ANTHROPOLOGIAI KÖZLEMÉNYEK

A MAGYAR BIOLÓGIAI TÁRSASÁG
EMBERTANI SZAKOSZTÁLYÁNAK FOLYÓIRATA

Szerkesztő:
EIBEN OTTÓ

32. kötet 1–2. füzet

BUDAPEST
1989–1990

ANTHROPOLOGIAI KÖZLEMÉNYEK

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Felhívás a szerzőkhöz

Az Anthropologiai Közlemények a Magyar Biológiai Társaság Embertani Szakosztályának folyóirata, a Magyar Tudományos Akadémia Biológiai Tudományok Osztályának felügyeletével és erkölcsi támogatásával jelenik meg. Szerkeszti a szerkesztőbizottság.

A szerkesztőbizottság elfogad a fizikai antropológia, ill. az általános (nem klinikai) humángenetika témaköréből önálló vizsgálatokon alapuló tanulmányokat, továbbá olyan kritikai vagy szintézist tartalmazó közleményeket, amelyek az embertani tudomány előbbrevitelét szolgálják. A közlés alapfeltétele általában az, hogy a tanulmányt a szerző a MBT Embertani Szakosztályának szakülésén előadja.

Az előadásokat a szakosztály titkáránál lehet bejelenteni és azok műsorra tűzéséről a Szakosztály intézőbizottsága dönt.

Az Anthropologiai Közleményekhez közlésre benyújtott kéziratok tartalmi és formai követelményei a következők:

1. A tanulmányok világosan fogalmazott célkitűzésű, korszerű módszerekkel végzett vizsgálatok igazolt, bizonyított eredményeit tartalmazzák, tömör és érthető stílusban. A tanulmányok terjedelme mondanivalójuk mértékéhez igazodjon. A rendelkezésre álló évi 12 ív terjedelem korlátozza az egyes tanulmányok terjedelmét, ezért 2–2,5 szerzői ívet meghaladó terjedelmű kéziratokat nem áll módunkban elfogadni. A történeti antropológiai tanulmányoknál egyedi méreteket – őskori és honfoglalás kori szériák kivételével – általában nem közlünk.

2. A kéziratot A/4 alakú fehér papírra, kettős sorközzel, a papírlapnak csak az egyik oldalára kell gépelni, oldalanként 25 sor, soronként 55–60 betűhely lehet. Minden dolgozatot két teljes, nyomdakész kéziratpéldányban kell benyújtani, összefoglalással, táblázatokkal, ábrákkal együtt.

3. Az idegen nyelvű összefoglalást – amely a tanulmány terjedelmének mintegy 10 százaléka – az Anthropologiai Közlemények a kongresszusi nyelvek egyikén közli. Az idegen nyelvű összefoglalásnak tartalmaznia kell a probléma felvetését, az alkalmazott vizsgálati módszert, valamint a kutatás legfontosabb eredményeit.

A tanulmány címoldalán 150 szónál nem nagyobb terjedelmű, angol nyelvű *Abstract*-ot közlünk. A fordításról – ha a szerzőnek nem áll módjában – a szerkesztő gondoskodik.

4. A tanulmányhoz tartozó táblázatoknak, ábráknak az Anthropologiai Közleményeknél az utóbbi évfolyamokban kialakult egységes gyakorlatot kell követniük.

A táblázatokat a tudományos dokumentáció elveinek figyelembevételével kell megszerkeszteni. Az egyes tanulmányokhoz tartozó azonos típusú táblázatoknak egységeseknek kell lenniük. A folyóirat tükrébe be nem férő táblázatok több részre osztandók; több oldalas (behajtós) táblázatokat nyomdatechnikai okokból nem fogadunk el. Minden táblázatot külön lapra kell gépelni, sorszámmal és címmel kell ellátni.

5. Csak gondos kivitelű és klisézésre alkalmas minőségű ábrákat fogadunk el. A rajzon alkalmazott jelölések világosak, egyértelműek legyenek. Minden ábrát, függetlenül attól, hogy vonalas rajz vagy fotó, *ábra* jelöléssel, sorszámmal és aláírással kell ellátni. A műnyomó papírt igénylő fényképeket tábla formájában közli a lap; ezek összeállításánál a szerzőknek a tartalmi követelmények mellett az esztétikai szempontokat is figyelembe kell venniük.

Folytatás a borító 3. oldalán

The Anthropologiai Közlemények is indexed in Current Contents.

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The Editor expresses his grateful thanks to the Reviewers for their generous and expert work.

The bronze plaquette of the Congress made by Mr. Sándor Kiss

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Anthrop. Közl. *32;* 3–4. (1989/90)

EDITORIAL

The successful 6th Congress of the European Anthropological Association, organized in Budapest early September, 1988 was an important milestone of our Association. The 211 scientists came from 26 countries of Europe, Africa and North-America. During the three-day Congress 154 papers and posters were presented and 42 of them were published as selected papers in the Volume 19 of the Humanbiologia Budapestinensis (1989). I planned to publish the other papers in the Hungarian journal "Anthropologiai Közlemények", *however, because of the well-known economic problems in Hungary in the late 1980s the publication of this valuable material had a long delay.*

In 1989/90 I asked for some financial contribution to the expenses of the journal from several Hungarian institutes. In August 1991 the necessary money were together and now I am able to publish the present volume.

I should like to express my grateful thanks to the following institutions of whom donations made this publication possible:

Buda Children's Hospital, Budapest
Department of Anthropology, Eötvös Loránd University, Budapest
Department of Anthropology, József Attila University, Szeged
Department of Anthropology, Hungarian Natural History Museum, Budapest
Department of Evolutionary Zoology and Human Biology, Kossuth Lajos University, Debrecen
Department of Hygiene, Debrecen University Medical School, Debrecen
Hungarian Biological Society, Budapest
Hungarian University of Physical Education, Budapest
National Institute of Pediatrics, Budapest
Training College for Teachers of Handicapped Children, Budapest

As I thank for the financial aid of the heads and colleagues of the above-mentioned institutions, I do not omit to express my thanks also to the authors of this volume for their scholarly contributions. My special thanks are due to the reviewers (listed on Page 2 of this volume) for their genuine international scientific co-operation. – A very special word of appreciation must go to Mrs Judith Horváth for *preparing all the figures in this volume and her "nursing" of this volume, then to* Mrs Edith Csányi *by whom the whole text was typed, and to the collective of the Plantin Publisher and Printing House Ltd for their careful work during the printing process.*

The Editor

*

A European Anthropological Association Budapesten, 1988. szeptemberében megrendezett sikeres 6. kongresszusa jelentős mérföldkő volt a Társaság életében. A 211 résztvevő szakember 26 európai, afrikai és északamerikai országból jött össze. A

háromnapos kongresszuson 154 előadást, illetőleg posztert mutattak be a résztvevők. Ezek közül egy válogatást, 42 dolgozatot a Humanbiologia Budapestinensis 19. kötetében (1989) közreadtam. Úgy terveztem, hogy a többi dolgozatot az Anthropologiai Közleményekben jelentetem meg. A hazánkban már az 1980-as évek végén is meglevő súlyos gazdasági gondok a Magyar Tudományos Akadémiát és az Akadémiai Kiadót sem kerülték el. Az MTA ugyan 1990-ben 20 millió forinttal járult hozzá a magyar nyelvű szakfolyóiratok kiadásához, az Anthropologiai Közleményeknek ebből az összegből nem jutott. Az MTA Biológiai tudományok Osztályának elnöke 1990. áprilisában úgy döntött, hogy "az Anthropologiai Közlemények megjelentetése egy évig szüneteljen" (az Osztály azonban nem mondott le a folyóiratról).

E nehézségek ismeretében már 1989/90-ben levéllel fordultam mindazokhoz a hazai tanszékekhez, intézetekhez, amelyeknek munkatársai lapunkban publikálni szoktak. Akik csak tudtak, segítettek. 1991. augusztusában azután a Magyar Biológiai Társaság igen jelentős összegű (200 ezer Ft) támogatást adott, és így a kiadás költségei végül együtt voltak, lehetővé vált e kötet megjelentetése.

Őszinte köszönetemet fejezem ki az alábbi intézményeknek:

Bárczi Gusztáv Gyógypedagógiai Tanárképző Főiskola, Budapest
Budai Gyermekkórház, Budapest
Debreceni Orvostudományi Egyetem Közegészségtani Intézete, Debrecen
Eötvös Loránd Tudományegyetem Embertani Tanszéke, Budapest
József Attila Tudományegyetem Embertani Tanszéke, Szeged
Kossuth Lajos Tudományegyetem Evolúciós Állattani és Humánbiológiai Tanszéke, Debrecen
Magyar Biológiai Társaság, Budapest
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Országos Csecsemő- és Gyermekegészségügyi Intézet, Budapest
Természettudományi Múzeum Embertani Tára, Budapest.

Amikor mindezen intézmények vezetőinek és munkatársainak köszönetet mondok a pénzügyi támogatásért, megköszönöm a kötet szerzőinek is, hogy dolgozataikkal hozzájárultak e kötethez. Külön köszönet illeti a kötet lektorait (felsorolásuk a 2. oldalon) azért a nemzetközi tudományos együttműködésért, amellyel e kötet létrejöttét segítették. – Kedves kötelességem, hogy külön köszönetet mondjak Horváth Juditnak, *aki a kötet összes ábráit rajzolta, és a tőle megszokott szeretettel és gondossággal segítette a nyomdai munkálatokat;* Csányi Sándornénak, *aki a kötet teljes kézirat-anyagát leírta, és a Plantin Kiadó és Nyomda Kft. munkatársainak gondos munkájukért.*

A szerkesztő

Anthrop. Közl. *32;* 5–8 . (1989/90)

ANALYTICAL MORPHOMETRY IN ANTHROPOLOGY: MORHOLOGICAL DISTANCES FOR HOMINID SKULL SHAPE

G. Alciati, T. Lettini, E. Vacca, E. Potente and *V. Pesce Delfino*

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Abstract: *Curves with a very little cross error with smoothed function curves by Kth order polynomials from Hominid fronto-facial profiles giving fundamental shapes, may be obtained by Bezier interpolation using a strongly reduced set of points. Such determinant points may be considered as nodes suitable to build composition parallelograms whose resultant are to be considered vectorial description of the different segments of the worked profiles. Four vectors were obtained.*

Key words: *Analytic morphometry; Bezier interpolation; Hominids.*

Introduction

In this work we tried to have a vectorial description of sagittal fronto-facial profiles of Hominid skull specimens. The given profiles were considered as curves, so that it was possible to submit them to analytical procedures (Pesce–Delfino & Ricco 1983). One of these procedures implemented by us to describe the profiles of Hominid skull was based on Kth order polynomials (Pesce–Delfino et al. 1984, Pesce–Delfino et al. 1987). Function curves gave a smoothing of the profiles reducing them to less irregular curves characteristic of different evolutive groups. The smoothing effect was able to reduce the influence of local profile characteristics that could be referred to individual morphology. In the present work the aim was to find the set of minimum number of points, strongly reduced in respect to the number of points in which original curves were subdivided, that was able to give new curves with very little cross error with respect to polynomials. We called these points "determinant points". Such determinant points may be considered as vertex points suitable for building up a composition parallelograms, whose resultant could be considered vectorial description of the different districts of the worked profiles. For this aim Bezier interpolation was used (Pesce–Delfino & Lettini 1987).

Materials and methods

The following fronto-facial profiles were worked: *Plesianthropus transvaalensis, Zinjanthropus boisei, Homo habilis and Homo sapiens s.* These profiles are digitized by a contour-following procedure, under conditions of positioning standardization within a coordinate system, according to Frankfurt plane, and normalization that consists of an optical scaling, for each profile, to the same height, to allow comparisons of size independent shapes (Fig. 1a). The normalization adopted subdivided all the profiles into the same number of known coordinate points. Kth order polynomials were used for an approximation of the profiles by a function which gives a new smoothed curve (Fig. 1b), whose fitness was calculated in terms of square root of mean square error. This evaluator

for each comparison was computed at the end of the progressive shifting, along abscissa axis, of a profile with respect to the other one, so that the minimum evaluator value was achieved. For each profile Bezier curves were obtained using six determinant points interpolation. These curves (Fig. 1c) were directly comparable with polynomial functions; in fact, as reported in Table 1, the values of square root of mean square error are very low, less than the values in the match between original profiles and polynomials. The six determinant points represent the vertex points of an open polygonal, that has the same height of the worked curves. The obtained polygonals (Fig. 2a–d) amplify the differences existing among Bezier curves. Each pair of consecutive segments was considered within a composition parallelogram; so, for each polygonal, having six vertex points and five joining segments, we obtained four parallelograms (Fig. 3a–d), whose resultants we suggest have the meaning of a vectorial description.

Table 1. **Morphological distance evaluator: mean quadratic error square root**

Original curves/Polynomial functions		Polynomial functions/Bezier's curves
P. transv.	2.94	1.39
Z. boisei	2.3	1.86
H. habilis	1.81	1.25
H. sapiens	2.04	1.9

Results

Fig. 4a–d shows for each profile the series of first (a), second (b), third (c) and fourth (d) vector with their numerical values. Modulus is expressed by arbitrary units; direction is expressed in degrees referred to abscissa axis with the sign referred to ordinate axis. This figure shows the differences recurring for vectors corresponding to the same districts of different specimens: a) for the upper part of the frontal profile; b) for the lower part of the frontal profile; c) for the upper part of facial profile; d) for the lower part of facial profile. We have seen that a Bezier curve obtained by a polygonal built up by six vertex points, that is a very small set with respect to the 190 points in which the original curve was subdivided, is able to give a satisfactory redrawing of the smoothed profile. In addition, the polygonal gives the ability to obtain a family of vectors, that express the main information on the considered object for morphological, phyletic and biomechanical evaluations. The first vector (a) describes differences related to platicrany and orthocrany; the second vector describes the supraorbital thickening or flattening; the third vector describes differfences related to more or less pronounced folding of nasal profile; the fourth vector describes differences related to different degree of prognatism or orthognatism. If we accept that the Bezier alghoritm based procedure actually gives a vectorial description, the possibility of obtaining a satisfactory understanding of the shape could be stated.

*

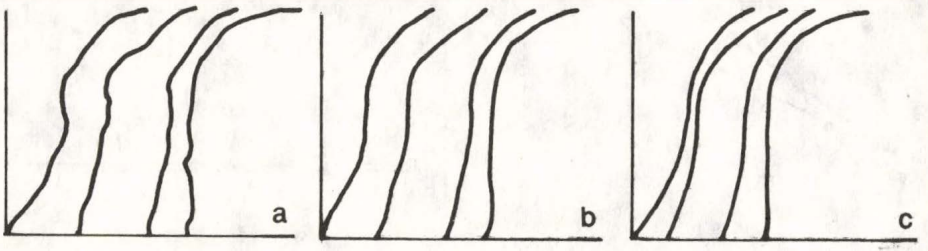


Fig. 1: a) From left to right, the sagittal fronto-facial profiles of *Plesianthropus transvaalensis, Zinjanthropus boisei, Homo habilis* and *Homo sapiens s.* are reported; b) Function curves by sixth order polynomials from the same profiles of previous figure; c) Curves obtained by Bezier interpolation from the same profiles of figure 1a.

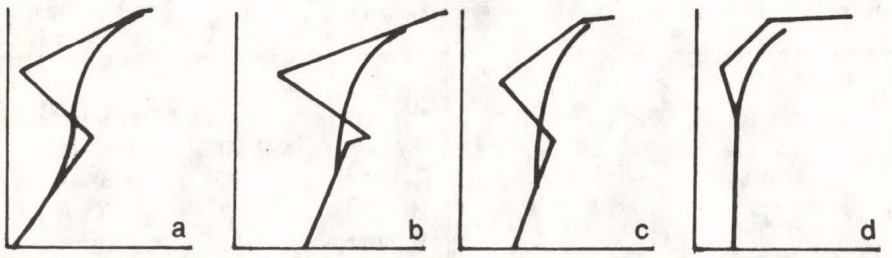


Fig. 2: Individualization fo the six determinant points from *Plesianthropus transvaalensis* (a), *Zinjanthropus boisei* (b), *Homo habilis* (c), and *Homo sapiens s.* (d). In *Homo sapiens s.* (d) fifth and sixth points lie on the same straight line correspondent to the facial district.

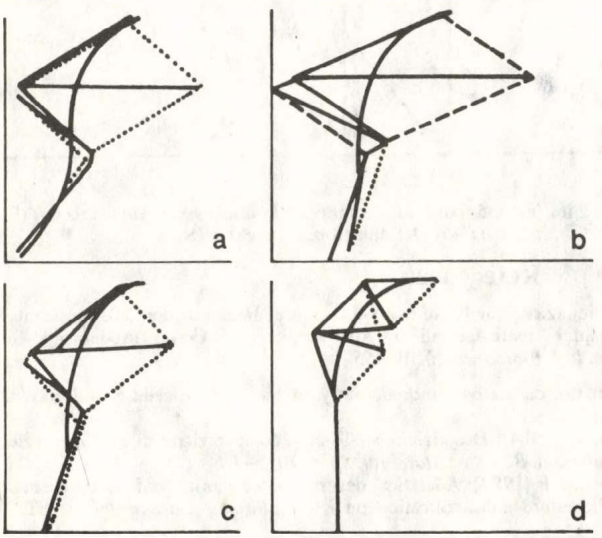
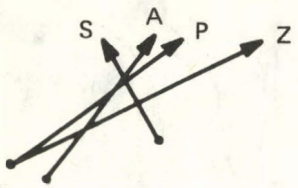


Fig. 3: The four composition parallelograms from the same profiles of Fig. 2



a.

	Modulus	Direction	Yersus
P. transv.	89	-30^{o}	PS
Z. boisei	118	-21^{o}	PS
H. habilis	69	-44^{o}	PS
H. sapiens	42	55^{o}	AS

b.

	Modulus	Direction	Yersus
P. transv.	161	0^{o}	A
Z. boisei	208	0^{o}	A
H. habilis	122	-3^{o}	AI
H. sapiens	61	12^{o}	AS

c.

	Modulus	Direction	Yersus
P. transv.	79	31^{o}	PI
Z. boisei	105	21^{o}	PI
H. habilis	65	34^{o}	PI
H. sapiens	44	67^{o}	PI

d.

	Modulus	Direction	Yersus
P. transv.	93	-47^{o}	PS
Z. boisei	75	-78^{o}	PS
H. habilis	72	-73^{o}	PS
H. sapiens	76	-89^{o}	AS

Fig. 4: The series of first (a), second (b), third (c), and fourth (d) vector for *Plesianthropus transvaalensis* (P), *Zinjanthropus boisei* (Z), *Homo habilis* (A), and *Homo sapiens s.* (S).

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THE MESOLITHIC–NEOLITHIC TRANSITION IN THE YUGOSLAVIAN IRON GATE

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Abstract: *The author compared 140 Mesolithic and early Neolithic cranial finds from the Yugoslavian Iron Gate region and its surrounding areas by the application of a principal component analysis and an angular transformation. As his results present even in the Iron Gate region, which shows remarkable local Mesolithic–Neolithic surviving, there can be proved a break in the population history. This break in the transition period may have been represented by the Lepenski Vir culture in the formation of which primarily southern, Balkanian influences and local precedings with exogamous profile played an important part.*

Key words: *Mesolithic; Neolithic; Iron Gate; Carpathian Basin.*

Introduction

The Iron Gate region is one of the exceptional territories of Europe in which the skeletal finds of the Mesolithic and the early Neolithic as well as of the transitional period between the two have been excavated and published (Srejović 1972; Srejović & Letica 1978). In both the Balkans and the Carpathian Basin only early Neolithic skeletons of the mentioned periods have been known so far; that is why the analysis of the Iron Gate cranial finds are of particular importance to forming an opinion of the anthropological profile of the transitional period of these territories.

Materials and Methods

The typical Mesolithic sample of the Iron Gate region (Vlasac) was followed chronologically by the remains of the Lepenski Vir culture (LVC) of the transitional period (Lepenski Vir, Padina), at last the early Neolithic crania of the Starčevo culture (Lepenski Vir) datable approximately between 7000 and 5000 B. C. constituted the basic material of the examinations (Table 1).

The comparative material only constituted of early Neolithic cranial finds. The skulls of the Karanovo horizon, of the Starčevo and of the Körös–Criş cultures, south, north and northeast of the Iron Gate region, respectively, represented approximately the overlaping period (5600–4500 B. C.). The crania of the Alföld Linear Pottery (ALP) alongside the river Tisza and of the Middle European Linear Pottery (MELP) developing west and north of the Danube are younger (4600–4000 B. C.) than the previously mentioned one. Thus altogether 70 male and 70 female individuals were examined.

The analysis of the non-metric traits was based on 20 cranial characteristics. The MMD (Mean Measure of Divergence) values and the variances were computed by the method of Grewall (1962) and Smith (1977; cf. Sjøvold 1976, 1977). The principal component analysis of the metrical traits involved 10 cranial measurements: M1=Martin (1928) N°1, M8, M9, M20, M45, M48, M51, M52, M54, M55. Only those cranial finds were included in the examinations in the case of which at least 4 of the 10 traits analysed were available. The missing items were reconstructed by Dear's (1959) method. The extracted factors were separated by Kaiser's (1960) criteria and non-standardized factor

scores of the individuals were clustered on the Euclidean distance by the following definition:

$$D(K,I) = \text{Min}\,[D(P,I)\,;\,D(Q,I)].$$

Table 1. **List of the Finds**

Findspots	Males		Females	
	N	No. on the Tree	N	No. on the Tree
YUGOSLAVIAN IRON GATE				
Mesolithic				
Vlasac	19	1–19	15	1–15
Lepenski Vir Culture (LVC)				
Lepenski Vir	6	20–25	1	16
Padina	1	26	–	–
Starčevo Culture				
Lepenski Vir	8	27–34	9	17–25
SURROUNDING EARLY NEOLITHIC CULTURES				
Karanovo horizon				
Anza (YU)	1	35	1	26
Devetaska Cave (BG)	1	36	–	–
Jassa Tepe (BG)	–	–	1	27
Karanovo (BG)	1	37	3	28–30
Kasanlak (BG)	–	–	1	31
Nea Nikomedeia (G)	5	38–42	7	32–38
Starčevo Culture				
Divostin (YU)	–	–	1	39
Lánycsók (H)	–	–	1	40
Körös–Cris Culture				
Birlad (RO)	–	–	1	41
Deszk (H)	–	–	2	42–43
Endrőd (H)	1	43	–	–
Gura Baciului (RO)	–	–	1	44
Hódmezővásárhely–Kotac–Vata (H)	6	44–49	3	45–47
Solca (RO)	1	50	–	–
Szajol–Felsőföld (H)	–	–	1	48
Vaskút (H)	1	51	–	–
Alföld Linear Pottery (ALP)				
Büdöspest Cave (H)	–	–	1	49
Hillebrand Cave (H)	–	–	1	50
Mezőcsát–Csemetekert (H)	1	52	–	–
Tiszalök–Hajnalos (H)	–	–	1	51
Vadna (H)	1	53	–	–
Zaránk (H)	1	54	–	–
Middle European Linear Pottery (MELP)				
Nitra–Nový Kŕškany (CS)	15	55–69	19	52–70
Pöttsching (A)	1	70	–	–

Results and Discussion

Besides the Mesolithic and the transitional (LVC) Iron Gate sequences it is the series of the three early Neolithic cultures, the Starčevo, the Körös-Criş and the MELP, that can also be analysed by the non-metric traits (Table 2). Since nowhere within the respective series does the manifested frequency of the 20 involved traits show significant sexual differences, the results can therefore be demonstrated on the common sample of the males and females. We can percieve that it is only the Mesolithic and transitional period of the Iron Gate region and the Starčevo sequence, by far the greater part of which also originates from the same region, between which no significant difference appears. In the case of all the other compared pairs significant differences can be pointed out.

Table 2. **The MMD Distances (up) and the variances (down) for Both Sexes**

Samples	Iron Gate (Mesolithic and LVC)	Starčevo	Körös-Criş
Starčevo	0.042		
	0.002		
Körös–Criş	0.100*	0.101*	
	0.000	0.002	
MELP	0.090*	0.095*	0.128*
	0.002	0.002	0.003

*Significant differences ($p < 0.05$)

Three principal components could be extracted in the case of the metrical traits. By these the 65 and 64 per cents of the total variance in the case of males and females could be expressed, respectively. The communalities (Table 3) in both sexes are relatively high in the cases of 6 variables and relatively low in the case of 3 variables. The correlations of the finds are demonstrated on the cluster trees drawn according to the extracted factor scores (Figures 1 and 2).

Table 3. **The Extracted Principal Components: Unrotated Loadings and the Communalities (CO)**

	Males				Females			
Variable	PC 1	PC 2	PC 3	CO	PC 1	PC 2	PC 3	CO
M1	0.51	-0.16	-0.61	0.80	0.63	-0.02	0.53	0.75
M8	0.65	0.21	0.27	0.66	0.53	0.10	-0.38	0.47
M9	0.79	0.22	-0.13	0.81	0.51	0.61	0.06	0.71
M20	0.55	0.37	-0.40	0.69	0.50	0.14	-0.47	0.66
M45	0.89	0.16	0.03	0.82	0.81	0.19	0.06	0.71
M48	0.76	-0.21	0.30	0.71	0.75	-0.27	0.39	0.82
M51	0.75	0.14	0.00	0.59	0.67	0.11	-0.43	0.67
M52	0.37	-0.63	0.29	0.77	0.59	-0.54	0.01	0.84
M54	0.05	0.55	0.59	0.91	-0.12	0.68	0.33	0.86
M55	0.57	-0.57	0.41	0.67	0.82	-0.06	0.06	0.81

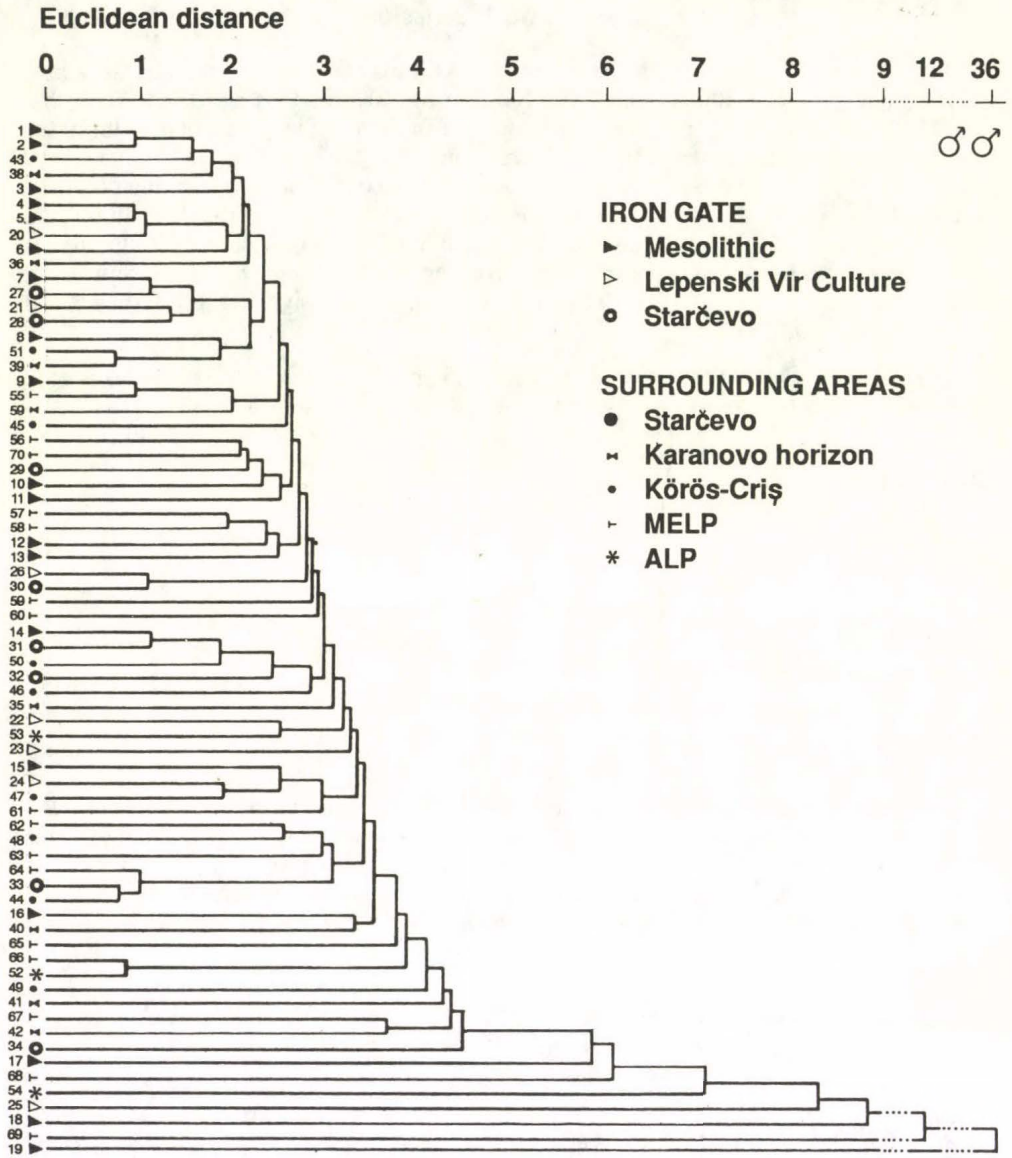

Fig. 1: The cluster tree of the male skulls by the non-standardized scores of the three extracted principal components.

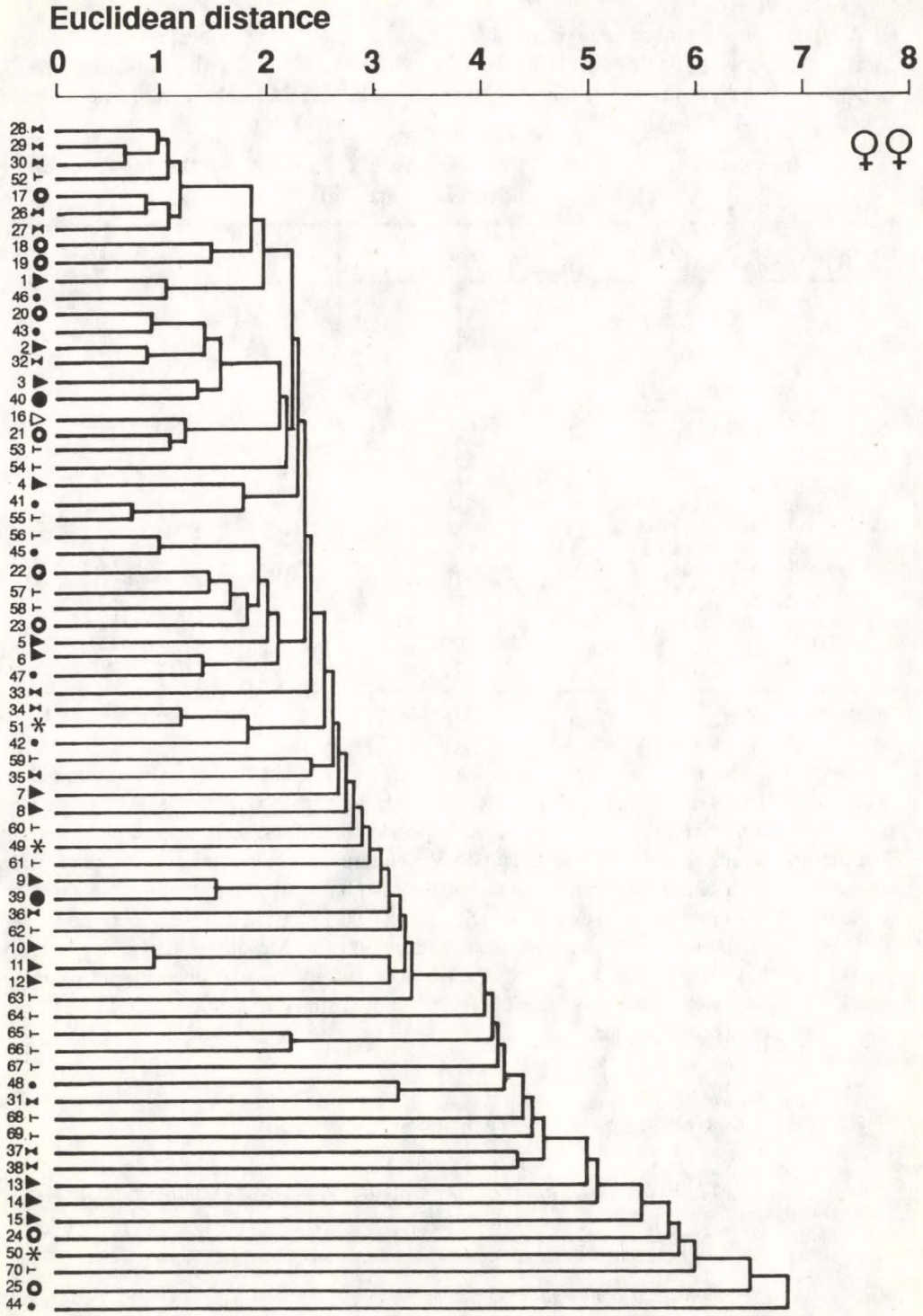

Fig. 2: The cluster tree of the female skulls by the non-standardized scores of the three extracted principal components. (For key to the signs used see Fig. 1.)

What seems certain on the basis of all these is the strong cohesion within the Mesolithic finds of the Iron Gate as well as within the Starčevo finds. Neither the Lepenski Vir culture nor the Körös–Criş culture could be said to show the same inner cohesive force (Table 4).

Table 4. **Intraserial and Interserial Connections (IAC and IRC) on the 2.0 Value of the Euclidean Distance (%)**

Connections	Males	Females	Together
IAC			
Mesolithic	32	27	30
LVC	0	–*	0
Starčevo	25	64	45
Karanovo horizon	0	38	19
Körös–Criş	0	0	0
MELP	13	11	12
IRC			
Mesolithic+LVC	25	–	25
Mesolithic+Starčevo	24	37	33
Mesolithic+Karanovo horizon	32	26	29
Mesolithic+Körös–Criş	30	32	31
Mesolithic+MELP	6	12	9
LVC+Starčevo	33	–	33
LVC+Karanovo horizon	0	–	0
LVC+Körös–Criş	13	–	13
LVC+MELP	0	–	0

*It cannot be estimated

Concerning the interserial connections it is remarkable that the Mesolithic cranial finds of the Iron Gate show similarity to the early Neolithic skulls of the Karanovo horizon, while its connections with the local Lepenski Vir culture seem somehow looser. The heterogeneous structure of the Lepenski Vir culture does not manifest similarity to the finds of either Karanovo horizon or the MELP, and has only a significant connection to the locally ensuing Starcevo crania, which show an extremely strong inner cohesion.

Thus we cawn suppose that in the Iron Gate region the Mesolithic-early Neolithic period may have experienced a process influenced by southern genetic impulses in which the local genetic pool may have been broken by a slight exogamous period, at the time of the Lepenski Vir culture.

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PALAEOPATHOLOGICAL STUDY OF THE SKELETAL REMAINS FROM ČELAREVO

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Abstract: *Čelarevo is a village apr. 20 miles west of Novi Sad, the capital city of Vojvodina. At its outskirts there is a site from which clay is taken for the brick factory where a burial was discovered. At the beginning of the archaeological excavations remains of 248 human skeletons were found. The burial is a large one and archaeological excavations are still in progress. The present study is limited to this first group of 248 skeletons which have been anthropologically examined and settled there in the early Mediaeval period (c. 10 to 11 century AD). The examined part of the burial was used by a homogeneous population which did not mix with members of diverse racial groups which also migrated into the area. The burial at Čelarevo represents one of the rare archaeological sites where a large number of skeletons was discovered in a relatively good state of preservation so that morphological, anthropological and palaeopathological features of individual skeletons could be studied, thus providing the relevant information and contributing towards the better understanding of the interrelationship of this people and the environment of the Pannonian plain. The preliminary palaeopathological investigation indicates that the population which used the examined part of the graveyard, lived and enjoyed uninterrupted development and their life was not affected by any major disease of war, or any other disaster. It is interesting to point out that in many graves of close to them a number of fragmented Roman bricks inscribed with menorah and Herbew letters were found.*

Key words: *Čelarevo; Palaeopathology; Mediaeval skeletons.*

Introduction

Man represents a single element in the general natural scheme which is continually changing and which he influences according to his needs and his desires, but which for its part exerts its influence on man as an individual and upon the human race as a whole. Studying the traces of diseases, disorders and injuries in human remains from ancient burials in Vojvodina it is possible to learn something which helps us to deduce the laws of natural environment and the social conditions of civilisations which have led to specific phenomena which in their turn are reflected in the traces of disease or injury which we can now, observe in human remains from archaeological sites (Živanović 1982). Pannonia, with Vojvodina as its southern part is a very interesting observation area for palaeopathological studies because of numerous migrations of different populations over the centuries. Some of these populations found Vojvodina an attractive place to settle and it is now interesting to see how the new environment influenced the settlers and what changes in the general pathology of the population could be observed. The plain country, the proximity of major rivers, the rich soil and all the other environmental and nutritional factors excersised their influence on all newcomers. Nomadic peoples could not adjust to the new conditions of life and moved away and those adjusted to agricultural production settled and remained there.

Material and Methods

Following the anthropological examinations of the skeletons (Živanović 1972–73), sex and age were determined and palaeopathological and radiographic investigations were carried out in the Department of Anatomy of the Medical College of St. Bartholomew's Hospital in London and Zavod za anatomiju, Medicinski fakultet in Novi Sad. Dates of the examined human remains were obtained from the radiocarbon laboratory of The British Museum in London. Specimens of collagen from human bone (humerus, skeleton No 244), collected in 1973, were dated by liquid scintillation counting of benzene. The dates are expressed in radiocarbon years relative to AD 1950 based on the Libby half-Life for ^{14}C of 5570 yr, and are corrected for isotopic fractination. No correction has been made for natural ^{14}C variations. The skeleton No 244 from Čelarevo BM-1394 was dated 970 ± 70 bp (Burleigh and Ambers 1982). The total number of skeletons was 248, and sex and age are presented in the following table (Table 1).

Table 1. **Sex and age**

Sex	Male		Female		Unknown		Inf. I. and II	
Age	No	%	No	%	No	%	No	%
Infans I	–	–	–	–	–	–	28	–
Infans II	–	–	–	–	–	–	31	–
Juvenile	1	1.33	5	7.14	1	2.27	–	–
Adult	12	16.00	15	21.43	7	15.90	–	–
Mature	47	62.66	35	50.00	32	72.72	–	–
Senile I	11	14.66	10	14.28	4	9.09	–	–
Senile II	4	5.33	5	7.14	–	–	–	–
Total	75		70		44		59	

The remains of human tissue found on archaeological sites has in the passage of time suffered such changees that it bears little resemblance to the tissue which a practising pathologist examines in his laboratory. A bone found in a grave after excavation is in fact only a sort of template of the bone as an organ, which functioned in a living organism. Signs of pathological change in such bones are evident only for those types of disease which lead to the disintegration or accumulation of bone tissue and which may even influence a change of shape in the bone. A whole range of diseases arising from metabolic disorders cannot be observed because of mineralisation after death and the influence or the evironment in which the skeleton lay. In palaeopathological examining of such human remains from Čelarevo all the current pathological and scientific methods were used including gross, microscopic and X-ray examination, radiocarbon dating and archaeological observations. The investigation of the skeletons followed the pattern described by the author (Živanović 1964, 1982).

Results

The most striking observations on these 248 skeletons from Čelarevo is the absence of violent injuries of the bones. Barbaric tribes that migrated into Vojvodina usually were warriors who fought their way into the new territory, and engaged themselves in many battles trying to rob their enemies. There was always a disastrous devastation in the area through which they passed. In most burials one can always find a number of skeletons with clear sign of violent injuries. In Čelarevo population such injuries have not been seen in any skeleton. On the contrary, the common type of fractures usually obtained in everyday domestic life such as injuries of two humeri and one fibula show that there were injuries of bones, but they were not very common. The next striking observation is the small precentage of skeletons with the signs of disease or a disorder that affected the bones and changed their morphology. The population living at Celavero was a relatively healthy one. Study of the age of individuals at the time of death indicates that only one fifth of individuals died before the age of 14, and apr. three fifths reached maturity or senility (Table 1). The incidence of death was larger in juveniles and adult females then in males of the same age group. The absence of signs of diseases and disorders in bones does not mean that this population was not affected by any disease, infection or disorder. Most diseases do not affect the bones, or individual cures itself, or dies before the bones are permanently affected. Some diseases and disorders are of a long lasting nature and in such cases pathological signs are visible on the bones.

Anatomical variations and congenital anomalies

During the study of skeletons from Čelarevo supernumerary bones were found in seven skulls (supernumerary bones in parieto-occipital sutures in 2.82%). Such supernumerary bones are most probably due to a disorder of ossification. The frequency of supernumerary bones in Čelarevo skulls is much smaller than in the European mediaeval skulls and the frequency is similar to the present-day population of the same region. A proper and fully developed Inca bone could not be found in any skull from Čelarevo.

Metopic suture, which is located between the left and right half of the squama of the frontal bone in adult or mature skulls is most often found in individuals.

Perforatio fossae olecrani was seen bilaterally in one skeleton, and one complete and one incomplete Posterior vertebral artery arch of atlas. The lack of fusion of sacral vertebrae was found in one case, and Spina bifida also in one case.

Injures and fractures

There were two cases of fractured humeri and in both cases the shaft of the bone has been fractured in its lower part. The fractures healed without dislocation of the fragments, but it took some time before the fragments fused because in both cases the extensive development of calus remained at the site of the fracture. One of the humeri was left and the other one right.

Transverse fracture of the lower end of fibula without the dislocation of the fragments caused by twisting of the foot was found in one skeleton.

Diseases of the joints

Signs of only one non-specific joint disease were found in Čelarevo skeletal remains. These were the signs of rheumatoid arthritis, which were found in six skeletons. In all these cases small joints of the feet or hands were affected together with intervertebral joints and at least one of the larger joints. The most striking signs were large exostoses on vertebral bodies.

Specific infections

Tuberculosis was always the most common specific infection in Vojvodina and it affected the Čelarevo population right from the beginning of their life there. Tuberculosis of the bones is most frequently caused by dissemination of the tuberculous bacilli from some active focus of infection, usually in the lungs, kidneys, intestines or lymphnodes. In comparision with pyogenic infection tuberculosis most often affects the epiphyses of the bones and spinal vertebrae which have a very good blood supply. There were two such cases in Čelarevo. In the first case clear signs of Pott's disease or the tuberculosis of the spine were found and the other case was a more complicated one because tuberculosis not only affected the vertebral column, but it also spread into the upper end of femur and the articular part of hip causing the tuberculous coxarthritis. The typical signs which resemble the bone affected by osteoporosis were quite extensive in the acetabular fossa.

Discussion

After considering the available skeletal material from Čelarevo for signs of injury, disease and healing it is possible to conclude that population from Čelarevo did not suffer much. Diseases, disorders and injuries were not very common. The living conditions and natural surroundings of Čelarevo area were very favourable for this nomadic population. Palaepathological study of the first 248 skeletons which have been uncovered at the beginning of the excavations is the preliminary study which will be completed when all the skeletons in the burial will be uncovered. But even these first observations gave an indication of the beneficial environmental conditions for immigrants into this area.

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DETERMINATION OF BLOOD TYPING ON SKELETAL REMAINS FROM THE HUNGARIAN CONQUEST

A methodological study

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Abstract: *The aim of this study to review the determination and the frequency of ABO phenotypes on skeletal remains with the absorption–elution method.*

The bone samples of 77 individuals from the Hungarian Conquest were examined. In 67 cases the authors got the same results several times but in 10 cases the serologic results were uncertain. Furthermore the authors carried out the calculation of the gene frequency, too.

Key words: *ABO phenotypes; Absorption–elution method; Skeletal material; Hungarian Conquest.*

Introduction

Genetic determinations are important factors in the classification of men and their migration history. The best known is the ABO system because they are distributed throughout body tissue. Since the initial study of Boyd-Boyd (1933), several attempts have been made to identify the antigen-antibody reaction of ancient tissue.

Regarding the mummified material the serological methods are the following: agglutination–inhibition (Boyd–Boyd 1934), serological–micro (Conolly–Harrison 1969), mixed field agglutination (Coombs et al. 1956, Otten–Florey 1964), micro–elution (Badawoy 1977).

For the determination of ABO phenotypes from fresh and ancient bones tissue the numerous versions of the absorption (Ders 1940, Salazár 1951, Thieme et al. 1956, Ezra–Cohn–Cook (1961), and the fluorescent antibody methods (Coons et al. 1941, Lengyel 1975) are generally used. Regarding the absorption methods the inhibition and the elution are the best known.

The inhibition–absorption method was first used by Holzer (1931) for demonstration of erythrocyte membran antigens from the bloodstains, and later it was applied successfully also in the examination of ancient bones (Candela 1936, 1940, 1937, Boyd–Boyd 1939, Berg et al. 1983).

All the researchers who acquired experience in criminological bloodstain diagnostics with this method and all those who used it for demonstration of the group substance in bones got sometimes "false positive" results, especially when the substance examined was exposed to bacterial contamination (Springer et al. 1961, Jenkins et al. 1972, Smith et al. 1983, Hauser et al. 1984). In the examination of archeological bone finds we can always reckon with such influences, too. As the error limit of this method in the criminological examination of bloodstains may reach 5%, it is evident that in the examination of archeological bone finds the error limit can only be wider.

The absorption–elution method was first used by Kind (1960) in criminal diagnostics of the bloodstain. The method gave very good results not only in the demonstration of ABO antigens, but also of the MN and RH factors.) The method can be used successfully also in fresh bones and for demonstration of antigens in archeological bone finds (Yah 1955, Yada et al. 1966, Omoto 1968, Yada et al. 1972). Using this method we must also reckon the influences of bacterial contamination. Yet, we must agree with the statement that an unambiguous result (e.g. demonstration of the "A" or "B" blood group) gives the best information in the examination of archeological bone finds. It is more probable that just because of the higher degree of bacterial contamination we can determine the antigens belonging to the group "B" at the expense of the antigens belonging to the group "A" more often during the examination of ancient bones and in the absence of anti–H antibodies or phytagglutinins group "0" because it may also happen more often that in the course of time the proteins responsible for the specificity of the bones are destroyed.

The fluorescent antibody method (Coons et al. 1941, Lengyel–Nemeskéri 1964, Lengyel 1975, Harsányi 1976, Lengyel 1982) utilizes fluorescent labelled antisera and histological sections. This technique seems to be more sensitive and suitable to screening large numbers of bones. The bone sample is subjected to a special decalcination procedure to make the bone tissue more suitable for microscopic immunofluorescent examination. The diagnostic sera prepared from lecitines are combined with the fluorescent dye in indicated proportions with appropriate controls (Lengyel 1984, Sokal et al. 1987).

Material and Methods

At Sándorfalva–Eperjes (South-Hungary, near to Szeged) skeletal remains were discovered in 1985 and 1986. On the basis of their archeological finds they dated from the Scythian and Sarmatian periods, and the Hungarian Conquest.

A preliminary archeological study was reported by Fodor (1985), whereas the number of the graves from the Hungarian Conquest is 105, and the cemetery was fully discovered. The general anthropological elaboration of 104 skeletons has been in progress.

We could carry out the determination of ABO phenotypes of 77 skeletons with the absorption–elution and inhibition methods. These procedures were chosen because they are in every-day practice for identification of ABO group substance in recent bone samples in our serologic–criminalistic laboratory (Szent-Györgyi Albert University Medical School Szeged).

