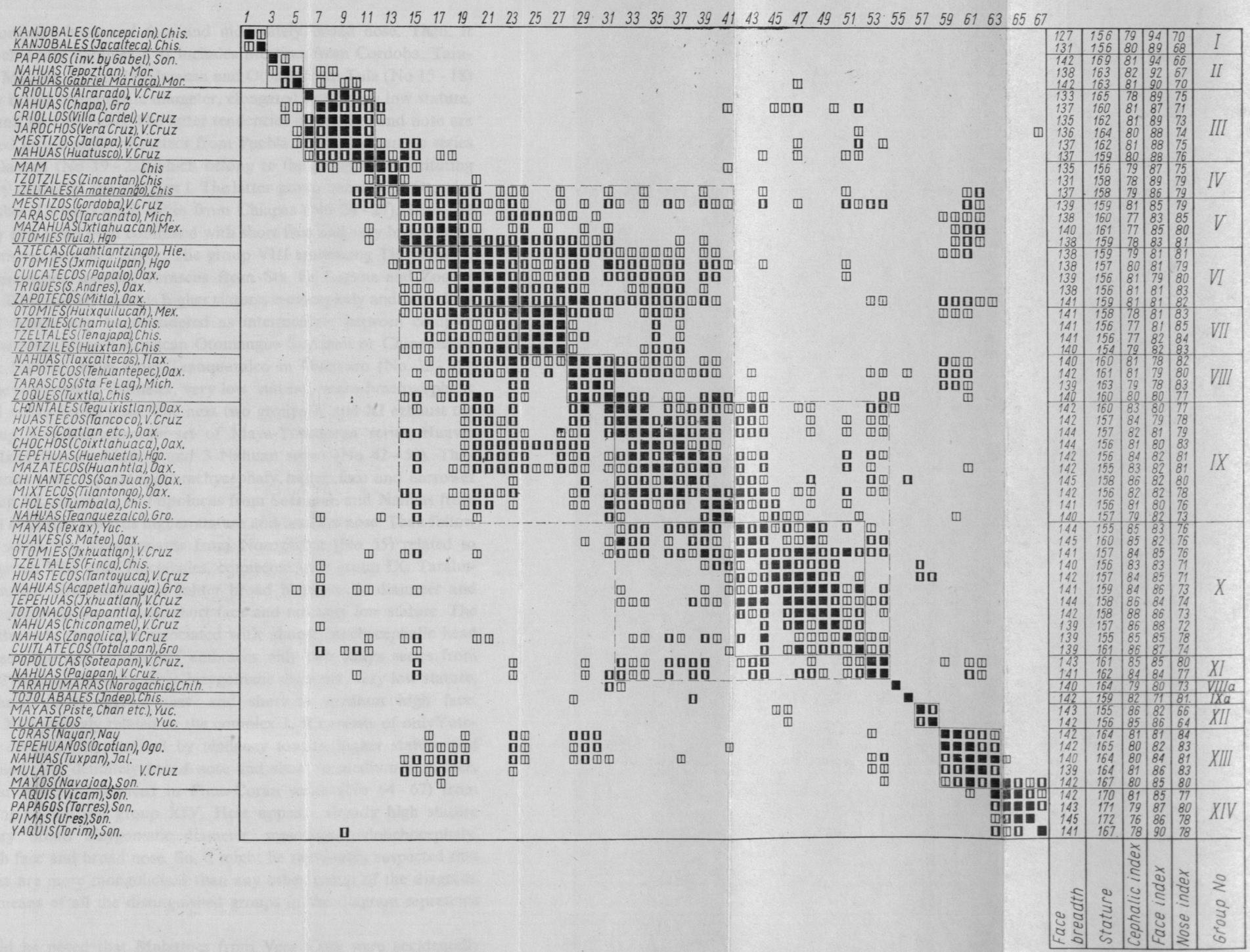

Fig. 1. The symmetrical diagram of shortest $\Sigma_5^1 (DD)^2$ distances of territorial groups in Mexico

very low stature, elongated head and face and moderately broad nose. Then, it follows group V which opens complex I. It includes Mestizes from Cordoba, Tarascos from Tacanato, Mazahuas from Ixtlahuacan and Otomis from Tula (No 15 - 18) which show not very broad bizygomatic diameter, elongated head, very low stature, clearly shorter face and broader nose. The latter tendencies in the face and nose are still more pronounced in the series of Aztecs from Puebla and 3 Otomangue series from Hidalgo and Oaxaca (No 19 - 23) which belong to the group VI constituting with group VII a very cluster of the complex 1. The latter group consists of Otomies from Mexico and other Tzeltal-Tzotzil series from Chiapas (No 24 - 27). They are distinguished by very elongated head combined with short face and very broad nose. The bizygomatic diameter becomes larger. The group VIII embracing Tlaxcaltecos, Zapotecos from Tehuantepec, another Tarascos from Sta Fe Laguna and Zoques from Tuxtla (No 28 - 31) is shifted towards higher stature, mesocephaly and very short face. The group IX which may be considered as intermediate between complex 1 and 2 consists of various Maya-Totonacan Otomangue Sayizaan or Chinantecan series and only one Nahuan series from Teanquezalco in Guerraro (No 32 - 41). All of them have large bizygomatic diameter, very low stature, meso-brachycephalic head, short face and rather broad nose. The next two groups X and XI exhaust the complex 2. The group X includes another set of Maya-Totonacan series, Huaves and Otomies from Ixhuatlan de Madera and 3 Nahuan series (No 42 - 52). They differ from the previous group by stronger brachycephaly, higher face and narrower nose. The small group XI consisting of Popolucas from Sotzapan and Nahuas from Pajapan (No 53 - 54) is shifted towards higher stature and broader nose. Then follow two more seperated series, i.e. Tarahumaras from Norogachic (No 55) related to lower series of the group VIII and Tojclabales, connected with group IX. Tarahumaras show more mosaic combination of rahter broad bizygomatic diameter and mesocephaly with moderately broad nose, short face and not very low stature. The Tojolabales have extremely short face associated with almost brachycephalic head and very broad nose. The next group XII embraces only two Maya series from Yucatan (No 57 - 58) distinguished by large bizygomatic diameter, very low stature, definite brachycephaly, really narrow nose and short to medium high face. Then, comes group XIII strongly related to the complex 1. It consists of onlyYuto-Nahuan series (No 59 - 63) characterised by tendency toward higher stature and mesocephaly combined with definitely broad nose and short to medium high face. This tendency is far more pronounced in Pima-Coran series (No 64 - 67) from Sonora which belong to the last group XIV. Here appears already high stature associated with very broad bizygomatic diameter, mesocephaly-dolichocephaly, medium high to high face and broad nose. So, it might be reasonably suspected that these Sonorian series are more mongolicised than any other group of the diagram.

The arithmetic means of all the distinguished groups in the diagram represents table 3.

Finally, it should be noted that Mulattoes from Vera Cruz were accidentally

Table 3

Average characteristics of the diagraphic groups of a.p.-types in Mexico

Group No	Bizygomatic diameter	Stature	Cephalic index	Face index	Nose index
I	129.0	156.0	79.5	91.5	69.0
II	140.7	165.0	81.3	92.0	67.7
III	135.6	162.6	80.0	88.2	73.6
IV	134.3	157.7	79.0	88.0	77.0
V	138.4	159.4	78.4	84.4	80.8
VI	138.8	157.4	80.4	80.6	81.0
VII	140.8	156.0	77.8	81.5	83.8
VIII	140.2	161.0	80.3	78.8	80.5
IX	142.4	156.8	82.5	81.0	78.6
X	141.5	157.5	85.1	84.9	74.0
XI	142.0	161.5	84.5	84.5	78.5
XII	142.5	155.5	85.5	84.0	65.0
XIII	141.0	164.8	80.4	83.6	82.2
XIV	142.7	170.0	78.5	87.0	78.3

included in the group XIII owing to their very broad nose and other traits though, at the same time, they are distinguished by the lowest figure for bizygomatic diameter within this group. Of course, this series would surely occupy isolated position if the comparisons would include diagnostic anthroposcopic characters.