The methods were used parallelly on the bone samples. In the cases where we obtained contradictory serological reactions we repeated the determination more times. If we could not obtain agglutination with anti–A and anti–B sera, elution was performed also with anti–H phytagglutinin (with Evonymus extract) and with this we controlled the results of the examinations of the "0" group.

In our work we also used the mixed cell agglutination technique what was devised by Coombs et al. in 1956 and used by Otten & Florey (1964) in order to identify A, B, and

H antigens on skin cells of mummies. This technique is used successfully for the demonstration of red blood cell antigens in bloodstains (Harsányi–Gerencsér 1968).

The gene frequency was counted by Berstein's method (1924). For the comparison ABO phenotypes of the living populations were available in our laboratory.

Results and Conclusion

The determination of ABO phenotypes in bone samples of 77 individuals with the absorption–elution method proved more reliable than with the inhibition (titer reduction) method.

Using the mixed cell agglutination technique in the course of the demonstration of antigens in the bones we obtained no evaluable results.

On the basis of the absorption–elution method the distribution of ABO phenotypes of 77 bone samples is presented in Table 1. From 77 individuals we have 10 uncertain and 67 certain determinations. The most frequent is the phenotype "AB" and than "B" regarding the all and the certain cases, too, resp.

Table 1. **ABO phenotypes on bone finds from the Hungarian Conquest (Sándorfalva–Eperjes)**

Cases determined with certainty		Uncertain reactions	Total samples	Phenotypes counted on all cases	Phenotypes counted on certain cases
A	3	6	9	11.69%	4.54%
B	22	1	23	29.67%	32.84%
0	18	1	19	24.67%	26.80%
AB	24	2	26	33.77%	35.82%
	67	10	77	100.00%	100.00%

Gene frequency* n=77	Gene frequency* n=67	Gene frequency** n=1774
p=0.2270 q=0.3180 r=0.4550	p=0.2015 q=0.3430 r=0.4555	p=0.2589 q=0.1922 r=0.5504

*Sándorfalva–Eperjes, 10th century
**Recent population, Szeged

The result of gene frequency corresponding with the gene frequency of recent population is evident (the differences are significant, $p > 0.05$).

It seems, that the absorption–elution method is applicable for the determination of ABO phenotypes on the ancient bone samples. Of course, the results with this method can be accepted in that case if the same results would be provided by other methods (for example fluorescent antibody technique).

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SOME ALKALINE EARTH METALS AS PALAEODIETARY INDICATORS AT PORROS SITE (MALLORCA, IRON AGE)

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Abstract: *Strontium is the first chemical element studied as a possible discriminant factor in diet. Its behaviour along food chains is well-known. To date other elements have also been studied as possible paleodietary indicators.*

This study analyses some alkaline earth metals present in bones by a new methodology. The skeletal material chosen for this project belongs to a talayotic necropolis "S'Illot des Porros" (Mallorca) (VI–II bC). S'Illot des Porros is a small island and in fact, the only human evidence to be found there is this necropolis. The inhabited place where this people lived is unknown. The dietary study of these skeletal remains can help in discovering the location.

Key words: *Paleodietary; Alkaline earth metal; Strontium; S'Illot des Porros (Mallorca).*

Introduction

Alkaline earth metals are chemical elements commonly present in soil composition. In the 1950s, Odum (1957) studied the biogeochemical cycle of one of these elements, strontium. During the same decade and as a result of the testing of nuclear weapons, some investigators observed a relatively high concentration of a dangerous radioactive isotope, ^{90}Sr, in the atmosphere, plants and animals (Karlson 1967). These variations in the concentration of strontium along the food chain are higher in the first step and lower in the last. Plants absorb a relatively high strontium concentration of the soil. Herbivore tissue has relatively lower strontium levels than the plants that these animals consume because the digestive tract discriminates againts strontium in favour of calcium. The small amount of strontium is placed principally in bones. Carnivores ingest herbivorous flesh and also discriminate against strontium, thus their bones should contain the lowest strontium content in a given trophic chain. So, we can establish differences along the food chain (Toots & Voorhies 1965). In 1974, Brown incorporates human bones of a mexican population (Huitzo 1100–900 bC) in these studies, to know the diet of that population.

Materials and Methods

The skeletal material chosen for this project belongs to a talayotic necropolis "S'Illot des Porros" (S. VI–II bC). This necropolis is placed in a small island in Alcudia bay (Mallorca, Spain) and the inhabited place where this people lived is unknown (Tarradell 1961). The skeletal remains of this necropolis consist of 230 individuals and other animal remains (Malgosa 1985).

Table 1.
Composition of the faunal sample

Herbivores	12	*Oryctolagus cuniculus*
	9	*Bos taurus*
	6	*Equus*
	22	*Capra, Ovis*
Omnivores	4	*Sus*
Carnívores	1	*Felis*

In this study the sample was taken from femurs of 197 individuals and 59 animal bones (Table 1). The sample was treated by a gravimetric analysis that is conducted on a modification of the Szpunar method (1978) based on an important reduction in the time of the sample preparation and a reduction in the bone weight (Subirà, Malgosa & Carrasco 1987). The reading of levels of trace elements was made by Atomic Absorption Spectrometry (AAS), and Inductively Coupled Plasma Atomic Emission Spectrometry (ICP/AES).

The elements analysed in this study are different alkaline earth metals: barium, strontium and calcium. The amount of calcium is expressed as a percentage while barium and strontium are expressed as ppm and are related to calcium. This is because strontium and barium have a similar chemical behaviour to calcium and replace it in the bone.

The SPSS statistic package was used in the treatment of data. Oneway was applied to analyse the differences in the food chain. Tests for homogeneity of variances was not respected. Then non parametric tests were applied: test of Kruskal–Wallis to analyse the differences in the food chain, and Mann–Whitney test to analyse the differences between two groups. Discriminant analysis was also applied in order to obtain a graph of distribution of groups and peercentage of grouped cases correctly classified.

Results and Discussion

Barium and strontium are chemical elements frequently present in the soil and therefore are present in high levels in herbivores. Barium is generally considered a more discriminant element than strontium. When you analyse Ba/Ca ratio (Table 2) you can observe that herbivores are the group which contains a higher barium level then omnivores, carnivores and finally man. The differences between the levels are significant as Kruskal–Wallis test shows. When you analyse these differences using the Mann–Whitney test, you see that they correspond to the study between man-herbivores and man–omnivores (Table 3). Discriminant analysis shows a 76.17% of grouped cases correctly classified (Fig. 1).

Table 2. **Descriptive statistics and Kruskal–Wallis test results for concentrations of Sr/Ca, Ba/Ca**

	Man	Herbivores	Omnivores	Carnivores	p(K–W)	
BA/Ca	$\bar{x}$	0.72255	2.0385	1.9757	0.9318	0.0000*
	SD	0.28	1.03	0.25		
Sr/Ca	$\bar{x}$	7.5960	4.3313	4.1255	3.0033	0.0000*
	SD	0.05	0.02	0.01		
	N	197	54	4	1	

Table 3. **Mann-Whitney test results**

Comparisons		Ba/Ca	Sr/Ca
Man–Herbivores	p	0.0000*	0.0000*
	N	251	251
Man–Omnivores	p	0.0007*	0.0014*
	N	201	201
Man–Carnivores	p	0.2518*	0.09138*
	N	198	198
Herbivores-Carnivores	p	0.1153	0.1015
	N	55	55
Omnivores–Carnivores	p	0.1573	0.1573
	N	5	5
Herbivores–Omnivores	p	0.5807	0.8061
	N	58	58

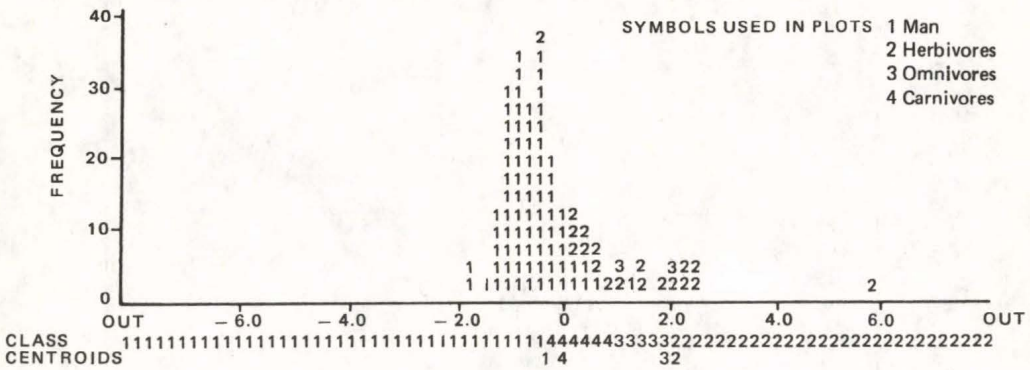
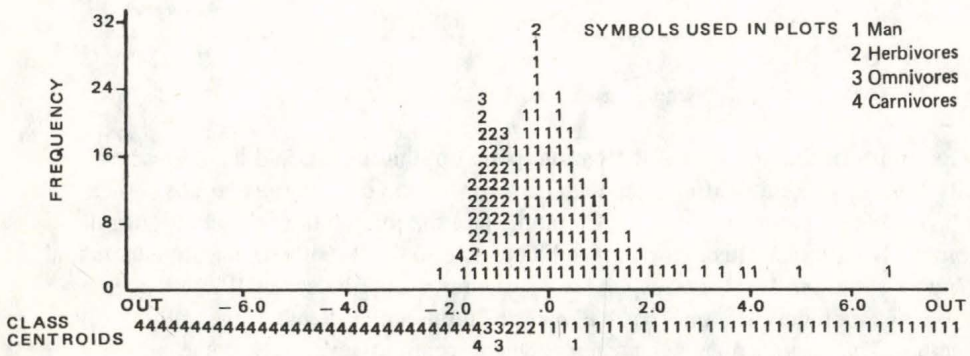


Fig. 1: Discriminant analysis of Ba/Ca ratio

When Sr/Ca ratio is studied, the higher levels belong to man, next to herbivores, to omnivores and finally to carnivores (Table 2). Discriminant analysis show a 70.70% of grouped cases correctly classified (Fig. 2).



In this case Kruskal–Wallis test also indicates significant differences along the trophic chain (Table 2) that correspond to man–omnivores and man–herbivores when the Man–Whitney test is applied (Table 3). These differences coincide with Ba/Ca ratio but unlike it, the higher concentration of strontium belongs to man in this case.

In both elements, the group of carnivores don't present differences between the other groups. This could be due to the small size of the sample only a cat. Also, there is a coincidence in the study of each element; there exist no differences between herbivores–omnivores. This absence can be due to a vegetarian diet for both groups because all the omnivore specimens belong to genus os *Sus* that also consume vegetables. The homogeneity present in omnivores and herbivores datas can be made evident in the discriminant analysis when this is applied to Sr/Ca ratio and Ba/Ca ratio. The percent of grouped cases correctly classified increase to 85.55% (Fig. 3).

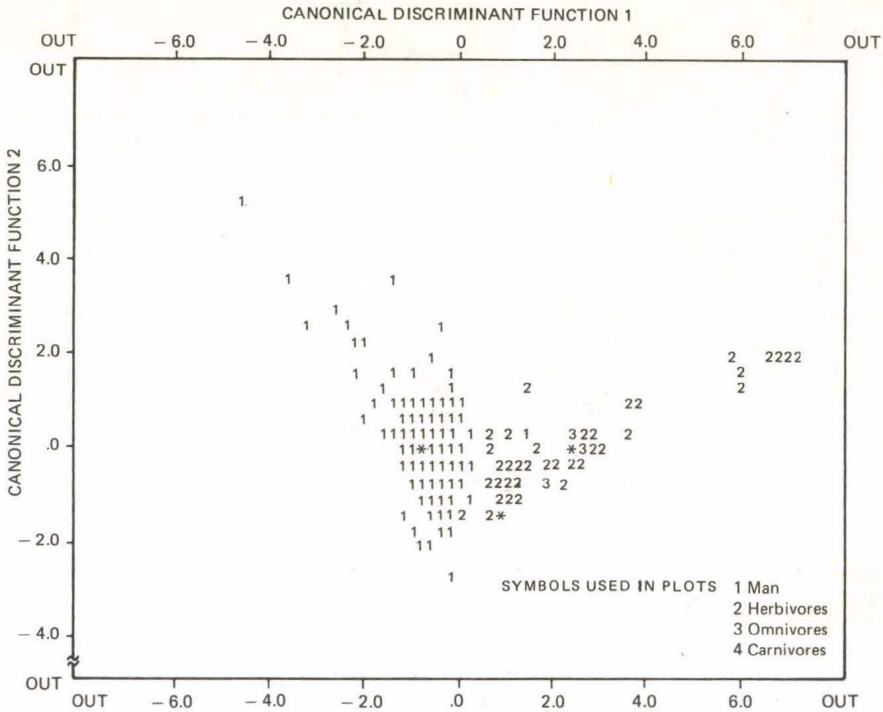


Fig. 3: Discriminant analysis of Ba/Ca ratio and Sr/Ca ratio

The results of the analysis of the barium point out that man could have low levels of plants in his diet like the differences with herbivorous and omnivorous groups show.

On the other hand the range of Sr/Ca ratio, place the man in the first and highest level before the herbivores. This fact seems to be opposed to the hypothesis that considers that the higher strontium levels correspond to herbivores. Nevertheless in 1979, Schoeninger studied two populations, one basically agricultural and the other basically mollusc collectors. The results obtained present higher strontium levels in people who ingest shellfish. Thus in the population of Porros we must consider that the necropolis is

located in a small island and therefore it's not unusual that these people are mollusc collectors. In this study, as in the Schoeninger one, the higher strontium levels can be explained by a great amount of molluscs in diet and a low content of plants. This can be corroborated by the low Ba/Ca ratio present in our population.

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GENETIC STRUCTURE OF THE DOMAHÁZA POPULATION 2. EFFECTIVE POPULATION, MIGRATION, DRIFT

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Abstract: *A number of variables were examined in order to determine the level of isolation of a Hungarian community living in partial geographic isolation, and thereby to evaluate the random genetic drift potential in the population. The relatively small proportion of migrants (0.3165), the limited individual mobility, as given by marital distance (28.98 km), the small effective size (N_e = 142; Kimura and Crow 1963), the effective migration rate (m_e = 0.1267; Malécot 1948), and the value of the product $N_e m_e$ (18) agree with the possibility of genetic drift in this population.*

Key words: *Migration; Individual mobility; Marital distance; Domaháza population (N-Hungary).*

Introduction

Small isolated communities are of great interest from both the theoretical and the practical standpoints. They represent an opportunity to investigate the potential factors of evolution and, particularly, to evaluate the genetic effects of random genetic drift.

The random drift in gene frequencies due to small population number and other causes has played a central role in the evolutionary theory advanced by Sewall Wright (1931, 1969), Kimura and Crow (1963).

In order to appraise drift effects, many models have been suggested. The first of these was proposed by Wright in 1943, and named the *island model.* It assumes that a population is subdivided into small groups, between which genetic exchanges are low. Inasmuch as a human community fulfils this condition, the island model can be applied particularly in investigations of genetic drift (Magalhàes and Arce Gomez (1987).

In the present study investigations were carried out in a partially isolated population in North Hungary. The characteristic features of marriages and the inbreeding tendencies have previously been reported (Pap and Holló 1988).

The Population

The settlement under study (Domaháza) is situated in Borsod County in the north-western part of the hilly region north of the Bükk Mountains, near to the national frontier (Fig. 1). The settlement lies in the narrow valley of a stream and is connected with the other settlements only by a road running east, this is the only passable road for vehicles. On the other three sides the village is isolated from the other settlements by extensive woods.

The name of the village first appears in written documents in the 14th century. In 1332 it is mentioned in the list of papal tithes as a parish. According to the 1784 census the number of inhabitants was 540. The characteristic feature of the settlement is that the population is made up mainly by the descendants of three clans (Elek, Holló, Kisbenedek).

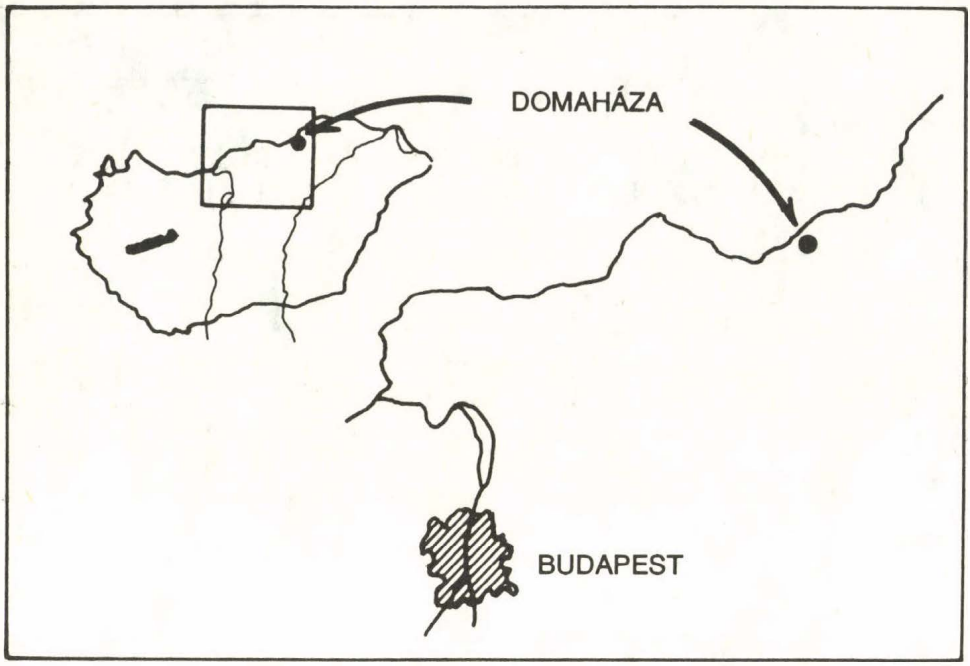

Fig. 1: Localization of the population

The clans, which in the past were assimilated into particular localities, can be traced back as far as 1500 in the documents. From data from the registers and censuses it was established that the growth of the population up till 1965 was 1.77-fold. At the time of our investigation (Holló 1965) the population numbered was 957 individuals, of whom 62% were members of the 3 clans.

Population Surveys

The study of the whole population involved processing of the state and church registers containing the births, marriages and deaths between 1779 and 1965. Processed, in addition, were the documents in the archives, records of legal proceedings and conscription data. After collecting this information, data were obtained by interview from each family and individual, such as: full name, place and data of birth, place and date of marriage, reproductive history of the couples, names and birth data of parents, brothers and sisters. If the marriage was consanguineous, the pedigrees were constructed. Detailed genealogical analyses were performed concerning the whole population. The data collection was conducted and performed by one of the authors (Holló, L.) who is a member of one of the clans and is personally acquainted with the majority of the population.

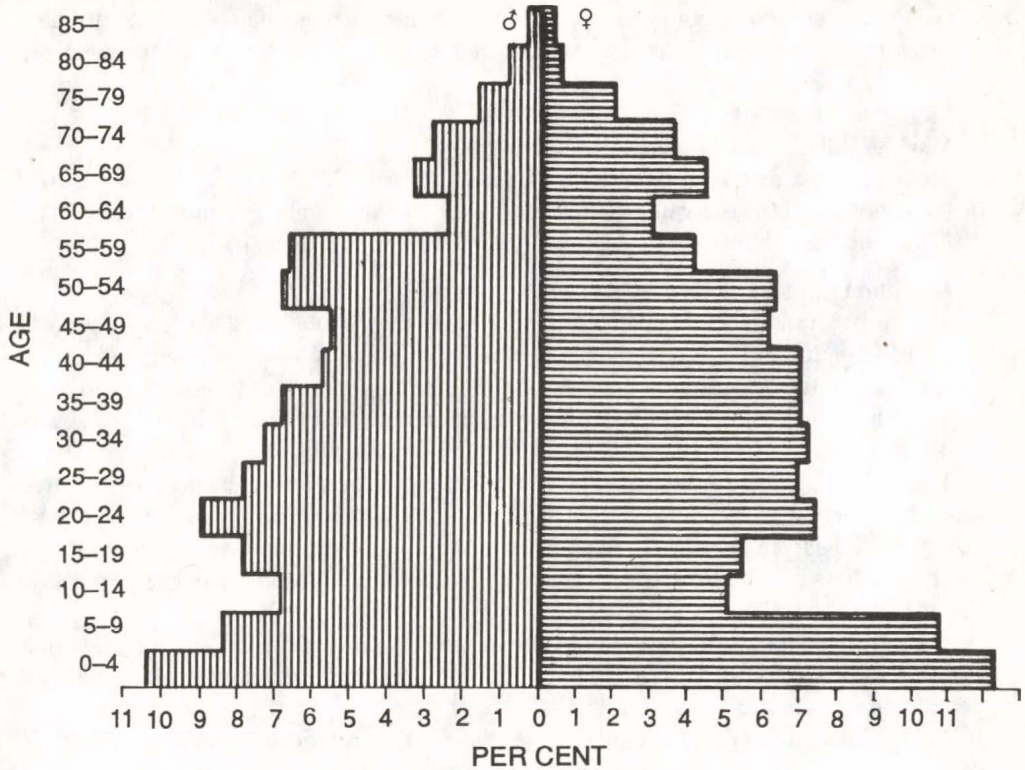

Fig. 2: Age and sex distribution in 1965 (Domaháza)

Results and Discussion

Age and Sex Distribution

In 1965 the population size of the settlement was 957 individuals. The number of males (469) and females (488) was approximately identical. The age pyramid shows a harmonic distribution (Fig. 2); one third of the population (34%) is younger than 20 years of age.

Effective Population

The breeding population N_r is defined herein according to Glass et al. (1952) and to Freire-Maia et al. (1978) as the number of individuals with at least one living offspring aged 0-30 years, and was estimated as 297 individuals or 31.03% of the total population (N=957). This estimation is not much lower than the value commonly found in human populations: 34% of N (cf. Freire-Maia 1974; Freire-Maia and Cavalli 1978). In a relatively isolated Hungarian population (Tiszamogyorós) the value of N_r was 32.5% (Pap 1979).

The effective population size (N_e) was estimated with Kimura and Crow's (1963) formula,

$$N_e = (2N_r - 2) / ({}^{x}k-1) + V_k/k$$

where N_r is the breeding population size, ^xk is the average number of contributed gametes per parent and V_k is the variance of the number of gametes contributed per individual in the present generation.

From the values $^xk = 3.78$ and

$V_k = 5.23$, the effective population size $N_e = 142$.

The value of effective population is 14.83% of N (or 47.81% of N_r). In the majority of human populations the value of N_e is about 25% of the total population (Freire-Maia 1977). In the Tiszamogyorós population N_e is 19.34% of N (Pap 1976).

Migration Rate and Effective Migration

The proportion of individuals born and living in the population, their contribution to the breeding and effective populations, then the number of immigrants and their proportion in the breeding population were determined. The fraction of the total population born, outside the village (total migration rate) is formed by the immigrants is 0.3164.

These two values (0.0982 and 0.3164) represent overestimates of the effective migration rates, that take into account the fact that migration tends to occur over short distances and is preferential as regards family composition, thus leading to a strong correlation between the gene frequencies among immigrants and those of the population that receives them (Wright 1931).

The effective migration rate should, therefore, be lower than the overall migration rate in the same way as the effective population size is generally smaller than the total population size (Freire-Maia, Cavalli 1978).

Among the migrants obviously only those that reproduce make any genetic contribution to the population that accepts them. From this fraction the effective migration rate (m_e) was estimated, which is the fraction of migration of genetic importance.

Effective migration rate can be estimated through the use of Malécot's (1948) approximation

$$m_e = \sqrt{m(m+2k)},$$

where m is the long-range and k the short-range migration rate after m has been eliminated (Morton et. al. 1976).

Since it is impossible to discriminate'short-range' and 'long-range' migration with accuracy (Freire-Maia, Cavalli-Sforza 1978).

The following procedure was adopted. Location of the birth places of the migrants on a map showed that they tended to cluster around a radius of 40 km from the village. Those coming from inside this area were designated as short-range migrants; and coming from more distant places as long-range ones those. The calculations were repeated taking 100 km as a conservative radius.

Table 1 presents the data and the corresponding estimates of m_e. The mean marital distance of the breeding population (i.e. the distance between the birth places of fertile mates) is 28.98 km. This number is compatible with considerable isolation of the Domaháza population.

Table 1. **Some parameters related to migration (for an analysis of the product $N_e m_e$)**

	Radius km	Short range	Long range	Total migration	Effectiv migration	$N_e m_e$
Breeding	40	0.2895	0.0269	0.3165	0.1276	18
population	100	0.3030	0.0135	0.3165	0.0914	13

The majority of the breeding population is made up of the clans Elek, Holló and Kisbenedek.

The members of the clans were born of marriages within the clan (46.80% of N_r) or between individuals with different surnames but of Domaháza birth (16.83% of N_r).

The distance between individuals born and living at Domaháza was taken symbolically as 1, and the mean migration distance was calculated with this value.

The average migration distance of the breeding population (i.e., the distance between birth places and Domaháza village; defined by Morton 1969) equals 11.04. These values are in good agreement with the inbreeding tendencies and our findings related to consanguineous marriages (Pap and Holló 1988).

Isolation and Genetic Drift

The effective size (N_e = 142) of the village population is less than half the breeding population (N_r = 297). The value of the effective migration rate is about 13% of the breeding population. Therefore the village of Domaháza can be considered fairly isolated. This raises the question of the possibility of the potential effectiveness of drift as a cause of evolutionary change in this population (Magelhàes and Arce-Gomez 1987). Wright (1931, 1969) has suggested a way of measuring the effects of genetic drift from the effective size and migration rates.

The product $N_e m_e$ (known as the coefficient of breeding isolation) is crucial in the determination of the action of random genetic drift on a given population (Wright 1931, 1969).

According to Wright, the action of drift is not negligible in populations with an isolation index between 5 and 50, whereas it is fairly extensive in populations with an isolation index equal to or lower than 5.

The estimate of N_e obtained through the formula of Crow and Kimura (1970) is 142 and that of $N_e m_e$ is 18. Thus, the contribution of random genetic drift to evolutionary change is not negligible in this population, as was expected.

The possible consequences of genetic drift were assessed on the basis of investigations on the clinically detectable abnormities, diseases and genetic polymorphisms.

Summary

The village of Domaháza is relatively isolated geographically. The relatively small proportion of migrants (0.3165), the limited individual mobility as given by marital distance (28.98 km), the small effective size (N_e = 142), the effective migration rate (m_e

= 0.1276), and the coefficient of breeding isolation ($N_e m_e$ = 18) agree with the possibility of genetic drift in this population.

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CONSANGUINITY STRUCTURE IN A ZONE OF GUADALAJARA (SPAIN)

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Abstract: *In a fairly large past of the province Guadalajara (Molina, Spain), made up of eightytwo parishes, pedigrees concerning consanguineous marriages up to the fourth generation were taken from ecclesiastical dispensations.*

Based on consanguineous matings celebrated in that mentioned area, over a period of fifty years (1875-1924), the following anthropogenetical items are evaluated: (i) levels of consanguinity. (ii) genealogical structures with regard to types of relationship - sex and number of intermediate ancestors - in relation to the mobility of the mates.

The average frequency of consanguineous marriages was 24.9%, the mean inbreeding coefficient (α) *being* $5.5\ 10^{-3}$.

The type of relationship found in marriages "with migration" was significantly different from that in marriages "without migration".

Key words: *Consanguinity; Types of relationship; Migration; La Molina, Guadalajara, Spain.*

Introduction

Numerous studies have been carried out to explain the factors that determine the frequencies of different types of consanguineous marriages found in human population. The correlation between the age of both mates seems to have a fundamental bearing on the consanguinity structure (Barrai, Cavalli-Sforza and Moroni 1962, Hajnal 1963, Cazes and Jacquard 1981, Leslie 1983). At the same time other factors such as the altitude of the location and size of the population (Cavalli-Sforza, Moroni, Zalaffi and Zei 1960, Relethford 1985), geographical mobility (Barrai et al. 1962, Imaizumi 1977, 1978, Pettener 1985) and social stratification (Abelson 1978, Malhotra 1979, Leslie 1981, Imaizuimi 1986) may play an important part.

In a previous analysis of the Archbishopric of Toledo one of the authors (Calderón 1987) points out a number of close consanguineous marriages, that is higher than expected, if at least one of the mates does not stem from where the wedding took place. In the study presented here this aspect is being expanded upon. Furthermore we are trying to evaluate the effect that common surnames might have had on the frequency of certain types of relationship.

Characteristics of the Population Being Studied

Fig. 1: Geographical situation of Molina

The population studied here comes from Molina, a region in the East of the province of Guadalajara in the center of Spain (Fig. 1). This region with a surface of 3350 km^2 includes 82 parishes which are situated at heights ranging from 900 m. to 1500 m. above sea level, on average 1200 m. They are isolated from the main roads. About 39.000 people lived in that area in 1900 (density approx. 12 inhabitants / Km^2), with an average number of inhabitants per parish of about 470. Only five of the parishes had more than 1000 inhabitants. The basis of their economy was agriculture.

Materials and Methods

Data on 4239 consanguineous marriages from 1875 to 1924, in the 82 parishes of the region, were collected from Roman Catholic Dispensations filed in the Archive of the Archbishop. These documents include the pedigree of the mates, that allowed us to trace back the genealogical tree of consanguineous mates up to four generations until 1917. From that date onwards, the requirements for getting married where lowered to second cousin marriages. Records of the total number of marriages per year and parish were gathered from the parish books in order to estimate the average consanguinity coefficient α. When studying this coefficient we only selected those parishes (53) which could provide a full data basis for the time span analysed here.

Temporal evolution of mean inbreeding coefficient and the different degrees of relationship were researched on. In order to investigate into the consanguinity structure, multiple consanguinities were separated into their constituent single consanguinities.

In the second part of our study the consanguineous marriages have been split up into two groups according to the premarital migration of the couple. Marriages "without migration" are defined as those where the place of marriage coincides with that of birth and residence of both bride and groom. Marriages "with migration" are those in which one of both of the spouses does not meet this condition.

Following Cavalli-Sforza, Kimura and Barrai (1966), the classes of relatives (II-II, II-III, III-III ...) will here be called "degrees of relationship"; while the relationship specified by a type of pedigree as determined by the arrangement of males and females among intermediate ancestors will be called "type of relationship".

Results and Discussion

Table 1 shows the frequencies of the different degrees of relationship (in periods of five years) as well as the relative frequency rate of consanguineous marriages and the corresponding consanguinity coefficient α. Marriages with various degrees of relationship have been broken down into their corresponding single relationships.

Table 1. **Temporal changes in inbreeding (α) in the population of Molina. T. M.: total marriages, C. M.: consanguineous marriages.**

Period	T.M.	C.M.	%	$\alpha.10^{-3}$	Degrees of Relationship I–II	II-II	II–III	III–III	III–IV	IV–IV
1875–79	1156	267	23.10	4.38		41	205	64	64	164
1880–84	1182	307	25.97	5.16	1	46	16	96	75	189
1885–89	1117	295	26.41	5.73	1	50	26	92	63	177
1890–94	1122	308	27.45	5.31	2	36	24	91	85	178
1895–99	1089	296	27.18	6.14		54	27	100	59	163
1900–04	1194	323	27.05	6.08	1	60	26	94	70	200
1905–09	1064	281	26.41	5.74		52	12	96	54	178
1910–14	1066	300	28.14	6.27		55	20	106	59	200
1915–19	935	196	20.96	5.52		42	20	102	31	82
1920–24	1051	154	14.65	4.63	1	40	18	118		
Total	10976	2727	24.85	5.49	6	476	205	959	560	1531

The frequency of consanguineous marriages (24.85%) discovered in relation to the total of marriages deserves special mentioning. Due to the great extension of the region studied here this percentage can be regarded as high.

According to these figures the consanguinity rate also shows relatively high levels, $\alpha = 5.49\ 10^{-3}$.

It is a well-known fact that temporal variation of α in European populations displays two main visible trends: an increase during the second half of the 19th century, followed by a decrease which began at a time during the two World Wars.

In order to find out the typical trends of the Molina region, first we calculated (by means of two linear regressions) the expected values for the degrees of relationship III–IV and IV–IV in the last two periods. In this way it was possible to compensate the lack of registers from 1917 onwards. Then we carried out a new regression of the corrected consanguinity coefficient on time. The graph ($y = 4.015 + 0.583\ x - 0.04\ x^2$, $p < 0.01$) shows a rising tendency until the beginning of this century, followed by a slightly falling tendency during the last two periods (Fig. 2).

Fig. 3 visualizes the temporal variation of the frequency of each of the degrees of relationship with respect to the total of the consanguineous marriages. In the course of time the interrelations between different degrees of relationship do not manifest any significant changes, which means that time does not appear to affect their distribution.

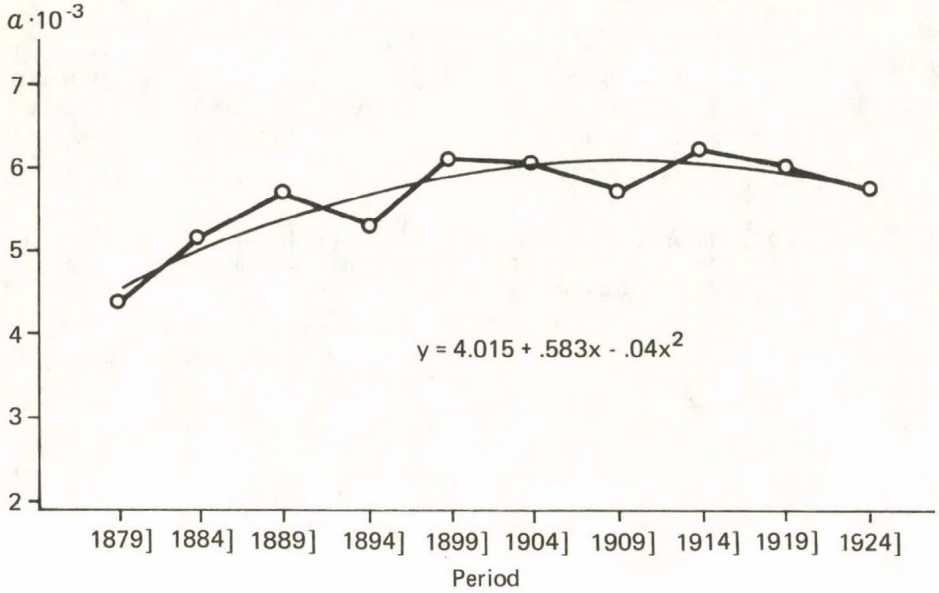

Fig. 2: Temporal trends of mean inbreeding coefficient in Molina

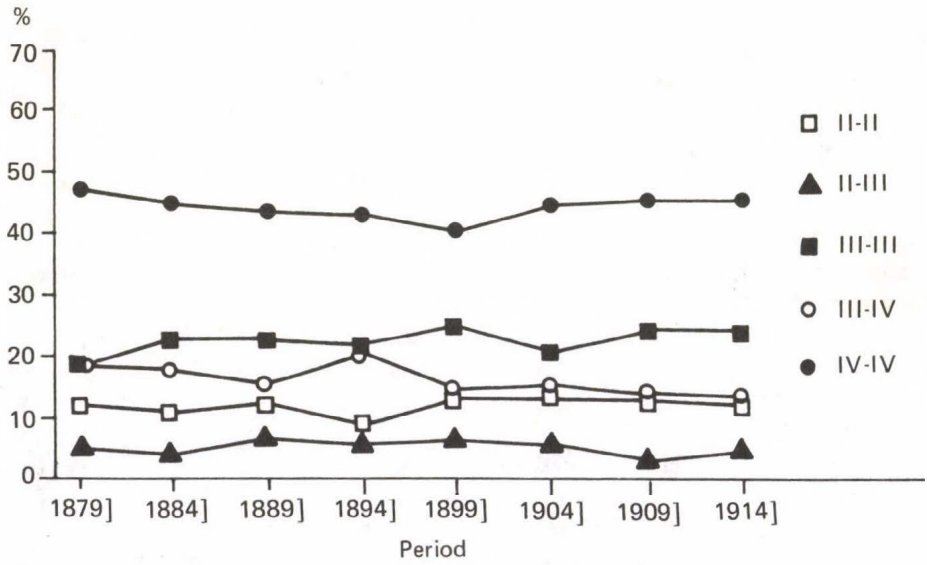

Fig. 3: Temporal trends of relative frequencies of different degrees of relationship

In the second place, the frequency distribution of the different degrees of relationship has been analysed in function of the spouses' places of origin. Consanguineous couples with at least one of the mates being non-autochthonous are characterized by a higher number of close relationships than couples in which both partners are autochthonous. As can be seen from table 2, in marriages "with migration" the relative frequency of the degrees of close relationship, mainly I–II and II–II, is higher than in marriages "without migration". The opposite is true with reference to the degrees III–IV and IV–IV.

Table 2. **Frequency distribution of different degrees of relationship: consanguineous marriages "with" versus "without migration"**

Degree of relationship	Without migration N	%	With migration N	%	Total
I–II	6	0.1	2	0.4	8
II–II	649	12.2	91	17.3	740
II–III	290	5.4	41	7.8	331
III–III	1314	24.7	149	28.4	1463
III–IV	804	15.1	63	12.0	867
IV–IV	2264	42.5	179	34.1	2443
Total	5327		525		5852

This fact has already been pointed out by Calderon (1987): The quotient between the number of first cousins and the number of second cousins, of the population in the Archbishopric of Toledo, was 0.41 as to marriages "without migration". On the other hand, marriages "with migration" showed a quotient of 0.77. In Molina, the corresponding figures are 0.49 and 0.61, respectively. With respect to the quotient II–II : IV–IV this difference increases, the figures being 0.29 in the case of marriages "without migration" and 0.51 in the case of those "with migration".

Fig. 4 shows the accumulated contributions of different degrees of relationship to the total consanguinity, which is statistically recorded as the number of consanguineous marriages as well as mean inbreeding coefficient; marriages "with migration" were differenciated from marriages "without migration". With regard to other previous findings, we can see that the main differences bvetween both marriage groups can be observed in the cases of close relationship. For a detailed analysis of the causes determining the differences between marriages "with migration" and marriages "without migration" we researched into a series of variables which characterize the different types of pedigrees in each degree of relationship. These variables include the number of females among intermediate ancestors, the difference between the numbers of females in the ancestry of the groom and in the ancestry of the bride, and the existence of marital isonymy.

We clustered together the different types of pedigree in function of each of these variables.

The comparison of the frequencies encountered according to the number of females intermediate ancestors between marriages "with" and "without migration" showed considerable differences (Table 3).

Table 3. **Frequency distribution of the different types of relationship, according to the number of female intermediare ancestors**

Degree of relationship	Females	Without migration N	%	With migration N	%	Ratio
II–II	2	133	20.49	38	41.76	2.04
	1	336	51.77	42	46.15	0.89
	0	180	27.73	11	12.09	0.44
Total		649		91		
III–III	4	80	6.09	13	8.72	1.43
	3	282	21.46	44	29.53	1.38
	2	525	39.95	48	32.21	0.81
	1	345	26.26	37	24.83	0.94
	0	82	6.24	7	4.70	0.75
Total		1314		149		
IV–IV	6	41	1.81	3	1.68	0.93
	5	184	8.13	16	8.94	1.10
	4	528	23.32	47	26.26	1.13
	3	683	30.17	57	31.84	1.05
	2	533	23.54	30	16.76	0.71
	1	246	10.87	22	12.29	1.13
	0	49	2.16	4	2.23	1.03
Total		2264		179		

With reference to the degrees of close relationship, and concentrating on those classes with a high number of females, the marriages "with migration" reach relative frequency levels which are higher than those in marriages "without migration". This tendency is reversed as the number of females in the ancestry diminishes. As to the degrees of remote relationship this pattern disappears, though.

Since not all the classes have got the same number of pedigrees, the expected frequencies vary from class to class. In order to eliminate this disproportion the quotient between marriages "with migration" and marriages "without migration" was calculated for the percentages of each class (Table 3).

It the quotient assumes a value of 1, it indicates a frequency which is identical in both kinds of marriages.

Fig. 5. shows this quotient for each of the degrees of relationship. With respect to the types of degree II–II, the diagram indicates a falling tendency of the quotient in proportion to the decrease of the number of females. The same tendency can be observed for degree III–III, even if it is less pronounced. As in the previous case, however, the ratio assumes values superior to 1 always if there are more females than males. It should finally be pointed out that practically all the values for third cousins are situated around the 1 mark.

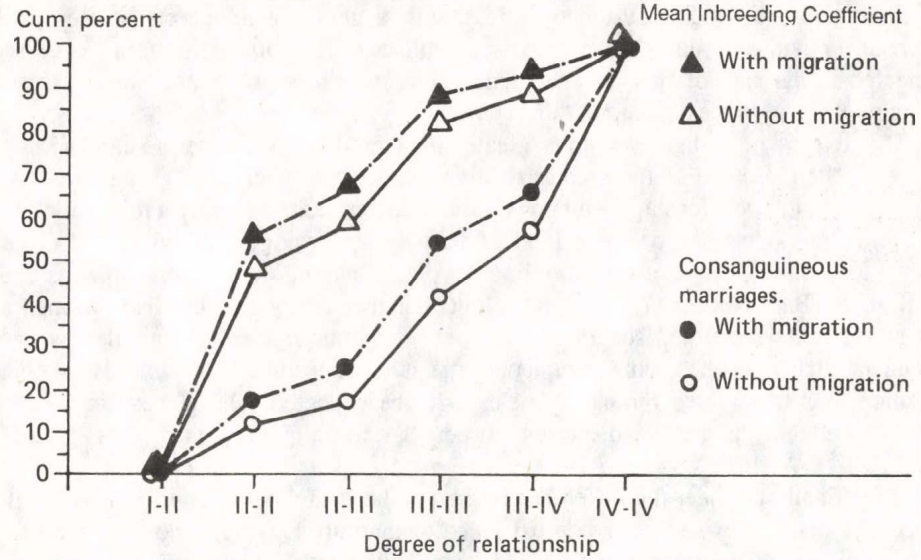

Fig. 4: Accumulated relative frequencies for the consanguinity coefficient and the number of consanguineous marriages between marriages "with migration" and those "without migration"

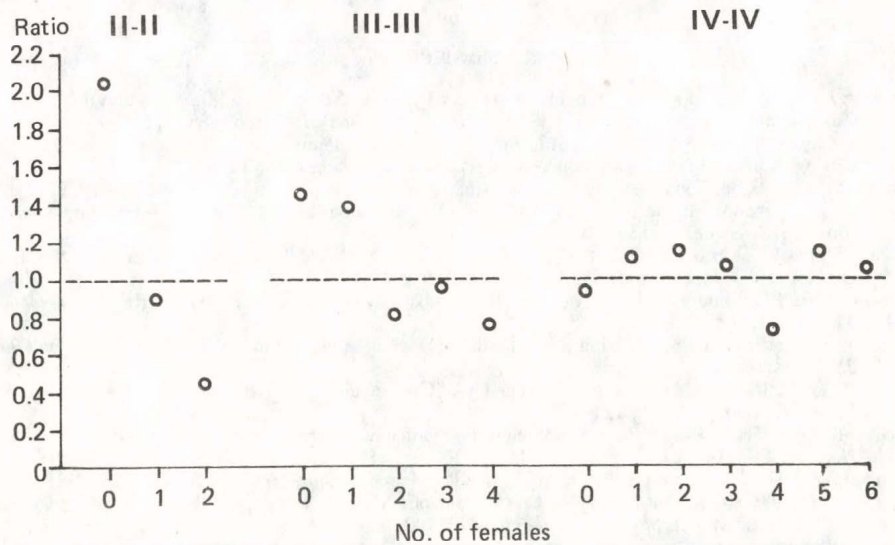

Fig. 5: Quotient of the frequencies observed in marriages "with migration" and in marriages "without migration" in function of the number of female intermediate ancestors

So higher frequencies of the pedigrees with a greater number of females in the marriages "with migration" in comparison with those "without migration" have been detected in the case of first cousins. This tendency is less pronounced among second cousins and does not exist among third cousins.

This excess of pedigrees with a greater number of female intermediate ancestors seems to be the cause of the greater relative frequencies of close relationships – with regard to remote relationships – among consanguineous marriages "with migration".

Here we might think of some kind of "kinship knowledge", which would make it easier to include close relatives, born in other places, among the potential spouses of the individual. Barrai et al. (1962) pointed out that the family ties between women are stronger, and, therefore, social contact between consanguineous females is more frequent than between consanguineous males. Accordingly, an excess of close relationships transmitted through females is to be expected. This excess is the more pronounced, the bigger the distance between the consanguineous partners' places of birth.

If we finally consider the difference in the number of females between both spouses' ancestors and the existence or non-existence of marital isonymy, a comparison of the frequencies which were observed for marriages "with" and "without migration" does not show any significant differences.

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DATA TO TRANSFERRIN POLYMORPHISM IN THE SZEGED-AREA POPULATION

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Abstract: *With regard to the transferrin serum polymorphism 3 codominant alleles: Tf^C, Tf^B, Tf^D were detected at one autosomal locus by Smithies (1957) by means of starch gel electrophoresis. Isoelectric focusing revealed three suballeles, Tf^{C1}, Tf^{C2} and Tf^{C3}, within Tf^C allele (Kühnl and Spielmann 1978).*

Our studies were performed on 891 blood samples obtained from the Blood Transfusion Station of our University, taken from unrelated persons and also on the blood samples of 120 pairs of mother–and–child.

In our sample the frequency of the Tf^{C1}, Tf^{C2}, and Tf^{C3} alleles was 0.744, 0.214 and 0.042, respectively. On the basis of the frequency values the theoretical chance of excluding in paternity testing was 9.5 per cent.

Key words: *Transferrin polymorphism; Szeged-area.*

Introduction

The transferrin glycoprotein of approximative molecular weight 73000-76000 belongs to the globulin fraction of human and animal sera. It has two branching carbohydrate chains containing hexoses, acetylhexosamines, acetylneuraminic acide and fucoses. The protein part binds to the carbohydrate chain. Each transferrin molecules contain two iron-binding sites.

The transferrin are involved in iron transport and controlls the iron metabolism. The iron molecules are not covalently binded to the transferrin but are adsorbed only onto specific iron binding sites on the surface. The iron bindig capacity is pH dependent and shows a maximum stability between pH 7.2–12.00.

The genelocus is localized on the 3rd chromosome. Electrophoretically it can be separated into three fractions having different mobility. Based on this fact three genetically determinated types are known and they were first characterized by starch-gel electrophoresis by Smithies (1957).

The Transferrin-phenotypes are determined by three codominant allels the Tf^A, Tf^B and Tfc^C.

The European population belongs to the phenotype Tf^C. As its probability of theoretical exclusion of fatherhood is only 1%, it has not been applied in the ascertaintment of paternity.

The probability of theoretical exclusion of fatherhood means the number of one hundred of non-fathers who can be definitely excluded by a given procedure from the fatherhood.

By isoelectric focusing on a polyacrylamide gel Kühnl and Spielmann (1978, 1979) subdivided three suballels Tf^{C1}, Tf^{C2} and Tf^{C3} within allel Tf^C. Isoelectric focusing first applied by Svenson and Vesterberg is one of the best method to separate proteins. During isoelectric focusing we apply pH gradient between the two electrodes on the polyacrylamide gel. Due to electric current the charged proteins move to pH gradient value which corresponds to their isoelectric point. As it is given in the literature (Giblett

1969, Prokop and Geserick 1975), by isoelectric focusing of theoretical exclusion of fatherhood increases 20 times (Patzelt and Geserick 1981).

Because the attainable possibility of theoretical exclusion of fatherhood by isoelectric focusing in the transferrin system is much higher, its importance in the serological determination of fatherhood has increased.

The above results made it possible to introduce this method in our laboratory of genealogy.

Material and Method

Our investigations were made by blood samples provided by the Blood Transfusion Service of 891 randomly choosed persons who were not relatives to each other.

The determination of transferrin was made by the method of Patzelt and Geserick (1981, 1982). For isoelectric focusing ampholin (Bio-lyte) was used in pH 4–6 and pH 5–7 regions. 0.1 M glutaminic phosphoric acid served as an anod, and 0.2 M NaOH as a catod. The run was at 10 W for 3 hours. After the electrophoresis the gel was fixed in 3% sulfosalicilic acid and stained by Comassie Brilliant Blue G 250 dye for 30 minutes. The excess of dye was washed out and the plates were dried. The Tf subtypes are schematically shown on figure 1. Figure 2 shows the Tf subtypes by our investigation.

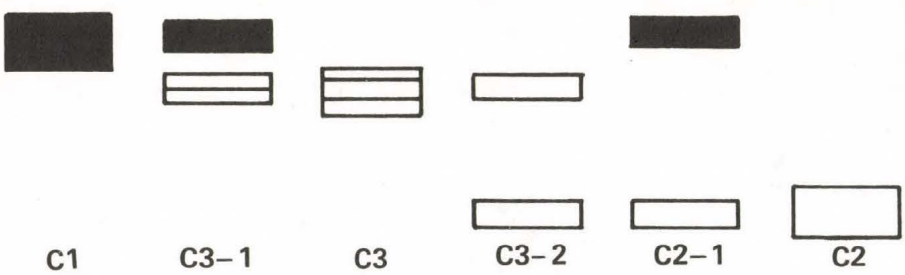

Fig. 1: Schematic representation of the transferrin subtypes according to Kühnl and Spielman (1979)

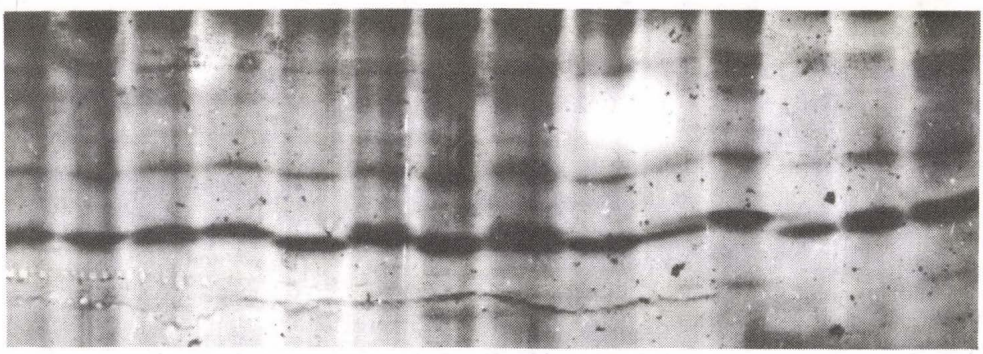

Fig. 2: Transferrin subtypes by isoelectric focusing from left to right: Tf C1; C3; C2-1; C1; C2; C3; C3-2; C3-2; C3; C3; C1; C2;

Results

Blood samples of 891 individuals from Szeged and its environs were investigated and the frequency of genes and phenotypes are summarized in table 1.

Table 1. **Distribution of the Transferrin Phenotypes and gene-frequencies in the population of Szeged area**

Phenotype	Observed n	Observed %	Calculated n	Calculated %	
C 1–1	534	59.91	539.32	60.53	
C 2–1	247	27.72	238.70	26.79	Tf^{C1} : 0.778
C 2–2	20	2.24	25.40	2.85	Tf^{C2} : 0.169
C 3–1	72	8.19	70.65	7.93	Tf^{C3} : 0.051
C 3–2	16	1.79	14.43	1.62	
C 3–3	2	0.15	2.50	0.28	
	891	100.00	891.00	100.00	

χ^2 : 1.7856 df : 2 $0.30 < P < 0.50$

According to our results the frequency of Tf^{C1} is 0.778, Tf^{C2} is 0.169 and Tf^{C3} is 0.051. These results were compared with the frequencies by other authors (Table 2).

Table 2. **Tf Gene frequencies in some other populations**

Population	Author	n	Tf^{C1}	Tf^{C2}	Tf^{C3}	Tf^{B}	Tf^{D}
West Germany							
Hessen	*Kühnl* (1980)	272	0.794	0.151	0.048	–	–
Bayern	*Weidinger* (1980)	184	0.772	0.147	0.070	–	–
East Germany							
Berlin	*Patzelt* et al. (1982)	931	0.770	0.156	0.068	0.006	–
Italy							
Padua	*Cortivo* et al. (1984)	618	0.778	0.180	0.036	0.004	0.0008
Hungary							
Ivád	*Walter* (unpublished)	112	0.827	0.094	0.079	–	–
Szeged	*Csete* et al. (1988)	891	0.778	0.169	0.051	–	–
Northwest India							
Gamit	*Walter* et al. (1983)	250	0.760	0.230	0.010	–	–
South India							
Koya	*Walter* et al. (1983)	175	0.691	0.263	0.012	–	–
Japán	*Yuassa* et al. (1987)	800	0.746	0.244	–	0.002	0.006

It can be concluded that these values does not essentially differ from the values of other people. The possibility of theoretical exclusion of fatherhood was determined by the frequency of genes and this proved to be 19.51%.

The system has not yet been applied routinly in genealogical investigations however population genetical ivestigations were done, we will use them in our practice.

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AGEING EFFECTS IN THE MARINE FISHERFOLK OF BENGAL

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Abstract: *The biological sequence of age changes in a sample of coastal fishermen villages in the district of Midnapore, West Bengal, is discussed. The present study shows that soft parts of the nose continue thickening throughout the life as nasal length and breadth increase in both sexes. However, the rate of annual increment or decrement of these and other characters differs by age. Loss of functional capacity and the impairment during cell division in the older age groups are the biological reasons of this difference. The occupational and behavioural patterns of the villagers may also play a vital role in the rate of change in some characters. Out of five metric measurements considered for the present study, stature and biacromial breadth, but not nasal length and breadth, could be functionally related to the occupational behaviour of sea fishing. Weight which is known to be influenced by the nutritional status of the individual may also be related to this type of occupation. No doubt, this type of synthesis can only be possible with the help of longitudinal data which are free from the effect of secular change.*

Key words: *Ageing; Anthropometric changes with age; Marine fishermen; Midnapore/West Bengal.*

Introduction

Developmental changes do not stop after puberty, but continue during adulthood. Ageing is a continuous process where it is difficult to distinguish between effects related only to age and the effects of degenerative diseases. These diseases are the cause or the result of senescence. Individual age changes occur as a function of the environment between limits determined by genetic factors.

Studies of ageing are not easy. It implies, of course, a definition and a choice of a homogeneous sample, such as in all anthropological studies. But, it would imply also a discrimination between chronological and biological age, if determination of objective morphological or physiological changes would be possible.

Moreover, the cross-sectional studies compare non-related individuals grouped on different age classes: the differences observed between these age classes include individual age changes but also the secular evolution of the anthropological characteristics and also the effect of selective mortality. Only the longitudinal studies, where the same individuals are measured different times, allow to observe individual age changes.

Physiological changes

Morphological, physiological and psychological changes of the adults are numerous.

With ageing, the loss of dead cells is not always compensated by mitosis. It results in a phase of negative growth, very clearly observed in the central nervous system, because in this case cell replacement does not occur. Modifications can already be observed after 20 or 30 years of age (Sinclair 1973): time of reaction increases and movement accuracy gradually deteriorates for instance.

Vital capacity reaches a maximum at 20 years and decreases afterwards (Morris et al. 1963). The increase with age in mean serum cholesterol level is also well-known (Abraham et al. 1978), as well as the increase of blood pressure, especially of systolic blood (Roberts et al. 1978), or the diminution of muscle width (Meema et al. 1975).

Osteological changes are also very numerous with age. An imbalanced bone remodeling has been observed; a reduced new bone formation, such as continued periosteal apposition, and less marked reduction in bone resorption, such as decrease in cortical thickness of the tubular bones. It results in skeletal rarefaction (Trotter et al. 1974, Meema et al. 1975) but at the same time in increases of diameters of tubular bones (Dequecker 1972, Semine et al. 1975).

Anthropometric changes

In head dimensions, the patterns of change are related to the osteological changes: skull dimensions are altered by an ectocranial apposition and an endocranial resorption. Outer skull diameters tend to increase, mandibular size too (Isreal 1973, Susanne 1977, 1980). Most transversal studies show an increase of head length and breadth.

The face also continues to grow: increases of face heights and diameters are observed, as well as changes in the morphology of mouth, nose and ears (Susanne 1974, 1980).

In cross-sectional studies of Western populations, weight increases during the first decades of adulthood but decreases very significantly after 60 years. A decrease of stature is observed, as well as of sitting height. A marked increase with age has been observed in biiliac diameter (Susanne 1974, 1980).

Cross-sectional versus longitudinal studies

In cross-sectional studies, differences are not identified with real age changes but secular changes are interfering. Moreover, selective survival must also be taken into account in the interpretation of cross-sectional data.

The longitudinal method is the most suitable for the study of individual age changes, but their numbers are limited. Let us mention for stature Büchi (1950), Lipscomb et al. (1954), Damon (1965), Gsell (1966), Miall et al. (1967), Hertzog et al. (1969), Pariskova et al. (1971), Susanne (1967, 1974, 1977), Borkan et al. (1977).

For other measurements such as weight, length of arm, biacromial diameter, biiliac diameter, arm circumference, head length and breadth, frontal and bizygomatic breadth, nose height, ear and lips height, Susanne (1974, 1977) published longitudinal data.

Individual age changes among the marine fisherfolk of Bengal

Age changes are of course universal but they are mediated by local environmental factors: differences in physical activities can influence senile changes, as well as physical factors (climate, altitude, pollution), nutritional factors, psycho-social factors (Susanne 1986). The present study is done on a sample of a genetically very homogeneous population in very specific environmental conditions: the marine fisherfolk of coastal Midnapore.

Material and methods

The material has been collected by S. Kundu on six villages in the endogamous caste group Jele Kaibartas who are traditionally fisherman by occupation. Middle aged males

go for deep sea fishing, above 45 years of age fisherman retire for deep sea fishing but remain attached with fishing operation in the sea cost, above 55 years of age males have light jobs like repairment of nets. Despite the house hold responsibilities, the female also go for trapping the sea crabs, sea shells and collect dry leaves and wood. Among the males, the percentage of literacy is 17.72%, and among the females it is 5.22%. Most of the families posses a small piece of land where they produce paddy generally once in a year for the household comsumption.

The data were collected on the same individuals in 1980, 1982 and 1984. It means that the comparison of the age groups inside the visit of 1980 for instance results in a cross-sectional analysis. On the contrary, a comparison of the measurements of the same individuals between 1980 and 1984 gives a longitudinal analysis.

Results

Stature: Table 1 shows from the cross-sectional data of 1980 a trend of decline from the sixth decade in males and females. The differences between the measurements of 1980 and 1984 are always negative, the decrease is however not significant. The rate of decrement in mean stature increases with increasing age in both sexes.

Table 1. **Changes of stature (quinquennial groups were defined in 1980) (in cm)**

		Males				*Females*	
Age group	N	transversal 1980	longitud. 1984–1980	Age group	N	transversal 1980	longitud. 1984–1980
35+	22	161.11	-0.04	35+	30	148.73	-0.04
40+	27	164.03	-0.05	40+	39	149.91	-0.12
45+	32	161.38	-0.28	45+	22	147.51	-0.14
50+	29	161.05	-0.13	50+	27	148.86	-0.20
55+	27	162.83	-0.24	55+	25	148.10	-0.24
60+	29	161.00	-0.48	60+	20	146.64	-0.46
65+	26	159.97	-0.49	65+	24	145.48	-0.33
70+	17	157.79	-0.40	70+	18	145.96	-0.40
75+	16	156.80	-0.51	75+	13	144.31	-0.49
80+	9	155.16	-0.66	80+	8	146.75	-0.37

The differences between 1984 and 1980 are not significant

Biacromial breadth: The cross-sectional comparison shows a decline from the 5th decade (Table 2). In longitudinal assessment (1980-1984), a decrease is observed from the 50s, in males an increase is however observed till the late 40s.

Weight: The longitudinal analysis (differences between 1980-84) shows a trend to decline in females (significant in the groups 65+ and 70+) and a trend of increase in males till the late 50s (significant at 40+) and a decrease afterwards (significant at 80+) (Table 3).

Nasal length: Table 4 shows from the results in 1980 the cross-sectional increase from the early 50s. In the longitudinal analysis (1980-84), on early increment is observed in both sexes: this rate is, however, higher in the older age groups in both sexes.

Nasal breadth: Table 5 illustrates more or less the same trend as for nasal length: a clear longitudinal increase, higher in the older age groups.

Table 2. **Changes of biacromial breadth (quinquennial groups were defined in 1980) (in cm)**

Age group	N	*Males* transversal 1980	longitud. 1984–1980	Age group	N	*Females* transversal 1980	longitud. 1984–1980
35+	22	37.96	+0.44	35+	30	33.19	-0.04
40+	27	37.94	+0.27	40+	39	33.68	-0.06
45+	32	38.18	-0.07	45+	22	33.11	-0.05
50+	29	37.40	-0.08	50+	27	33.00	-0.08
55+	27	37.11	-0.13	55+	25	32.69	-0.12
60+	29	36.78	-0.39	60+	20	32.51	-0.23
65+	26	36.65	-0.26	65+	24	32.19	-0.22
70+	17	35.92	-0.44	70+	18	31.26	-0.31
75+	16	35.07	-0.29	75+	13	30.98	-0.28
80+	9	34.19	-0.51	80+	8	31.49	-0.29

The differences between 1984 and 1980 are not significant

Table 3. **Changes of weight (quinquennial groups were defined in 1980) (in kg)**

Age group	N	*Males* transversal 1980	longitud. 1984–1980	Age group	N	*Females* transversal 1980	longitud. 1984–1980
35+	22	50.94	+2.31	35+	30	34.62	-0.48
40+	27	50.00	+3.00*	40+	39	39.72	-1.60
45+	32	48.00	+0.30	45+	22	37.96	-0.27
50+	29	48.38	+0.62	50+	27	38.30	-0.85
55+	27	50.28	+3.96	55+	25	36.57	-0.87
60+	29	46.20	-3.27	60+	20	36.55	-1.55
65+	26	47.66	-1.60	65+	24	35.63	-2.13*
70+	17	43.53	-0.87	70+	18	40.50	-1.74*
75+	16	45.00	-1.73	75+	13	32.93	-2.93
80+	9	45.00	-2.50*	80+	8	30.87	-1.00

*Significant at the level of < 0.5

Table 4. **Changes of nasal length (qulinquennial groups were defined in 1980) (in cm)**

Age group	N	*Males* transversal 1980	longitud. 1984–1980	Age group	N	*Females* transversal 1980	longitud. 1984–1980
35+	22	4.84	+0.02	35+	30	4.40	+0.03
40+	27	4.73	+0.03	40+	39	4.70	+0.03
45+	32	4.84	+0.04	45+	22	4.62	+0.03
50+	29	4.81	+0.03	50+	27	4.76	+0.04
55+	27	4.96	+0.05	55+	25	5.00	+0.10
60+	29	4.96	+0.11	60+	20	5.09	+0.06
65+	26	4.96	+0.14*	65+	24	5.18	+0.13*
70+	17	5.09	+0.13	70+	18	5.21	+0.13
75+	16	5.20	+0.14	75+	13	5.24	+0.17
80+	9	5.22	+0.18	80+	8	5.21	+0.19

*Significant at the level of < 0.5

Table 5. **Changes of nasal breadth (quinquennial groups were defined in 1980) (in cm)**

Age group	N	*Males* transversal 1980	longitud. 1984–1980	Age group	N	*Females* transversal 1980	longitud. 1984–1980
35+	22	3.78	+0.02	35+	30	3.40	+0.04
40+	27	3.79	+0.02	40+	39	3.45	+0.03
45+	32	3.73	+0.04	45+	22	3.50	+0.03
50+	29	3.90	+0.06	50+	27	3.51	+0.06
55+	27	3.93	+0.07	55+	25	3.84	+0.09
60+	29	3.70	+0.07	60+	20	3.83	+0.10*
65+	26	3.75	+0.14	65+	24	3.58	+0.11*
70+	17	3.92	+0.14*	70+	18	3.65	+0.13*
75+	16	4.00	+0.14	75+	13	3.82	+0.15*
80+	9	3.97	+0.15	80+	8	3.74	+0.24*

*Significant at the level of < 0.5

Discussion

With this longitudinal analysis, we expected to avoid the usual error in the interpretation of cross-sectional data, namely the interaction with secular changes and with selective death.

We expected also that in the genetically homogeneous group we considered here, the rate of change with age would be a function of environmental factors, and that ageing in this marine fisherfolk of Bengal would show sometimes similarity with the general trend observed in other populations and other times variations related to the specific environment of this population.

We could predict that nasal length and breadth would not be affected by this specific ecological background. Indeed our results are similar, in cross-sectional and longitudinal evolution, with data already published (Susanne 1974, 1977). These ageing modifications could be due to the growth of the nasal cartilage and to fat deposits, too. Macho (1986) showed also a continuous increase with age of the thickness of the soft tissues along the face.

A decrease of stature is observed: this confirms results observed in other longitudinal studies (Susanne 1980). But the decrease is continuously observed from 35 years of age, in other populations the decrease is sometimes observed later on. Ecological factors may be implicated. Borkan et al. (1980) showed also that men considered as active following physical activity variables were biologically younger than inactive men.

Weight and biacromial diameter show an influence of the local environmental factors at the level of a sexual difference in ageing rate and at the level of an acceleration in the rate of decline from about 50 years of age in the male groups. During long term deep sea fishing, the males consume very high amount of sea fish (3.6 kg/day) rich in protein for instance. A slower rate of decline is observed during this period in males than in females. The change in life-style after retirement accelerates the ageing process. In females, the changes occur regularly from 35 years of age, their life-style is less dynamic, and does not change very much with age both behaviourally and nutritionally.

The increase in weight till the late 50s in man compared to the regular decrease in females may be also explained by the local ecological conditions. The male situation is similar to the results observed in populations with good nutritional conditions, there

where the female situation is similar to the evolution observed in populations with unsatisfactory conditions (Susanne 1974, 1980).

The trend of the changes of biacromial diameter is raqther similar to this of weight. The literature confirms that before 55 years of age changes are almost absent but that a decrease is systematically observed after that age (Susanne 1971, 1974, 1977).

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TEMPORARY VARIATION OF PHYSIOLOGICAL CHARACTERISTICS IN VENEZUELAN WOMEN. A COMPARISON WITH SPANISH POPULATION

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Abstract: *Sexual maturation of Venezuelan female has been investigated considering secular trend in the last five decades and the reproductive period. Sample was composed of 400 women from 16 to 60 years of age, living in Caracas and belonging mainly to a middle-low socio-economic status. The recalled age method has been used. Menarche ranges are between 8 and 17 years (x=13.14 ± 1.71). Data show a secular trend from 13.32 to 12.76 in the youngest group, corresponding with the highest welfare period in the country. In women over 45 years, 25%l have menopause due to operation. The average age of menopause is 50.8 ± 2.47 year. Comparing Spanish female population of same age, the last has late menarcheal age. Blood pressure values increased with age.*

Key words: *Menarche; Menopause; Secular trend; Blood pressure.*

Introduction

Menarche is an amply treated trait by physicial antropologists, because even if the onset age is genetically determined for each population, its variability depends on the dissimilar environmental conditions and it may reflect socio-economical conditions and quality of life which a determined human group is facing (Tanner 1962, Eiben 1970-71, Brief 1972, Prado 1982, Fundacredesa 1985).

Studies on the biological and social level of menopause and variability of blood pressure carried out at a population level in our country are scarce.

In Venezuela important changes have occured that place this country as a transitional one, between the underdeveloped and developed countries. Its population is characterized by a biological cross of races, product of migrations and social mobility, and it became an urban country at the expense of a continous diminishing of its rural population. The cross of races has been a continous process up to the present time. Therefore, it is necessary to make periodical studies in order to note the changes that these physiological traits have produced, and that reflect the situation of the country. The aim of this study is to analyze aspects of feminine sexual maturity and its variation in the last decades, and the results obtained are compared with the Spanish female population. This is a chapter of the later and more profound study, which will treat the characteristics and health aspects specifically feminine, and their possible relation to pathology of the gynecological system with emphasis in the cervix.

Material and Methods

Morphophysiological data have been gathered on 400 women, between the ages of 18 and 69 working at the TGextile Industry. They all live in Caracas, even though some are from other areas, rural as well as urban.

This study has been possible thanks to the cooperation of Enterprise "Confecciones Ararat, C. A." and the Clinic for Cancer Prevention of the Venezuelan Cancer Society.

Physiological variables measured in each woman and its abbreviations are: menarcheal age (MEN), systolic blood pressure (PRS), diastolic blood pressure (PRD). With these data the difference between systolic and diastolic pressure (DPR) has been calculated and the pressure index (ITE) and menarcheal age determined in a retrospective manner. Data have been gathered about menopause applying the method of the recalled age and the useful reproductive period has been calculated, in such women that have already gone through menopause.

Besides physiological data, socio-economical situation has been classified considering salary (daily income) and professional occupational level, establishing the following categories: First category: universitary professionals or higher level. Second category: technical personnel, including assistants to the presidency or management, computer operators and nurses on medium level. Third category: commerce personnel, which includes sales ladies and similar. Fourth category: textile operators, which include dressmakers, apprentices and finishers. Categories three and four correspond to the basic level.

Data has been collected during the first three months of 1988 according to the standards of IBP and processed using the statistic packages of BMDP.

Results

In Table 1 we present a summary of the *socio-economical characteristics* of the sample based upon two facts: occupation of these women within the Enterprise and daily income level (in Venezuelan bolívares). Based upon those results, we may imply that our sample is located in a low medium socio-economical level and a salary increase is evidenced according to the increase in the average age of women. Educational level reflects lack of professional universitary women (1.3%), being the maximum percentage among the workers without specialization with a basic education. We have inferred by the results obtained, that this sample is representative of the socio-economical characteristics of the workers of Venezuelan industries.

Table 1. **Socio-economical characteristics of the sample**

AGE		(Income bolivares daily) (%)					Groups of occupation (%)			
(year)	N	60–80	81–100	100–200	200–300	300–400	1	2	3	4
> –20	30	66.7	33.3	0.0	0.0	0.0	0.0	3.3	3.3	93.3
21 – 30	145	26.9	55.9	15.8	1.4	0.0	0.0	7.6	2.1	90.3
31 – 40	131	4.6	54.9	38.2	1.5	0.8	1.3	5.3	0.0	93.1
41 – 50	63	3.2	44.4	50.8	1.6	0.0	0.0	3.2	3.2	93.7
50 and over	28	0.0	35.7	60.7	3.6	0.0	0.0	0.0	0.0	100.0

In Table 2, we observe that the age at menarche of female included in the sample obeys to a variation each two decades. So, we find similar maturity ages among the age

groups from 41–50 and between the ages of 50 years and over. We find another similar maturity age in women between the ages of 21–40 and a more precocious age in women younger than 20 years. The variation range between the maximum and minimum values seem to shorten in younger women.

Table 2. **Menarcheal age in Venezuela (year)**

AGE (year)	N	x	SD	V_{max}	V_{min}
6> – 20	30	12.76	1.72	15	8
21 – 30	145	13.13	1.59	16	8
31 – 40	131	13.10	1.82	16	8
41 – 50	63	13.42	1.72	17	9
50 and over	28	13.32	1.82	16	8

It is observed that the secular trend is diminishing and its estimate is near the statistic significance (t=1.73) to a level of $\alpha = 0.1$. The lowering noticed in sexual maturity of our Venezuelan sample has been of 7.9 approximately, i.e. 8 months. There is also a variation in the maximum values of age while the minimum values seem to remain unchanged in the two decades studied, therefore, we think that the age of 8 years corresponds to the minimum age, non pathological of sexual maturity in women of our country.

We compared our results with those obtained by C. Prado (1982) in an urban sample of Madrid, which values are summarized in Table 3. Comparing both populations, an earlier menarche is observed in the Venezuelan sample which explains a greater precociousness of Venezuelan women. The secular trend recorded in these decades is lower than that observed in Spanish women, which has been of twelve (12) months in the latter (Fig. 1).

Table 3. **Menarcheal age in Spain (year)**

AGE (year)	N	x	DS
> – 20	97	13.02	1.17
21 – 30	13	13.11	0.73
31 – 40	523	13.54	0.96
41 – 50	249	13.90	1.19
50 and over	22	14.04	0.72

We studied the duration of the *feminine reproductive cycle* in which only women over 45 years of age were included. The average age of *menopause* is 50.8 ± 2.47 years. In this group, only those women are included, who have had a natural menopause. Those that evidenced menopause due to operation were excluded. However, we calculated within this age group a 25% percentage of menopause due to operation.

Once the measures of menarche and menopause were established it was calculated in each woman the useful reproductive period, with a result of a mean of 37.4 ± 2.9 years. Comparing this sample with that of Madrid, we observe similar results in the measure of menopause and that of the useful reproductive period. According to Pérez G. B. (1986), this feature seems to be less dependent of the environment that the age of the first menstruation.

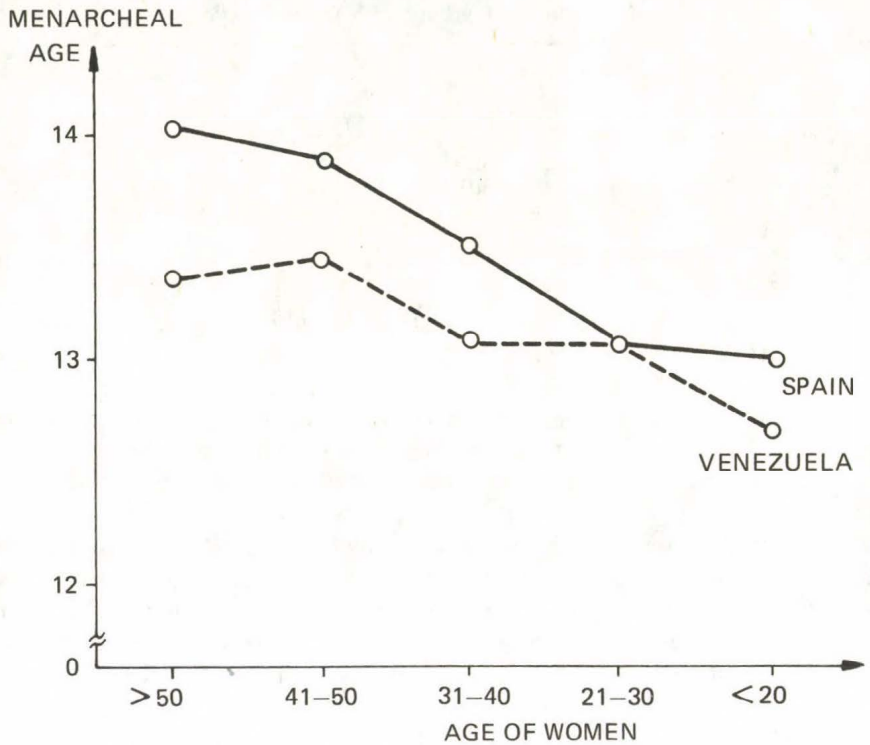

Fig. 1: Secular trend in age at menarche in Spainish and in Venezuelan women

According to the *blood pressure values*, it is important to know the normal variation of this feature in women, since it is a variable that falls into the viability of individuals and allows to detect pathological cases. Some studies have shown how blood pressure increases with age, thus it is interesting to note this feature in females from juvenile stages to the peri–menopausic cycles.

Table 4. **Values of blood presure by age in Venezuela (Hgmm)**

AGE (year)	N	$\bar{x}_{PRS}$	$\bar{x}_{PRD}$	DPR	ITE
> – 20	30	113.6 ± 1.13	64.3 ± 0.77	49.7 ± 1.06	77.98 ± 21.20
21 – 30	145	120.0 ± 0.93	67.0 ± 0.75	53.0 ± 0.79	80.56 ± 15.91
31 – 40	131	125.1 ± 0.89	72.3 ± 0.76	52.8 ± 0.76	74.52 ± 14.80
41 – 50	63	129.8 ± 0.99	76.6 ± 0.75	53.2 ± 0.84	70.23 ± 14.40
50 and over	28	132.1 ± 0.95	77.6 ± 0.68	54.5 ± 1.06	71.17 ± 6.70

Table 4 shows the values of systolic and diastolic blood pressure, the differences between maximum and minimum values and tension index of each one of the age groups studied. From it, it is evident to note a continous increase of the systolic values as well as of the diastolic ones with age; increasing from 113.6 to 132.1 Hgmm the systolic, while the diastolic fluctuates from 64.3 to 76.6 Hgmm. An increase is evident between values of maximum and minimum blood pressure, showig lower values with age. The difference found in blood pressures between younger and older women is highly significant ($t=6.85$ for $\alpha=0.001$) showing how the disappearance of menstruation may cause a risk factor in the increase of her blood pressure. Compared to the Spanish sample, similar results are obtained, passing from a systolic blood pressure of 115.9 ± 14.4 Hgmm among women of 40 to 44 to a systolic blood pressure of 145.8 ± 20.4 among women of 60–64 years. In relation to diastolic blood pressure values, they fluctuate between 77.6 ± 8.9 and 89.1 ± 9.5 Hgmm for the aforementioned groups (Marrodan and Cols 1982). An increase in the difference of blood pressure and a diminishing in the index of blood pressure with age was also evident.

Conclusions

The results obtained show a precociousness in regard to the onset of menarche in women of Caracas. Similar results are observed in the average age of menopause and that of the reproductive useful period between Venezuelan and Spanish women and similar values of blood pressure between both samples.

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GROWTH ANALYSIS OF MARGINAL CASES OF NORMAL VARIATION

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Abstract: *Individual growth curves of 81 boys and 78 girls from Prague, followed-up from birth to 20 years of age, were plotted by hand and using Preece-Baines Model I. Velocity curves were derived from distance curves for each child and 12 of their parameters were computed. From the total number of boys and girls three individuals were selected which represented tall, short, retarded and accelerated individuals of each sex.*

No chronic diseases were present in the investigated children. Common child- and respiratory diseases showed no relation either to tall or to short children and to early and late maturers. Occupation of the fathers had no distinct positive or negative impact on growth and maturation of the investigated children.

Positive impact of midparent height on tall and short stature was observed. Secondary sex characteristics and vital capacity correlated positively with early maturation. Tall and short stature could be predicted already at 4 years of age (H4 and V5). Late maturers often overtook early maturers in their final height. Body characteristics other than heights tend to shift in short as well as in tall boys and girls to normal values. At the age of 12 years, late maturing boys and girls were shorter and more slender than the early maturers.

Key words: *Prague Longitudinal Growth Study; Variation of growth; Tall and small people; Accelerated and delayed maturation.*

Introduction

Growth is regulated most probably by polygenic expression rather than by a single gene. A specific genetic losus for growth has not been found yet (Hill and Fiser 1977). Different growth patterns in children would most problably exist even under optimal living conditions of all members in a given humaen population. However, living conditions of children in normal human societies differ somewhat in each community, even in each family. Environmental conditions differ for each child even in the same family.

An attempt was made to elucidate the impact of genetic and environmental factors on the growth, using marginal cases of normal variation from the Prague Longitudinal Growth Study from birth to 20 years (81 boys and 78 girls). This paper is concerned with healthy boys and girls of extreme stature (tall and low) and with extreme early and late maturers of both sexes (Prokopec 1986).

Material and Method

The original sample of 300 children was selected at random from one Prague district (Žizkov) between 1956 and 1960. Children included in the study were followed-up from birth to the age of 20 years. The health history, social and family background were recorded and 15 measurements were made in each child 5 times in the first year and thereafter twice a year, adhering to the guidelines of the International Childrens' Centre in Paris (Falkner 1960).

Distance and velocity growth curves were drawn first by hand and than by a plotter using Preece-Baines Model I for each individual. Distance curves separately for all boys asnd all girls were drawn on one diagram (Figure 1). This gives a unique picture of the

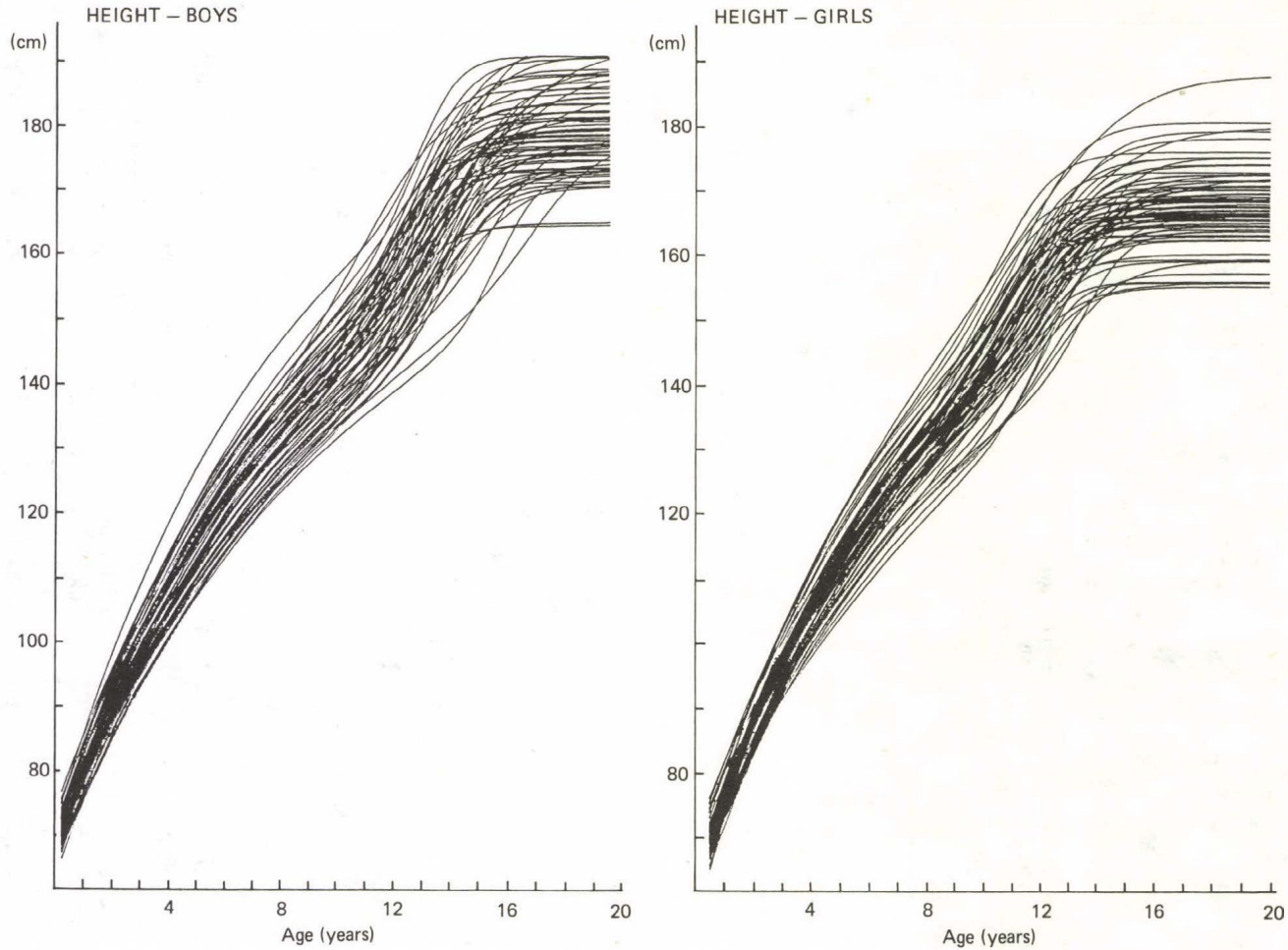

Figure 1: Growth curves after Preece–Baines Model I from birth to 20 years of 81 boys and 78 girls from the Prague Longitudinal Growth Study

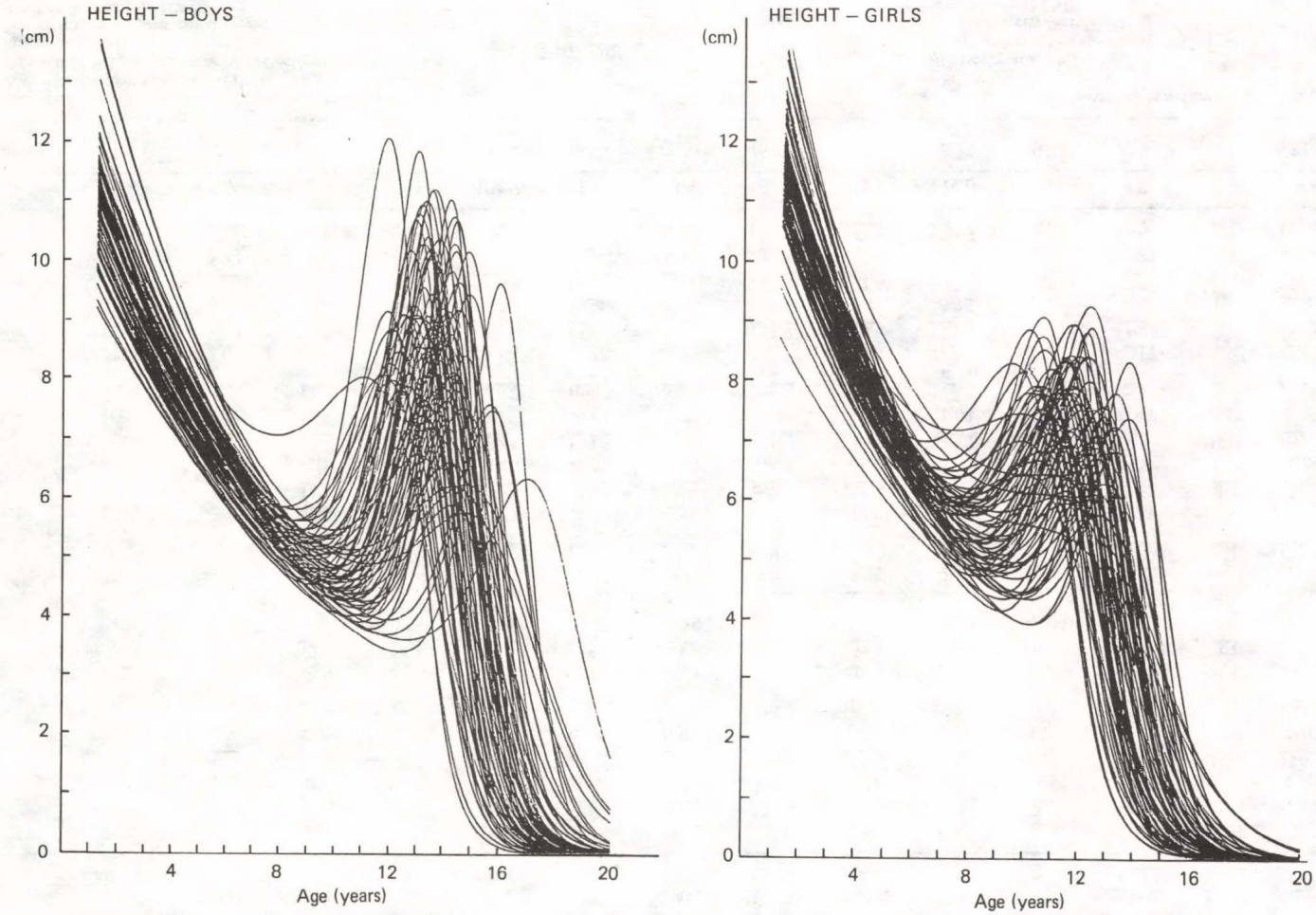

Figure 2: Velocity curves of 81 boys and 78 girls from the Prague Longitudinal Growth Study

Table 1. **Preece-Baines growth curves parameters in boys from the Prague Longitudinal Growth Study***

	No. of Children	AMHV y	APHV y	AMHVR y	H4 cm	HMHV cm	TAG y	HPHV cm/y	HMHVR cm/y	HA cm	V5 cm/y	MHV cm/y	PHV cm/y	MPH cm
Tall	2*4	0.33	-0.3	-0.55	2.97	2.48	-0.92	2.31	2.16	1.83	3.00	0.00	1.07	1.32
		10.2	13.2	14.5	115.7	156.5	30.5	176.4	187.1	190.5	8.3	4.7	10.4	175.0
	114	0.0	0.1	0.09	0.73	0.84	1.83	1.61	1.97	1.92	1.5	0.83	1.07	1.59
		9.9	13.6	15.2	107.4	145.5	40.4	172.1	185.9	191.1	7.7	5.2	10.4	176.5
	223	0.66	0.8	0.82	1.46	1.58	0.97	2.11	2.29	2.21	1.00	0.17	0.21	-0.02
		10.5	14.3	16.0	110.1	150.5	37.3	175.2	187.9	192.9	7.5	4.8	9.2	167.5
Small	272	-0.77	-0.9	-0.91	-1.35	-1.64	-0.81	-2.10	-2.24	-2.29	-1.25	-0.17	-0.57	-2.16
		9.2	12.6	14.1	99.7	128.9	30.9	149.5	159.8	164.6	6.6	4.6	8.1	155.5
	210	0.56	0.6	0.55	-1.08	-0.87	-0.39	-1.15	-1.16	-1.40	-2.00	-1.17	-0.07	0.25
		10.4	14.1	15.7	100.7	134.1	32.4	155.3	166.5	170.2	6.3	4.0	8.8	169.0
	79	-1.11	-1.2	-1.18	-1.22	-1.79	-0.47	-2.18	-2.21	-2.37	-1.75	-0.33	0.14	-2.16
		8.9	12.3	13.8	100.2	127.9	32.1	149.0	160.0	164.1	6.4	4.5	9.1	155.5
Early	122	-2.11	-1.9	-1.82	-0.62	-1.72	0.58	-1.54	-1.50	-0.94	0.00	1.83	-0.57	-2.07
		8.0	11.6	13.1	102.4	128.4	35.9	152.9	164.4	173.1	7.1	5.8	8.1	156.0
	215	-1.78	-1.8	-1.73	-0.49	-1.51	2.00	-0.97	-0.47	-0.60	-0.25	1.00	2.29	-1.09
		8.3	11.7	13.2	102.9	129.8	41.0	156.4	170.8	175.2	7.0	5.3	12.1	161.5
	100	-1.56	-1.8	-1.82	0.41	-0.84	-0.22	-0.97	-1.02	-1.03	0.00	0.83	0.21	-0.29
		8.5	11.7	13.1	106.2	134.3	33.0	156.4	167.4	172.5	7.1	5.2	9.2	166.0
Late	211	2.67	2.4	2.18	-1.68	-0.16	-0.72	-0.59	-0.60	-1.02	-2.00	-2.17	0.50	-2.61
		12.3	15.9	17.5	98.5	138.8	31.2	158.7	170.0	172.6	6.3	3.4	9.6	153.0
	92	2.11	2.1	2.00	-0.24	0.54	-1.03	0.16	-0.02	-0.25	-1.25	-1.67	-1.00	0.70
		11.8	15.6	17.3	103.8	143.5	30.1	163.3	173.6	177.4	6.6	3.7	7.5	171.5
	13	2.89	3.4	3.36	-1.38	0.27	-0.83	-0.02	-0.19	-0.30	-1.75	-1.83	-1.86	-0.64
		12.5	16.9	18.8	99.6	141.7	30.8	162.2	172.5	177.3	6.4	3.6	6.3	164.0
Total	M	9.9	13.5	15.1	104.7	139.9	33.8	162.3	173.7	179.0	7.1	4.7	8.9	167.6
Sample	(SD)	(0.9)	(1.0)	(1.1)	(3.7)	(6.7)	(3.6)	(6.1)	(6.2)	(6.3)	(0.4)	(0.6)	(1.4)	(5.6)

* Age at minimal prepubertal height velocity (AMHV)
Age at peak height velocity (APHV)
Age at minimal prepubertal height velocity retum (AMHVR)
Height at age 4 (H4)
Height at minimal prepubertal height velocity (HMHV)
Total adolescent gain (TAG)
Height at peak height velocity (HPHV)
Height at minimal prepubertal height velocity return (HMHVR)
Adult height (AH)
Height velocity at age 5 (V5)
Minimal prepubertal height velocity (MHV)
Peak height velocity (PHV)
Midparent height (MPH)

Table 2. **Preece-Baines growth curves parameters in girls from the Prague Longitudinal Growth Study**
(abbreviations idem as in Table 1)

	No. of Children	AMHV y	APHV y	AMHVR y	H4 cm	HMHV cm	TAG y	HPHV cm/y	HMHVR cm/y	HA cm	V5 cm/y	MHV cm/y	PHV cm/y	MPH cm
Tall	136	-0.33	0.1	0.18	1.64	0.97	1.73	2.04	2.32	2.25	1.0	0.86	1.75	1.02
		8.1	11.5	13.0	109.2	137.0	36.0	161.3	172.9	180.2	7.4	5.9	8.9	174.0
	66	0.55	0.9	1.00	1.91	1.69	0.51	2.20	2.17	2.03	0.75	-0.14	0.00	1.66
		8.9	12.3	13.7	110.1	141.5	30.5	162.2	172.0	178.5	7.3	5.2	7.5	177.0
	195	1.55	-0.7	-1.55	1.94	3.46	-4.4	1.51	0.32	3.47	3.25	1.57	1.38	2.94
		9.8	10.7	11.1	110.2	152.6	8.4	158.4	161.1	187.4	8.3	6.4	6.4	183.0
Small	141	-1.33	-1.6	-1.64	-1.73	-2.02	-1.16	-2.85	-3.00	-1.98	-1.25	0.86	1.38	-0.68
		7.2	9.8	11.8	98.1	118.5	23.0	134.4	141.5	155.2	6.5	5.9	6.4	166.0
	105	0.0	-0.1	-0.18	-1.24	-0.97	-1.20	-1.73	-1.93	-2.08	-1.50	-0.71	-0.75	-1.96
		8.4	11.3	12.6	99.7	125.0	22.8	140.6	147.8	154.6	6.4	4.8	6.1	160.0
	221	0.78	0.6	0.45	-1.45	-0.79	-0.47	-1.27	-1.20	-1.98	-1.75	-1.71	1.63	-2.06
		9.1	12.0	13.3	99.0	126.1	26.1	143.1	152.1	155.2	6.3	4.1	8.8	150.5
Early	26	-1.22	-1.7	-1.91	-0.88	-0.89	-0.73	-1.33	-1.47	0.69	1.75	2.57	-0.13	-0.15
		7.3	9.7	10.7	100.9	125.5	24.9	142.8	150.5	171.0	7.7	7.1	7.4	168.5
	36	-2.44	-2.1	-2.00	0.03	-1.74	1.11	-1.29	-0.28	-0.22	0.50	2.29	0.88	1.98
		6.2	9.3	10.6	103.9	120.2	33.2	143.0	153.4	165.6	7.2	6.9	8.2	178.5
	203	-1.33	-1.7	-1.82	-1.36	-1.53	-0.93	-2.18	-2.32	1.22	0.50	1.57	-0.75	-0.36
		7.2	9.7	10.8	99.3	121.5	24.0	138.1	145.5	159.7	7.2	6.4	6.9	167.5
Late	61	1.67	1.8	1.64	0.45	1.29	-0.42	1.20	1.02	0.58	0.00	-1.29	-0.88	0.38
		9.9	13.2	14.6	105.3	139.0	26.3	156.7	165.2	170.3	7.0	4.4	6.8	171.0
	154	1.44	1.7	1.64	-0.39	0.5	0.11	0.56	0.61	0.03	-1.00	-1.43	0.38	-1.96
		9.7	13.1	14.6	102.5	134.1	28.7	153.2	162.8	167.1	6.6	4.3	7.8	160.0
	205	1.56	1.7	1.64	0.18	1.05	-0.16	1.05	0.98	0.49	-0.25	-1.29	-0.38	0.38
		9.8	13.1	14.6	104.4	137.5	27.5	155.9	165.0	169.8	6.9	4.4	7.2	171.0
Total Sample	M (SD)	8.4 (0.9)	11.4 (1.0)	12.8 (1.1)	103.8 (3.3)	131.0 (6.2)	28.2 (4.5)	150.1 (5.5)	159.2 (5.9)	166.9 (5.9)	7.0 (0.4)	5.3 (0.7)	7.5 (0.8)	169.2 (4.7)

increasing variability in height from 1 year to 20 years of age. Some of the curves show clearly that children who were taller than others during puberty do not necessarily retain their position at adult age and that, on the other hand, some extremely short children at the age when most of the children pass their puberty period may reach medium stature at the age of 20.