However, in general, the results of diagraphic analysis, in spite of so small number of only metric traits and very simple concept of taxonomic distance, revealed undoubted regularities. First of all, the conclusion of Comas and Schwidetzky (see: Comas, 1966) about evident racial heterogeneity of Maya-Totonacan tribes has been fully assessed. But, at the same time, it must be stated that their distribution among various diagraphic groups is not uniform. Namely, they concentrate (inclusive Huastecs) in the complex 2 of groups. The Otomangue series prevail among the groups of the complex 1 while, Pima-Coran subfamily reveals its own assemblage, as well as, it did their Sonorian wing. Other Yuto-Nahuan series show heterogeneity comparable with that of Totonac-Mayan.

All these relations may be more deeply appreciated by use of an approach of individual taxonomy what will be shown below.

DIAGRAPHIC ANALYSIS IN THE LIGHT OF INDIVIDUAL TAXONOMY

Most unfortunately, all the analysed materials of Mexican Amerindians were not published in the form of individual data, both anthropometric and anthroposcopic. Consequently, an application of the common procedure of individual racial diagnosing utilized by the Comparative-Morphological Trend of the Polish Anthropological School was fully impossible. However, there exists another, far less infor-

mative and more arbitrary approach provided by the Formal-Mathematical Trend of the same School, i.e. the Reference Points Method formulated by A. Wanke which may be applied to a.p.–types. It is based on the assumption that the populational means in diagnostic metric traits yield information about the racial structure of a population studied. This information is appreciated by coefficients of relative similarities of a.p.–type to the mean characteristics of the main, primary racial elements of individual taxonomy. It is assumed that the values of such coefficients are proportional to the shares of the racial elements in the composition of the investigated population. Of course, this proportionality is not a simple function and depends on different factors in various comparisons. Sometimes even, this procedure may lead to completely wrong results. However, the previous individual diagnosing of some series of Precolumbian crania from Mexico made by the present author (see: A. Wierciński, 1969) allow to suppose with greater probability that the very substratum of Amerindian groups should consist of variable frequencies of the 4 main racial elements of Asiatic derivation: Ainuid (p), roughly corresponding to the Amurian raceex of Birdsell and belonging to the White variety, Laponoid (l) which occupies an intermediate position between Yellow and White varieties, Pacific (z) a non-typical representative of the Yellow variety with rather well profiled nose, oftenly convex and, at last, Mongoloid (m), a most clasic brachycephalic and tall component of the steppe region of the eastern part of Central Asia. Their mean characteristics in stature and 3 cephalometric indices represents table 4 while a more

Table 4

Average characteristics of the racial elements used in Wanke's equation (acc. to Michalski)

Trait	Ainuid P	Laponoid L	Pacific Z	Mongoloid M
Stature	157	158	172	173
Cephalic index	72.5	84.5	80	92.5
Face ,,	80.5	79	92	79
Nose ,,	81	78	66.5	76.5

detailed description was published by the present author in Current Anthropology (A. Wierciński, 1962). It should be noted that there is a lack of exact information for the mean of bizygomatic diameter for the living material.