Similarly the great interindividual variability of peak height velocity and the age at peak height velocity in both sexes are shown in Figure 2.

Three of the tallest and three of the shortest boys and girls at the age of 18 years were selected for the detailed study.

Similarly, three boys and three girls with an early onset of peak height velocity and three boys and three girls with delayed peak height velocity were selected for detailed analysis. Parameters of velocity curves of these 24 children were tabulated and analyzed using z-scores. These were computed as deviations from the means of the total groups (81 boys and 78 girls), (Table 1 and 2). Customary abbreviations of individual characteristics of velocity curves used in the text and tables are explained in the text to Table 1.

Results

Tall and small boys: Tall boys show positive deviation and small boys a negative deviation in AMHV from the mean (except in boy number 210). Already at the age of 4 years the tall boys differ distinctly in height and at the age of 5 years in height velocity (V5) from the small boys (H4, HMHV). HPHV and also TAG (except in boy 254) are greater in the tall boys than in the short ones. The HMHVR, HA and V5 (and to a slightly lesser extent the PHV and MHV) display distinct differences between the two groups in favour of the tall boys.

Tall and small girls: Similar results are found in girls. Differences in MHV between short and tall girls are greater and in PHV smaller than between short and tall boys.

Early and late maturing boys: Early maturing boys reach MHV at an earlier age than late maturing ones and APHV, AMHVR, HMHV, HPHV, HMHVR and HA are in them smaller. On the other hand, the V5, MHV, TAG, and even PHV are on the whole greater in early maturing boys.

Early and late maturing girls: The position in girls is essentially similar to that in boys. As in boys, early maturing girls can be differentiated from late maturing ones already at the age of 4 (H4, MHV) resp. 5 years (V5). Late maturing individuals of both sexes deviate distinctly in their growth characteristics from general mean values.

Growth curves of boys and girls with tall and short stature at 18 years (Figure 3) show a variability in growth patterns. The greatest differences are found during puberty (between 11 and 14 in boys and 9 and 12 in girls). In tall individuals distinct differences from the mean may be present already at the age of 2 years or even before.

Common feature of early maturers, boys as well as girls (Figure 4) is an early start of the growth spurt, and of the late maturers a late start of pubertal growth acceleration. The growth pattern beyond the puberty period and the final height are unpredictable in early as well as in late maturers.

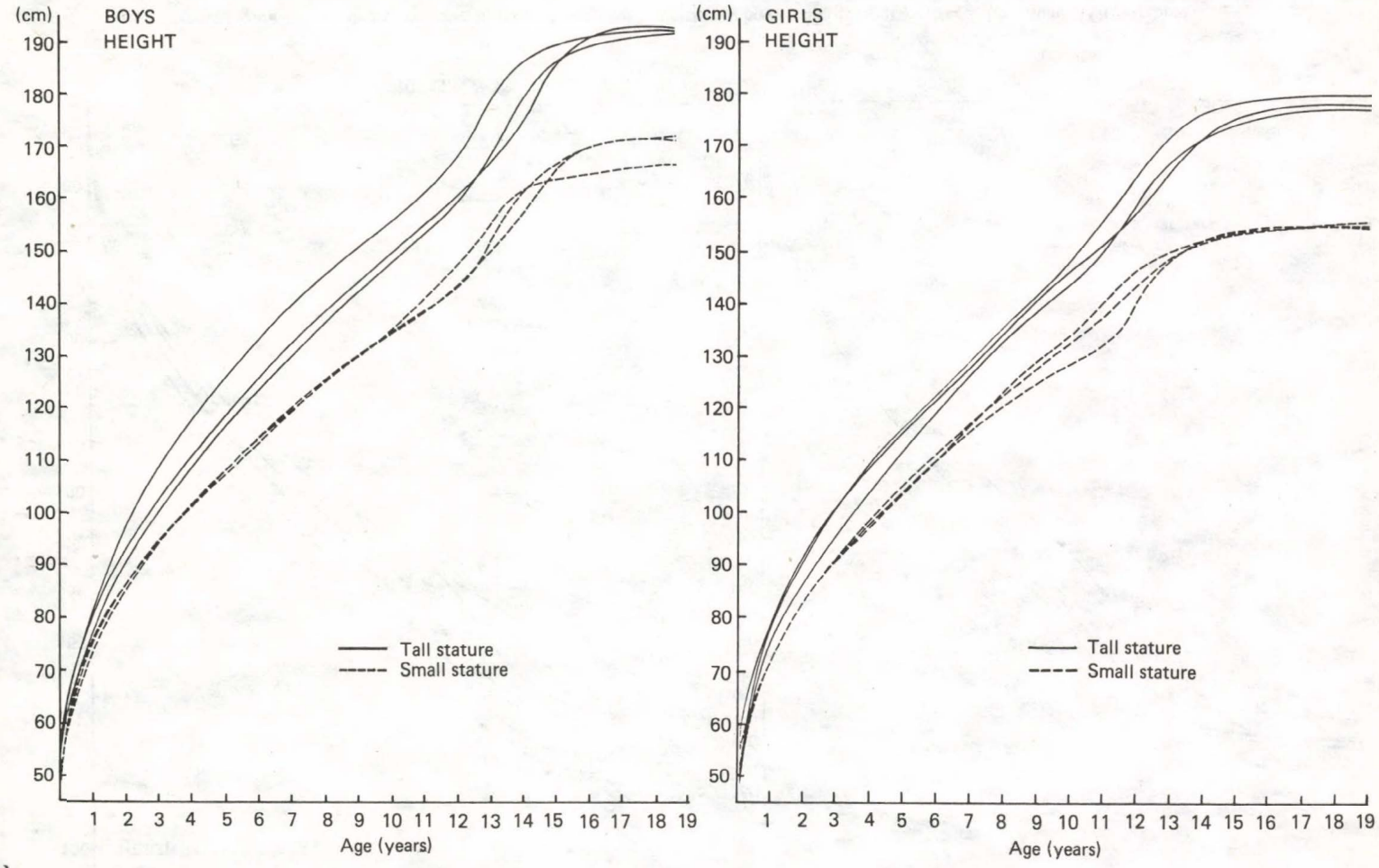

Figure 3: Growth curves drawn by hand of boys and girls of short and tall stature

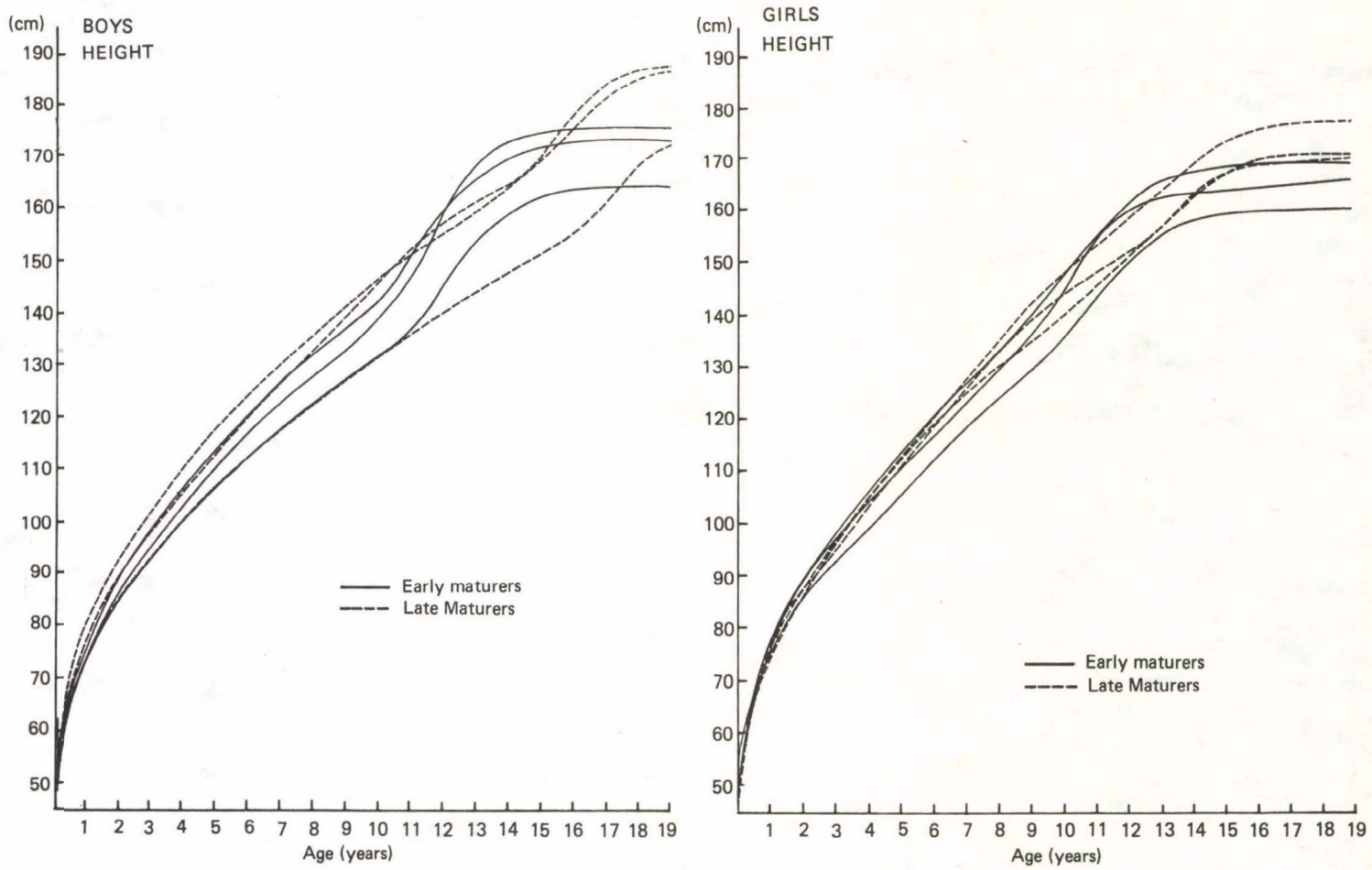

Figure 4: Growth curves drawn by hand of early and late maturing boys and girls from the Prague Longitudinal Growth Study

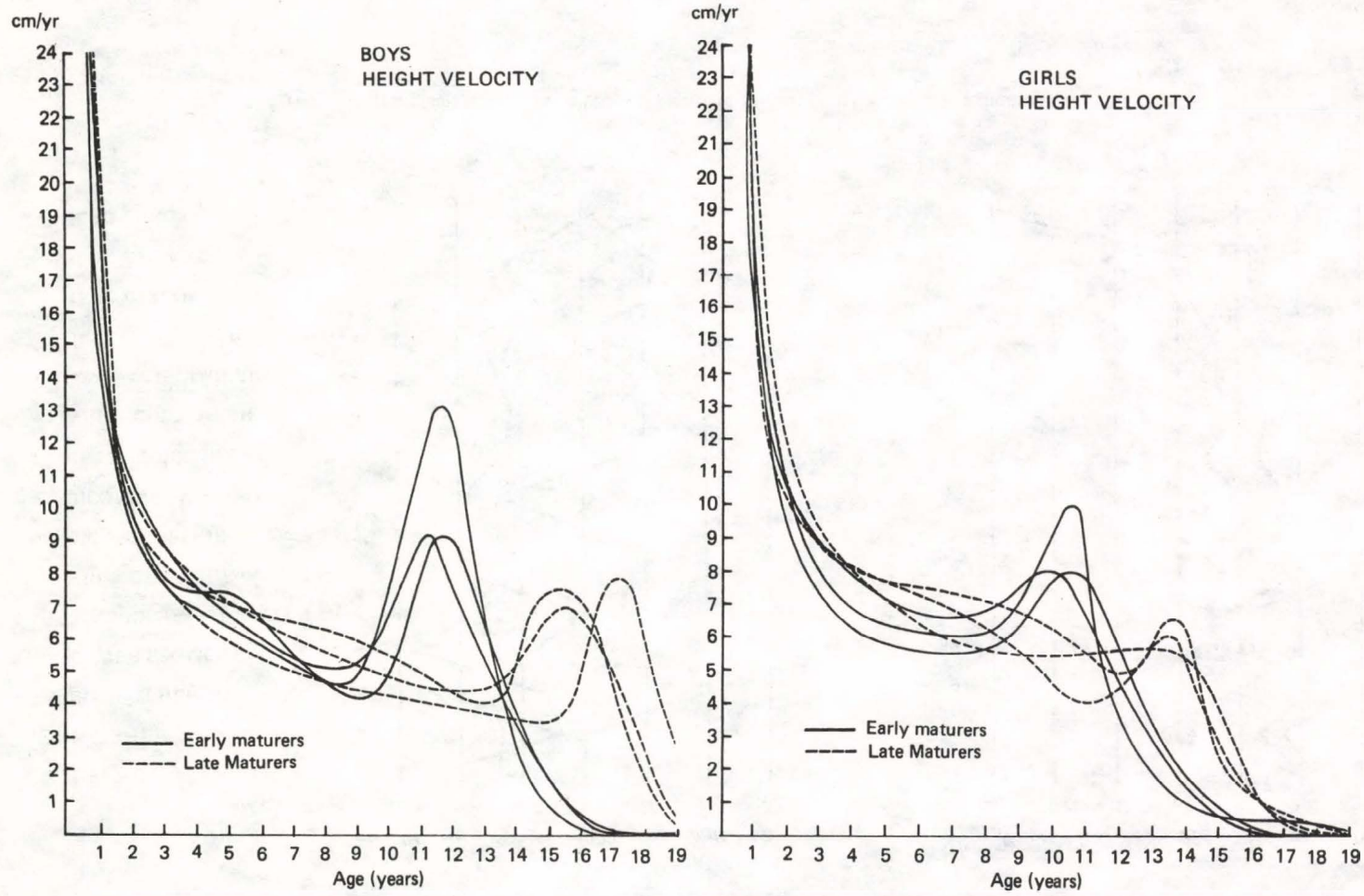

Figure 5: Height velocity curves drawn by hand in early and late maturing boys and girls from the Prague Longitudinal Growth Study

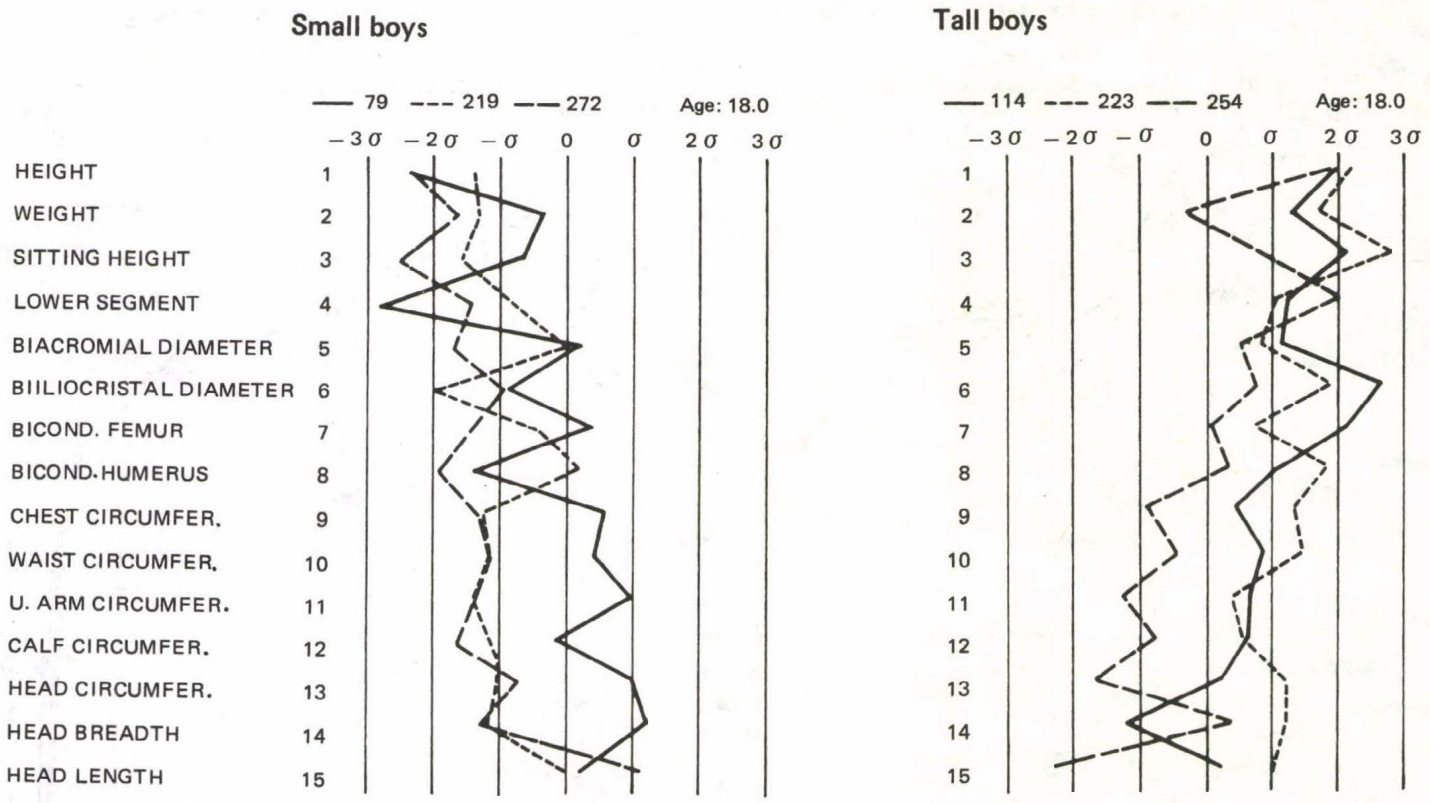

Figure 6: Morphograms of short and tall boys at the age of 18 years from the Prague Longitudinal Growsth Study

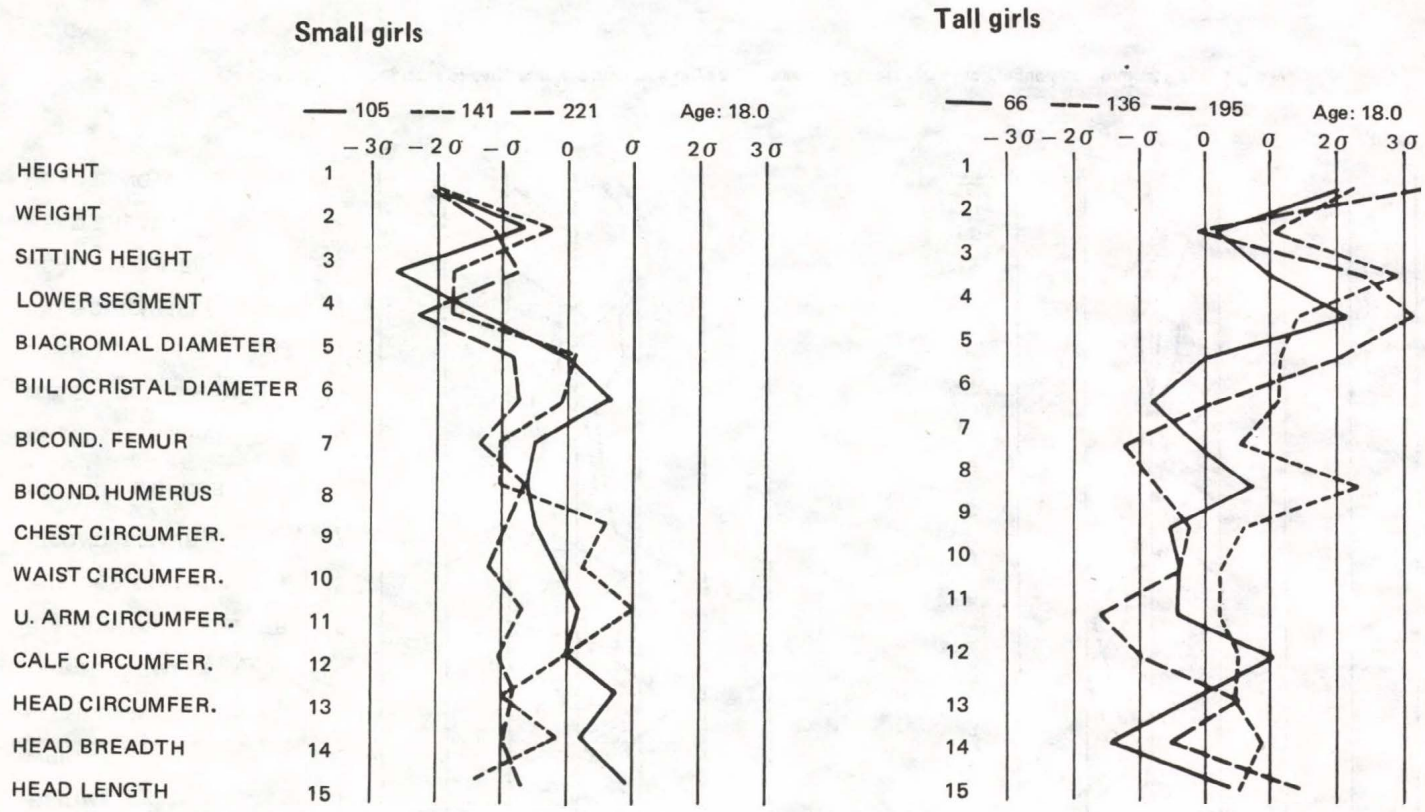

Figure 7: Morphograms of short and tall girls at the age of 18 years from the Prague Longitudinal Growth Study

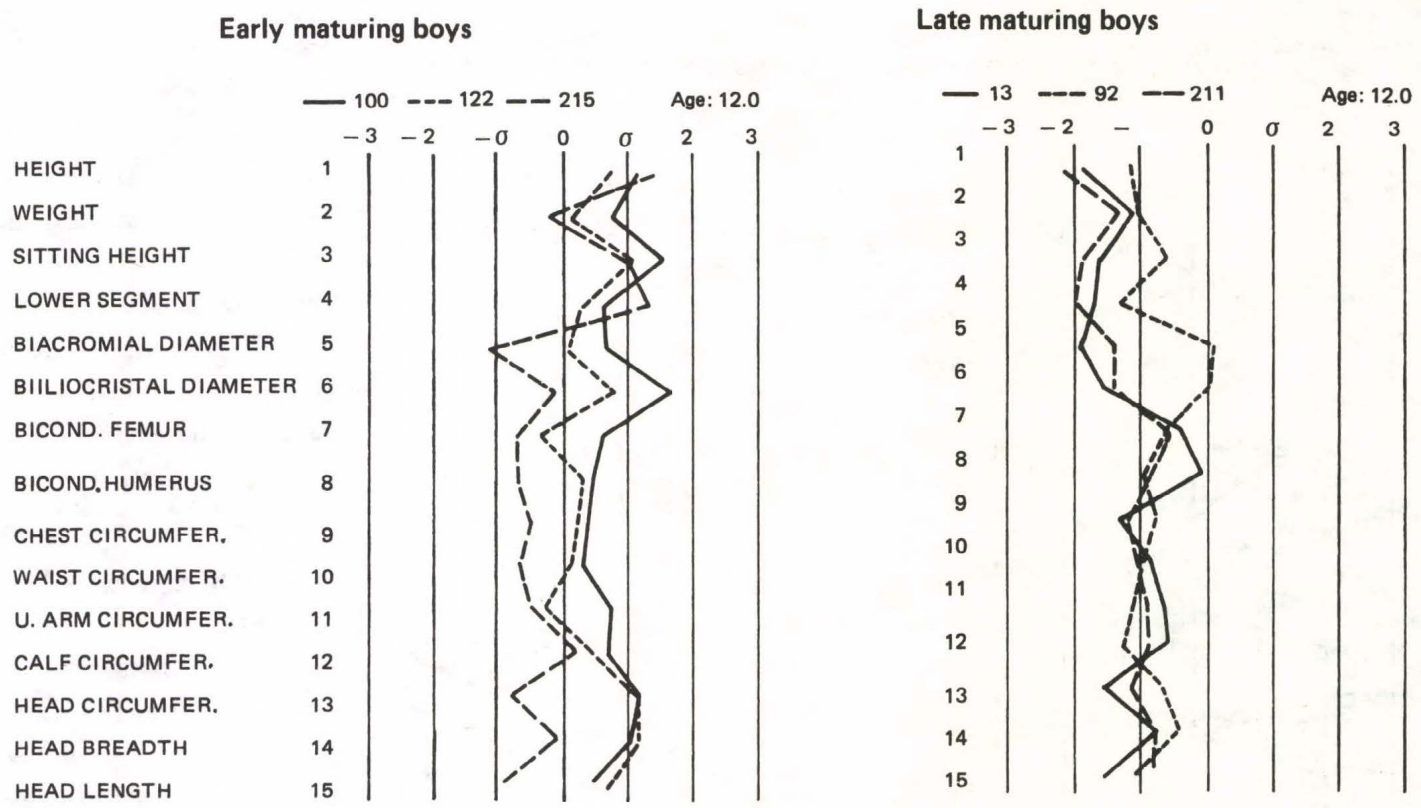

Figure 8: Morphograms of early and late maturing boys at the age of 12 years from the Prague Longitudinal Growth Study

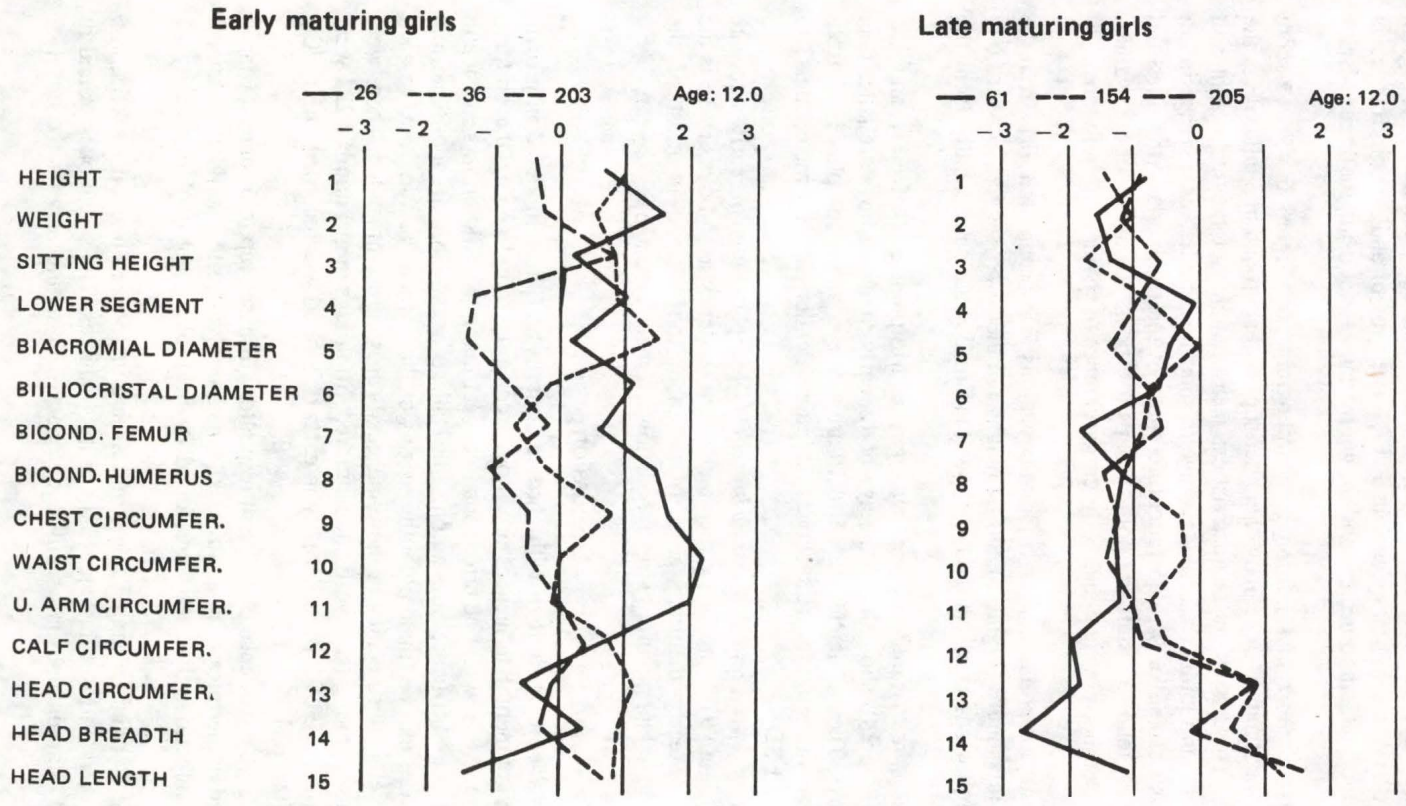

Figure 9: Morphograms of early and late maturing girls at the age of 12 years from the Prague Longitudinal Growth Study

Figure 5 shows typical velocity curves of early and late maturers with great differences in APHV and in some cases in PHV. (The growth and velocity curves in Figure 3, 4, 5 have been smoothed out and drawn by hand – not using the Preece-Bains Model I).

Morphograms of short and tall boys: Morphograms on Figure 6 show z-score deviations from the standard in 15 body characteristics in 3 short and in 3 tall boys at the age of 18 years. The first eight characteristics: measurements of height, weight and widths of the trunk and joints are below average in short boys and above average in tall boys. Characteristics number 9 to 15 (circumferences of the trunk and extremities and hand dimensions) tend to shift in both groups of boys towards normal values. Correlation between body weight and body circumferences is evident in individuals 79 and 254.

Morphograms of short and tall girls: Great deviations in short and tall girls from the mean concern only stature (Figure 7), sitting height and the lower segment. Other body characteristics followed-up in the study do not tend to deviate substentially from the average.

Morphograms of early and late maturing boys: Morphograms of early and late maturing boys (Figure 8) show that at the age of 12, early maturing boys are taller than late maturing boys. Their characteristics 5 to 15 are between minus and plus 1 SD from the mean. The late maturing boys are shorter and more slender, with characteristics 7 to 15 close to minus 1 SD.

Morphogram of early and late maturing girls: Morphograms of early and late maturing girls (Figure 9) do not show such a clear cut tendency as in boys. There is the same tendency in early maturing girls to overshoot the average in most of the measurements and in late maturing girls to be below average at the age of 12 years.

Discussion

It may be assumed that children with chronic diseases and those hindered in growth by negative environmental influences are more frequently found among the children with short stature, but it would be erroneous to expect that only children in good health and those living in affluence are among the tallest ones. Normal and abnormal (pathological) cases can be found on both margins of the normal variation next to each other. Therefore clinical screening of these marginal cases is recommended. There were no chronic diseases among the investigated children. Short legs in girl number 221 were noted already at the age of 5 years. Obesity in early childhood was recorded in girl 205, later in life in girls 26, 105 and 141.

Health records give evidence of frequent respiratory diseases (up to 5 times a year in one case) treated sometimes with antibiotics, sometimes with sulfonamides or aspirin only. Common infectious diseases were found in the health records of practically all children.

Fathers of the 24 children from Table 1 and 2 were in 15 cases manual workers, in 5 white collar workers and in 5 instances university graduates. The social background in these individual children does not seem to correlate with stature or with the onset of

puberty, although social status of the family always correlated closely with child growth in cross-sectional studies (Prokopec & Dutková 1985).

Midparent height proved to be highly predictive; this applied in tall boys (average midparent height 173 cm) and girls (173.5 cm), whereas midparent heights of short boys was 160.0 cm and of short girls 161.3 cm. Midparent heights of the early and late maturers showed no clear cut correlation with either early or late onset of puberty of the children.

In all early maturing boys and girls, secondary sex characteristics developed two or more years earlier than in the late maturers. Accelerated morphological development in the early maturers was followed by earlier physiological maturation in comparison with late maturers, as was shown by the values of vital capacity.

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A NEW METHOD FOR EVALUATING CHILD'S GROWTH

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Abstract: *Growth-standards are based on the pinciple that the growth of a child may be considered as "healthy" if the child fully realizes his genetically determined potential of growth. A child's height is therefore evaluated against the height expected for his sex, age, parent's height, and his developmental advancement. Standards for body height are constructed as* $(M \pm 1.65\ S_e)$, *where M means the respective group-mean, and* S_e *is the genetical variance, estimated by the Twin Method. Body weight is evaluated on the basis of a physical fitness criterion. Standards of weight, for a given height and body build, are the same form except that M then means optimal weight, i.e. weight associated with greatest physical fitness. Growth standards of this sort should be constructed on the basis of anthropological parameters of children growing in favorable living conditions.*

Key words: *Growth standards; Method; Body build.*

Introduction

Physical development of an individual is a process throughout which one's genetic potential fulfills and undergoes modification in a particular environment. Growth-standards are based on the principle that growth of the child may be considered as "healthy" if the child fully realizes his genetically determined potential for growth. Conditioned standards which describe physical development of children according to their predispositions, can be estabilished in various ways: (1) for all the children in the country, (2) for the children reared up in the optimum conditions, (3) for the children originating from a given region or a social group. Unfortunately, each of those attitudes is lame and inconsistent. Let us apply a two-step evaluation in which a growth-standard, i.e. with a hypothetic phenotype of a child brought up in the optimum conditions and sharing the same genetic developmental pattern with the examined subject. This evaluation is crucial, because it reveals deficient living conditions of the subject and shows a correct and desired development pattern of the child. Next, the child's development should be evaluated by a subpattern, i.e. a pattern with somewhat reduced parameters, that is such ones which are accesible for a given child in a particular environment. Genetic load of body size in a child is predictable from his parent's height. Since children of the same couple are not genetically alike, variability of children's body height can be evaluated from genetic variance, calculated from body height differences in twin pairs. Because reconstruction of growth-standards for all the individuals within the population is impossible, therefore for the sake of convenience, common standards are required for groups of individuals sharing similar genetic potentias, regarding, for instance a particular trait like tempo of growth or body size.

The aim of this paper is to propose a new method for constructing growth-standards and a two-step system of evaluating child's growth.

Growth-standards – A method

Physical development of the child is judged by his actual body height and weight. Body height of the examined subject is evaluated in comparison with the conditioned parent-allowed-for standards. Generally those standards are based on regression equations with the values of mid-parent-child correlations coefficients which are assumed as r=0.5. Because the process of development is usually stimulatled by two groups of genes (Tanner 1962), one responsible for body size and the other for the tempo of growth, therefore, body height of the examined individual should be compared to tempo-conditioned standards. Those standards are constructed from the child's position in puberty standards or from skeletal age standards. Growth-standards considering main genetic aspects of maturation can be evaluated from the multitrait equation.

$$H_{exp} = a_1 \cdot X_1 + a_2 \cdot X_2 + a_3$$

where X_1 is the average height of the child's parents and X_2 is the child's maturity level. The range of normal development of the child is evaluated from genetic variance, obtained in twin studies:

$$V_g = V_{DZ} - V_{MZ}$$

The development of the child is considered normal if the value of his height for age falls within the bracket of 90 per cent of genetic variability of his actual body height.

$$(H_{exp} \pm 1.65 \cdot S_g), \text{ where } S_g = \sqrt{V_g}$$

Example: A boy, aged 14 years, is 140 cm tall, his mid-parent stature being 160 cm. He is delayed in maturation, and his score on the scale of sexual maturation is only 4 points (the scale used was based on the sum of scores describing development of pubic hair (1–5 pts), arm-pits (1–5 pts), and penis (1–5 pts). Expected body height is thus 144 cm. Because the assumed genetic variance is 11.5 cm (Wrocław Longitudinal Twin Study; Bergman 1987), the 5–95 centile range of the expected values for this boy equals 138.4–149.6 cm. This example shows that the boy, albeit fairly short among his peers in the population, grows correctly in respect to his predispositions. To a final evaluation of his body height we need a standard based on the data on children brought up in the optimum conditions.

Body weight of the individual is mostly related to body height and body build, thus the expected body weight must be determined by the combination of those two factors. The impact of body height may be replaced, if necessary, by the relative body weight index which is weakly correlated with body height (Billewicz 1962), and facilitates determination of body mass for subjects of various body build. Somatotype method, conveyed by Parnell's analysis, can be applied to the evaluation of development of children with different body build (Welon 1984), but this method is rather complicated. Instead, we may employ a single index based on a few simple measurements and in this way describe massiveness of body build. The proposed T index has the following advantages:

$$T = \frac{(t1-t1) \cdot (xi-ts) \cdot 10^2}{(B-v)^2}$$

(1) It changes slightly at school age, 7 to 18 years; (2) Body build type, determined by the T index is relatively constant in youth; (3) The index T is strongly correlated with relative body mass. All these statements had been evidenced by the longitudinal data (Welon 1990a). Due to its advantages, the index is convenient for the description of body build type. By the application of the index, we may compute the expected body mass value and determine the range of its variability, similarly as we have already calculated the range of the standards for body height. It must be noted that those walues refer only to children brought up in the optimum conditions, because exclusively in this instant body mass is correct. Since the data indispensible for the construction of optimum standards are unavailable, we may employ standards for suboptimum conditions in which the correct body mass of an individual is determined by a functional criterion, where the correct body weight is described as the range of relative body mass values of physically fit individuals.

An example of the evaluation of correct relative body mass in the 13-year-old girls, which belong to two different body types: T_1 – slim, and T_3 – strong, definied by the T index, is at fig. 1. Correct body weight was determined by physical fitness criterion, being the sum of cathegorized (1–3) values of 6 tests: shuttle run, 60 m dash, high jump, long jump, baseball throw andd 2 kg ball throw. Brackets of correct relative body mass, determined by usig the values of average fitness, are for the slim-build girls 165–192 and for strong-build girlsl 185–203 (Welon 1990b).

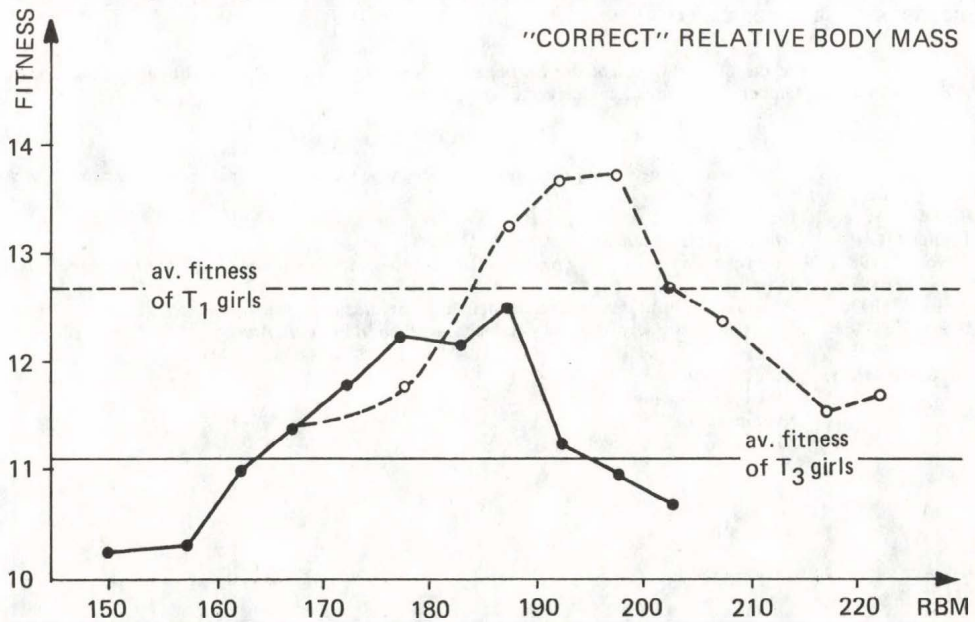

Fig. 1: "Correct" relative body mass, RBM, of 13-year-old girls of two body build types: T_1 – slim, and T_3 – strong, determined by physical fitness criterion, being the sum of 6 normelized tests. RBM = (weight) : (height)^2.

System of evaluation of child's physical development

The system of evaluation of physical development of a child is two-step: in reference to a correct growth-standard and in reference to a suboptimum growth standard in which actual living conditions of the family considered.

(1) If the child falls within the range of expected for height values along with its genetic variability, then he fulfills his growth potential and develops correctly. If the child, with a given body mass and height and body build type falls within the range of the values for the correct body mass, it is evident that the ratio of body mass and body height is proper, for physically fit individuals.

(2) The child may not fit in growth-standards because of poor health or impaired living conditions. If the child's body height and body mass falls within the range of appropriate suboptimum growth standard we may assume that in this environment the whole genetic potential is fullfilled to the maximum. The development of such a child may be then considered correct, in respect to his environment. Suboptimum growth standards may be constructed for main social groups significantly differing in children developmental level. Thus substandards for such groups should have adequately reduced parameters. For example, if village boys are on the average 4 cm lower then appropriate correct growth standard, then this difference marks the substandard diminished value for height.

Growth standards assessing "correctness" of physical development in children provide also the explanation why the given child has that particular body height or weight and not the other (tall or short parents, early or late maturation, slim or strong body build of the child). Besides these standards evaluate the child's body mass by means of a functional criterion.

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MODELS OF ONTOGENETIC DEVELOPMENT

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Abstract: *The article presents a new theoretical concept of phenotypic development of a population and an individual. It is pointed out that deviations and fluctuations which are normal phenomena in biological development take place in ontogeny. Determinants, models and evaluation of multi-level ontogenetic development are described.*

Key words: *Multi-level ontogenetic development; Ontogeny.*

Introduction

The main thesis of this work says that biological development in ontogeny takes place in a non-standard way. Therefore changes of developmental regularities. The thesis breaks decisively with the traditional description of the process of development.

The new theoretical concept on ontogenetic development presented in this article and called "multi-level ontogenetic development" provides more profound description of development regularities of both population and individual.

In this paper models of phenotypic and ontogenetic development are discussed and sets of theorems which describe them are formulated. They describe the theoretical structure of the concept of multi-level ontogenetic development of a population and an individual.

Determinants of the Phenotypic Development

Figure 1 presents a general outline of the interaction of genetic and environmental factors which form a system, within the adaptive norm for a given population, in which the phenotypic formation of morphological features of particular genotypes is determined genetically in a quantitative way, and its image is the result of "selection" by these genotypes at the appropriate level of value V within the range of reaction norm. Magnitude V is an adaptive value determined on a pair, or more numerous set, of features which were used in the evolution of the phenotypic formation of features in the development. Therefore, one could say that the genetically determined reaction norm is the range of phenotypic reactions of a definite genotype manifesting itself in the form of various phenotypes, taking place as a result of interaction of a genotype with environmental factors. Adaptive norm is a more or less constant complex of features which guarantee environmental adaptation and are evidence of the genetic changeability within the population.

Models of Ontogenetic Development

Model I. Stable development

This model characterizes the first kind of phenotypic formation of features in the development. According to this model the course of ontogenesis of a population is determined by the framework of the adaptive norm. Organisms which belong to such a population always realize phenotypically the definite developmental path. In this type of ontogenetic development the organism always form their phenotypes on the middle level of the genetically given range of the reaction norm. The developmental path so determined corresponds in each interval of time to the optimum level of development. Therefore, organisms and population do not possess any ability of transition into other developmental levels and it is both into the ultra-optimum and sub-optimum levels. Hence the population (and individuals) develop in a stable way. This phenomenon fully justifies the name of model I in which one can clearly see that the population develops according to the genetically given level of development (Figure 2).

Model II. Progressive development

This model presents a different, specific situation in the development, in which the population develops phenotypically along the lines of changing developmental levels. This process takes place as follows. The course of ontogenetic development is limited by an adaptive norm. The population (and organisms) realize phenotypically the developmental path which in the subsequent periods of ontogenesis is situated on increasingly higher developmental levels. Therefore, the phenotypic formation of features takes place in increasingly higher ranges of the reaction norm. In other words, this model illustrates the phenomena of "leaping" in the subsequent phases of development on to developmental levels higher than the previous ones. That is why the most essential feature of the discussed model is considered to be the progression of development in relation to the genetically given level of development (Figure 3).

Model III. Regressive development

This model presents an opposite situation to that described in model II. Within the adaptive norm the population (and individuals) form their developmental path selecting in the subsequent phases of ontogenesis increasingly lower developmental levels. The developmental specificity of model III is shown by its regressive character manifested by a decrease, through passage, into the lower developmental levels, in respect of the initial level of genetically determined, developmental possibilities (Figure 4).