The results of calculations by applying Wanke's equation (cited above) to averages of 4 traits received for the particular groups of the diagram of distances are presented in the table 5. As it may be seen from that table, some new informations appeared which might supply another basis for following ethnic affiliations. First of all, some of the diagraphic groups revealed very high similarity to one or only two racial elements what presumably sygnalizes the fact of their true high shares in the racial structure. These groups are: II – with Yuto-Nahuan series showing close affinities to the Pacific race, V and VII with a considerable prevalence of the Ainuid

Table 5

Percentage coefficients of similarities calculated by use of Wanke's methode

Diagraphic group	Ainuid	Laponoid	Pacific	Mongoloid
I. Kanjobalan	26	31	31	12
II. Proto-Nahuan	8	9	74	9
III. Hybrid Nahuan	26	25	35	14
IV. Otomi-Mayan	41	35	14	10
V. Otomi-Mazahuan	58	27	7	8
VI. Proto-Mayan – Zapotecan	38	51	5	6
VII. Proto-Otomian	65	27	4	4
VIII. Tarasco-Otomian	43	39	7	11
IX. Proto-Mayan	16	76	3	5
X. Maya-Totonacan	18	58	12	12
XI. Maya-Nahuan	26	47	14	13
XII. Yucatec-Mayan	19	42	23	16
XIII. Otomi-Nahuan	39	27	14	20
XIV. Nahua-Otomian	24	17	36	23

race and Otomangue series, IX and X – with very strong Laponoid influence and a relative concentration of the Maya-Totonacan tribes and groups XIII and XIV – with Pima-Coran and other northern Yuto-Nahuas showing relatively highest figures for the Mongoloid race. Thus, perhaps, it will be possible to correlate racial affinities with linguistic ethnic affiliations, in spite of equalizing action of all the various processes of acculturation and interpopulational hybridisation.

These correlations have been appreciated by use of Chi-square testing (see tables 6 - 8). All the comparisons appeared to be significant at the P-level of 0.05

Table 6

Chi-square testing of racial affinities for Otomangue stock

Racial Linguistic		Otomangue	Non-Otomangue	Totals
Ainuid above 35%	f	8	8	16
	f'	3.67	12.33	
	d	+4.33	−4.33	
	X^2	4.00	1.19	
Ainuid below 35%	f	6	39	45
	f'	10.33	34.67	
	d	−4.33	+4.33	
	X^2	1.42	4.33	
Totals		14	47	61

X^2 with Yates' correction equals to 7.03 and P is below 0.01

So then, the Otomangue tribes (table 6) are connected with strong Ainuid influence (above 35%), the Maya-Totonacan series with Laponoid (above 30%) and Nahuan

tribes – with Pacific + Mongoloid (jointly above 25%). Now, in the light of these results, the ethnogenetic position of different territorial series may be discussed in a more detailed way, as well as, a mnemotypical labelling of all the distinguished diagraphic groupings.

The primary racial structure of the Otomangue stock consequently represents group VII which may be called the Proto-Otomian type, while the whole complex 1 (groups V, VI, VII, VIII and XIII) with generally high coefficient of similarity to the Ainuid race could be labelled Paleo-Otomangue complex. It is mostly dolichocephalic what reflects, probably, a very archaic populational background in Mexico, reaching Paleoindian Period. Beyond any doubt, it is strongly related to a such Californian tribe as Yuki while, also similar Pomo, Maidu and Mono are a little more

Table 7

Chi-square testing of racial affinities for Yuto-Nahuan stock

Racial \ Linguistic		Yuto-Nahuan	Non-Yuto-Nahuan	Totals
Pacific and Mongoloid above 25%	f	15	5	20
	f'	7.21	12.79	
	d	+7.79	−7.79	
	X^2	7.37	4.15	
Pacific and Mongoloid below 25%	f	7	34	41
	f'	14.79	26.21	
	d	−7.79	+7.79	
	X^2	3.59	2.03	
Totals		22	39	61

X^2 with Yates' correction equals to 17.14 and P is below 0.001

influenced by the Pacific admixtures owing to their higher stature associated with more pronounced tendency toward mesocephaly (see: Gifford, 1926). The Tepexpan Man should be precisely assigned to the latter combination, i.e. that of the Subainuid (PZ) type.

Accordingly, the Paleo-Otomangue complex spread over many Amerindian groups over a vast territory of Mexico, like: Coras from Nayarit, Tepehuas from Hidalgo, Tuxpan Nahuas from Jalisco and Tlaxcaltecas, Mayos from Sonora, Tarascas from Michoacan, Cuicatecos, Triques, Zoques and Zapotecas from Oaxaca and, of course, through Otomies from Hidalgo and Mexico and Mazahuas from Mexico. However, very strange Otomangue affinities show also some Maya tribes (Mam. Tzotziles and Tzeltales). An attempt of explaining the latter fact will be presented below.

Now, worthy of considering will be the affinities of the Maya-Totonacan stock. Its evident connection with the prevalence of the Laponoid element leads to the contents of the group IX. And indeed, this group comprises such Old Mayan units as the Huastecas from Tancoco closely related to Mixes and Chontales and then,

Table 8

Chi-square testing of racial affinities for Maya-Totonacan stock

Racial \ Linguistic		Maya-Totonacan	Non-Maya-Totonacan	Totals
Laponoid above 30%	f	20	21	41
	f'	15.46	25.54	
	d	+4.54	−4.54	
	X^2	1.06	0.64	
Laponoid below 30%	f	3	17	20
	f'	7.54	12.46	
	d	−4.54	+4.54	
	X^2	2.17	1.31	
Totals		23	38	61

X^2 with Yates' correction equals to 5.18 and P is below 0.02

to Tepehuas, Zoques and Choles. These relationships constitute good example of anthropological evidences for the linguistic and lexico-statistical findings (see: N. McQuown, 1964 and T. S. Kaufman, 1964) which assess very remote kinship between Maya and Mixe-Zoque group and rather ancient date for the Huastec separation (1800 B.C.).

Therefore, the group IX showing as much as 76% of similarity with the Laponoid race may be safely labelled as the Proto-Mayan type. Consequently, the Otomangue Chochos, Mazatecas, Chinantecas and Mixtecas belonging to the same group should be anthropologically considered as Proto-Mayan populations what refers, as well as to Nahuas from Teanquezalco. But, the contents of the group X which created with group IX a complex 2, seems to reflect also the Proto-Mayan structure somewhat modified. The observed changes based on a slight increase of the similarities to the Pacific and Mongoloid races could denote Nahuan influences superimposed on typically protomayan preponderance of the Laponoids. Here belong Yucatan Mayas and another series of Huastecas from Tantoyuca, together with Tzeltales from Finca, Tepehuas from Ixhuatlan and Totonacos. So then, this more Neo-Mayan assemblage might be simply called the Maya-Totonacan type. If so, the Nahuas from Chiconael, Zongolica and Cuitlatecos from Totolapan must be viewed as anthropologically Mayan populations, only slightly modified by Nahuan influence. The same refers to Otomangue Huaves from S. Mateo and Otomies from Ixhuatlan in Vera Cruz. The latter may be eventually regarded as otomicised Huastecos. Logically, group XI containing Popolucas from Soteapan and neighbouring Nahuas from Pajapan should be labelled as the Maya-Nahuan type while, very similarity modified group XII embracing both Maya series from Yucatan as, the Maya-Yucatec type.

Nowadays, the position of the group VI is easily to denote as the Proto-Mayan-Zapotecan type what suggest strong Proto-Mayan influence exerted on the Zapotecos. Such a population created, perhaps, the civilisation of Monte Alban. It was

also strongly related to Paleo-Otomangue complex, as it is evidenced by the relationships which connect Zapotecos with Otomies. Triques and Cuicatecos in the same diagraphic group.