Model IV. Multi-level development

Model IV precisely characterizes the actual process of the course of ontogenetic development. It permits the possibility of simultaneous occurrence of all the three situations, described in models I, II, and III in the process of phenotypic development of the population. This complex developmental situation may be characterized in the following way. Ontogenetic development of a population takes place within the adaptive norm. Organisms taking part in the complex process of development form their developmental paths in various phases of ontogenesis on various developmental levels. Thus the phenomena of simultaneous shift of individuals in the range of adaptive norm on various developmental levels takes place with the utilization various (often full)

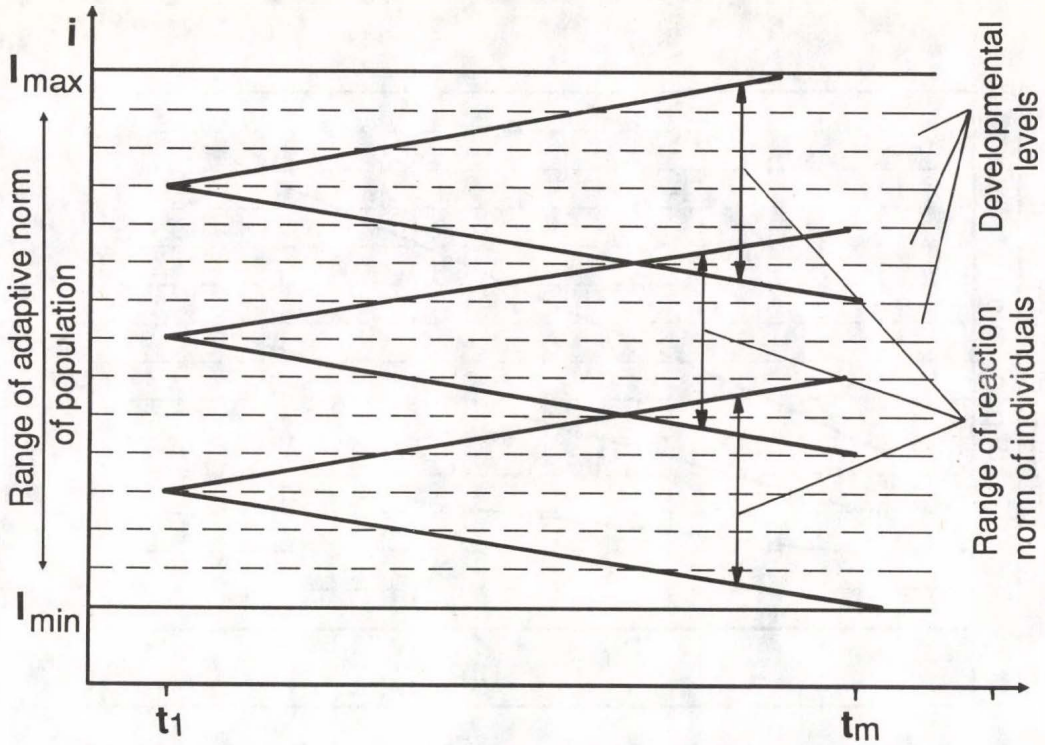

Fig. 1: A diagram of interaction of genetic and environmental factors

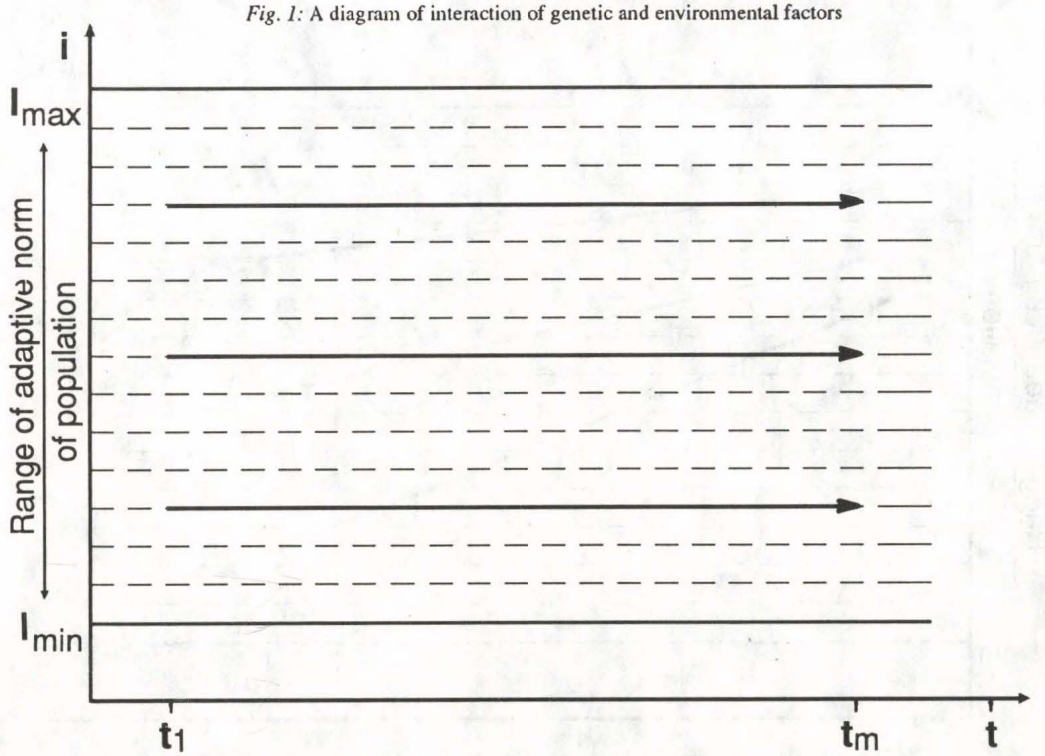

Fig. 2: Model I.

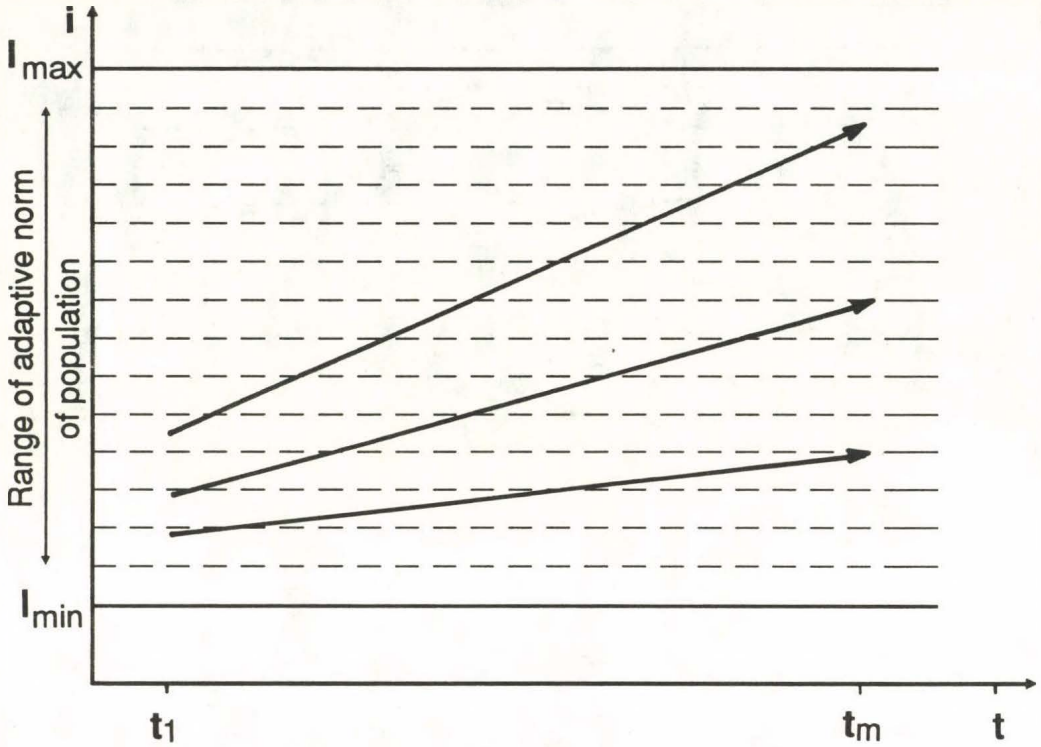

Fig. 3: Model II.

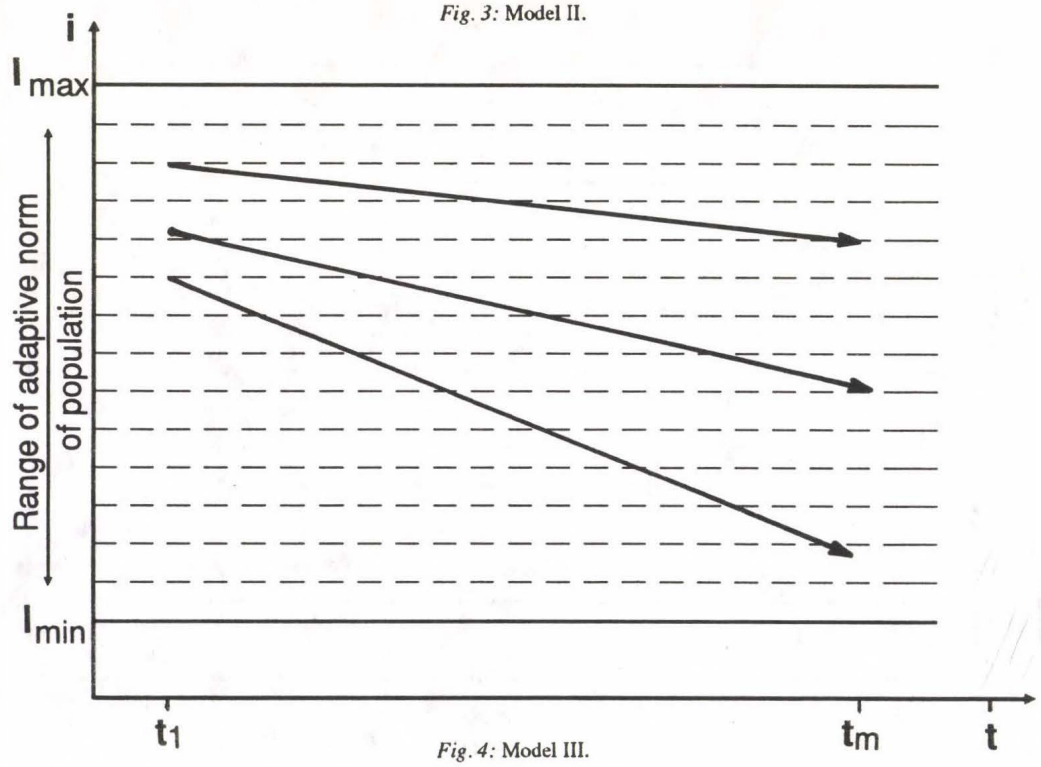

Fig. 4: Model III.

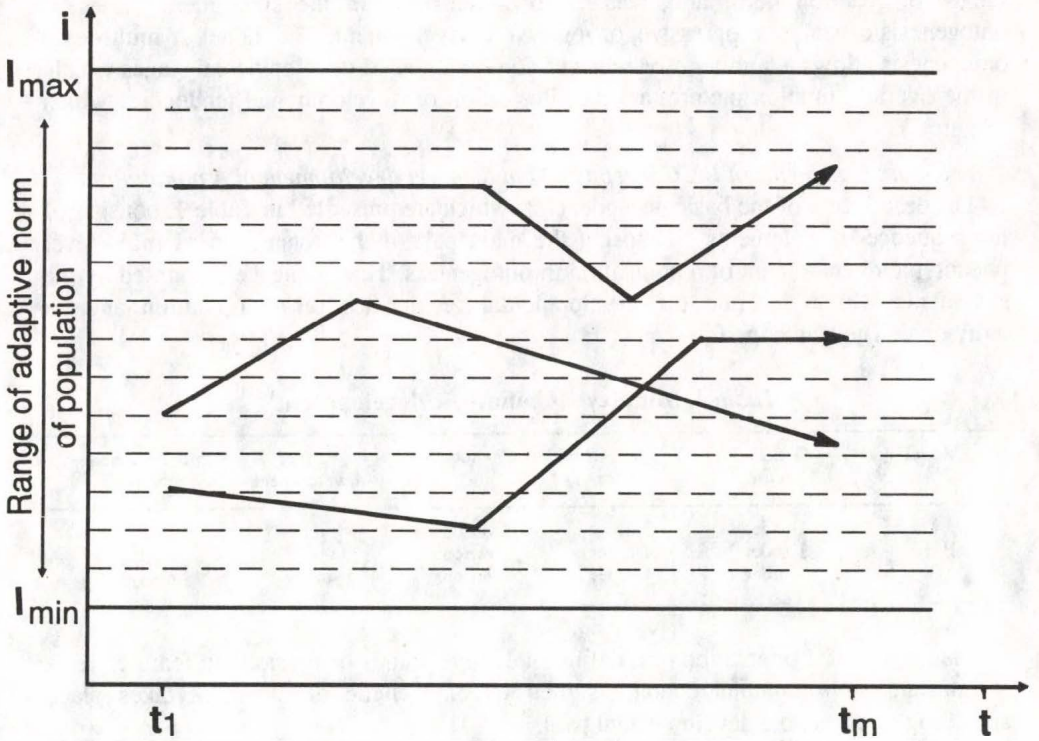

Fig. 5: Model IV.

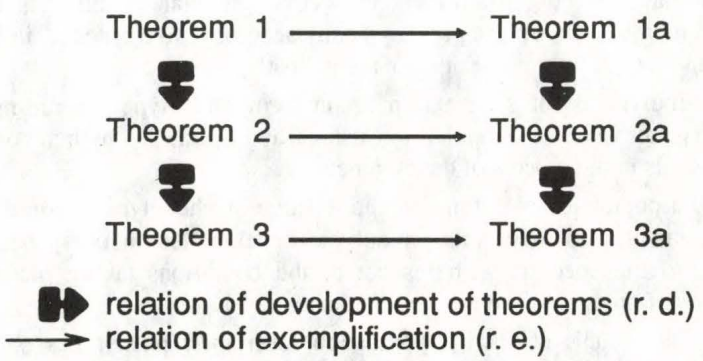

Fig. 6: Theorems

ranges of reaction norm and, what follows transition in the subsequent stages of ontogenesis of stable, progressive, or regressive development. The model of multi-level ontogenesis allows a number of variants of combinations of developmental stages which, in the overall complex picture, are the illustration of developmental tendencies which (Figure 5).

The main statements of the Conception of multi-level development of A population

The description of the basic dependencies, which are presented in Table 1. consists of the sequence of statements composing the main part of the conception of multi-level phenotypic development of a population in ontogenesis. This sequence is marked by the statements which describe the developmental regularities of a population and an individual. They state the following:

Table 1. **Multilevel phenotypic development**

Model	Genetic factor	Environmental factor	Phenotypes	Path of development	Number of phenotypic variants
I	1-order	2-order	various	one	one
II, III	1-order	1-order	various	one	many
IV	1-order	1-order	various	many	many

Theorem 1. If a population of a definite adaptive values of phenotypic features lives in constant environmental conditions then its ontogenetic development takes place according to one stable developmental path.

Theorem 1a. Individuals of this population form their phenotypes according to the developmental pattern of the population and their developmental paths are always located on the optimum of development.

Theorem 2. If a population with phenotypic features of definite adaptive value encounters advantageous, or disadvantageous environmental conditions, then its ontogenetic development takes place phenotypically according to a specific, in case (1): progressive, or in case (2): regressive developmental path.

Theorem 2a. Individuals of such a population form phenotypes according to the developmental pattern of a population using appropriately higher or lower developmental levels in the process of development.

Theorem 3. If a population of definite adaptive value of phenotypic features lives in changing environmental conditions its phenotypic development in ontogenesis takes place according to the specific, with respect to the conditions taking place in the subsequent phases of ontogenesis, developmental path.

Theorem 3a. Individuals of such a population form their phenotypes on various developmental levels depending on the type of environmental conditions taking place in the subsequent phases of ontogenesis (Fig. 6).

Conclusions

The conducted characterization of models of ontogenetic development, tabular arrangement of dependencies taking place within the suggested concept, and the fundamental theorems of this concept enable the following conclusion to be drawn:

1. The concept of multi-level phenotypic development of a population makes possible the execution of the phenotypic description of the development of a population closer to the actual course of ontogenesis; this means that the multi-level interpretation gives a non-homogeneous structure of population development, which is attended by the possibility of showing the contribution of individual development in the formation of the phenotypic picture of population development (model IV, theorems 3 and 3a).

2. It guarantees the description of the specific course of the development of population in ontogenesis (model I, II, III, theorems 1, 1a, 2, 2a).

3. Each of the models together with the corresponding set of theorems illustrates the regularity of ontogenetic development of a population and an individual, whereas the developmental deviations (e.g. the change of developmental level) is explained as a natural reaction of an individual to the influence of environmental conditions.

4. The concept of multi-level phenotypic development of a population makes possible the formulation of theorems which describe the fundamental regularities of ontogenetic development.

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DATA TO CRITICAL BODY MASS OF A FOETUS

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Abstract: *There is still no clear answer to the question whether and to what a degree acceleration of development concerns also the foetal life of man. Assuming hpothesis on diachronic enlargment of newborns' body mass, verification has been undertaken on two generations, born in 1960 and in 1970 in Poznan. Differences in body mass of investigated generations of newborns have been analysed from the point of view of three aspects: (1) as one group (for each sex)* $X_{1970} - X_{1960}$*; as three groups differentiated on the basis of gestational age (as born before, in, after term); (3) in subsequent weeks of gestational (chronological) age. Results of the work make it possible to formulate the hypothesis of critical body mass of a foetus limits the date of childbirth.*

Key words: *Critical body mass; Foetus.*

Introduction

The aim of the present work is to verify the hypothesis on increase of the body weight of the new-borns and an attempt at an answer to the question: whether and to what a degree acceleration of development concerns also the foetal life of man.

Material and Methods

The material for the present work is two generations of new-borns: all alive and able to live now-borns in the years 1960 and 1970 were submitted to retrospective analysis. This took place in the First Clinic of Gyneacology and Obstetrics, University Medical School in Poznan. Altogether there were collected data of 3620 new-borns born in the year 1960 and 4206 new-borns born in 1970. The collected material has two fundamental advantages: (1) it is highly representative as far as numbers are concerned, and (2) it is homogeneous with respect to birth-place of subjects as well as that of residence of their parents. It seems that both are indispensable conditions for reaching a goal of the present work.

The developmental status of the investigated generations of new-borns was evaluated on the basis of their gestational age and body weight. In order to capture trends in the biological development of new-borns both features were submitted to comparative analysis between the investigated generations. Gestational age of investigated new-borns was calculated in full weeks from the first day of the last menstruation period. Arithmetic means of gestational age of the investigated new-borns of both sexes are presented in Table 1. It appeared that the mean gestational age of newborns after ten years was lower and the difference for both sexes is statistically significant. In the course of analysis the investigated new-borns were grouped onto categories of gestational age commonly applied in obstetrics and paediatrics:

(1) ≤ 37 weeks – new-borns born before term (preterm babies),
(2) 38–42 weeks – new-borns born in term (term babies),
(3) 43 ≤ weeks – new-borns born after term (posterm babies).

Table 1. **Gestational age of all new-borns (weeks)**

Sex	1960		1970		α
	$\bar{x}$	s	$\bar{x}$	s	
Male	40.01	1.13	39.61	0.94	0.00
Female	40.05	1.08	39.61	0.95	0.00

The mean gestational age of new-borns born prematurely increased after ten years: the difference is very significant for male new-borns and significant on level $\alpha = 0.05$ for female new-borns. Meanwhile the mean gestational age of new-borns born in term and those born too late was significantly lowered (Table 2).

Table 2. **Arithmetic means of chronological age in classes of gestational age (weeks)**

Gestational age (week)	sex	1960		1970		α
		$\bar{x}$	s	$\bar{x}$	s	
≤ 37	male	35.53	1.67	35.98	1.41	0.00
	female	35.68	1.76	35.86	1.49	0.05
38 – 42	male	40.07	1.19	39.69	0.95	0.00
	female	40.12	1.17	39.69	0.94	0.00
43 ≤	male	43.16	0.52	43.00	0.00	0.05
	female	43.50	1.15	43.25	0.63	0.04

When analysing the body weight each of the investigated generations of new-borns were considered from the point of view of three aspectes:

(1) As one group – disregarding the time of birth (chronological age);

(2) As three groups differentiated on the basis of gestational age (three obstetrical categories of gestational age);

(3) The developmental status in the subsequent weeks of gestational age was also investigated.

Results

No significant differences were observed on the body weight between the generations of new-borns of both sexes as a whole (Table 3). A different picture was obtained when categories of gestational age of investigated new-borns were taken into consideration (Table 4). It appeared that body weight in new-borns of both sexes born prematurely has very significantly increased in the course of the analysed decade. During the same period of time the mean body weight of new-borns born in term did not undergo any change whereas the body weight of male new-borns born too late decreased, and that of female new-borns increased. Both the decrease and increase were very significant.

Table 3. **Body weight of all examined new-borns (g)**

Sex	1960		1970		α
	$\bar{x}$	s	$\bar{x}$	s	
Male	3533.1	536.1	3518.0	509.2	0.09
Female	3374.1	509.9	3369.6	487.2	0.14

Table 4. **Body weight of new-borns divided into classes of gestational age (g)**

Gestational age (week)	sex	1960		1970		α
		$\bar{x}$	s	$\bar{x}$	s	
≤ 37	male	2984.9	551.3	3329.4	569.4	0.00
	female	2779.3	531.8	3136.9	522.6	0.05
38 – 42	male	3580.8	496.5	3566.1	481.1	0.10
	female	3434.4	463.7	3426.9	463.4	0.16
43 ≤	male	3726.7	489.1	3631.0	473.6	0.00
	female	3546.6	482.3	3592.6	400.7	0.00

Similar results were obtained when the body weight of new-borns born from the first pregnancies of their mothers was investigated and that of new-borns born by mothers whose each pregnancy ended with the birth of an alive new-born.

From the biological point of view development is a function of time. That is why the investigated phenomenon may be evaluated in the fullest possible way when we analyse body weight in groups of chronological age (in case of investigated new-borns: weeks of gastational age). A comparative specification of arithmetic means of body weight in new-borns born in the subsequent weeks of life for both generations were presented graphically in Fig. 1. The differences in body weight between both generations of new-borns until the 39th week of life are very distinct; in the later weeks this divergence practically disappears. It seems that there may be only one interpretation of this last analysis: body weight is submitted to the process of acceleration, but to a certain moment. It points to the existence of a threshold in the increase of body weight of a new-born. Such a limitation may be various features of mother's organism in whose uterus the foetus develops.

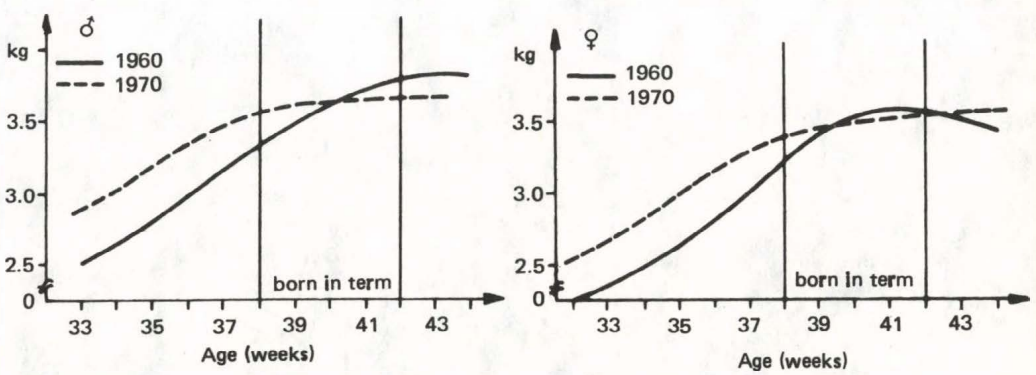

Fig. 1: Birth weight (means) of male and female new-borns in function of their gestational age

Conclusions

The here presented results make it possible to formulate the following *conclusions:* In the ten-year period the length of time of the pregnancies ended before term prolonged a little bit and the newborns were born with a heavier body weight. Length of time of the pregnancies ended in term became shorter but body mass of the new-borns did not change. Body mass of the foetus is submitted to the process of acceleration only to a limited period of gestation age (here until the 39th week).

Based on the above-mentioned conclusions, it seems to exist a critical body mass of the foetus which limits the term of birth, apart from all other factors hitherto known.

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MATERNAL WEIGHT GAIN DURING PREGNANCY IN CONNECTION WITH SOME DEMOGRAPHIC AND ANTHROPOLOGIC VARIABLES

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Abstract: *Data come from the "Health and demographic survey of pregnant women and live-born children" carried out on a national representative sample. On the basis of pregnant women's data the following has been found. While extremely low or extremely large maternal weight-gain during pregnancy can call attentio to the embryo being endangered, the authors are of the opinion that the utilization of the reference percentiles here is important in judgement of maternal weight-gain during pregnancy. On the basis of the variables studied, it has been found that pregnant women with the lowest educational attainment, with the oldest ages, with the largest pre-pregnancy weight get the lowest weight-gain during pregnancy.*

Key words: *Weight-gain during pregnancy; Reference values; Age; Educational attainment; Settlement type of home; Weight and height of the mothers.*

Introduction

During the past decades it became apparent that either too big or too little weight-gain during pregnancy is disadvantageous. The former increases the risk of the development of toxemia as well as other obstetrical problems and its unfavourable impact on mother's health status after the pregnancy cannot be neglected. In consequence of the latter the risk of low–birth–weight is higher. Therefore, the optimum maternal weight-gain which assures the best conditions for the mother's health and her infant's intrauterin and extrauterin development should be determined. In respect of some demographic and anthropologic criteria the maternal weight-gain in the different groups of the female population investigated is different, that is the risk in the various groups are not the same in this regard. It must be mentioned, we do not state at all a direct relationship between maternal weight-gain and the new-born's birth–weight, however, a loss in weight or too little as well as too much weight-gain can be a warning that the foetus is endangered. Our data derive from the information on about 7700 pregnant women included in the "Health and demographic survey of pregnant women and infants", a project realized on a national representative sample (Joubert–Ágfalvi–Gárdos 1986). The examinations and interviews were realized with the first appearance at prenatal care simultaneously and later on the 20th, 27th and 34th week of pregnancy, and finally at the end of pregnancy.

On the following figures it can be seen markings in accordance with these points of time.

Reference values and percentile curves of maternal weight-gain during pregnancy

The reference values (Table 1) have been computed from the data of about 6500 pregnancies ended after 37–42 weeks with single live-births weighing 2500–4500 grams. These data and the percentile curves (Fig. 1) deriving from them are showing the weight-gain from the conception till the given duration of pregnancy. The reference values make the tracing the maternal weight-gain of every single woman possible for the doctors in charge of prenatal care. The disadvantageous developing of the weight-gain (either in positive or negative direction from the appropriate value at the given duration of pregnancy) can be observed in time and then the necessary examinations, treatment and instructions can decrease the degree of risk.

Table 1. **Reference values of weight-gain during pregnancy from the conception till the end of pregnancy**

Duration of pregnancy (weeks)	N	$\bar{x}$ (kgs)	SD	Percentiles (kgs)						
				3	10	25	50	75	90	97
20	6440	5.21	3.49	-0.41	0.36	2.51	4.50	6.68	8.90	12.02
27	6504	8.70	3.91	1.23	3.53	5.68	7.96	10.48	13.06	16.13
34	6468	11.63	4.37	3.42	5.89	8.33	10.89	13.39	15.63	19.94
37	357	12.62	4.85	3.45	6.34	8.87	11.81	15.13	18.37	22.06
38	790	12.47	4.69	3.16	6.18	9.11	11.86	14.69	17.87	21.78
39	1460	12.81	4.73	3.53	6.43	9.17	12.11	15.19	18.49	21.91
40	2284	12.94	4.76	3.70	6.49	9.30	12.31	15.28	18.37	22.54
41	1123	12.98	4.70	3.79	6.65	9.36	12.31	15.49	18.50	22.03
42	359	13.65	5.13	3.26	6.59	9.93	13.25	16.28	19.51	23.32

Mother's age at the end of pregnancy

On Fig. 2 (and on the following figures) the lower and upper limit of the weight-gain till the 20th, 27th and 34th week of pregnancy is marked by solid lines and the values at the end of pregnancy by dotted ones. In this sample the gestational period of the liveborn ranges 22–45 weeks. The considerable diversion of lines before 33–36 weeks is due to the few number of cases on the one hand, and to the factors responsible for the early delivery on the other. This statement is true for the following figures as well. Generally, regarding the weight-gain during pregnancy there is no material difference between the various age-groups. Pregnant women under 25 years gain weight slightly more slowly than the olders. However, at the end of pregnancy at the gestational age of at least 37 weeks the women older than 30 years have significantly less weight-gain than the 18–29 year old mothers. This phenomenon can be explained by the fact that pregnant women over 30 years frequently have a higher pre-pregnancy weight and this (as it latter will be seen) has a considerable impact on the size of weight gains.

The social status of the mother has been approached with two variables: the mother's educational attainment and the settlement type of her home.

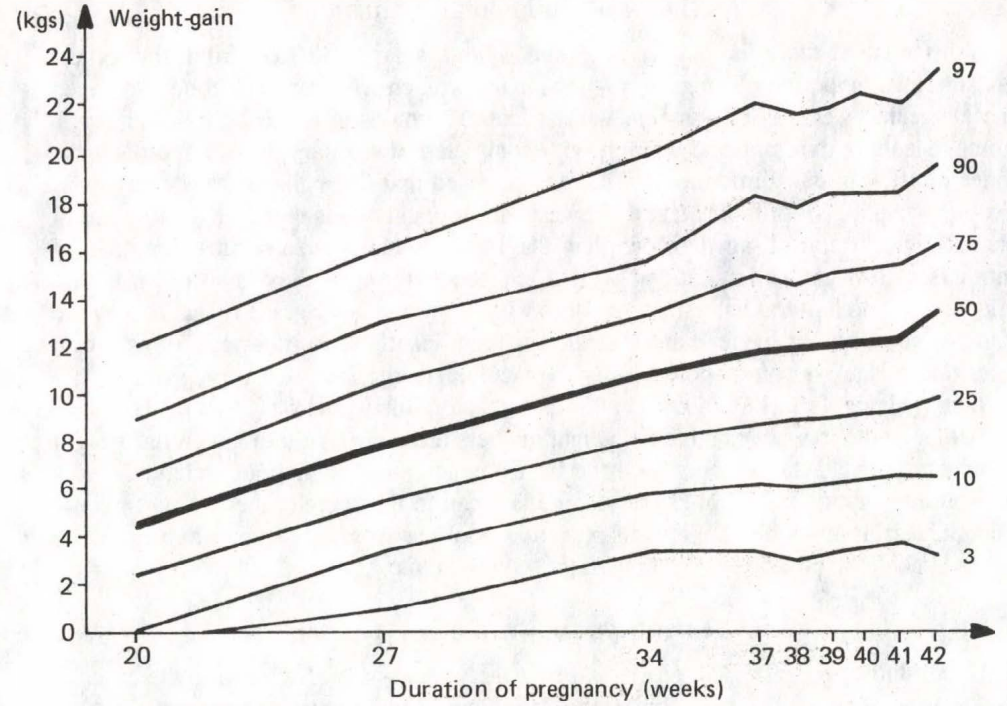

Fig. 1: Percentile curveds of maternal weight-gain during pregnancy

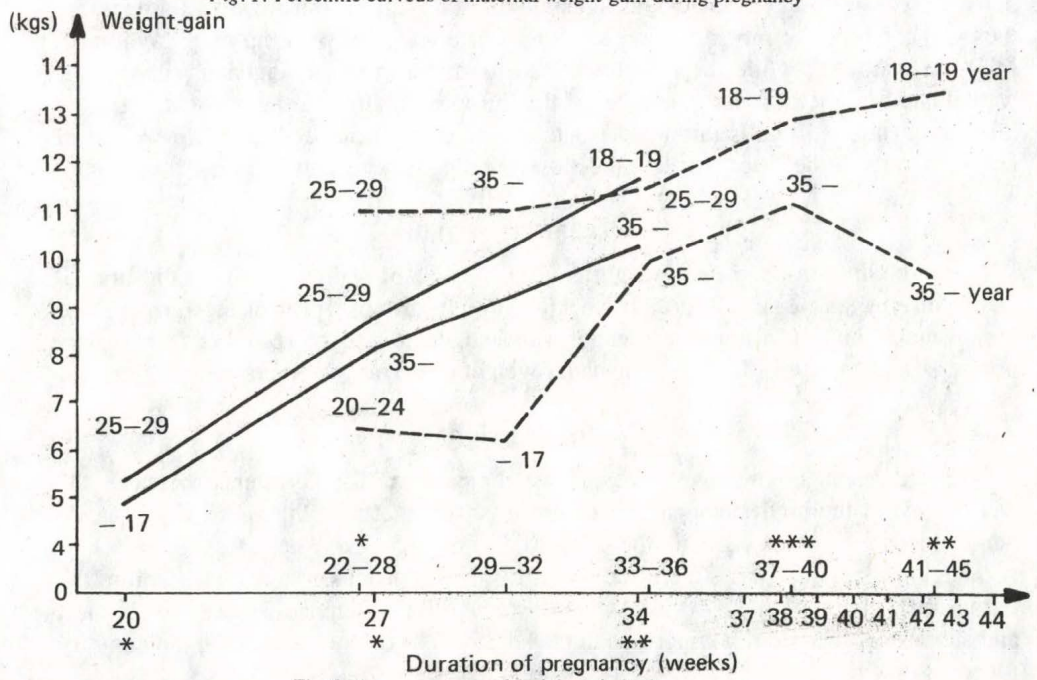

Fig. 2: Average maternal weight-gain by her age
(n.s. = not significant; * = significant at $p < 0.05$; ** = significant at $p < 0.01$; *** = significant at $p < 0.001$)

Mother's educational attainment

Substantially, there is only one group which sharply differs from the others considering any period of pregnancy: they are the women who have not completed even the elementary school. The women with at least 13 grades prove to be more or less a homogeneous group, and the women with completed elementary school approach the latter rather than the former ones. It can be supposed that the explanation for the lower average weight gain of mothers at the lowest educational level is that their socio-cultural status is much more disadvatageous than that of any other groups because the 45% of mothers with 8 grades is a skilled worker, consequently even they have much higher educational and cultural level, than the ones with no more than 7 grades. That is why the knowledge of health hygiene and nutrition is significantly more poorish in this group than that of the educated ones. It must be mentioned, the rate of the pregnancies not wanted is almost four times higher in this group than in the whole sample (Fig. 3).

Although the low pre-pregnancy-weight mothers are more likely to gain more weight during pregnancy, the mothers with the lowest educational attainment weighted 2 kgs less on the average before pregnancy than the mean in the sample, their weight-gain is nevertheless unfavourable. With this it also is true that women in this group are three times likely to be under 154 cms than in the whole sample.

Settlement type of the mother's home

Either during pregnancy or at the end of it the weight-gain of women in the cities is the highest. Mothers living in Budapest or in villages gain almost the same weight till delivery. The strikingly advatageous situation of cities can be explained by the fact that they can combine the infrastructural conditions of the capital with the more favourable life-style of towns, while the population here is much more homogenous than in the capital and the "melting pot" character of the European metropolilses is not effective. It must be mentioned that regarding the outcome of pregnancies and the birth weight of new-born as well the cities have got the most advatageous conditions (Fig. 4).

Prepregnaney weight

The more the pre-pregnancy weight the less the size of weight-gain is in the first 20 weeks of pregnancy. After the 20th week the weight-groups under 54 kgs prove to be homogenous, but the former tendency is unchangeable and moreover, as pregnancy progresses the groups of large prepregnancy weight move off the others (Fig. 5.)

Mother's height

The higher the mother the more the weight gain is. The difference between the weight-gain of the highest and shortest women is 0.7 kg at the 20th week of pregnancy which increases to 1.4 kgs till the 27th week and 7 weeks later it exceeds 3 kgs. Although this regularity is slightly confused for the pregnancies have ended before the term, for the delivery at 37–40 weeks it is restored. The difference between the highest and shortest women does not increase in the latest weeks of pregnanncy, on the contrary it decreases (Fig. 6).

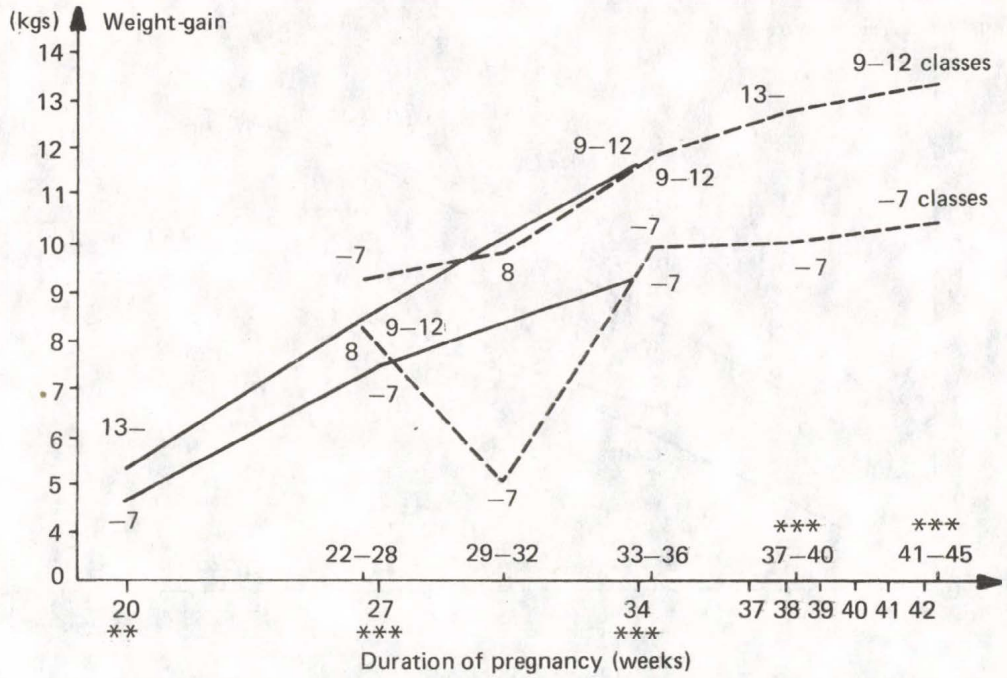

Fig. 3: Average maternal weight-gain during pregnancy by her educational attainment

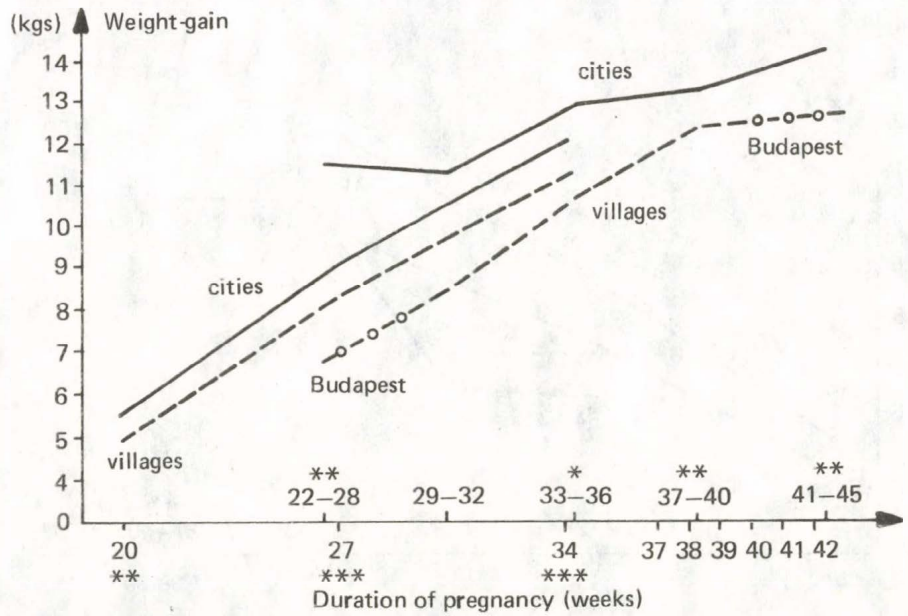

Fig. 4: Average maternal weight-gain during pregnancy by her settlement type

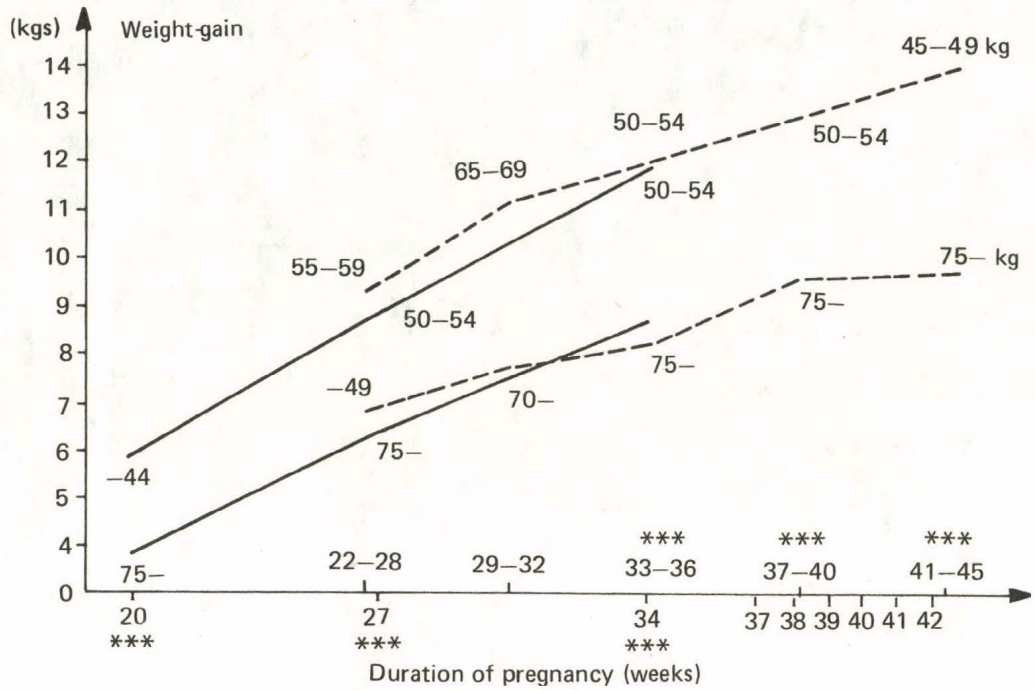

Fig. 5: Average maternal weight-gain during pregnancy by her weight before conception

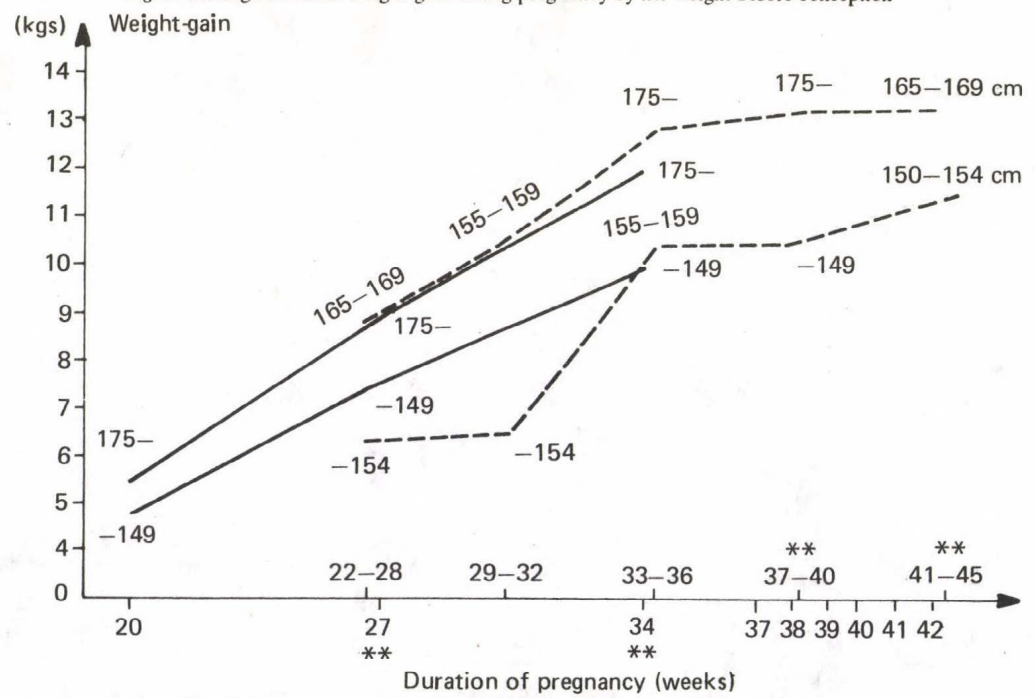

Fig. 6: Average maternal weight-gain during pregnancy by her body height

Summing up the foregoing it can be stated that the size of maternal weight-gain during pregnancy is disadvantageously effected by the mother's low educational attainment and if her home is in Budapest or in a village. In both effects the socio-cultural cinditions under the average is responsible for the not appropriate weight gain.

*

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THE WEIGHT AND LENGTH GAIN OF INFANTS AS INFLUENCED BY BREAST FEEDING OR ARTIFICIAL FEEDING AND BY THE EDUCATIONAL LEVEL OF THE MOTHER

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Abstract: *The physical growth of 5428 infants, born in Hungary during the period Juni 30, 1980 – Juni 30, 1983, was studied. Some results of growth and development of this complex longitudinal survey on a nation-wide scale, with the title "Health and Demographic Study of Pregnant Women and Infants" are presented in this paper. There is a significant difference in the mean weight and length gains of those being exclusively breast-fed or artificially fed up till the first three months. The means of those having artificial feedings only are significantly greater. Breast-feeding was most prevailing among mothers of Group A (0–7 grades, i.e. uncompleted elementary school) and the weight and length growth are lowest in this Group.*

Key words: *Breast-fed; Artificially fed; Growth; Educational level of the mother.*

Introduction

In 1979 we have launched a complex longitudinal survey on a nation-wide scale, with the title "Health and Demographic Study of Pregnant Women and Infants". The project, its range, selection criteria and research techniques were already introduced in Pécs, at the IVth International Symposium of Human Biology, in 1986 (Joubert et al. 1986).

The survey is not yet completed and we have started to elaborate its demographic, anthropometric, health and socio-cultural aspects. We have prepared the reference figures of weight and length gains among infants from birth to 24 months. The reference data are filed among the documentation of children's health in Hungary.

Material and Methods

Table 1 shows you the breakdown of infants studied by sex and birth weight. The feeding practice of infants from birth to 6 months are shown in Table 2.

The proportion of infants with normal or low birth weight is also indicated, grouped according to feeding practice (that is, exclusively breast-fed, partially breast-fed of artificially fed.) 72.7% of infants with normal birth weight were exclusively breast-fed in the first month; 12% were given artificial complements while being breast-fed. The proportion of those being fed by artificial means is only 15%.

On the other hand, it is only 57.4% of the infants with low birth weight who were exclusively breast-fed. 22.9% among them were breast-fed for only a short time, that is, less than a month. At the age of 3 months, it is only 22% of the full term and 15% of the preterm infants who were exclusively breast-fed. The proportion of those partially breast-fed is 30% in both groups.

In a statistical analysis process we have used the incidence (N), mean ($\bar{x}$) and SD values of the reference data. The difference between the mean values was measured by significance levels.

Table 1. **The division of infants under study according to sex and birth weight***

Age	Reference data (2500-4499 g)			Low birth weight (< 2500 g)		
	Together	Boys	Girls	Together	Boys	Girls
Birth	6589	2996	2693	415	186	229
1 year	5300	2813	2487	361	160	201
2 years	4889	2591	2298	321	143	178

* The infants of high birth weight ad/or those with disease, together with the unestimated data were excluded from the present study

Table 2. **Distribution of infants studied according to feeding practice***

Age (month)	Together	Ref.	LBW	Exclusively breast-fed		Partially breast-fed		Artificially fed	
		together		Ref.	LBW	Ref.	LBW	Ref.	LBW
Incidence									
1	5799	5428	371	3946	213	658	73	824	85
2	5778	5408	370	2649	137	1026	88	1733	145
3	5755	5370	385	1155	60	1630	1o9	2585	216
4	5707	5326	381	154	13	1821	104	3351	264
5	5652	5272	380	27	1	1359	71	3886	308
6	5487	5111	376	11	1	855	48	4245	327
Percentage									
1	100	93.61	6.39	72.69	57.41	12.12	19.67	15.18	22.82
2	100	93.59	6.41	48.98	36.05	18.97	25.78	32.05	38.17
3	100	93.31	6.69	21.52	15.58	30.35	28.31	48.13	56.11
4	100	93.32	6.68	2.89	3.42	34.19	27.29	62.82	68.29
5	100	93.28	6.72	0.51	0.26	25.77	18.68	73.72	81.06
6	100	93.15	6.85	0.21	0.26	18.32	12.77	81.46	86.97

* National survey, 1980: 34.5% of infants are exclusively breast-fed up till 3 months of age; National survey, 1981: 36.0% of infants are exclusively breast-fed up till 3 months of age. – Abbreviations: Ref. – reference; LBW – low birth weight

Results

The growth of breast-fed and artificially fed infants

Table 3 indicates the mean weight and length gains of infants with a normal birth weight, from birth to 24 months (and SD). There is a significant difference in the mean weight and length gains of those being exclusively breast-fed or artificially fed up till the first three months (Table 4). The means of those having artificial feedings only are significantly greater.

The weight difference of boys with normal birth weight from 3 to 8 months and at the age of 15 months is especially apparent; in the case of girls, both weight and length measurements show a significant difference from the age of 3 months up till 2 years. This observation coincides with various studies on infant feeding and growth of different countries. They show that the difference is especially great in a population where breast-feeding is prevailing up till the age of 9–12 months (Hitchcock et al. 1981).