Then, it comes a solution for the Nahuan affiliations. Most probably, a genuine Nahuan structure reflects group II which showed the highest coefficient for the Pacific race. At the same time, this group consists of typical Nahuas from Morelos and of more northern Papagos, investigated by Gabel. Therefore, a most proper name for the group II will be the Proto-Nahuan type. Accordingly, well differentiated group XIII must be labelled as the Otomi-Nahuan type, while, the group XIV, as the Nahua-Otomian type, owing to a mutual play of the Ainuid and Pacific affinities. In this case, Tarascans are distinguished, in the frame of the Paleo-Otomangue complex by higher similarities to the Mongoloid race, and so, the group VIII may be called as the Tarasco-Otomian type to which would be assigned also Tlaxcaltacos and Zapotecos from Tehuantepec while the Zoques will occupy an intermediate position between this type and the Proto-Mayan one.

The group III, mainly consisting of various Mestizo series from Vera Cruz and Nahuas from Chiapa and Huatusco should be recognized as being essentially hybrid Nahuan-Otomian and possibly – Mayan populations. So, this group was called Hybrid Nahuan type.

In the case of the group V, it might be said that its structure is almost the same as Proto-Otomian, with a modification introduced by a slight Nahuan influence. It contains Mestizos from Cordoba, Tarascas from Tarconate, Mazahuas and Tulan Otomies, so, it may be labelled as the Otomi-Mazahuan type. Their well expressed tendency towards dolichocephaly, combined with medium high face and broad nose connect clearly this a.p. – type with Teotihuacan sample of crania (see: A. Wierciński, 1969). This may provide a basis for the hypothesis that Otomian element influenced by the ancient Nahuans had played a main role in the formation of Teotihuacan population.

Another question bear the affinities of the group IV which consist of only Mayan series (Mam, Tzeltales from Amatenango and Tzotzilles 4 racial elements with a prevalence of the Ainuid and Laponoid races allow to call this group as the Otomi-Mayan type, in order to explain so distant in the south (as Chiapas) appearance of the Otomian structure, two working hypotheses may be advanced:

1) that all these 3 Mayan groups constitute, in fact, mayanised Proto-Otomian relics or,

2) that this an evidence of strong influence of "Teotihuacans" which were simply "Paleo-Otomiana".

The present author prefers the latter hypothesis which is concordant with archeological facts.

Finally, there remained the affinities of the group I which includes only two Kanjobalan territorial units. Their average type is entirely different in regard to all the other considered here a.p. – types. Its distinctness is based on a combination

of exceptionally in Mexico narrow bizygomatic diameter with very low stature, mesocephaly, definitely high face and only medium broad nose. First character suggests rather the affinities of the White variety and so, Kanjobales would appear as most meticised group of Amerindians in Mexico (with European immigrants ?). If it is not the case, a special environmental conditions which retarded growth of cephalic diameters together with stature may be assumed. At any rate, a special term for this group must be reserved, i.e. that of the Kanjobalan type until their affinities will not be clarified, after having their anthroposcopy.

Yet one problem demands some explanation, i.e. the problem of the living descendants of the "Olmecs". It the oppinion of the present author (see: A. Wierciński, 1969) of their very mixed origin (inclusive some strange admixtures of Armenoids together with African Negroids from the Western Mediterranean area of Megalithic cultures) is right, the problem can not be solved on the basis of so scanty and only metric material of 5 populational means.