Table 3. **Gains in weight and length in certain period of study**

Age (months)	Boys						Girls					
	Breast-fed for 90 days			Artificially fed			Breast-fed for 90 days			Artificially fed		
	N	$\bar{x}$	SD	N	$\bar{x}$	SD	N	$\bar{x}$	SD	N	$\bar{x}$	SD
Weight (g)												
birth	548	3.308.5	421.7	468	3.312.1	415.0	582	3.182.7	390.4	337	3.215.0	425.7
1	552	4.131.1	495.3	475	4.108.0	510.1	586	3.925.4	432.8	350	3.882.4	451.4
2	556	5.075.7	561.9	473	5.104.3	586.8	582	4.741.1	474.7	342	4.751.6	513.4
3	560	5.882.6	628.0	462	5.989.4	676.4	591	5.439.7	562.4	336	5.569.0	576.7
4	551	6.588.5	705.8	467	6.747.5	764.6	583	6.092.6	610.9	335	6.302.6	636.0
5	545	7.141.1	745.3	457	7.315.2	811.1	573	6.612.0	651.9	331	6.878.8	703.4
6	544	7.741.1	800.3	452	7.889.3	860.3	567	7.168.0	713.2	328	7.411.4	748.3
8	532	8.551.1	878.8	443	8.681.7	975.0	564	7.940.4	810.7	321	8.143.7	839.0
10	528	9.280.1	999.7	445	9.375.2	1.026.1	560	8.635.3	902.2	314	8.845.0	910.4
12	533	9.928.3	1.072.4	447	10.019.5	1.092.8	558	9.286.0	969.4	317	9.509.9	1.024.4
15	507	10.437.4	1.125.4	414	10.818.2	1.197.4	520	9.964.6	1.069.3	292	10.324.1	1.103.7
18	504	11.326.0	1.218.1	415	11.443.1	1.258.2	516	10.717.6	1.159.1	289	10.954.3	1.251.5
21	495	11.994.5	1.315.5	415	12.060.0	1.357.9	512	11.349.9	1.293.5	282	11.607.8	1.342.8
24	503	12.563.4	1.404.8	421	12.645.6	1.408.1	524	12.009.9	1.413.0	294	12.251.4	1.440.8
Length (cm)												
birth	546	50.72	2.15	468	51.00	2.21	582	49.96	2.00	337	50.27	2.19
1	552	54.01	2.23	475	54.20	2.23	586	53.26	2.08	350	53.35	2.15
2	556	57.37	2.31	473	57.58	2.41	582	56.39	2.14	342	56.52	2.31
3	560	60.58	2.42	461	60.88	2.43	591	59.26	2.25	336	59.63	2.27
4	545	63.31	2.44	456	63.63	2.52	573	61.90	2.26	331	62.41	2.33
5	551	65.85	2.47	465	66.22	2.62	583	64.22	2.32	335	64.77	2.27
6	544	67.97	2.39	451	68.27	2.67	567	66.26	2.41	328	66.89	2.42
8	532	70.72	2.40	442	71.11	2.83	563	69.00	2.45	321	69.69	2.36
10	528	73.33	2.53	444	73.60	2.74	559	71.61	2.54	314	72.39	2.55
12	507	76.02	2.67	414	76.31	2.81	520	74.27	2.66	292	75.15	2.67
15	533	79.37	2.84	447	79.42	3.10	558	77.56	2.91	317	78.43	3.15
18	504	82.25	3.07	415	82.23	3.29	518	80.62	3.02	289	81.39	3.32
21	495	85.13	3.34	415	85.00	3.61	513	83.60	3.37	282	84.47	3.47
24	503	87.87	3.70	421	87.71	3.65	525	86.41	3.65	292	87.13	3.71

Table 4. **Significance level of differences between weight and length means of infants breast-fed (b.f.) for 90 days or artificially fed (a.f.)**

Age (months)	Boys				Girls			
	Weight		Length		Weight		Length	
	b.f.	a.f.	b.f.	a.f.	b.f.	a.f.	b.f.	a.f.
birth				*				
1								
2								
3		**		*		***		*
4		***		*		***		**
5		***		*		***		***
6		**				***		***
8		*		*		***		***
10						**		***
12						**		***
15		***				***		***
18						**		**
21						**		***
24						*		**

* = $p < 0.05$ ** = $p < 0.01$ *** = $p < 0.001$

Figures 1 and 2 show a diagram of weight and length gains for boys and girls separately, as measured month by month, or, after the age of 18 months, every second or third months. We find that during the first year boys precede girls in growth. However, after this age girls are ahead of boys both in weight and in length gains, among children with normal birth weight.

The educational level of the mother and the weight and length gain of the infant

Table 5 shows the grouping of children included in the study, according to the educational level of the mother. We have made four groups of education, dependig on the grades finished by the mother: Group A 0–7 grades, Group B 8 grades, i.e. elementary school finished, Group C 9–12 grades, and Group D 13–18 grades.

Table 5. **Distribution of infants studied of the mother according to the educational level of the mother**

Educational level		Reference			Low birth weight		
		Together	Boys	Girls	Together	Boys	Girls
Incidence							
A 0–7	grades	340	189	151	62	27	35
B 8	grades	2633	1392	1241	200	98	102
C 9–12	grades	1869	993	903	89	32	57
D 13–18	grades	559	283	276	20	10	10
Together		5428	2857	2571	371	167	204
Percentage							
A 0–7	grades	6.26	6.61	5.87	16.73	16.17	17.16
B 8	grades	48.51	48.70	48.27	53.93	58.68	50.00
C 9–12	grades	34.94	34.75	35.12	23.95	19.16	27.94
D 13–18	grades	10.29	9.94	10.74	5.39	5.90	4.90
Together		100	100	100	100	100	100

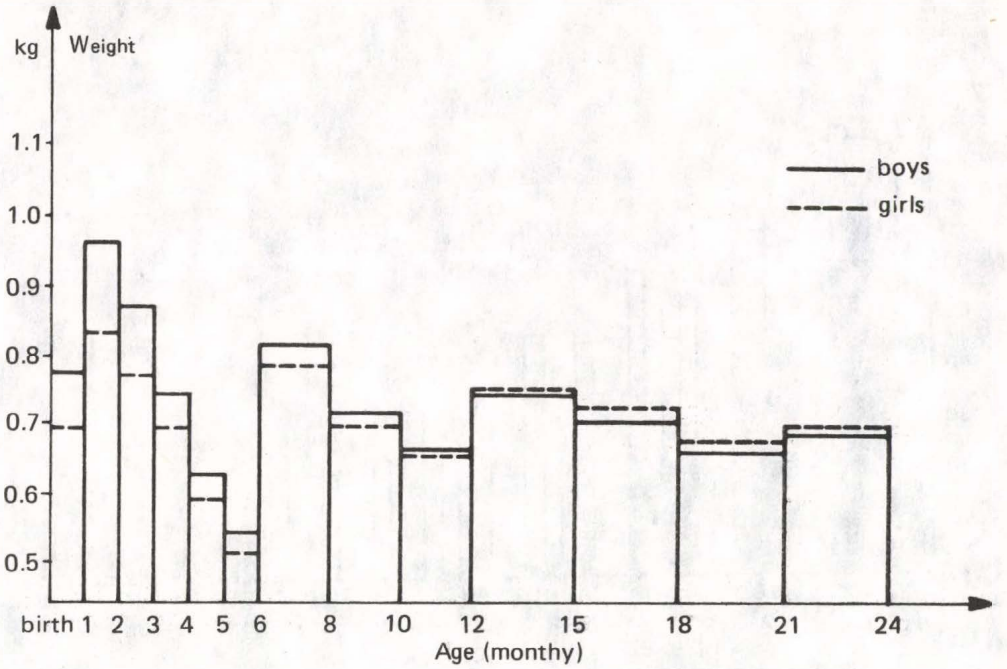

Figure 1: Mean weight gains in different periods of boys and girls

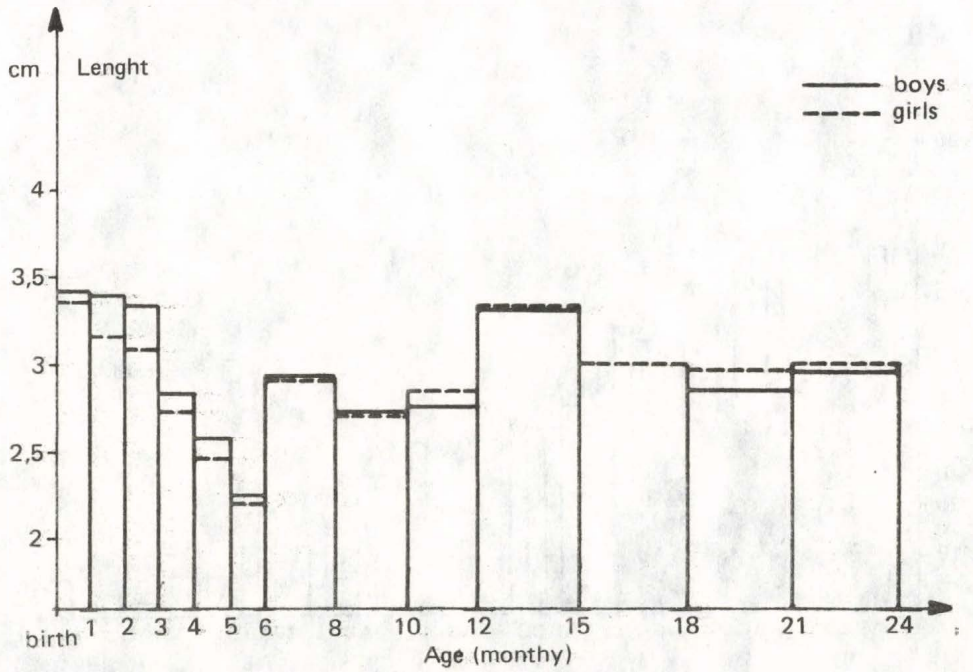

Figure 2: Mean length gains in different periods of boys and girls

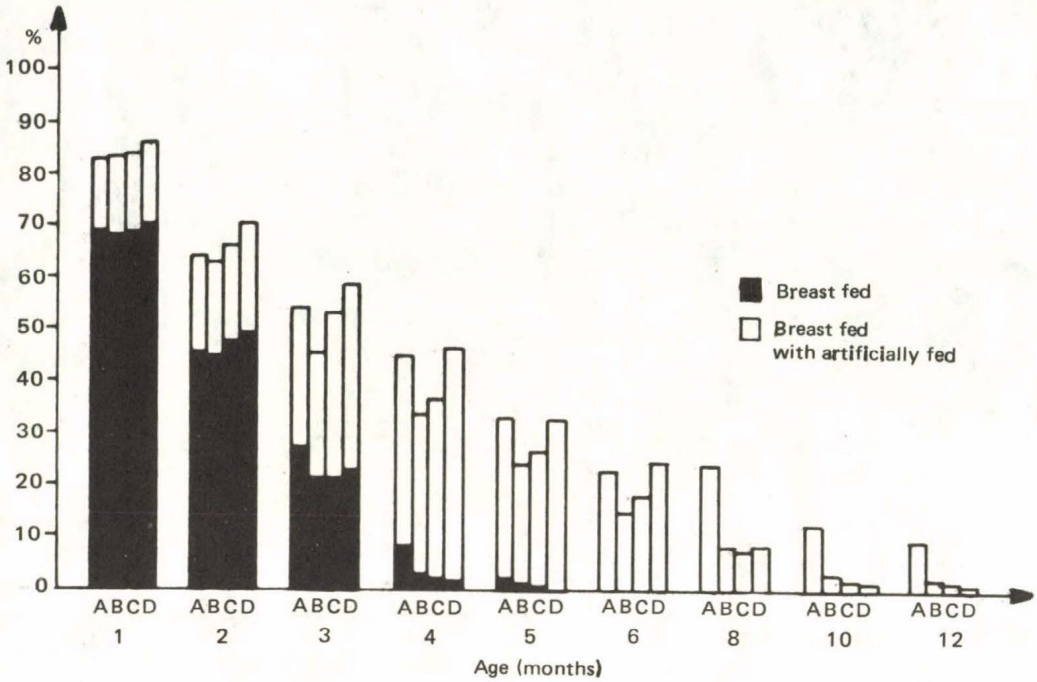

Figure 3: Feeding practice according to the educational level of the mothers (birth weight 2500–4499 g). A = uncompleted general school; B = completed general school; C = secondary school; D = high school

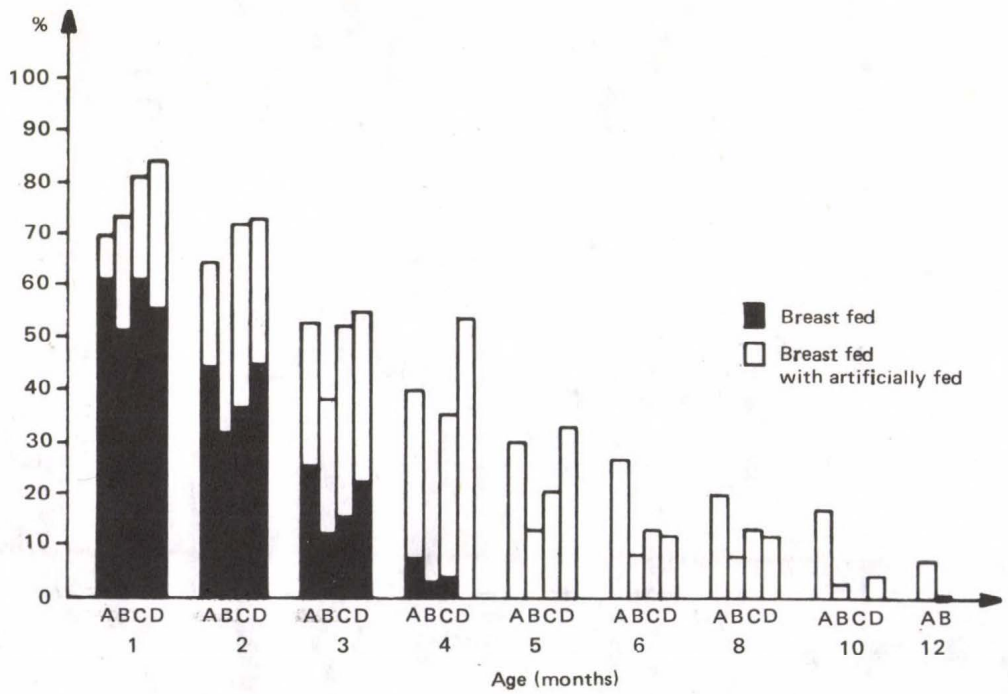

Figure 4: Feeding practice according to the educational level of their mothers (birth weight < 2500 g) A = uncompleted general school; B = completed general school; c = secondary school; D = high school

Figures 3 and 4 indicate feeding methods of mothers of various educational level, among infants with normal and low birth weights, up till the age of 12 months. Breast-feeding was most prevailing among mothers of Group A. Exclusive breast-feeding up to 3 months of age was highest in Goups A and D; however, mothers kept on partial breast-feeding for a longer period. Among infants of low birth weight, those in Group B get the lowest amount of breast milk, compared to the others.

The weight and length growth are lowest in Group A. On the other hand, Group D shows significantly great gains, especially in length.

Discussion

We may conclude that there is a significant difference in the mean weight and length gains of those being exclusively breast-fed or artificially fed up till the first three months. The means of those having artificial feedings only are significantly greater. In Hungary, 37% of the children are exclusively breast-fed up to 3 months of age, whereas one month later, that is, during the fourth month, only 6.5% of them get breast milk exclusively. That means that owing to low incidence we have no proper data about the way longer breast-feeding affects weight and length gains later on.

Breast-feeding was most prevailing among mothers of Group A (0–7 grades, uncompleted elementary school) and the weight and length growth are lowest in Group A. We would also like to deal with other, external factors influencing growth and support our observations with some correlatives.

*

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INTERRELATIONS BETWEEN WEIGHT AND LENGTH GAINS OF MALE INFANTS AND THE PLACE OF RESIDENCE OF THE MOTHER, AND FEEDING WITH OR WITHOUT BREAST MILK (A SUMMARY)

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Abstract: *In this paper the effects of the feeding with or without breast milk and the effects of urban and rural residental surroundings are investigated on the weight and length gains of the children (boys) from birth till the age of two years. In a longitudinal research program carried out on a representative sample the following have been found: The children's weight and length gains are influenced by the fact if they live in urban or rural areas more than they were fed with or without breast milk. In the background of the effect of the settlement type different cultural, social, hygienic conditions have to be presumably searched.*

Key words: *Feeding with or without breast milk; Weight gain; Length gain; Urban and rural residence.*

In 1979 we have launched a complex longitudinal survey on a nation-wide scale, with the title "Health and Demographic Study of Pregnant Women and Infants". The project, its range, selection criteria and research techniques were already published (Joubert–Ágfalvi–Gárdos 1986).

Our previous paper dealt with the relations between growth of the infant, the effect of feeding with or without breast milk, and the mother's educational level (Ágfalvi et al. in this volume). We have concluded that other factors influencing the growth should also be investigated. The present paper examines the infants' growth and feeding methods as related to the residence of the mother.

Methodological aspects: We have divided the infants studied into two groups, according to the feeding methods. The first group covered those fed exclusively with breast milk until the age of 90 days; the second group comprised those infants fed without breast milk during the same period. The growth in both groups was observed till the age of two years.

As a result of the longitudinal survey carried out on a sample representative of the country, we had already published reference data on weight and length gains from birth to the age of two years and the reference curves developed on basis of these data (Joubert–Ágfalvi 1988a, 1988b) up to the age of two years. We compared the growth of children examined according to feeding methods and types of residence to the so-called reference values. For the comparison we used the values of the number of cases (N), the mean values ($\bar{x}$) and the standard deviation (SD) of the reference data. The difference in the values was measured by t-test. In this paper we present only the boys' data.

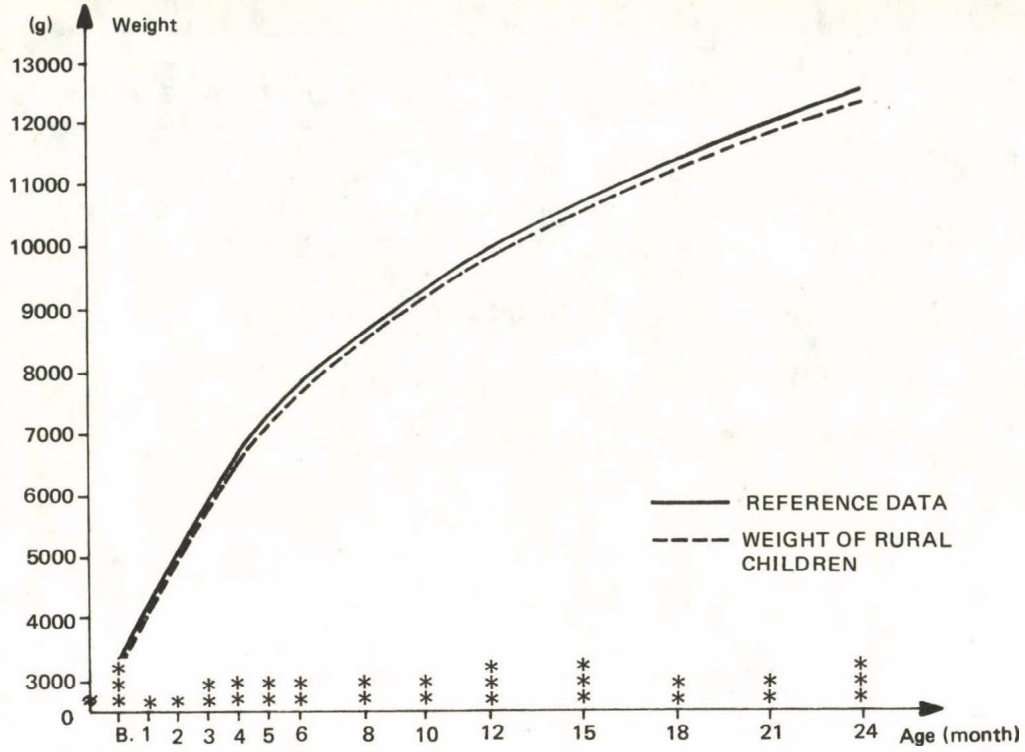

Fig. 1: Weight of children living in villages as compared to reference data (Difference in significant: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$)

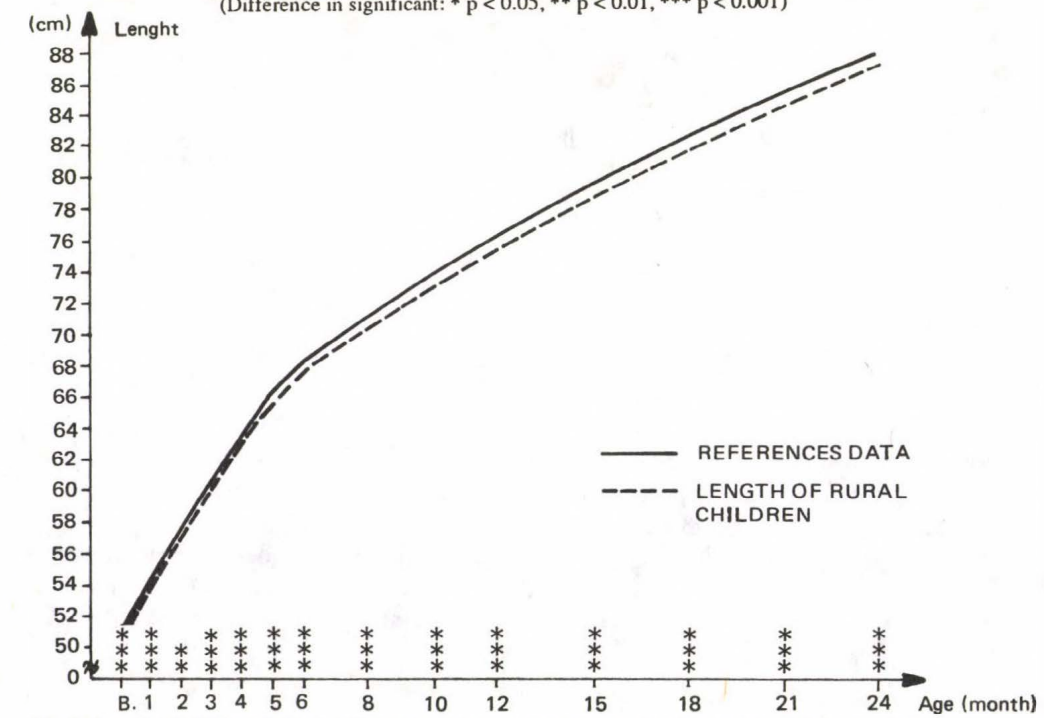

Fig. 2: Length of children living in villages as compared to reference data (Sign of significance as in Fig. 1)

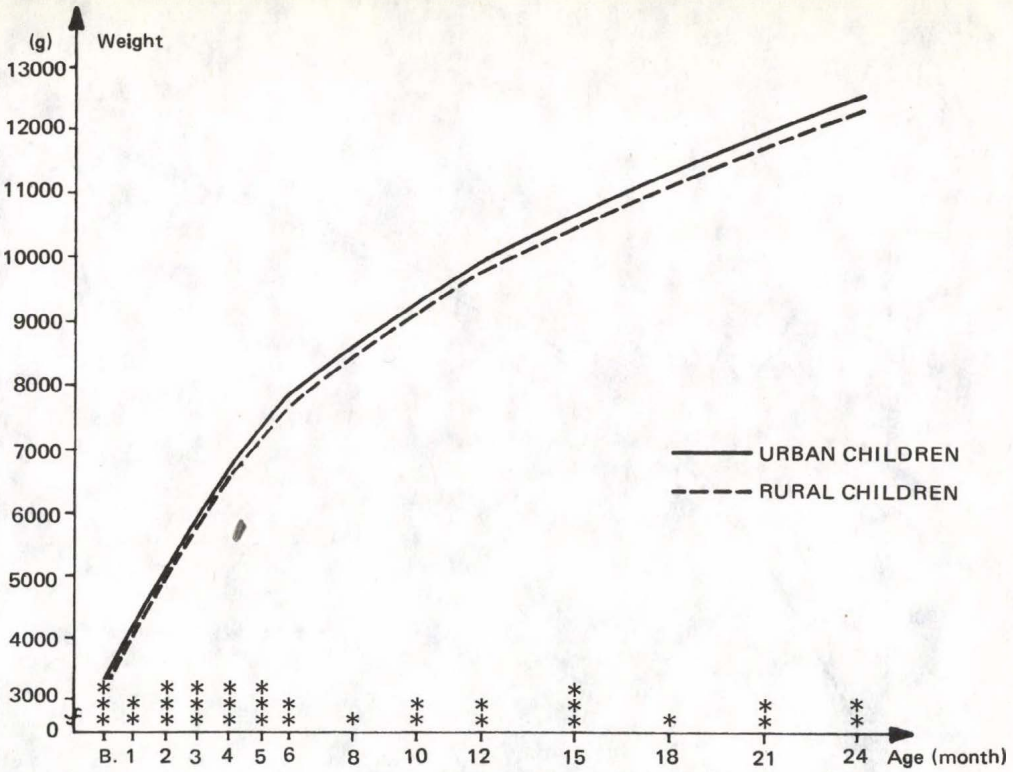

Fig. 3: Weight of children living in cities and villages up to the age of two (Sign of significance as in Fig. 1)

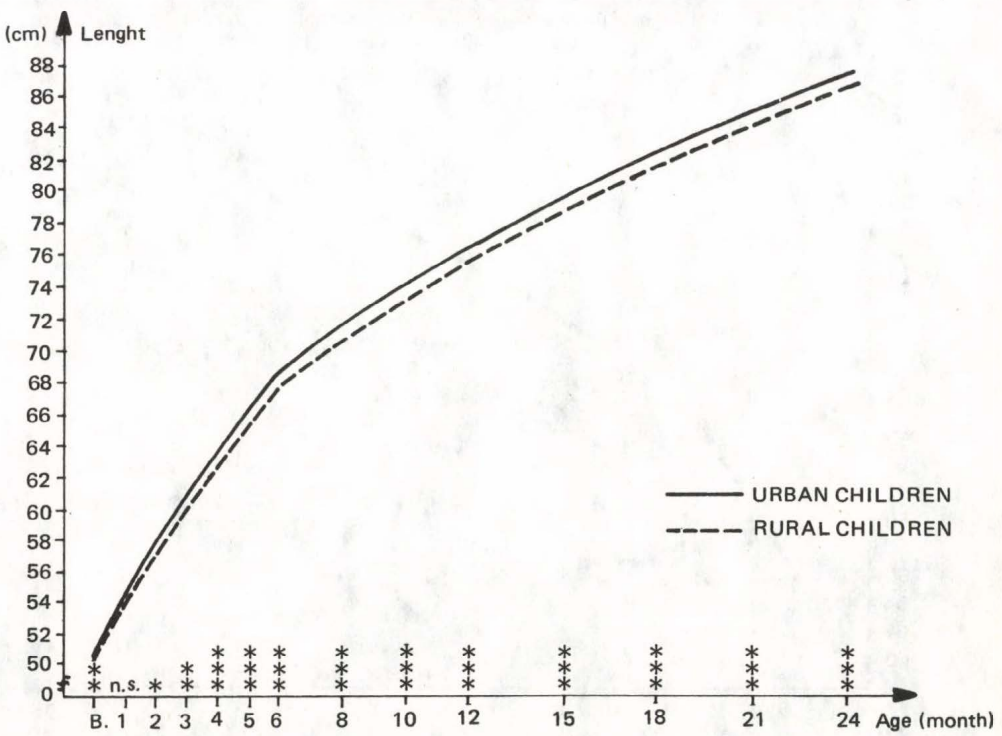

Fig. 4: Length of children living in cities and in villages up to the age of two (Sign of significance as in Fig. 1)

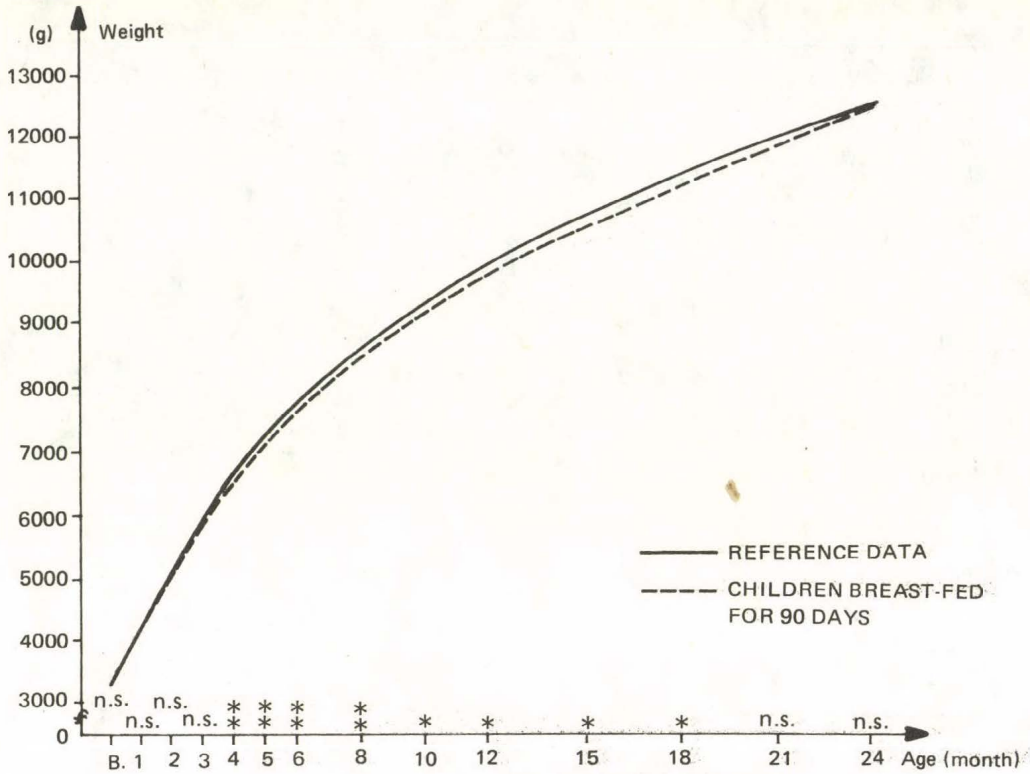

Fig. 5: Weight of children breast-fed for 90 days as compared to reference data
(Signs of significance as in Fig. 1)

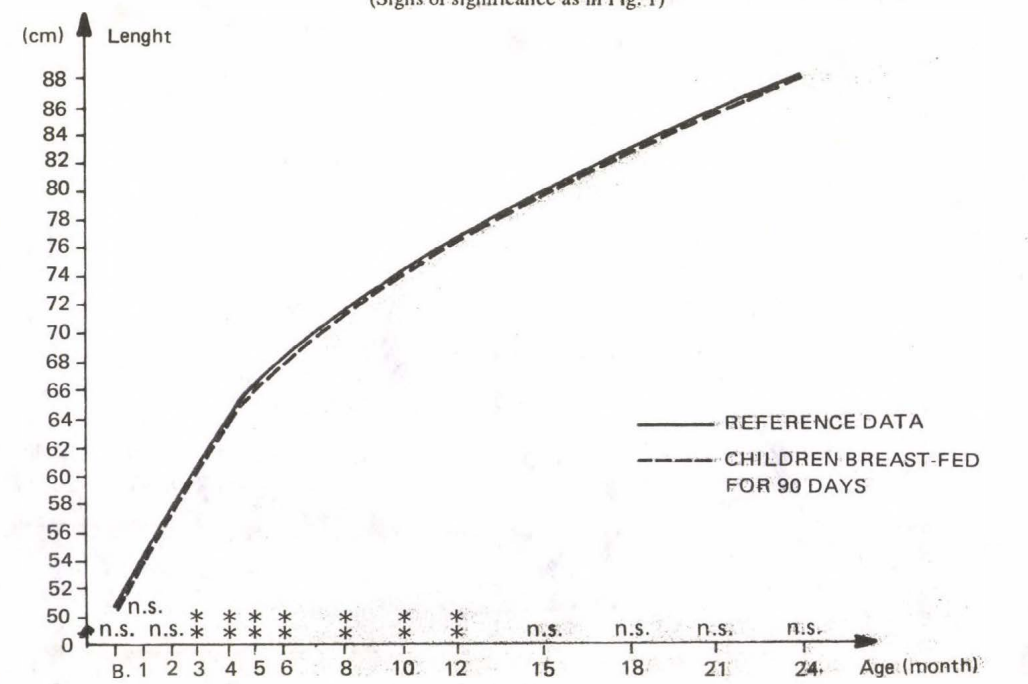

Fig. 6: Length of children breast-fed for 90 days as compared to reference data
(Signs of significance as in Fig. 1)

While examining the weight and length gains of infants fed with or without breast milk for 90 days by types of settlements, we came to the following conclusions: Within the same type of settlement there was no significant difference neither in weight, nor in length gains between the groups of babies fed with or without breast milk.

Comparing the values of the urban children's weight and length to the reference figures we note a significant difference of 5 per cent in the mean values of the weight at the age of two months, at all other ages there is no significant difference. The weight gain (Fig. 1) and length gain (Fig. 2) of the rural children, however, are lower than the reference values. Differences can be found only in the degree of significance.

Comparing the weight (Fig. 3) and length (Fig. 4) of the rural and urban children significant differences emerged in the average values at all ages, exept for the length at the age of one month.

If we compare the average values of the weight and length to the reference figures by methods of feeding the following can be stated: The weight means (Fig. 5) and length means (Fig. 6) of children fed only with breast milk for 90 days were lower than the reference values at all ages. We found significant differences in the average values of the weight at the age between 4–18 months, and in the average values of the length between 3–12 months. The weight means of children fed without breast milk do not significantly differ from the reference values, exept for the value at birth. The length means are lower than the reference values at all ages. A significant difference, however, can be found only in the first three months and the second year of life.

Summing up, it can be stated that the children's weight and length gains are more affected by the place of residence than the mode of feeding, i.e. whether they fed with or without breast milk. The effects of the locality types originated presumably from the various cultural, social and hygienic conditions.

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INFLUENCE OF DENTAL DECAY DURING THE GROWTH IN DIFFERENT AREAS IN CUENCA, SPAIN

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Abstract: *In this study, belonging to the wide study of growth done in Cuenca, we deal with the influence of dental decay in the present population, as a possible sanitary sing and an indicative point in the quality of life. The research includes 1800 people both sexes of a rural area (three specific areas: Alcarria, Sierra and Mancha). They were divided in six groups of different ages between 13 and 17 years old. The research also includes a sample of young people: males and females. The present study shows the influence of the socioeconomic, cultural and geographic situation in dental healt.*

Key words: Human dentition; Caries; Diet; Rural populations.

Introduction

Dental decay appeared very early in the history of humanity: injuries in human teeth realized by dental decay which date back to the Paleolithic and Neolithic have been observed (Bennike 1985). It has been referred to it as the illness of "civilization", because caries appeared when human populations adopted a "saft and sweet" nutrition of occidental type (Newbrun 1978, Triller 1981, Smith and Garn 1987, Tanguay, Buschang and Demirjian 1986, Maat and Van der Velde 1987, Hildebolt et al. 1989).

In comparison with caries occurrences in recent time, it is true, however, that caries has been relatively rare in the early history of mankind and has first become really widespread in connection with the spread of civilization (Wells 1975).

Dental caries may attack the enamel crown (especially on the occlusal surface and the proximal and distal sides), the dentine, the transition to the cement and finally the root itself.

It involves a desmineralization and solution of hydroxyl apatite in the enamel and dentine and a proteolysis of the organic component of the dentine. Hydroxyl apatite is soluble at a pH of 4–5, i.e. in an acid medium, and the rate of solution depends on how low the pH of the plaque falls. This process is governed by several factors, not least the number of bacteria and their acid production, but the number of bacteria depends on the thickness of the plaque, which is again related to the different kinds of sugars contained in the food. Saccharose in particular is held to be the most cariesfacient sugar, while sugar alcohols (sorbitol or xylitol) do not cause appreciable fermentation (Hillson 1980).

Although the dental decay is never mortal and seldom incapacitates people, it represents a considerable socioeconomical cost due to its great frequency.

It's known that the factors which cause dental caries can be grouped in three great categories: factors related to the teeth carbohydrates of the food (sugars) and factor related to the bacteria. Sugar consumption has been quintupled in Wetern Europe since 1850, in parallel with the growth of the dental decay measure. The sugar-caries correlation has been clearly demostrated.

Saccharose particularly favours the colonization of the teeth surface by the bacteria. And they are more harmful when they remain in buccal cavity for long (due to non-buccal hygiene) or, more frequently, when they are swallowed (number of meal with starch).

Material and Methods

We have analysed a sample constituted by 1800 members of both sexes and ages between 13 to 17 years old, both included, and a young group of adults (18 to 25 years old), in the three natural regions of the Cuenca province: Alcarria, Sierra and Mancha.

The presence/absence of dental decay has been studied in each member, for each one of the definitive dental pieces.

The data were collected through direct observation, the present permanent dental pieces being and notated in individual cards as well as the absent pieces. In the case it was distinguished between non-emerged and extracted pieces, the absence by extraction being considered present, as well as decay pieces (Demirjian 1983). The appearance of the third molar wasn't taken into account owed to its belated eruption with regard to the ages of the study (Sánchez 1987, Mesa 1986). We have studied the habits and the foods consumed throughout the development; the percentage of grease, proteins, carbohydrates and other nutriments; dietetic inquiries were carried out and traced for 7 days which informed us of the qualitative feeding.

We have realized χ^2 (Chi-Quadrat) tests to see if the differences between the percentages of dental decay incidence were significant for all dental pieces in the three regions and for both sexes. The results are enclosed in tables.

Our objetive: this paper tries to emphasize the importance of the buccal hygiene and the feeding diet as a way of dental decay prevention as well as its relation to the socioeconomical level of the member valued by the studies level and parent's profession.

Results

The pieces which show a bigger percentage of caries in the three regions and for both sexes are the first and second molar (M1 and M2). That is in part because of their position into the mouth as well as their function to triturate. These are the more directly implicated pieces in mastication; and as they are situated in the rear part of the mouth, access to cleaning is made difficult, so helping accumulation of food rests and this promotes the appearance of bacterial coverings which cause the dental decay. Occlusal caries were almost exclusively found on molars.

First molar: This is the piece with the highest percentage of caries because it's the dental piece which is exposed longer to the risk of suffering caries.

The incidence of the caries shows a very high percentage in the three regions for the first molar (14–45%), and it has been observed that the Sierra and Alcarria show a dental decay incidence similar in both sexes for this dental piece, while the Mancha has lower values. The differences are very significant between Sierra–Mancha and Alcarria–Mancha in men (Table 1). In women the significant differences are observed between the Sierra and Mancha (Table 1). We haven't observed significant differences between both sexes in the caries incidence.

Table 1. **Dental decay percent in Sierra (S), Alcarria (A), and Mancha (M) men and women (means and SDs)**

MEN

Maxillary – left

M2			M1			PM2			PM1			C			I2			I1		
S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M
15.33	9.33	3.00	35.00	34.66	13.33	5.00	6.33	3.66	8.00	7.33	6.00	1.66	1.33	1.00	2.33	0.00	1.33	2.33	0.00	0.00
4.10	4.98	3.60	5.00	13.35	6.59	3.78	5.58	4.38	5.77	5.37	4.61	2.42	2.21	2.23	2.42	0.00	1.88	3.72	0.00	0.00

Maxillary – right

M2			M1			PM2			PM1			C			I2			I1		
S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M
13.33	12.66	4.66	28.66	28.33	14.00	5.00	6.00	3.33	6.66	10.00	8.66	3.00	1.33	1.00	3.00	0.00	3.00	2.33	0.00	0.00
5.37	5.73	3.77	6.99	11.68	4.89	3.00	6.73	3.77	3.19	6.00	6.18	2.23	2.21	2.23	2.23	0.00	3.60	3.72	0.00	0.00

Mandibulary – left

M2			M1			PM2			PM1			C			I2			I1		
S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M
25.33	16.33	11.50	46.00	37.66	27.00	7.66	7.33	2.33	5.66	8.00	6.00	2.00	0.00	0.00	1.66	0.00	0.00	3.00	0.00	0.00
8.29	4.67	4.38	7.48	7.06	10.24	2.68	2.49	3.35	6.67	5.41	6.43	2.00	0.00	0.00	2.42	0.00	0.00	3.60	0.00	0.00

Mandibulary – right

M2			M1			PM2			PM1			C			I2			I1		
S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M
23.66	20.00	5.66	37.00	35.33	16.00	4.00	7.00	2.33	3.33	5.33	4.00	2.00	0.00	0.00	2.33	1.00	0.00	3.00	0.00	0.00
5.82	3.82	3.24	10.18	9.06	5.88	3.05	3.78	3.35	2.45	3.19	3.05	2.00	0.00	0.00	2.42	2.23	0.00	3.60	0.00	0.00

WOMEN

Maxillary – left

M2			M1			PM2			PM1			C			I2			I1		
S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M
19.16	10.66	7.33	31.33	29.66	19.66	7.83	6.66	1.66	10.66	5.66	4.33	1.33	0.33	0.00	5.00	0.33	1.00	2.00	0.00	1.00
5.17	2.49	4.10	11.35	6.87	8.44	5.89	2.49	2.42	12.09	3.14	4.38	1.88	0.74	0.00	3.21	0.74	2.23	2.00	0.00	1.52

Maxillary – right

M2			M1			PM2			PM1			C			I2			I1		
S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M
20.66	13.00	5.33	31.00	31.66	16.66	7.66	4.33	0.66	8.66	6.00	2.33	0.66	0.00	0.00	2.66	0.33	0.00	3.66	0.00	1.33
4.42	6.60	2.74	9.00	10.54	8.76	10.35	3.72	1.49	4.71	5.16	2.42	1.45	0.00	0.00	1.88	0.74	0.00	3.35	0.00	1.88

Mandibulary – left

M2			M1			PM2			PM1			C			I2			I1		
S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M
31.50	17.00	15.66	45.33	44.66	34.33	9.00	5.66	2.66	5.33	4.00	6.00	0.66	0.00	0.66	2.00	0.00	0.00	1.33	0.33	0.00
12.56	5.13	8.28	10.24	5.85	12.13	6.29	4.23	4.42	6.79	3.05	5.77	1.49	0.00	1.49	2.00	0.00	0.00	1.88	0.74	0.00

Mandibulary – right

M2			M1			PM2			PM1			C			I2			I1		
S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M	S	A	M
24.66	16.33	13.66	44.83	41.33	28.66	9.00	5.66	3.33	3.66	5.00	2.66	0.66	0.00	0.00	2.00	0.00	0.00	2.00	0.33	1.66
8.37	6.04	8.11	15.14	9.70	10.99	5.25	2.42	4.26	1.79	3.95	2.21	1.49	0.00	0.00	2.00	0.00	0.00	2.00	0.74	2.42

The caries incidence in the men of the three regions isn't symmetrical, being higher in the left side. It isn't observed in women. In both sexes there is a higher dental decay incidence in the pieces of the jaw than in the maxilar ones.

Second molar: This piece shows a lower caries incidence if it's compared with the first molar, but lateral differences in the caries incidence have nat been observed.

In the three regions and for both sexes, the caries incidence in the first two inferior molars is higher than in the superior ones. We have observed a gradation in caries incidence among the three regions, in this order from high to low incidence: Alcarria, Sierra and Mancha, for both sexes.

Differences are significant in the men from the three regions. In the women there are significant differences between Sierra–Alcarria and Sierra–Mancha (Table 2).

Table 2. **Chi-quadrat test for dental decay incidence***

M 1		Boys	Girls	M2	Boys	Girls
MXR	SAM	5.92^{*}	4.43^{*}		4.60	9.09^{***}
	SA	1.98	0.82		1.58	9.09^{*****}
	SM	5.00^{**}	4.40^{**}		4.01^{**}	4.57^{**}
	AM	4.86^{**}	3.65^{*}		3.60*	4.51^{**}
MDR	SAM	9.25^{****}	4.12		11.01^{*****}	3.61
	SA	3.12^{*}	1.70		3.94^{**}	2.47
	SM	8.07^{*****}	3.87^{**}		10.24^{*****}	3.42^{*}
	AM	7.31^{****}	2.66		7.84^{****}	1.33
MXL	SAM	8.24^{***}	4.27		11.14^{*****}	2.95
	SA	4.06^{**}	2.63		3.72^{*}	1.02
	SM	8.24^{*****}	4.17**		9.37^{*****}	2.67
	AM	4.19^{**}	1.73		9.19^{*****}	2.22
MDL	SAM	5.56^{*}	7.21^{**}		4.97	1.83
	SA	3.37^{*}	5.88^{***}		1.34	0.61
	SM	5.45^{***}	6.32^{***}		4.93^{**}	1.58
	AM	2.29	2.42		3.66^{*}	1.47

*Abbreviations: MX: maxillary, MD: mandibule; L: left, R: right; S: Sierra, A: Alcarria, M: Mancha;
Significant at level: $p < 0.005^{*****}$; $p < 0.01^{****}$; $p < 0.025^{****}$; $p < 0.05^{**}$; $p < 0.1^{*}$

Conclusions

According to the parent's profession, the Mancha has a lower population devoted to agriculture and higher number of qualified industrial workers. The Mancha is a flat region, with mechanized agriculture and modern systems of irrigation. These are the causes why the Mancha has higher income levels than the other two regions, and at the same time, a really lower incidence of caries (Fig. 1).

No significant differences are observed in the intake of carbohydrates in the three regions.

So the economic-status determines the familiar resourses spent on health and cleanness of the mouth.

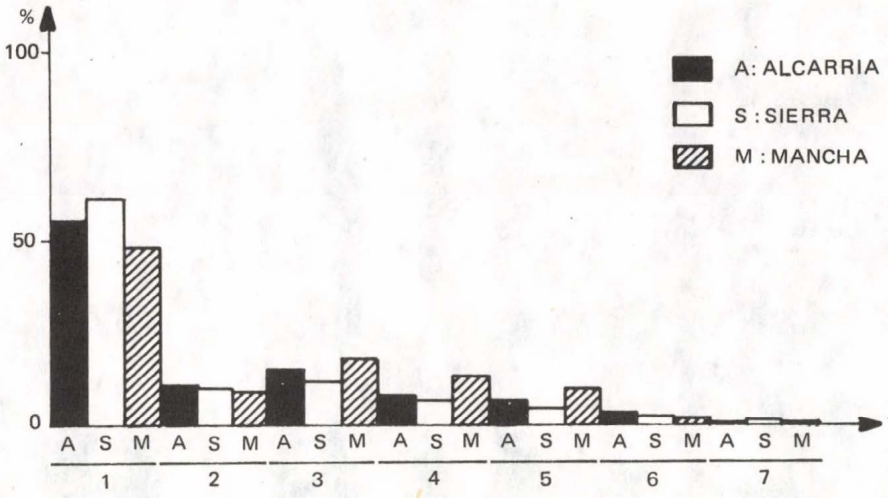

Fig. 1: Father's profession: 1. Farming, 2. Unskilled worker, 3. Skilled worker, 4. Employee, 5. Industrialist, 6. Administrative, 7. Liberal profession

During the collection of data we observed a higher care and cleaning of the mouth in the Mancha region.

In Spain, the National Health Service only extracts the pieces with caries. A preventive medicine through fillings, prothesis for the correction of the teeth position, is only accesible to families with higher incomes. To eliminate these economic discriminations and get a population with a healthy mouth it's only possible if we carry out a true social sanitary policy.

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DISTINCTIVE PARAMETERS DURING GROWTH PROCESS IN THREE SPANISH RURAL POPULATIONS

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Abstract: *In this study we deal with principal components analysis the variability which has been detected in the anthropometric and physiologic parameters in the population of Cuenca (Spain) at three stages of development. The socioeconomic environment of the sample and the nutritional norms belonged to a dietetic study which was done during a week to every single person studied, have been taken into account. The sample includes 3600 people, both sexes. One group of 7 year old children, another one of 17 year old young people and three other groups of children approaching puberty. Three rural areas have been considered: Alcarria, Sierra and Mancha. A "short up" happens between 13 and 14–15 year old boys and between 11 and 12–13 year old girls. It has been demonstrated that rural population in different geographical areas have analogos behaviour to the contributions of the different variables with respect of the first factor of variability. The rural population shows a deviation between the variables of size and build.*

Key words: *Principal Components Analysis; Rural populations; Anthropometry; Growth.*

Introduction

The complexity of the growth process is evident. The analysis of the dynamics in several characters during growth process shows a simple idea of this process. In order to have a better knowledge of the growth process it's interesting to analyse the interactions which were found between all parametres and the multidimensional relations between these ones and the variables which affect them.

In last years, the Principal Component Analysis was used in growth studies of the human populations (Mueller and Reid 1979, Bernis and Sandín 1979, Sandín 1981, Mueller and Stallone 1981, Prado 1981, 1982, Prado, Martínez and Nielsen 1983, 1986a, 1986b, Neves, Salzano and Da Rocha 1985).

In this study the variability observed in the anthropometric, physiological, nutritional, paragenetic and socio-professional parametres of rural population in the province of Cuenca was analyzed with Principal Component Analysis.

Material and Methods

The sample analyzed includes 3600 boys and girls. Their age varied from 7 to 17 years both including a young adult (18–30 year old) group. The population studied corresponds to the province of Cuenca in its rural ambit, being differentiated the natural regions: Alcarria, Sierra, and Mancha.

Cuenca is a province, situated in the outh subtable land, being the fifth province in extension and presenting one of the lower activity of Spain. It has suffered a strong rural exodus and its rural population has been reducing to almost half in this century. The Mancha zone, situated in the south of the province is the least depressed demographic

and economically (it represents aproximatly the 71% of the rural population in the whole province). This three natural regions (Alcarria, Sierra and Mancha) differ geographically, demographically and economically (Altitude: Sierra 1105 m., Alcarria 885 m. and Mancha 709 m.).

Data were collected according to the IBP norms (Weiner and Lourie 1969). Statistical analysis were carried out in the Computer Centre of the Autonoma University of Madrid using the 4M (Principal Component Analysis) BMDP statistical package. The following variables were registe red:

Anthropometry: Stature (EST), Sitting height (SIT), Biacromial diameter (DBA), Biiliocristal diameter (DBI), Total length of the arm (LTB), Total length of the leg (LTP), Head circumference (CCC), Arm circumference (CCB), Thigh circumference (CCM), Leg circumference (CCP), Abdomen circumference (PEA), Weight (PES), Subcutaneous fat: Skinfolds Triceps (GRT), Subscapular (GRE), Suprailiac (GRS); Bizigomatic width (ABZ), Head width (ACE), Head length (LCE), Morphological face height (AMC).

Physiology: Left hand (DII) and Right hand (DID) grip (Dynamometer), Difference of the two grips (DIF), Systolic Blood pressure (PRS), Diastolic Blood pressure (PRD), Difference of Blood pressure (DPR), Vital Capacity (ESP), Menarche (MEN).

Sociodemography: Father's and mother's age (EDP; EDM), Educational level of the father and the mother (ETP; ETM), Father's and mother's profession (PRP, PRM), Endogamy (END), Family size (TAF), Parity (PAR), Viability (VIA), Tobacco comsumption (FUM).

Nutrition: Number of meals in a day (NCD), Number of meals with Carbohydrates (NCF), Calcium NCC), Proteins (NCP) and Vegetables (NCV).

Calculated indexes: Cormico Index (ICO), Quetelet Index (IQE), Robusticity (Rohrer Index, IRO), Cephalic Index (ICE), Facial Index (IFA). (These abbreviations are used in Table 1.)

The CCPP analysis were carried out in each age, sex and region group. In this short study only three groups are presented: preadolescents (8.5 year old), adolescents (in girls: 12.5, 13.5, 14.5 year old, and in boys: 13.5, 14.5, 15.5 year old groups), adults (17.5 year old group and young adults) of each region and both sexes.

Results

Preadolescent girls: The first factor in all the three regions was distinguished by morphophysiological variables against paragenetic variables. The second factor was distinguished by the opposition between the paternal ages and their socioprofessional variables (Table 1 and Fig. 1).

Preadolescent boys: The first factor keeps characterized the women's scheme (morphophysiological variables against paragenetic variables) although in the Mancha group the morphophysiological variables were opposed to the endogamy. The second factor in the Mancha group was distinguished by the opposition amongst the vital capacity, hand grip (dinamometer), blood pressure and skinfold fat. In the Sierra group, the socioprofessional variables distinguished this factor where as the feminine scheme stands in the Alcarria group.

Table 1. **Unrotated factor loadings (pattern) for principal components (VP is variance explained by the factor)**

Char-actor-istics*	Mancha: females 14 Factor 1	Factor 2	Factor 3	Alcarria: males 8 Factor 1	Factor- 2	Factor 3	Sierra: males 17 Factor 1	Factor 2	Factor 3	
SIT	0.900	0.322	0.141	0.812	-0.243	-0.284	-0.244	0.414	-0.196	SIT
EST	0.746	0.500	0.187	0.773	-0.392	-0.296	-0.419	0.581	-0.203	EST
PES	0.943	0.078	0.188	0.905	0.109	0.164	0.751	0.224	0.164	PES
DBA	0.652	0.341	-0.543	0.574	-0.246	-0.373	0.243	0.353	0.309	DBA
DBI	0.283	-0.250	-0.538	0.751	-0.228	-0.262	-0.142	0.408	-0.067	DBI
GRT	0.235	-0.499	0.544	0.808	0.349	0.219	0.850	-0.232	0.017	GRT
GRE	0.372	-0.440	0.050	0.648	0.497	0.424	0.753	-0.501	0.047	GRE
GRS	0.425	-0.479	-0.057	0.638	0.447	0.443	0.718	-0.524	-0.039	GRS
PAS	0.484	-0.099	0.440	0.668	0.146	-0.183	0.519	0.365	0.105	PAS
PAD	0.158	0.617	0.134	0.570	0.343	-0.098	0.358	0.112	0.407	PAD
DPR	0.295	-0.495	0.499	0.349	0.252	-0.184	0.359	0.411	-0.305	DPR
DID	0.316	-0.387	-0.500	0.542	0.040	-0.002	0.270	0.690	0.215	DID
DII	0.371	-0.351	-0.489	0.397	0.109	0.104	0.084	0.433	0.462	DII
ESP	0.151	0.175	-0.243	0.571	-0.447	0.078	-0.319	-0.119	0.106	ESP
DIF	0.055	-0.152	0.152	0.146	-0.161	-0.209	0.210	0.147	-0.511	DIF
LTB	0.782	0.497	0.044	0.563	-0.533	-0.150	-0.492	0.395	0.101	LTB
LTP	0.906	0.080	-0.031	0.701	-0.324	-0.175	-0.299	-0.494	0.187	LTP
CCC	-0.020	0.412	0.643	0.642	-0.040	-0.098	-0.232	0.469	0.037	CCC
CCB	0.555	-0.335	0.305	0.833	0.255	0.269	0.727	0.270	0.082	CCB
CCM	0.363	-0.224	0.670	0.771	0.064	-0.083	0.920	0.069	-0.076	CCM
CCP	-0.124	0.372	0.111	0.879	0.175	0.106	0.326	0.276	-0.320	CCP
PEA	0.371	-0.193	0.307	0.797	0.278	0.187	0.815	-0.265	0.167	PEA
MEN	0.118	0.551	0.382	0.790	0.084	-0.122	0.331	0.294	0.145	ABZ
ABZ	0.815	-0.003	-0.296	0.598	0.196	-0.416	0.377	0.406	0.125	ACE
ACE	0.639	0.194	-0.202	0.657	-0.065	-0.473	0.469	0.461	-0.040	LCE
LCE	0.281	0.807	-0.098	0.586	-0.064	0.173	0.071	0.461	-0.280	AMC
AMC	0.863	0.230	-0.176	0.256	0.174	-0.154	0.454	-0.175	0.006	ICO
ICO	0.631	-0.350	-0.067	0.638	0.485	0.476	0.908	-0.137	0.242	IQE
IQE	0.658	-0.392	0.415	0.285	0.649	0.600	0.888	-0.263	0.247	IRO
IRO	-0.006	-0.584	0.200	0.169	0.365	-0.102	0.076	0.414	0.220	ICE
ICE	0.405	-0.588	-0.263	-0.300	-0.148	0.341	0.094	0.497	-0.014	IFA
IFA	-0.257	0.311	0.269	0.122	-0.491	0.459	-0.192	-0.405	-0.325	PRP
PRP	0.053	0.355	-0.190	0.112	-0.061	-0.259	-0.243	-0.151	-0.030	PRM
PRM	-0.174	0.799	0.271	0.142	-0.411	0.579	-0.339	-0.341	-0.201	ETP
ETP	-0.174	0.799	0.271	0.029	-0.397	0.654	-0.018	-0.129	-0.034	ETM
ETM	-0.127	0.787	0.178	-0.239	-0.446	-0.387	-0.311	-0.193	0.608	TAF
TAF	0.397	0.148	0.505	-0.305	0.627	-0.356	-0.352	-0.131	0.696	PAR
PAR	-0.423	-0.313	0.557	0.285	-0.412	0.074	-0.155	-0.299	0.097	END
END	0.018	0.823	0.063	0.101	0.680	-0.287	-0.316	-0.368	0.611	EDP
EDP	0.261	-0.582	0.457	-0.191	0.627	-0.325	-0.269	-0.416	0.601	EDM
EDM	-0.028	-0.423	0.671	-0.106	0.513	-0.097	-0.017	0.201	0.749	VIA
VIA	0.229	0.127	-0.352	0.000	0.000	0.000	-0.264	0.004	0.418	FUM
FUM	-0.336	-0.273	0.021	-0.029	-0.350	-0.087	-0.107	-0.280	-0.220	NCD
NCD	0.151	0.211	0.466	0.134	-0.187	0.085	-0.387	-0.373	0.202	NCP
NCP	0.551	0.306	0.570	0.399	0.176	0.243	0.231	-0.428	0.017	NCF
NCF	0.016	-0.168	0.616	0.319	-0.450	-0.188	-0.117	-0.019	-0.434	NCC
NCC	0.195	0.149	-0.599	0.060	-0.291	0.525	0.108	-0.472	-0.044	NCV
NCV	0.435	0.240	0.349							
VP	25%	15%	11%	23%	17%	9%	24%	16%	9%	

*Abbreviations used in this table are explained in text, see: Material and Methods

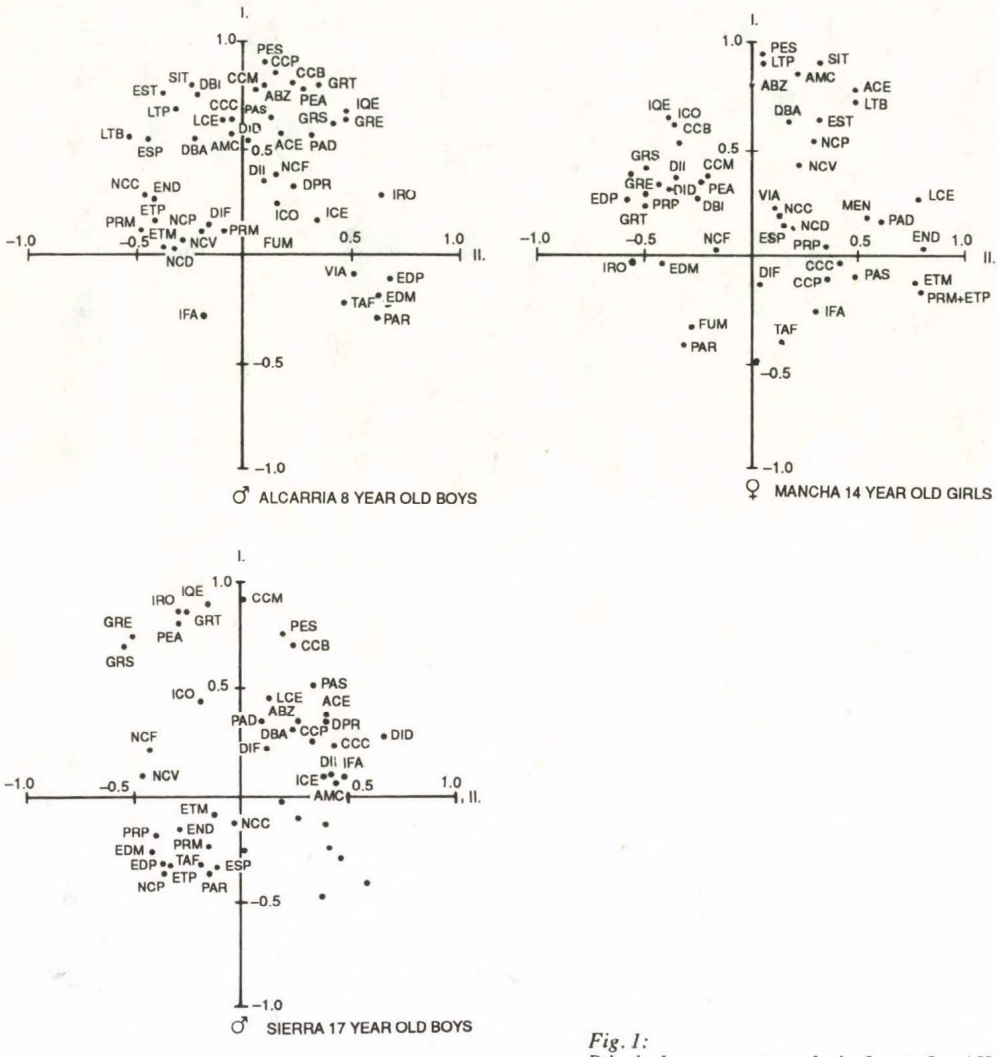

Fig. 1:
Principal components analysis, factors I and II

Adolescent girls: A dissociation between height and weight was observed in the 13.5 year old Mancha girls, and in the Sierra and Alcarria girls a year later. The first factor, however, continuously were defined by morphophysiological variables in opposition to the paragenetic variables. In the second factor an opposition between socioprofessional and paragenetic variables was observed. In 14.5 year old group, the second factor was defined by the the height in the Sierra and Alcarria groups, and by the endogamy in the Mancha group.

Adolescent men: In the three age groups the first factor was distinguished by the morphophysiological variables, against the paragenetic variables. In the Mancha group endogamy existed against the morphophysiological variables. In the second factor

heights, lengths diameters and vital capacity were against the skinfold fat and Cormico, Robusticity of Rohrer and Quetelet Indices, being less marked in the Mancha group where the second factor was distinguished by paternal socioprofessional variables.

Adult women: There was a tendency to dissociation size – shape and height – weight in the three regions, although the first factor continuously were defined by the morphophysiological variables which were against to the nutritional variables in the Sierra group, to the paragenetilc, socioprofessional variables, endogamy, vital capacity and hand grip (dynamometer), in the Alcarria group and to the paragenetic variables in the Mancha group. The second factor in the Mancha group was distinguished by the endogamy and socioprofessional variables which were against the paragenetic variables. In the Sierra group it was distinguished by height, cephalic variables, vital capacity and blood pressure, against the skinfold fat and menarche. In the Alcarria group it was distinguished by the opposition among the circumferences, indices and weight against lengths, height and menarche.

Adult men: The first factor was distinguished by the morphophysiological variables which were against the height in the Sierra and Alcarria groups. In the Sierra men the size variables were associated with the socioprofessional variables. The nutritional variables were against the shape variables in the Alcarria and Mancha groups. The second factor was distinguished by the paragenetic variables which were against the height in the Sierra and Alcarria groups.

Conclusions

Based on these results one can see that it isn't easy to synthesize all the relations observed among the variables.

In growth process in both sexes there was observed an opposition between morphophysiological and paragenetic variables. These results show like family size and high parities have negatives repercussions on the individual growth. In the most age groups studied, the profession and educational level of the father was against the parameters which define the development of the subcutaneous adipose tissue. This is understandable because a high economical and cultural status allows the access to a more balanced nutrition while the most unfavourable status have diets rich in carbohydrates. In both sexes of the Mancha population during the puberty there was an opposition between the endogamy level and body size. This implies that a bigger heterosis helps the somatic development of the individual, in a favourable environment.

Out of the three regions, the Mancha group shows a bigger heterosis and socioeconomical development. In general, during the preadolescent and postadolescent periods the size and shape variables (height and weight) were associated, becoming independent in the adolescent and adult periods. This would show that the tallest individuals aren't always who have the bigger weight.

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SEXUAL MATURATION AND SOCIOFAMILIAL CONDITIONS' IN SCHOOL BOYS AND GIRLS IN SOFIA

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Abstract: *A sample of 447 boys and 465 girls from different districts of the city of Sofia was examined in the years 1984 and 1987. A considerable variation in the age at menarche in girls asnd in the age at first puberty signs in boys was noted, depending on parents' education, fathers' occupation, incomes per capita, number of children in family, dwelling conditions and type of household. The median age at menarche of the total material is 12.86 ± 0.11 years and there are no significant changes during the last two decades. A new fact, early maturation in children from extended and multiple households in difficult dwelling conditions was noted.*

Key words: *Puberty in boys and girls; Menarche; Sociofamilial conditions; Type of household.*

Introduction

The aim of the present study is to examine the process of sexual maturation of boys and girls in Sofia in connection with the individual sociofamilial environment. There are many studies on the influence of different sociofamilial factors on the process of sexual maturation, mostly on the age at menarche (review: Danker-Hopfe 1986). But in Bulgaria only the differences in age at menarche between town and village girls are reported in few papers (Damyanova 1974, Karamanlieva 1973, Katsulov, Ivanov 1973, Rashkova-Andreeva 1978) and there is not a more detailed study. In the 1980s in Bulgaria a semiofficial thesis was that there exist only very small social differences in terms of puberty because the social homogenity is reached (Stanchev 1981).

Material and methods

447 boys and 465 girls, aged 9 to 17 years are investigated in the city of Sofia (366 800 inhabitants in 1946, 1114 800 in 1985). The investigation is carried out in 1984 and 1987 in three schools in different districts of the city: a) in the central part; b) in Geo Milev district, built-up about 1965; c) in Nadezhda district, built-up about 1980. The sociodemographic structure of these districts is different.

The secondary sexual signs were evaluated from 0 to 3 (Miklashevskaya 1983). If needed, inte4rmediate marks are used (0.5, 1.5, 2.5). The summary sexual maturation index (SMI) by Schwidetzky and Pavilonis was calculated, too. This index is a generalization of the particular sexual maturation signs and varies from 0 to 12. Its rubrication is: 0 – child stage; 0.5 – first puberty signs, prepuberty in boys; 1.5 (2.0) – early puberty, "phasis cetera" in boys (girls); 5.0 (6.5) – late puberty, "phasis lenta" in boys (girls); 10.5 – postpuberty; 12.0 – adult stage. (More details can be find in: Cieslik et al. 1986, Martirosov (1982). The age at the different stages of sexual maturation was evaluated by probit analysis.

An investigation for the sociofamilial conditions is carried out among the parents of the schoolchildren. For evaluation of the influence of the sociofamilial environment on sexual maturation, age at menarche in girls and age at first puberty signs in boys are

used. Single age groups divided by sociofamilial subsamples are not numerous. So three year moving average ages and sums are used to calculate the proportion of girls with menses (boys with puberty signs) in connection with the age, which is the base of probit analysis. Using this method we recedive a good evaluation of the median age, but an overestimation of the standard deviations, so in Table 5 only medians and their standard errors are presented (see also table 6).

Results and Discution

The process of sexual maturation in adolescents in the city of Sofia is demonstrated in the tables 1 to 3.

The median age at menarche is 12.86 ± 0.11 years. The results of the investigations on the age at menarche in Sofia during 1960–1980 differ strongly, from 12.5 to 13.1 years, when in recalled age studies in girls under 16 the correction needed is made (Angelov 1970, Damyanova 19754, Katsulov, Ivanov 1973, Todorov, Vizev 1979, Kadanoff et al. 1976). This wide variability is practically the same as the variabillity among city districts, established in the course of the present study (Table 4), which is due to the differences in the familial environment. In the city centre the educational and professional levels of the parents are higher, and the living conditions are better. Unfortunately, in earlier studies neither school localisation nor sociofamilial environment were taken into consideration. Thus it seems that there are no significant changes of the age at menarche in Sofia during the last two decades.

Table 1. **Sexual maturation in Sofia girls**

Age at last birthday (years)	n	Girls with menses		Mean stage of the secondary sexual signs (0–3)			Mean sexual maturation index (0–12)
		n_m	p (%)	Ma	Pu	Ax	
9	34	–	0	0.21	0.03	0	0.24
10	66	2	3.1	0.40	0.33	0.09	0.91
11	65	6	9.2	0.72	1.08	0.39	2.47
12	58	23	39.7	1.28	2.00	1.03	5.50
13	86	72	83.7	1.90	2.62	1.78	8.81
14	49	45	92.8	2.15	2.81	2.36	10.02
15	63	62	98.4	2.25	2.87	2.41	10.49
			98.1				
16	41	40	97.6	2.49	2.94	2.63	10.99
17	3	3	100.0	3.00	3.00	3.00	12.00

Table 2. **Sexual maturation in Sofia Boys**

Age at last birthday (years)	n	Mean stage of development of thesecondary sexual signs (0–3)			Mean sexual maturation index (0–12)
		Pu	Ax	Ba	
9	34	0.01	0.01	0	0.04
10	54	0.17	0.04	0.01	0.28
11	84	0.20	0.03	0.01	0.31
12	72	0.87	0.22	0.04	1.47
13	69	2.04	0.60	0.14	3.71
14	60	2.62	1.14	0.36	5.49
15	36	2.83	1.74	0.94	7.35
16	29	2.91	2.34	1.72	9.31
17	9	2.89	2.56	2.44	10.52

Table 3. **Age at some stages of sexual maturation in Sofia girls and boys (years)**

Signs:		Girls Mean	m	s	Signs:		Boys Mean	m	s
Menarche		12.86	0.11	1.29	Pu	0.5	12.32	0.13	1.43
Ma	0.5	10.29	0.17	1.54		1.5	12.86	0.11	1.23
	1.5	12.31	0.12	1.32		2.5	13.59	0.11	1.21
	2.5	15.56	0.23	2.36		3.0	14.40	0.13	1.60
	3.0	17.03	0.49	2.83					
Pu	0.5	11.13	0.10	0.97	Ax	0.5	13.56	0.15	1.79
	1.5	11.76	0.09	0.93		1.5	14.72	0.14	1.41
	2.5	12.97	0.09	1.05		2.5	16.44	0.28	1.84
	3.0	13.57	0.14	1.89		3.0	17.39	0.51	1.94
Ax	0.5	11.59	0.13	1.24	Ba	0.5	14.30	0.14	1.44
	1.5	12.75	0.10	1.21		1.5	16.07	0.17	1.17
	2.5	14.82	0.15	1.87		2.5	17.30	0.39	1.31
	3.0	15.81	0.22	2.07		3.0	17.73	0.56	1.38
SMI	0.5	10.16	0.14	1.17					
	1.0	10.88	0.11	1.12	SMI	0.5	12.30	0.13	1.43
	2.0	11.54	0.10	0.98		1.5	12.76	0.11	1.32
	6.5	12.97	0.10	0.94		5.0	14.27	0.11	1.16
	10.5	14.87	0.15	1.83		10.5	17.10	0.33	1.31
	12.0	17.17	0.36	1.63					

Table 4. **Sexual maturation in different city districts of Sofia (years)**

Disctrict	Girls: menarche n	Mean	m	s	Boys: first puberty signs n	Mean	m	s
Centre	112	12.35	0.14	0.85	149	11.72	0.11	0.63
Geo Milev	78	12.62	0.19	1.23	175	12.27	0.12	1.21
Nadezhda	275	13.15	0.16	1.37	123	12.31	0.13	1.53

The research has found that the maturation in girls is earlier in families with less children, higher education of the parents, with fathers nonmanual workers. The occupation of the mothers seems to have a small influence on the sexual maturation of their children, since there are many women nonmanual workers with only secondary education. The differences in age at menarche in connection with the monthly income per capita are very well expresed (13.1 o. 11.8 years). This is probably connected with the influence of the income on the proteine diet (Table 5).

On the contrary, the differences in connection with the dwellig surface per capita are not very clear. They are complicated by the different disposition of the dwellings, which determines the number of inhabitans per room, and also by the type of the household. In extended and multiple households the children mature early, although they live in more difficult dwelling conditions. Moreover, in the small households when the number of inhabitants per room is higher, the sexual maturation is retarded. In the households with relatives, however, the girls, living in dwellings with 2.5 and more inhabitants per room mature most early. Thus there are two minima in the curve of the connection of the age at menarche and the number of inhabitants per room: in girls living in the best and in girls living in the most difficult dwelling conditions.

Table 5. **Sexual maturation in Sofia girls and boys in function of different sociofamilial conditions (years)**

Conditions		Girls: menarche n	Mean	m	Boys: first puberty signs n	Mean	m
number of sibs	0	102	12.46	0.11	109	12.26	0.12
	1	318	12.81	0.08	338	12.40	0.07
	2–3	45	13.22	0.21			
father's education	high	130	12.61	0.11	189	12.33	0.12
	secondary	110	12.94	0.14	86	12.56	0.12
	primary	25	13.36	0.36			
mother's education	high	124	12.54	0.12	168	12.48	0.10
	secondary	131	12.90	0.13	107	12.55	0.15
	primary	14	14.28	0.32			
father's occupation	manual work	107	13.13	0.15	67	12.55	0.19
	nonmanual	161	12.56	0.10	220	12.38	0.09
mother's occupation	manual work	51	12.79	0.20	30	12.38	0.27
	nonmanual	214	12.72	0.09	247	12.43	0.08
monthly income per capita (leva)	less than 99	83	13.06	0.16	63	12.76	0.22
	100–139	101	12.95	0.14	93	12.63	0.14
	140–179	45	12.55	0.22	65	12.39	0.17
	180 and more	23	11.84	0.26	28	11.95	0.38
dwelling surface per capita, m^2	less than 9.9	23	12.98	0.31	26	12.41	0.37
	10–19.9	130	12.95	0.13	101	12.33	0.11
	20 and more	93	12.65	0.13	119	12.49	0.12
inhabitants per room	0.5 –1.25	38	12.48	0.18	54	12.23	0.35
	1.33–1.5	62	12.78	0.19	68	12.62	0.14
	1.67–2.33	84	13.53	0.17	66	12.60	0.17
	2.5 and more	73	12.34	0.17	57	12.53	0.14
type of the household	simple	179	12.87	0.11	158	12.46	0.10
	extended	49	12.69	0.17	99	12.33	0.09
	multiple	39	12.37	0.22			
inhabitants per room (simple household)	0.5 –1.25	27	12.54	0.19	39	12.01	0.75
	1.33–1.5	59	12.86	0.20	58	12.66	0.17
	1.67–2.33	60	13.28	0.21	38	12.64	0.28
	2.5 and more	27	13.08	0.46	19	13.10	1.48
(extended and multiple household)	0.5–2.33	38	13.11	0.11	53	12.58	0.18
	2.5 and more	46	12.23	0.19	38	12.41	0.21

The differences in the age at the first puberty signs in boys in connection with their family environment follow the differences in the age at menarche in girls, but they are not so well expressed (Table 5). Perhaps it is due to some subjectivity and indetermination in the evaluation of the appearance of the secondary sexual signs. However, when in girls the dependence of the sexual maturation on some factor is well expressed (for example, on income), it is well expressed and statistically significant in boys too ($p = 0.001$ in girls, $p = 0.05$ in boys).

For more connections between sexual maturations and sociofamilial environment established by this study parallels could be found with other investigations (Laska-Mierzejewska 1983, Bodzsar 1975, Danker-Hopfe 1986). But the authors could not find a research on the dependence of the sexual maturation on the type of household. The early sexual maturation in adolescents from households with relatives in difficult dwelling conditions could be connected with the influence of the psychical faktors (Hulanicka 1986).

In conclusion, the sexual maturation of adolescents in Sofia is under the strong influence of the sociofamilial conditions. This influence is expressed both in boys and girls. A new fact is the type of connection between dwelling conditions, the type of household and sexual maturation: early maturation in children in extended and multiple households in difficult dwelling conditions.

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AGE AT MENARCHE, TREND AND ENVIRONMENT IN A RURAL SAMPLE OF NORTH-ITALIAN WOMEN

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Abstract: *Our study explores some interrelations of environmental conditions with the age at menarche in a rural sample of 1202 women born between 1900 and 1969 in two villages of Emilia-Romagna region (North-Italy). A decrease in the age at menarche was evident during the first 7 decades of this century. This decrease was stronger in rural environments than in urban one. An evident influence on maturation was exerted by the pre-puberal activity of the subject and the socioeconomic environment (tested through father/mother activities). The age at menarche of girls of our sample was also influenced by the familly size.*

Key words: *Menarche; Environment; Secular trend.*

Introduction

Adverse environmental factors can cause growth retardation in man. The type and degree of the response of the organism depends above all on the length of exposure time to these adverse factors. The determinants of growth performance were grouped for practical purposes in two major categories (Ferro–Luzzi 1984): direct determinants (food intake and infectious diseases) and indirect determinants, which are all those conditions (income, family size, overcrowding, etc.) that affect the direct determinants. Although the genetic control of the timing of growth is demonstrated in the best way by the heritability of menarcheal age (Tanner 1981), nevertheless the last trait too is influenced by environmental conditions. As evidence of this influence, we can mention the decrease in age at menarche during the last century. It is probable that there are many causes for the secular trend (from improved nutrition to natural selection and increased heterosis). As regards the trend in menarcheal age, in particular, the improvement of environmental quality may be the most powerful factor (Johnston 1974).

The present study explores changes of age at menarche in girls from the country during this century, and relations between age at menarche and some indirect determinants.

Materials and Methods

The analysis was performed by means of retrospective method on 1202 women born between 1900 and 1969 in the boroughs of Medicina (737) and Castel bolognese (465). Both boroughs are in the vicinity of the town of Bologna, seat of local government in Emilia-Romagna region (North Italy). The principal economic activity in both the boroughs, at the beginning of the century, was agricultural, followed by handcrafts and by industry.

The research includes women living in the above mentioned villages and in the rural hamlets of the two boroughs. The women were interviewed in their houses and were

encouraged to remember the date of the first menstruation with precision, eventually helping them to associate this event with other contemporaneous ones.

The secular trend of age at menarche was represented through straight lines according to the least squares method on the basis of mean values of the trait for each birth decade. The statistical comparisons among subsamples (formed respectively on the basis of subject activity in pre-puberal age, parents activity, order of birth) were carried out through a test of equality of group means: ANOVA. Moreover a pairwise t-test between every pair of groups were computed and accompanied by Bonferroni probabilities. The Bonferroni's multiple T is a simultaneous test of the hypotheses relative to comparisons (the level of significance depends upon the number of comparisons) (Camussi et al. 1986).

Results

A change in age at menarche had taken place during the first 70 years of this century (Table 1). The trait variability (SD) is decreasing from the beginning of the century to the last decades considered, slowly at first and then rapidly. The constant anticipation of age at menarche of girls living in Medicina and Castel Bolognese is pointed out by the course of the regression lines in Fig. 1. In the same figure and with comparative intent we also reported the course of the regression line in a town sample from Bologna (Benassi Graffi et al. 1980) restricted to 1037 women born after 1900 (on a total sample of 1811 women born after 1850). There is an increase in angular coefficient from rural villages |0.22| to Bologna |0.25|. The coefficients of determination are very similar in rural and urban samples.

Table 1. **Age at menarche with regard to birth decades**

Decades	N	Mean	SD
1900 – 09	27	13.74	1.62
1910 – 19	125	13.73	1.78
1920 – 29	239	13.56	1.76
1930 – 39	218	13.21	1.52
1940 – 49	202	12.91	1.49
1950 – 59	273	12.50	1.29
1960 – 69	118	12.77	1.17

If we take into consideration firstly the relation between age at menarche and type of activity of the subject in pre-puberal age, a difference in age at menarche greater than 1.5 year resulted between the groups with non-manual activity (students) (n=540, $\bar{x}$=12.31, SD=1.24, Range=9–17) and with manual activity (n=317, $\bar{x}$=14.08, SD=1.49, Range=9–19). The mean values of age at menarche in relation to the different activities of subjects are reported in Table 2. The higher values in age at menarche may be found in farmers and factory workers; with a mean age at menarche superior of about 2 years in comparison to students. The last group has also a lesser variability of the trait and a decrease in the minimum of the range. ANOVA showed a significant difference among groups in age at menarche. F-value was greater than the tabular one, then we can refuse the null hypothesis (H_0:$\mu_1=\mu_2=...\mu_p=\mu$) with an error probability: $P < 0.0001$. The pairwise t-test (with separate variances) resulted always significative, except in the comparison: farmers/craftswomen.

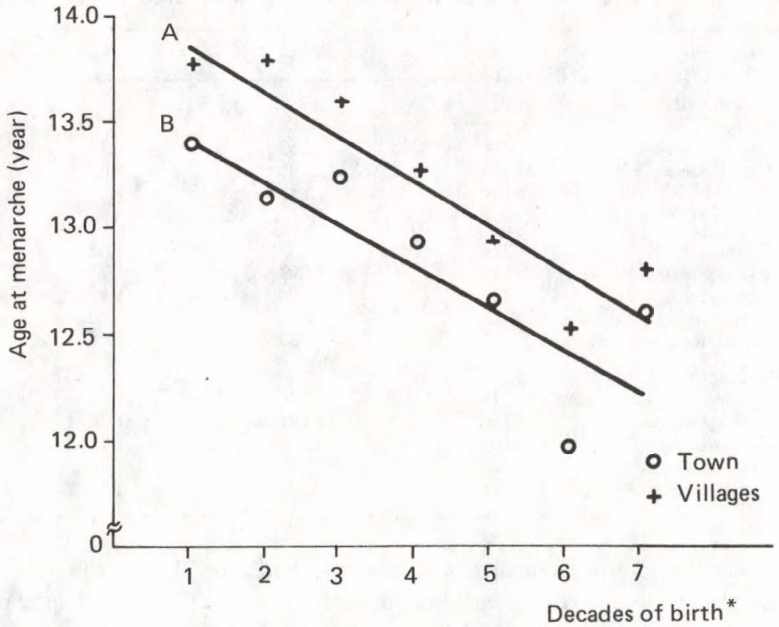

Fig. 1: Trend of age at menarche in town and in villages. –
Villages A : $y = 14.06 - 0.22x$, $r^2 = 0.89$; Town B : $y = 13.74 - 0.25x$, $r^2 = 0.85$
*The numbers from 1 to 7 correspond to decades of birth from 1900–09 to 1960–69.

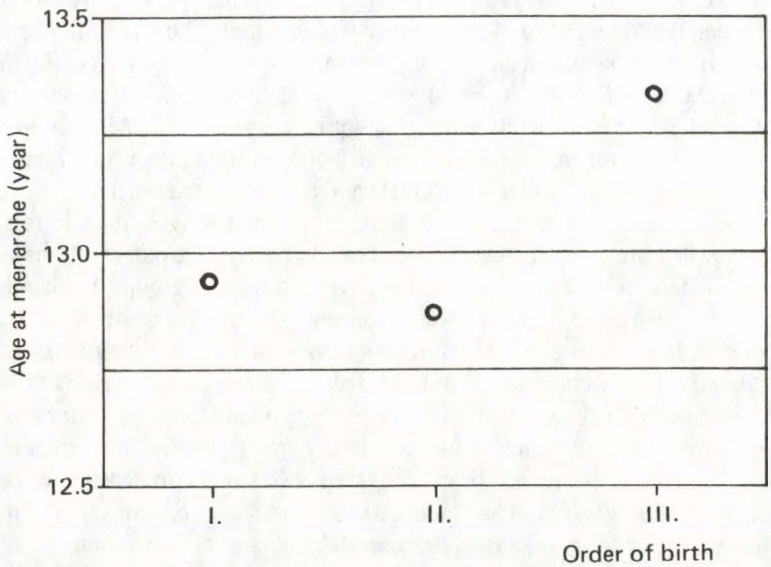

Fig. 2: Relationship between age at menarche and order of birth

Table 2. **Relationships between age at menarche and work**

Type of activity	N	Mean	SD
Subject's activity			
Farmer	118	13.84	1.52
Factory worker	74	14.63	1.39
Craftswoman	125	13.96	1.45
Student	540	12.31	1.24
Father's activity			
Farmer	374	13.33	1.62
Factory worker	282	12.97	1.73
Craftsman	236	12.80	1.43
Office worker	52	12.76	1.40
Professional man	24	12.37	1.08
Mother's activity			
Farmer	279	13.44	1.66
Factory worker	176	13.06	1.76
Crafswoman	102	12.62	1.30
Office worker	29	12.29	1.18
Home-worker	392	12.90	1.51

The socioeconomic environment has an important role on the growth. We wonder whether one socioeconomic factor such as the work activity of the father may exert an influence on menarcheal age. We considered a first simple division of our sample in two groups: daughters of manual workers asnd daughters of non manual workers. A greater precocity resulted in the second group of girls (n=76, $\bar{x}$=12.64, SD=1.31, Range=10–17) than in the first one (n=892, $\bar{x}$=13.07, SD=1.62, Range=9–19). In particular there was a greater precocity in daughters of office workers and professional men than in daughters of factory workers and farmers (Table 2), with a difference of 0.96 year in age at menarche between daughters of farmers and professional men. The variability of the trait was lesser in daughters of non-manual workers than of manual ones. The F-value was significant ($P < 0.0001$). Pairwise t-test always showed significant differences between the daughters of farmers and of all other categories of workers. The Bonferroni test resulted highly significant in the comparison between daughters of farmers and, respectively, daughters of craftsmen ($P < 0.001$) and of professional men ($P < 0.01$).

A similar trend is also noticeable if we consider the age at menarche in relation to mother's activity. We prefer to neglect the comparison between groups with manual and non-manual activities. In this case, in fact, we have also a third group (the daughters of home-workers) and there is a numerical disproportion among groups owing to the short numerical consistency of the group of daughters of non-manual working women. So let us proceed directly to the comparison among ages at menarche of girls with mothers belonging to one of the following different activity groups: farmers, factory workers, craftswomen, office workers, home-workers (there weren't professional women; Table 2). The age at menarche decreases from daughters of farmers to factory workers, to craftswomen, to office workers. The daughters of home-workers must be considered apart: they have mean values lower than those of daughters of craftswomen and of office workers. The "home-worker" category probably gathers women of very different socio-economic conditions, from unemployed women to wives of professional men. The

noticeable variability of this group in the age at menarche of daughters is an ulterior evidence of that (their range, 9–19, is equalized only by the range of the factory workers daughters). From the ANOVA a highly significant F-value ($P < 0.0001$) resulted, while the probability values of Bonferroni confirmed significant differences in the mean age at menarche between the daughters of home-workers and farmers ($P < 0.001$), between the daughters of farmers and craftswomen ($P < 0.001$), between the daughters of farmers and office workers ($P < 0.001$), between the daughters of factory workers and office workers ($P < 0.05$).

In order to assess the weight of other family influences, the age at menarche was analyzed in relation to the order of birth of the subject (Fig. 2). Some differences in menarcheal age are noticeable proceeding from the first-born or second-born daughters to the daughters born as third or more. The F-value computed on these data gave a $P = 0.033$. The Bonferroni probabilities associated to the pairwise t-test did not gain a level of statistical significance lower than 0.05.

Discussion and Conclusion

A secular trend in age at menarche was evident in Europe and in other countries of the world (U.S.A., Australia, etc.). In particular for Italy we observed a secular trend toward earlier menarcheal age in population of Bologna during a previous research (Benassi Graffi et al. 1980). With this paper we show that the phenomenon took place in the neighbouring rural villages, too. In the last environment in fact there was a mean decrease in age at menarche of 1.7 months every ten years (about 1 year in 70 ears, as a whole). This change was greater than the analogous phenomenon in Bologna, where the age at menarche decreased 1.4 months every decade (about 10 months during the same period of 70 years). In spite of the greatest ten years rate modification in rural environment, delayed ages at menarche resulted in rural villages in comparison with town also in the last decades examined; nevertheless the difference between the mean values of the two environments was reduced from 4.6 months in the first decade of this century to 2.5 months in the last decade.

Inheritance exerts a direct effect upon the age at menarche. A correlation of $r = +0.32$ for mother/daughter pairs (only $r = +0.26$ for sister/sister pairs) was pointed out by a previous research (Gualdi Russo, Veronesi Martuzzi 1983) carried out in the same area (Castel Bolognese). The correlations between mother and daughter are indicators of a definite but not preponderant family influence; only 10–15% of the total variance may be justified by genetic variation (Johnston 1974). There is a large evidence of environmental influence on age at menarche. In particular the onset would be highly sensitive to deficiencies in the diet. Malnutrition in prepuberal period slowed theonset of menarche by an average of 24 months, as it was observed in a research carried out in Alabama, U.S.A. (Dreizen et al. 1967). The greater frequency in the onset of menarche during the spring (32.6%) in our sample (the summer in some villages of Poland, Wolanski 1967) corresponds to the general course of growth, that is more rapid in spring and summer (especially as regards stature) and it has perhaps been connected with a larger vitamin intake (through fruits and vegetables) and, in general, with a more changing diet. In our sample the summer (27.4%), the winter (25.2%) and the autumn

(14.7%) were the following seasons of appearance of the first menstruation. This course kept constant in every decade of birth.

Since girls of the higher socio-economic levels are believed more precocious than girls of the lower levels (data still not confirmed in some countries: Nkiama et al. 1986, Vercauteren and Susanne 1986) we took into consideration in our study the socioeconomic conditions of girls. In this context we observed an earlier maturation and a lesser variability of the trait in the students group in comparison with other groups of girls carrying on manual work during the prepuberal age. The social changes and the decrease in work load during a premature age are probably jointly liable factors in the secular trend toward earlier age at menarche. The frequency of students changed from 14.3% in girls born in the first decade of the century to 95.9% in girls born in 1960–69. At the same time the percent of working girls decreased: the girls involved in agricultural work passed from 42.9% (1900–09) to 0.0% (1960–69). On the other hand the actual early age at menarche and compulsory education up to 14 (as from 1963–64) make work in pre-puberal age difficult. Although country children could be occasionally involved in agricultural work. The pre-puberal activity of the subject would not only be an indirect determinant as indicator of social level, but also a direct determinant. Growth can be delayed in fact as a consequence of the energetic expenditure and of physical effort in intense pre-puberal activity.

In relation to occupation of the father, we observed a more precocious age at menarche in daughters of non-manual workers (office workers and professional men) compared with daughters of manual-workers. In relation to the phenomenon of secular trend we also observed the changed frequency of these occupations during the 70 years examined. The frequency of farmer fathers passed from 57.1% for girls born in the first decade to 22.9% in the last decade. A stronger decrease (about 1/3 of the initial value) took place for the craftsmen frequency, which passed from 28.6% (fathers of girls born in the first decade) to 9.0% (in the last decade). The percent of factory workers kept constant, while the percent of white-collar workers increased from 0.0% (first decade) to 13.3% (last decade).

Examining relationships between age at menarche of daughters and mother's activity, we observed an analogous lesser earliness in the daughters of women engaged in agriculture and of factory workers than in daughters of office workers. Intermediate values in the mean of menarcheal age and a greater variability (in comparison to daughters of office workers) were observable in daughters of homeworkers, a category that is probably mixed from a socioeconomic point of view. The social changes, as from the beginning of XXth century, involved a gradual decrease in the number of women who work in agriculture from 42.9% (for mothers of girls born in the first decade) to 16.0% (last decade). The "homeworker" occupation remained the prevailing job during all the period considered (the frequency passed from 35.7% for mothers of girls born in 1900–09 to 45.0% in 1960–69). The frequency of factory workers remained constant in this period and the one of office workers was always very low and present only beginning from mothers of girls born after 1930 (it passed from 1% to 7.7% in the last decade).

Rate of maturation and growth present direct associations with family size (Tanner 1981). We have no news on real size of the families of provenance of our subjects.

However, we took into consideration an indirect parameter: the order of birth. A small increase in age at menarche in relation to the increasing order of birth was pointed out in our sample. We know that the family size surely decreased from the beginning of the century. This decrease involved, as a concomitant factor, a very low frequency of girls born as third (or more) in the last decade (22.2%) than in the first one (71.4%). In a complementary way there was an increase in the frequency of first born girls in the last decade (46.0%) compared with the first one (14.3%) and of second born girls in the last decade (37.7%) compared with the first one (14.3%).

The ecosensitivity of the trait considered is well documented in rural populations of our study in relation to some socioeconomic factors. Probably the same factors are responsible for differences between rural and urban populations, in addition to selective migration, level of physical activity, etc. Moreover the secular trend may be almost in part explainable in the context of deep social and economic changes (as some of the traits we considered showed) and would be a consequence of the elimination of factors that delay the growth and maturity.

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AGE AT MENARCHE IN SARDINIA (ITALY)

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Abstract: *The median age at menarche in 2325 Sardinian girls (age 9.00 to 16.99) was calculated with the status-quo method and probit analysis (maximum likelihood estimation according to Finney 1971). Heterosis (assessed by parental endogamy) and the seasonal rhythm of menarche (coincidence between the month of menarche and the calendar month of birth and higher incidence of menarche in some months) were determined. The variations of some anthropometric measurements related to early and late menarche were calculated; the body build of the menstruating girls is greater than that of the non-menstruating ones.*

Key words. *Menarche; Probit analysis; Heterosis; Seasonal rhythm; Anthropometry.*

Introduction

Menarche (appearance of the first menstruation) which indicates female sexual maturity has been reached, depends on several different factors: constitutional, social, geographic, climatic, etc. (Tanner 1960, 1962). Changes in some of these factors (as, for example, better nutritional and hygienic conditions, less fatigue, more psychic stimuli, etc.) has led to a statistically demonstrated, progressive lowering of the age at which puberty begins. As concerns Sardinia, with the retrospective method an average age of 13 was obtained for menarche (M=13.02±1.32) (Maxia, Fenu and Floris 1974), while recently, with the status-quo method and probit analysis, the median age was found to be between 12.70 and 12.80 (Floris, Murgia, Sanciu and Sanna 1987).

Within the framework of these investigations, as suggested by Eveleth and Tanner (1978) we report here data on the examination of 2325 girls between the ages of 9.00 and 16.99, considering, besides median age, also some of the factors that influence menarche.

Materials and Methods

During the last three years 2325 girls between the ages of 9.00 and 16.99 (calculating the decimal age and then dividing the sample into groups covering six-month periods), attending different secondary schools in the city and province of Cagliari, were examined using the status-quo method. Median menarche age and its standard error were calculated by analyzing the probits (method of maximum likelihood, Finney 1971). For the age groups between 11.0 and 14.99 certain body measurements (weight, height, sitting height, brachial skinfold) and indices (skelique, body mass and fat%) were taken. These allowed comparisons between menstruated and non-menstruated girls in the same age groups.

Results

The median age of menarche in the sample examined (made up of a total of 1383 menstruated and 942 non-menstruated girls) was 12.78±0.04 χ^2=21.95; d.f.=14). This

figure, which indicates an early menarche compared with the 13.02 year found in 1974, is slightly higher than that has been found in other parts of Italy using the same techniques (12.66 year in Apulia, Grassivaro Gallo and Parnigotto 1982; 12.70 year in the Marches, Grassivaro Gallo 1984) (Table 1).