The Popolucas from Soteapan showed Maya-Nahuan affinities, the other Maya-Totonacan populations from Vera Cruz have been mainly distributed in the complex 2 of the diagram whilst, so called Hybrid Nahuan type from Vera Cruz embodying only Mestizo groups, has created its own diagraphic grouping. In fact, precisely the a.p.-type of the latter group III is very similar to the ancient "Olmecoid" series from Tlatilco, at least, in the constellation of 3 classic indices which may be roughly transcribed from the crania over the living material. If it is not a pure coincidence resulted from a highly hybrid condition of both ancient and modern a.p. – types, it might be just an evidence for a continuation. In this case, Nahuas from Chiapa in Guerrero and from Huatusco, as well as various Mestizo series from Villa Cardel, Jalapa and Alvarado in Vera Cruz could be viewed as living "olmecoid" populations. The verification of such a hypothesis could be done only after careful examination of the individual data with a strong emphasis laid upon the anthroposcopic traits. Believing, at the moment, in this hypothesis and looking at almost uniform distribution of Wanke's coefficients in the mentioned above series, it might be supposed that the Olmec civilisation arose precisely at the main meeting place of Proto-Otomies, Proto-Nahuans and Protomajas which were Tabasco and Vera Cruz. A biological and cultural "hybrid vigour" eventually together with an action of some foreign impulses could create a very advantageous situation for the rise of the first mathernal civilisation in Mesoamerica.

SPATIAL DISTRIBUTION OF THE DISTINGUISHED GROUPS OF A.P.-TYPES

The results of the presented above diagraphic analysis from the standpoint of individual taxonomy have been cartographed on the map 2. It shows undoubtled regularities in the spatial distribution of the distinguished groups of a.p. – types characterized by Wanke's coefficients of similarities. First of all, a very wide ter-

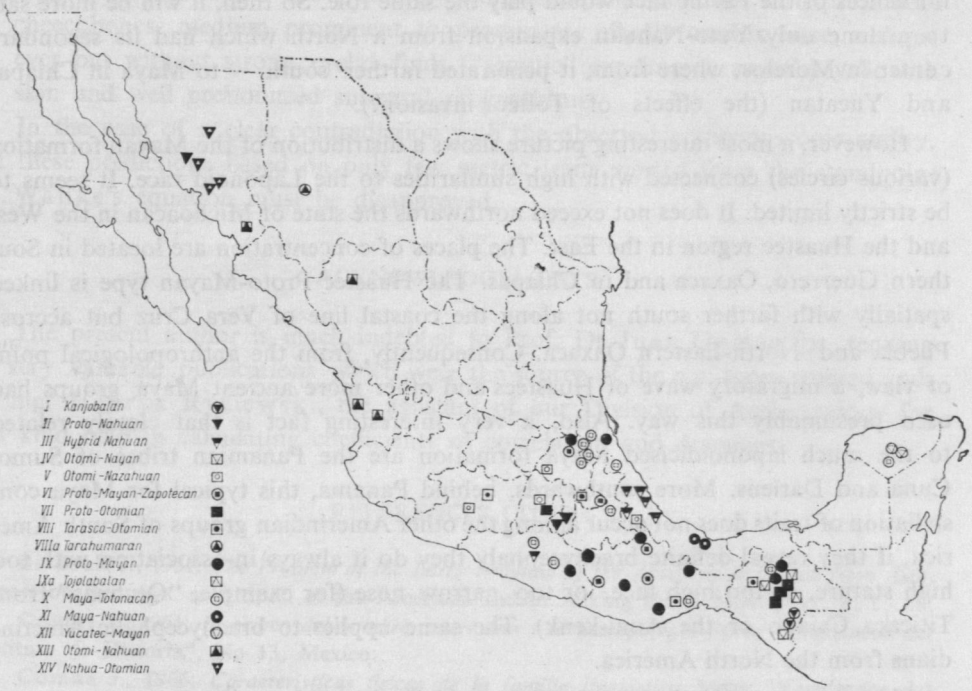

Fig. 2. Spatial distribution of racial affinities of a.p. – types in Mexico

ritorial dispersal of the Paleo-Otomangue formation (denoted by various squares) yielding, more or less, strong influence of the Ainuid race, should be emphasized. It starts from the lower Sonora and ends in Yucatan what reflects the supposed very archaic anthropological background connected with the Otomian and related ethnos.

The second, also rather universal in Mexico formation of Yuto-Nahuans (various triangles) characterized by higher incidencies of the Pacific race constitutes a belt, with some places of concentration. It extends from northern Sonora, passes through Nayarit and bifurcates into two wings. One of them embraces Guerrero, Mexico and Vera Cruz where it ends in the form of a coastal distribution. A slighter penetration is visible among some Mayan tribes in Yucatan and Chiapas. Perhaps, the Yuto-Nahuan route of migration started somewhere northwards of Mexico, then it led through Sonora and coastaly reached Guerrerro. However, reappearance of extremely high similarities to the Pacific race among Nahuas from Morelos may suggest a residuum or, an additional migratory wave. For instance, it could be an evidence for the occurence of a transpacific migration from North China of Shang or Dshou period which after landing at Guerrerro coast, settled itself in Morelos where from expanded to Vera Cruz and participated in formation of the Olmec civilisation (see: A. Wierciński, 1970a). Both hypotheses are not conflicting but, it is very difficult to verify them since, in both cases the same stronger

influences of the Pacific race would play the same role. So then, it will be more safe to assume only Yuto-Nahuan expansion from a North which had its secondary center in Morelos, where from, it penetrated farther south – to Maya in Chiapas and Yucatan (the effects of Toltec invasion?).

However, a most interesting picture shows a distribution of the Mayan formation (various circles) connected with high similarities to the Laponoid race. It seems to be strictly limited. It does not exceed northwards the state of Michoacan in the West and the Huastec region in the East. The places of concentration are located in Southern Guerrero, Oaxaca and in Chiapas. The Huastec Proto-Mayan type is linked spatially with farther south not along the coastal line of Vera Cruz but accross Puebla and North-Eastern Oaxaca. Consequently, from the anthropological point of view, a migratory wave of Huastecs and other more ancient Maya groups had used presumably this way. Also, a very interesting fact is that closely related to the much laponoidicised Maya formation are the Panamian tribes of Sumo, Cuna and Dariens. More southwards, behind Panama, this typical for Maya constellation of traits does not occur among the other Amerindian groups of South America, if they reveal definite brachycephaly they do it always in association with too high stature, or too high face, or too narrow nose (for example, "Qechuas" from Titicaca, Caiapo or the Aoni-kenk). The same applies to brachycephalic Amerindians from the North America.

If so, how to explain these limitations of the Maya formation? At present, any hypothesis would be premature, especially because of a lack of sufficient data for the Prehispanic epoche. Here, only a suggestion of possible transpacific connections with low-statured and brachycephalic Indonesian groups may be most timidly advanced. At the end of these anthropological and ethnogenetical considerations some proposal of their verification may be advanced. Namely, in spite of so few metric traits used in the comparative diagraphic analysis, the application of even very rough approach of individual taxonomy (Wanke's equation of the Reference Point Method) allows to formulate modal expectations in the antroposcopic characteristics for well differentiated groups of a.p.-types, i.e. Proto-Otomian, Proto-Mayan and Proto-Nahuan. They may be precised as follows:

a) Proto-Otomian populations should be characterised by a tendency toward a more abundant bodily hair and wavy hair on head, swarthy skin without yellowish tunes, europoid eye frame, facial ortho-mesognathy, concave to straight nose, well or medium prominent though definitely short and broad and, in general, rather crude facial traits;

b) Proto-Mayan would possibly reveal more yellowish skin, more straight hair, stronger eye lid fold with a tendency towards slight mongolic eye frame, medium prominent cheeckbones, medium prominent and short nose with a tendency towards straight, concave and wavy concave profiles;

c) Proto-Nahuans would show modally elongated facial contour with prominent cheeckbones, medium prominent to prominent, oftenly convex nose, oblique eyes but without strong eyelid folds ("semitic" eye frame), swarthy yellowish skin and well pronounced subnasal prognathism.

In the case of a clear contradiction with the observed anthroposcopic reality, all these predictions based on only few metric traits viewed from the standpoint of Wanke's equation must be disapproved.

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