Table 1. **Age at menarche in Sardinia**

Total sample (n = 1383 menstr. + 942 non menstr. = 2325)	12.78 ± 0.04
High Endogamy	12.78 ± 0.06
Low Endogamy	12.73 ± 0.06
Families with 1–2 children	12.56 ± 0.07
Families with more than 2 children	12.92 ± 0.06
First born	12.29 ± 0.07
Second born	12.86 ± 0.08
Third born	12.96 ± 0.11
Fourth born and others	12.95 ± 0.11

On subdiving the sample into two sub-groups, one made up of girls whose parents were both born in the same town (more endogamic) and the other of girls whose parents were born in different towns (less endogamic), we found a median age of 12.78±0.06 year (χ^2=14.08; d.f.=14) in the more endogamic group and 12.73±0.06 year (χ^2=18.37; d.f.=14) in the less endogamic group.

The number of children in a family appears to influence menarche. In fact, subjects belonging to families with one or two children had a median age of 12.56±0.07 year (χ^2=11.48; d.f.=14) while those coming from families with more than two children had a median age of 12.92±0.06 year (χ^2=33.43; d.f.=14; $p < 0.01$) at menarche. At the same time, the first-born had a median age of 12.29±0.07 year (χ^2=17.21; d.f.=13) and the fourth-born 12.95±0.11 year (χ^2=4.80; d.f.=11). Thus, even taking into consideration the heterogeneity of one of the groups considered, we have further confirmation of what has been found by other authors (Bodzsár 1975, Štukovsky, Valsík and Bulai-Stirbu 1967, Pasquet and Ducros 1978, Vercauteren and Susanne 1986), that is, that menarche is delayed in large families where the economic, nutritional (fewer proteins) and in general environmental conditions are less favourable (including the fact that on the whole with an increase in the number of prelgnancies the mother's age increases, making the intrauterine environment less favourable).

When the subject examined remembered the year, and above all the month, of menarche (fewer subjects than the overall sample) a table of contingencies could be elaborated to see if menarche had a random distribution or not.

If the occurrence of menarche is casual, we should expect a monthly frequency of 8.33% (1/12 with small variations depending on the number of days in the month), while we observed a variation between 5.13% in October and 15.97% in January. Differences between frequencies expected and those observed were significant for the months of January (χ^2=12.56; d.f.=1), October (χ^2=9.23; d.f.=1), February (χ^2=5.22; d.f.=1) and March (χ^2=5.20; d.f.=1). Considering the seasons, the expected frequency should be 25% (1/4), while the frequency observed varied from 22.27% in autumn to 28.27% in summer, although no differences were significant.

The coincidence of month of birth with month of menarche should also take place in 8.33% of cases (1/12), while in this sample it was in 12% of cases, with a significant difference (χ^2=7.61; d.f.=1) (Fig. 1). Thus the influence of some months on menarche is confirmed, probably depending on general climatic conditions, as has been observed by different authors (Valšík 1965, Valšík, Štukovsky and Janku 1973, Bodzsár 1975), while the reason for the greater coincidence noticed between month of birth and month of menarche is still not clear.

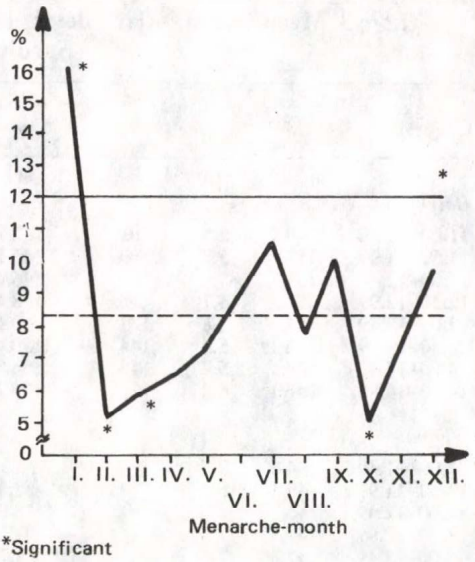

Fig. 1: Monthly distribution of the menarche in Sardinian girls

Comparison between menstruated and non-menstruated girls in the time interval between 11 and 15 years of age showed that menstruated girls were taller up to 14.5 years, while non-menstruated girls (although not numerous) were taller from 14.5 to 15.0 years of age. Menstruated girls were always heavier than non-menstruated ones. The skelique index was always greater in girls who had menstruated, with mean values indicating mesatyskelia in all age groups except for 12.00–12.49 in which they were macroskelic (but at the limits of the class), while the non-menstruating girls were always macroskelic, except at 14.50–14.99 years, at which time they were mesatyskelic (Fig. 2).

The body mass index was always higher in the menstruated group, with values between 19 and 20, while the non-menstruated group showed a more irregular trend with values between 16 and 18.

Applying Mellits' and Cheek's equation (in Frisch and McArthur 1974) we also calculated the percentage of body fat in the two groups. The menstruated group always had higher values, which increased fairly regularly from 24% to 26%, while the non-menstruated group had values below 21.2%, with variations in all age groups. It can thus be concluded, in agreement with other authors (Bayley 1943, Guerci 1972, Bodzsár 1975, Floris 1981, 1984, Capucci 1984–85, Prado Martines 1986) that girls who have menstruated, in comparison with those who have not, are, generally speaking, megasomal (taller and heavier) and brachyskelic (higher skelique index and more fat).

Conclusions

In conclusion, with few exceptions, it can be said that:

– The median age of menarche has gone down in the last few years and is now stable at about 12 years and 9 months;

– Factors such as the size of the family and the position occupied in it affect menarche, probably together with other factors such as socio-economic level, consumption of protein, age of the mother, etc.;

Table 2. **Mean and standard deviation in menstruated and non menstruated Sardinian girls**

Age (years)	Menstruated M	SD	N	Non-menstruated M	SD	N	Total M	SD	N
Height									
11.00–11.49	149.3	5.5	10	142.7	6.4	90	143.4	6.6	100
11.50–11.99	151.7	5.3	36	145.1	6.2	136	146.5	6.6	100
12.00–12.49	151.7	5.7	51	146.9	6.2	99	148.5	6.4	150
12.50–12.99	154.1	4.7	84	148.4	5.9	69	151.5	6.0	153
13.00–13.49	154.1	5.8	129	150.1	6.1	63	152.8	6.2	192
13.50–13.99	154.1	5.5	144	150.4	7.1	30	153.5	5.9	174
14.00–14.49	154.5	5.8	110	154.0	4.9	18	154.4	5.6	128
14.50–14.99	156.1	6.2	127	156.7	6.4	9	156.1	6.2	136
Weight									
11.00–11.49	44.6	9.7		36.3	7.3		37.2	8.0	
11.50–11.99	45.4	5.3		37.0	7.0		38.7	7.5	
12.00–12.49	46.1	8.6		38.6	7.1		41.1	8.4	
12.50–12.99	47.4	7.5		39.2	7.0		43.7	8.3	
13.00–13.49	47.8	7.5		41.7	8.9		45.8	8.5	
13.50–13.99	48.1	7.3		39.7	6.9		46.7	7.9	
14.00–14.49	48.3	7.1		42.3	4.8		47.4	7.1	
14.50–14.99	50.0	7.9		41.1	4.1		49.4	8.1	
Skelique index									
11.00–11.49	52.69	1.35		51.88	1.28		51.96	1.30	
11.50–11.99	52.70	1.57		51.94	1.34		52.10	1.42	
12.00–12.49	52.07	1.38		51.96	1.40		52.00	1.39	
12.50–12.99	52.42	1.44		51.97	1.11		52.21	1.32	
13.00–13.49	52.55	1.51		51.90	1.36		52.33	1.49	
13.50–13.99	52.80	1.24		51.63	1.23		52.60	1.32	
14.00–14.49	52.62	1.45		51.78	1.14		52.50	1.43	
14.50–14.99	52.76	1.41		52.29	2.03		52.73	1.45	
Body mass index									
11.00–11.49	20.00	4.17		17.81	2.74		18.03	2.96	
11.50–11.99	19.73	2.20		17.47	2.43		17.94	2.55	
12.00–12.49	19.98	3.23		17.78	2.51		18.53	2.96	
12.50–12.99	19.97	2.81		17.72	2.44		18.96	2.87	
13.00–13.49	20.08	2.69		18.44	3.36		19.54	3.02	
13.50–13.99	20.21	2.63		17.48	2.11		19.74	2.75	
14.00–14.49	20.21	2.90		17.86	2.03		19.88	2.91	
14.50–14.99	20.48	2.71		16.69	0.92		20.23	2.79	
Fat%									
11.00–11.49	24.32	6.67		19.32	6.25		19.82	6.43	
11.50–11.99	24.61	4.63		18.79	6.11		20.01	6.28	
12.00–12.49	24.68	5.94		19.68	5.96		21.38	6.39	
12.50–12.99	24.90	5.20		19.59	6.26		22.51	6.27	
13.00–13.49	25.30	4.96		21.06	6.74		23.91	5.94	
13.50–13.99	25.60	4.79		19.34	5.13		24.52	5.38	
14.00–14.49	25.58	4.90		20.61	4.29		24.88	5.11	
14.50–14.99	26.22	4.76		18.07	2.63		25.68	5.07	

– Menstruated girls are larger in body measurements and shorter-limbed than those who have not yet menstruated.

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MENARCHEAL AGE AND GROWTH IN JÁSZBERÉNY GIRLS

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Abstract: *A subject material of similar physiological (maturation) age was studied longitudinally. The 97 girls were subdivided retrospectively into three groups. 29 girls were studied 3–6 months after menarche (leading group); 45 girls were studied within ±3 months of menarche (middle group); and 23 girls were studied 3–6 months before it (lagging group). Body mass, lean body mass, fat per cent, six skinfolds, sitting height, stature and the height of the anterior superior iliac spine were measured in every group four times in yearly intervals of which three consecutive years were considered in the named groups. There were obvious changes in both fat and lean masses before as well as after menarche. During the year preceding it there was a decrease in body fat per cent whereas lean mass grew considerably. During the year following the menarche the rate of lean mass increase became comparatively slower and was associated with a more intense rate of fat deposition. The relative share of skinfolds diminished on the limbs and increased on the trunk in the observation period. In the premenarcheal year stature and length of the lower extremity grew fast while sitting height developed rather linearly both before and after menarche.*

Key words: *Body composition; Body dimensions; Growth; Menarche; Skinfold ratios; Jászberény girls.*

Introduction

Growth and development of children of the same chronological age often diverge so their biological ages also differ. Developmental rate is generally expressed in the state reached by body dimensions (Mészáros and Mohácsi 1984), bone (Roche 1978) and tooth maturation (Demirjian 1978). In girls physiological maturation status can be characterized by the age of menarche as well (Bodzsár 1983, Yoneyama et al. 1988).

The aim of our investigations was to establish the manner in which body composition and the intensity of growth changed before and after menarche in the girls classified by their physiological-functional status.

Material and Methods

The investigation was carried out in Jászberény (a provincional town in Middle-Hungary). At the outset in 1979, all the subjects (N=147) were either 10.5 or 11.0 years old chronologically and all were in the premenarcheal phase. The measurements were repeated in the autumn of four consecutive years. Then the girls were subdivided retrospectively into three groups each studied four times. The girls that were still in their premenarcheal phase at the age of 13.5, and 14.0 years, respectively, were omitted from the study. Of the remaining girls, all of whom had been observed both before and after menarche, 97 were only retained who were studied for the second time within 6 months after menarche ("leading group", N=29), within 6 months before menarche ("lagging group", N=23) and within three mouths of their menarche ("middle group", N=45), respectively.

This paper reports on body height, sitting height, the height of the anterior superior iliac spine, body mass and six skinfolds. Body composition was estimated by using the body fat approximation method of Siri (1956) and obtaining body density by the formula of Durnin & Rahaman (1967).

Results and Discussion

Sitting height and lower limb length contributed equally to the rapid increase of stature in the middle group (Fig. 1). The decreasing rate of longitudinal growth was above all due to the slowing rate of increase in lower limb length as sitting height grew almost linearly even after menarche. In the leading group the contribution of iliac spine height to the postmenarcheal slowing of height increase was greater than that of sitting height though the latter also grew slower. In the lagging group the decrease in the rate of longitudinal growth was very slight after menarche and was again attributable to the reduced rate of iliac spine height increase. All these facts point to a change in the rate of growth around menarche, the more important factor in which is the growth rate of the lower limb which undergoes more marked changes than the increase in sitting height.

A fast increase in body mass was noted in the studied period (Fig. 2). The rate of mass apposition was maintained also after menarche by all groups except the leading one in which postmenarcheal weight increase became slightly slower. However, this apparently steady gain in mass was associated with dissimilar trends in the share of the factors of body composition. As shown in Figure 2, there was an intense gain in lean body mass (LBM) in all the three groups before menarche. The postmenarcheal rate of LBM increase became much slower as shown b the difference between the lagging group and the two other ones. Before menarche body fat percentage was found to decrease, in contrast to its markedly rising ratio after menarche. The phase shift between the groups was, nevertheless, quite apparent, the lagging and middle groups showing the larger decrease. Therefore, in interpreting the almost steady mass gain we have good evidence that there is a switch-over in the main contributors, lean body mass dominating before menarche and fat gain after it.

Since relative body fat had been estimated by using skinfolds, we became naturally interested in analyzing the trend of fat apposition in the respective regions of the body. Absolute skinfold dimensions followed of course the trend reflected by the percentage of body fat (Table 1). When, however, the relative shares in the sum of the six studied skinfolds were analyzed (as shown in Fig. 3 summarizing the behaviour of limb fat) a slight but steady decrease was noted. This decreasing share was more marked in the middle and lagging groups.

Figure 4 shows the relative shares of the trunk skinfolds. The subscapular skinfold reflecting the subcutaneous fat layer of the upper trunk region showed a slight increase. On the other hand, the skinfolds of the lower region of the trunk displayed different tendencies. Starting from a relatively low level before menarche the growth rate of the abdominal skinfold was fast in all the three groups to become slower after menarche. The share of the iliac skinfold was, however, more or less steadily decreasing. It was a surprise, it is admitted, to observe differences in the rate of fat apposition within the same body region.

The findings indicate, therefore, that around menarche the pattern of fat deposition becomes rearranged: subcutaneous fat on the limbs grows comparatively less while on the trunk, particularly around the navel, a greater proportion of fat is deposited. This is clearly evidenced by the lagging group which had the largest proportion of fat on the limbs and the smallest one on the trunk at the time of the premenarcheal measurement

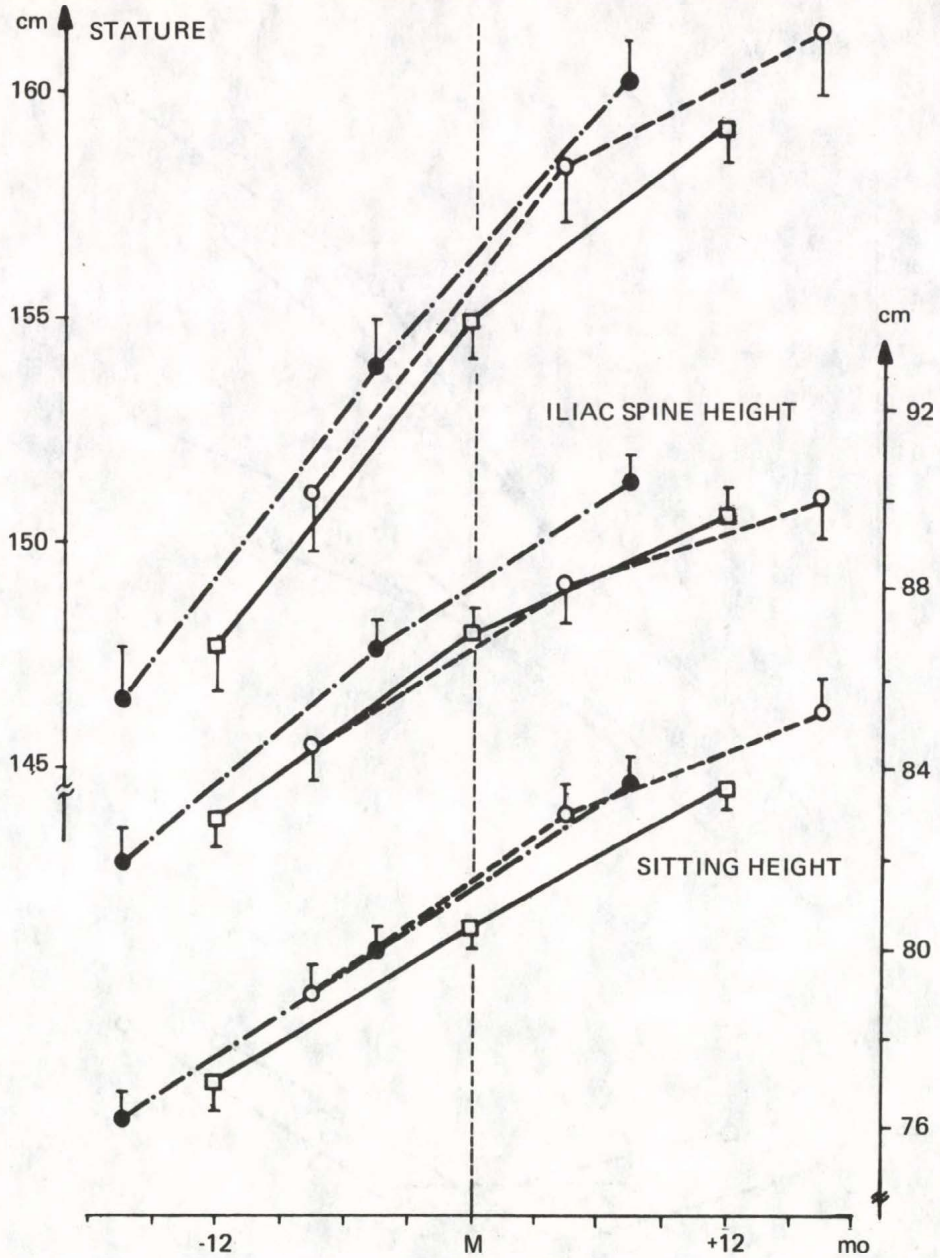

Fig. 1: Heights before and after menarche of the Jászberény girls (means ± s.e.m.). On the abscissa the date of menarche is designated by M and the scale is in trimesters.
Symbols: lagging group (n=45) ●——·——●; middle group (n=45) □——□; leading group n=29): o- - - - - -o

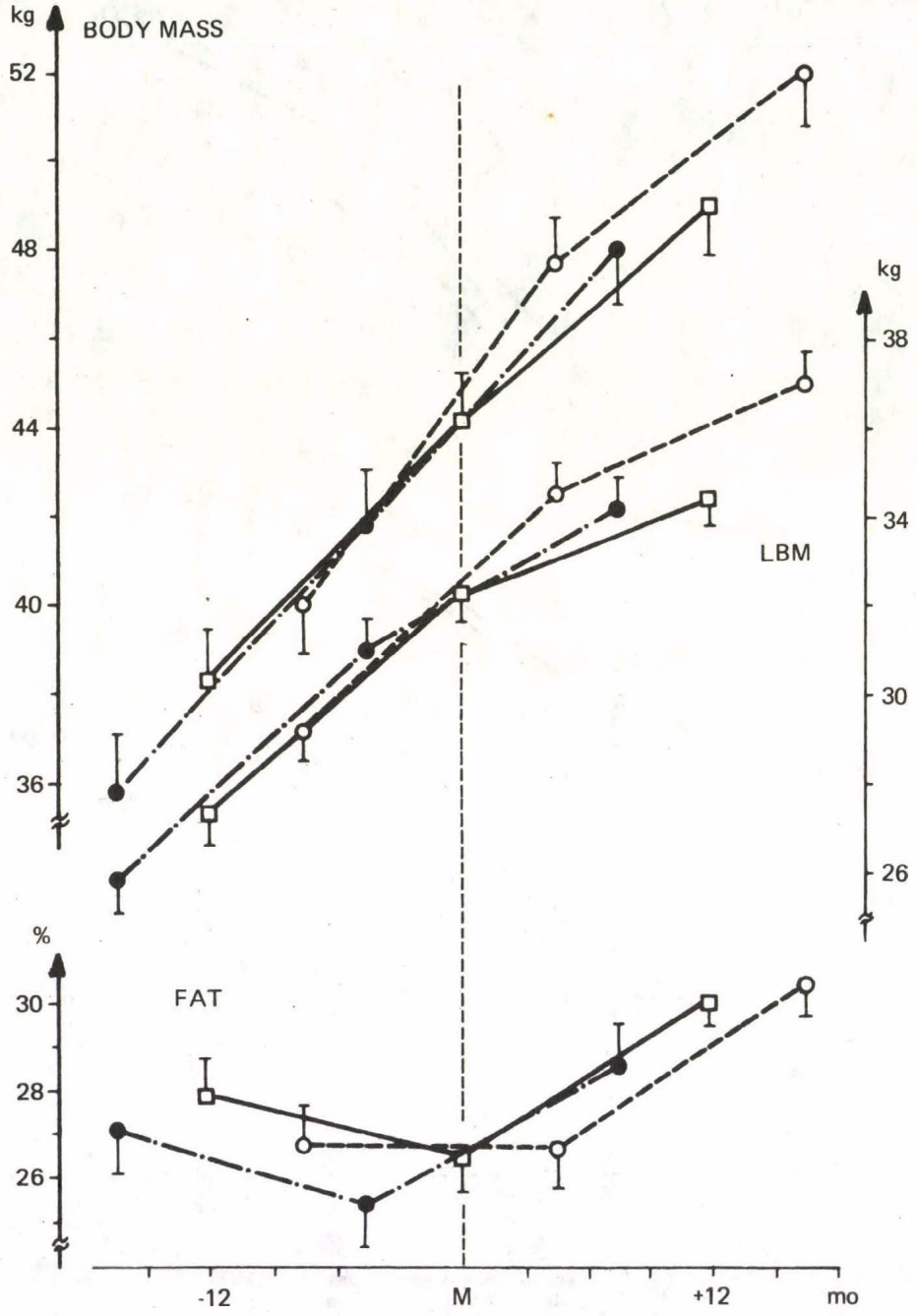

Fig. 2: Body composition before and after menarche. Symbols and marks as in Fig. 1.

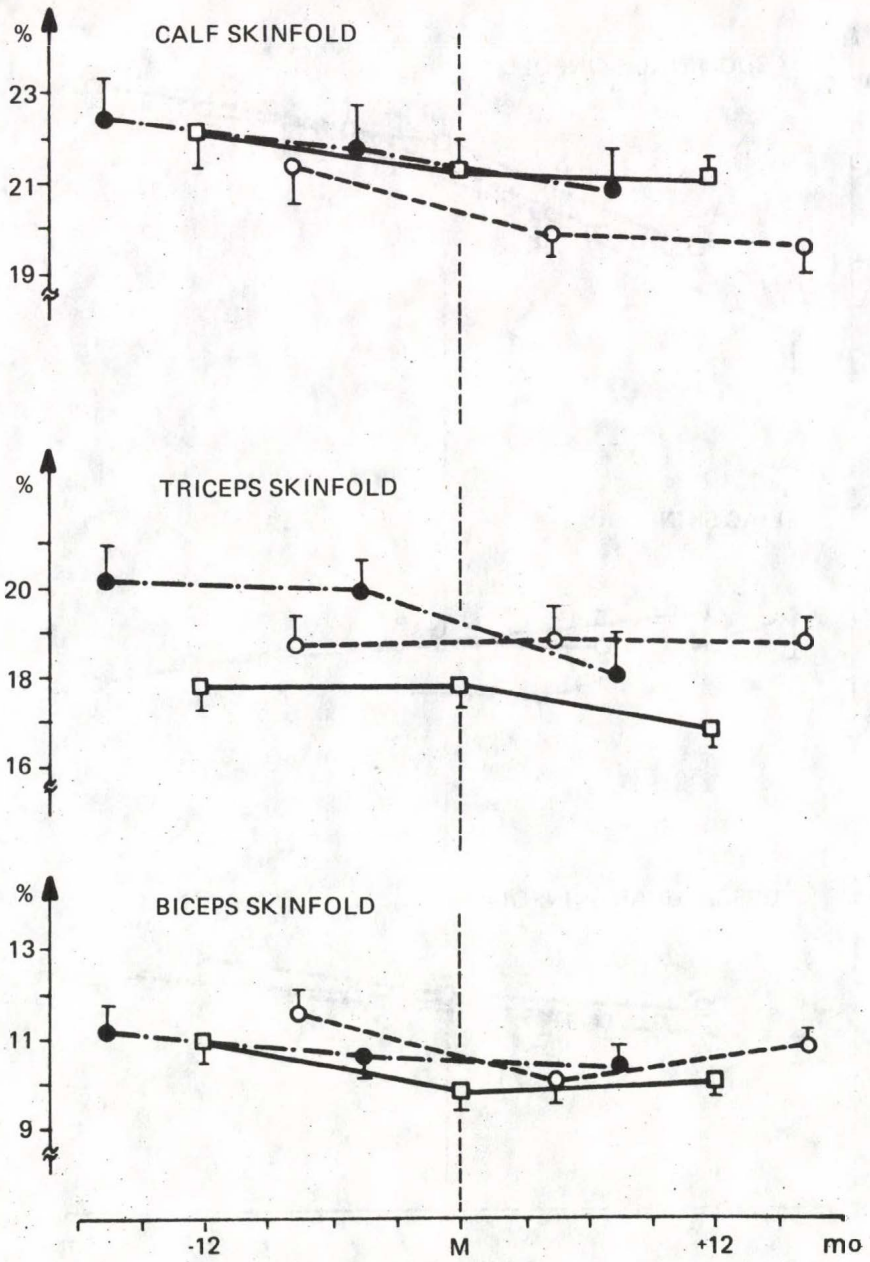

Fig. 3: Skinfolds on the limbs before and after menarche. Symbols and marks as in Fig. 1.

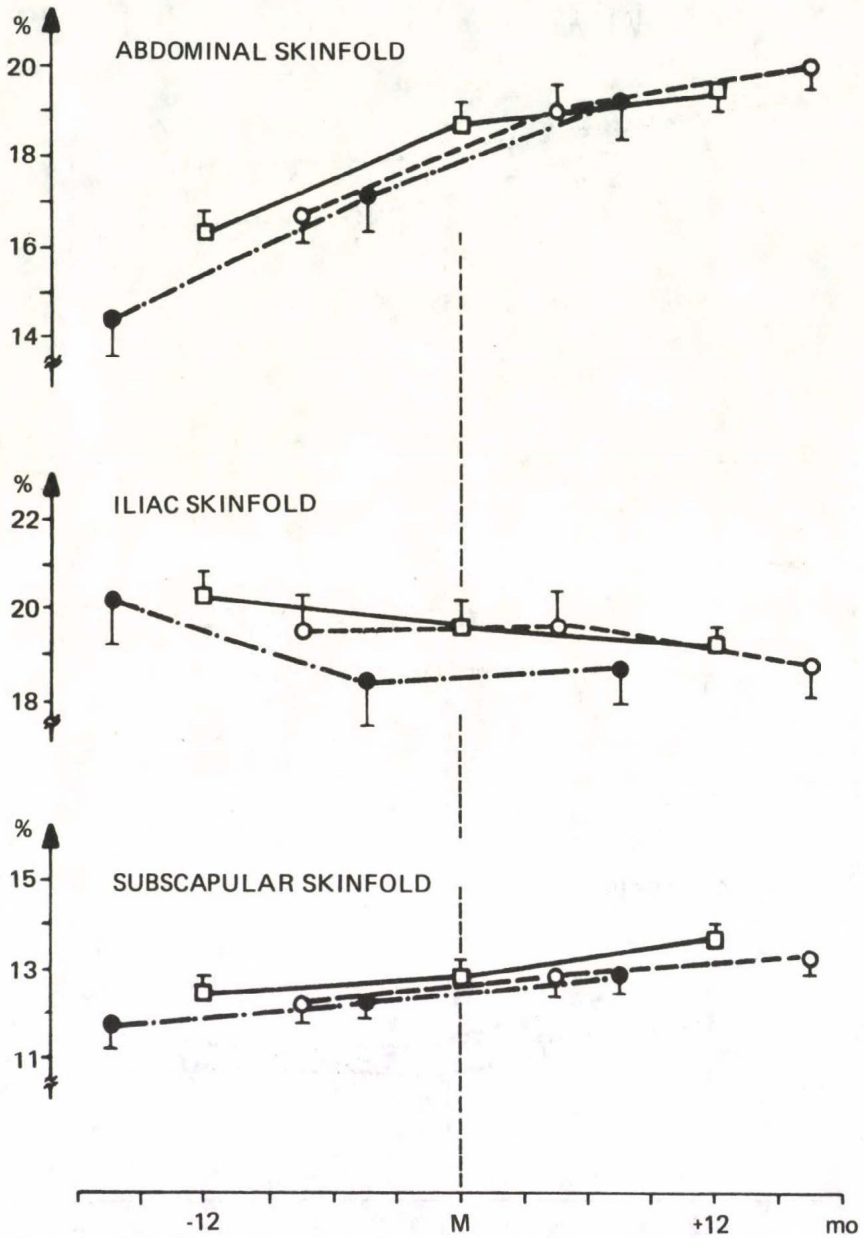

Fig. 4: Skinfolds on the trunk before and after menarche. Symbols and marks as in Fig. 1.

Table 1. **Absolute skinfold measurements of Jászberény girls (mm, $\bar{x} \pm$ s.e.)**

Skinfolds	Leading group			Middle group			Lagging group		
	before	after menarche	after	before	at menarche	after	before	before menarche	after
Biceps	9.3 ± 1.0	7.9 ± 0.7	11.4 ± 0.8	9.9 ± 0.8	7.9 ± 0.6	10.8 ± 0.7	8.6 ± 0.8	7.4 ± 0.7	9.7 ± 0.9
Triceps	14.1 ± 0.9	14.2 ± 0.8	18.1 ± 0.9	14.7 ± 0.8	13.3 ± 0.6	17.4 ± 0.8	14.9 ± 0.9	13.2 ± 0.8	16.1 ± 1.1
Calf	16.5 ± 1.3	15.0 ± 1.0	20.1 ± 1.0	18.8 ± 1.2	15.9 ± 0.8	21.5 ± 0.9	16.7 ± 1.2	14.2 ± 0.7	18.3 ± 1.0
Subscapular	9.2 ± 0.7	9.9 ± 0.7	14.1 ± 0.9	11.6 ± 0.9	10.3 ± 0.8	14.4 ± 0.9	9.6 ± 1.3	8.5 ± 0.8	11.9 ± 0.9
Iliac	15.9 ± 1.7	15.8 ± 1.5	20.3 ± 1.7	19.2 ± 1.8	16.0 ± 1.2	20.3 ± 1.2	16.9 ± 2.2	13.2 ± 1.6	17.7 ± 1.6
Abdominal	13.4 ± 1.3	14.8 ± 1.1	21.1 ± 1.3	15.3 ± 1.4	14.9 ± 1.0	20.4 ± 1.1	12.2 ± 1.7	12.2 ± 1.4	17.9 ± 1.5

and which lined up with the other two groups after menarche. A more detailed study is thought necessary to clarify the particulars of this process as well as the time needed until the regional proportions of subcutaneous fat grow stable.

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NEW ASPECTS OF THE SECULAR TREND IN JENA SCHOOLCHILDREN

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Abstract: *Anthropological investigations have been performed on Jena schoolchildren since 1880. On the basis of the last examination – carried out in 1985 – the following statements can be made on the present level and the extend of secular trend: The secular trend continues into the present, if sometimes partially weakened and with differences between the sexes, for Jena schoolchildren. There are varying secular changes of individual body measurements which cause an alteration, if only slight, in body proportions. Increases in average growth rates at any particular time are indicated as a result of the secular trend during school years. Causes of secular trend must be researched now, because an explanation of causal relationships in only possible as long as the acceleration determined changes in growth and development continue.*

Key words: *Jena Growth Studies; Secular trend.*

Anthropological examinations have been performed on Jena schoolchildren at relatively regular intervals since 1880. Thus, we have the longest existing examination series from a single town at our disposal. In the time interval between 1880 and 1985, nine representative investigations (Table 1) have been done (1880, 1921, 1932/33, 1944, 1954/55, 1964, 1975, 1980 and 1985). In most cases, the children were between the ages of 7 and 14 years. The range of the first investigations was usually limited to a few characteristics (stature and body weight were always reported). However, since 1975 the anthropological characteristic programme has been widely expanded; between 30 and 35 metric, morphological as well as physiological parameters are now included.

Table 1. **Investigations of schoolchildren in Jena 1880–1985**

Year of investigation	Number of probands	Number of anthropological characteristics
1880	1295	2 (+3)
1921	6186	8
1932/33	122 – 323 *	3
	104 – 205 *	
1944	4868 (2259 ♂; 2609 ♀)	9
1954/55	2110 (1022 ♂; 1088 ♀)	6
1964	2517 (1269 ♂; 1248 ♀)	10
1975	2115 (1062 ♂; 1053 ♀)	30
1980	1057 (540 ♂; 517 ♀)	35
1985	1621 (829 ♂; 792 ♀)	33

* for each semi-annual group

Our investigations have the following principal aims: (1) finding out the age- and sex-specific variability of the metric, morphological and physiological characteristics as well as of indices and proportions; (2) providing up-to-date standard values for our research area; (3) investigating of the effect of the secular trend on the body signs under investigation; (4) clarifying the present situation and dimensions of the secular trend in single signs and body proportions; (5) investigating of the influence of selected social factors on growth and development; (6) demonstrating correlations between the signs; and (7) ascertaining of the variability of the biological age.

Generally speaking the interval between two investigations amounts to 10 years. In this way we also can see short-term changes of growth and development in childhood and youth.

In the following statement we exclusively restrict ourselves to assertions about the effects of the secular trend of selected body signs as well as the description of the present position and dimensions of secular trend in Jena schoolchildren.

Some remarks about the secular trend of height and weight: The absolute mean differences in the body height of schoolboys and -girls between 1880 and 1985 (Table 2) are 15.3 cm and 14.5 cm, respectively. This results in a relative increase in the past 105 years of 11.8% for boys, and 11.2% for girls.

Table 2. **Overall differences in body height and body weight in Jena schoolchildren aged between 7 and 14 years (1880–1985)**

Age (years)	Boys		Girls	
	Body height (cm)	Body weight (kg)	Body height (cm)	Body weight (kg)
7	12.8	5.3	11.8	4.8
7.5	13.8	6.4	12.5	6.4
8	14.2	6.2	12.6	5.9
8.5	12.2	6.8	12.1	7.0
9	14.2	6.3	12.5	5.8
9.5	15.6	6.9	14.4	7.3
10	14.2	5.6	14.7	7.6
10.5	12.3	7.1	15.0	8.2
11	14.6	8.7	16.9	11.2
11.5	13.3	6.7	14.5	8.5
12	15.9	11.4	16.9	11.5
12.5	16.2	9.2	16.9	12.3
13	18.5	13.6	16.2	13.0
13.5	20.8	16.1	14.4	11.9
14	20.8	17.1	15.7	14.9
Overall differences	15.3	8.9	14.5	9.1

If we calculate the increase per ten years due to acceleration, the mean body height increases 1.5 cm = 1.1% (boys), and 1.4 cm = 1.1% (girls) per decade for schoolchildren aged between 7 and 14 years.

Similar results exist for example for pupils from Belgium, Hungary and Czechoslowakia (Vercauteren and Susanne 1985, Eiben 1987, Procopec 1987, Hajniš et al. 1985).

Table 3. **Mean differences in body height (cm) and weight (kg) in Jena schoolchildren aged between 7 and 14 years**

Year of investigation	1880–1921	1921–1932	1932–1944	1944–1954	1954–1964	1964–1975	1975–1985
Boys	4.7 cm	3.0 cm	0.6 cm	1.2 cm	1.1 cm	2.8 cm	0.9 cm
	2.2 kg	2.3 kg	-0.7 kg	1.1 kg	0.7 kg	1.9 kg	0.5 kg
Girls	3.9 cm	2.9 cm	-0.6 cm	2.4 cm	1.0 cm	2.7 cm	1.3 cm
	2.6 kg	2.1 kg	-1.3 kg	2.4 kg	0.7 kg	1.0 kg	0.7 kg

The differences of body height between 1880 and 1985 partly reach considerable values. Thus for instance 14-year-old boys of 1985 are 20.8 cm (= 14.5%) taller than the boys of the same age in 1880. It is also striking than the boys of the same age in 1880. It is also striking that the mean value for body height of 14-year-old boys of 1880, which was 143.6 cm, today will be reached in the age between 10.5 and 11 years.

The secular trend in the 105 years under investigation was not regular (Table 3), but there were phases of higher and smaller increases, in some cases there were even decreases of the mean values. Especially accentuated is the war-conditioned stagnation of acceleration in the interval between 1932 and 1944. This reflects (as in all of our investigations) the greater environmental-dependence of growth in female individuals.

Starting from these results we can establish that the secular trend in our research-area is not yet completed, though between 1975 and 1985 in some age-classes we can find (probable) random sample-conditioned decreases of the mean values.

Perhaps at the present time we have approached a point of exhaustion of the given genetic potential of information with the present environmental factors. Under these environmental conditions the secular trend would come to a temporary standstill. Only if decisive developmental-biological changes of the situation of our environment appear, we might see a continuation of acceleration. So it is periodically provable in skeletal material from the past more than 1000 years (compare Wurm, H. 1982; Zellner, K. 1984; Bach, A. 1986 and others).

We have already mentioned that the schoolchildren today reach the values of body height and body weight essentially earlier than the pupils of 1880 (Table 4). This developmental acceleration of the "body height-age" and the "body weight-age" amounts to about 3 years on an average in all age classes. The variation range of this developmental acceleration ranges for single age classes between 2 years and 4 months and 4 years and 2 months for body height and between 1 year and 5 months and 5 years and 4 months for body weight.

We have also examined whether the absolute and relative increases of body dimensions in children aged between 7 and 14 years have changed under the influence of acceleration (Fig. 1 and 2). In this case the semi-annual (and the annual) growth rates must also have changed. Fig. 1 and 2 show that this comes true for example of the absolute and relative differences of body height and body weight. But the differences in the relative increase of the body height of the girls are minimal. However, we can say (looking at the extreme age classes 7 years on the one side and 14 years on the other side) that a slight increase in the mean semi-annual growth rates can be seen in nearly all body dimensions investigated.

Table 4. **Acceleration of "Body weight- and Body height-age"**

Years	∅ Differences		Acceleration of "Body weight- and Body height-age"	
1. *Body height*	♂	♀	♂	♀
1880 – 1985	15.3 cm	14.5 cm	abt. 3 years 1 month	abt. 2 years 10 months
1964 – 1975	2.8 cm	2.7 cm	abt. – 6 months	abt. – 6 months
1975 – 1985	0.9 cm	1.3 cm	abt. – 2 months	abt. – 3 months
2. *Body weight*	♂	♀	♂	♀
1880 – 1985	8.9 kg	9.1 kg	abt. 2 years 10 months	abt. 2 years 8 months
1964 – 1975	1.9 kg	1.0 kg	abt. – 7 months	abt. – 3 months
1975 – 1985	0.5 kg	0.7 kg	abt. – 2 months	abt. – 2 months

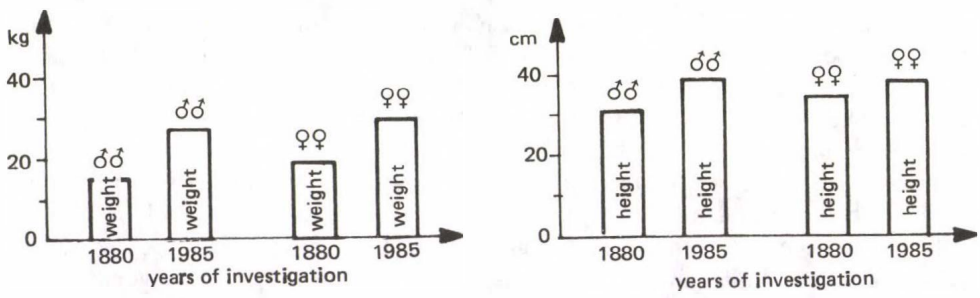

Fig. 1: Mean differences in weight (kg) and height (cm) in Jena schoolchildren aged 7 and 14 years

A different picture arises from considering the increases between the single age classes in 1880 and 1985 (represented as moving averages which smooth the time series; Fig. 3 and 4). On this occasion there exists no homogeneous trend but in most cases in both sexes in 1985 there are greater semi-annual increases than in 1880.

In this analysis it was found (similar to other analyses) that the variation range and also the variability of many morphological and metric characteristics in the female sex is not so extreme as in the male sex.

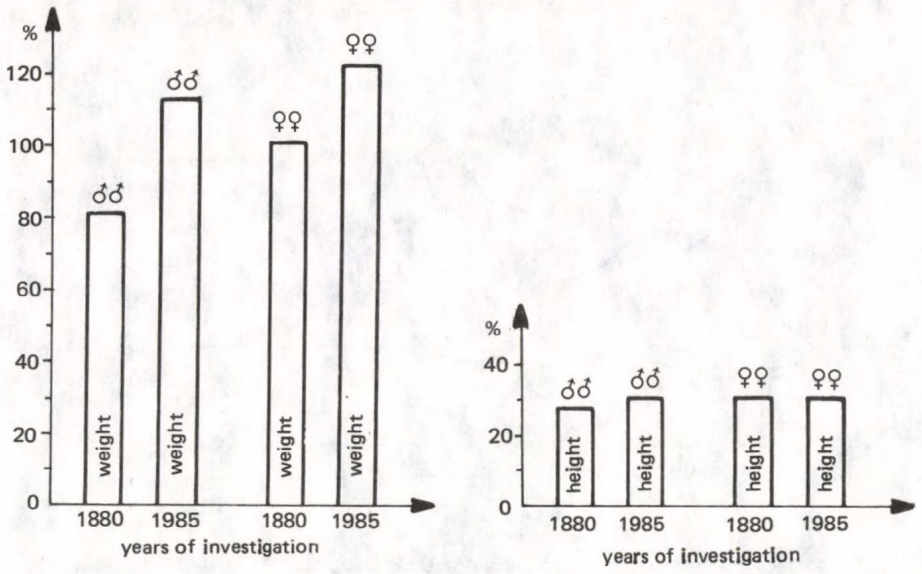

Fig. 2: Mean differences in percent in weight and height in Jena schoolchildren aged 7 and 14 years

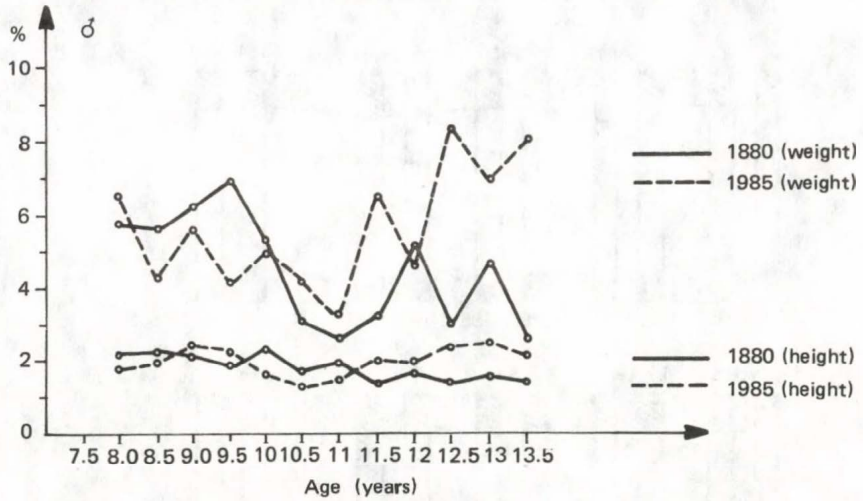

Fig. 3: Moving averages for the increases of weight and height in Jena boys in 1880 and 1985 (in percent per six months)

We also tried to get an impression of the changes of the percentage of given classes of body height and body weight by acceleration (Fig. 5 and 6). Unfortunately this comparison has only been possible since 1975 because we do not have the primary material of the previous investigations. We divided our probands into 3 classes:

- individuals with body dimensions below the −1 SD limit
- individuals with body dimensions above the +1 SD limit
- individuals with body dimensions within the ±1 SD limit.

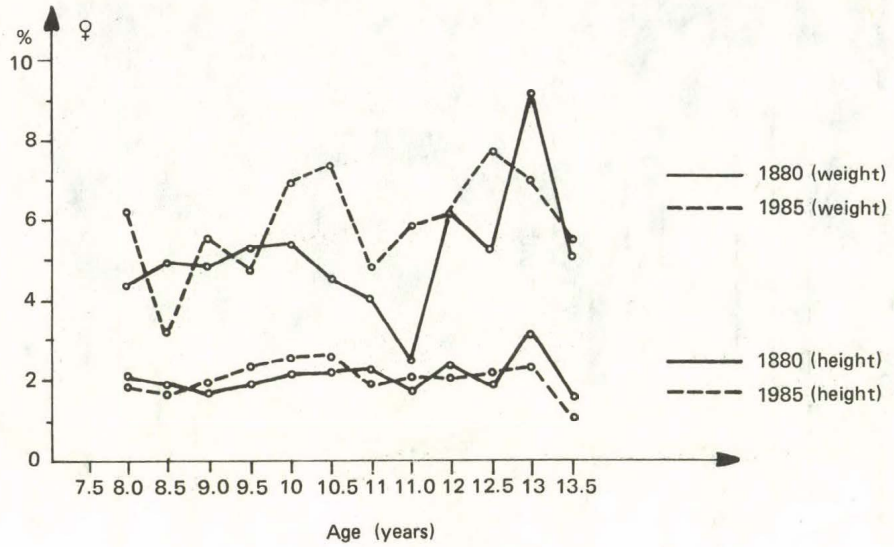

Fig. 4: Moving averages for the increases of weight and height in Jena girls in 1880 and 1985 (in percent per six months)

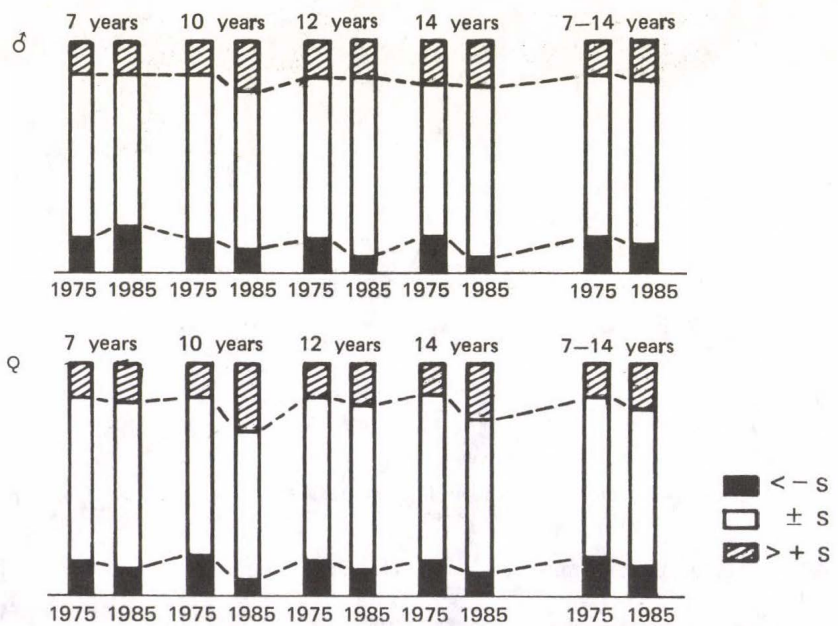

Fig. 5: Classes of body height in Jena schoolchildren in 1975 and 1985

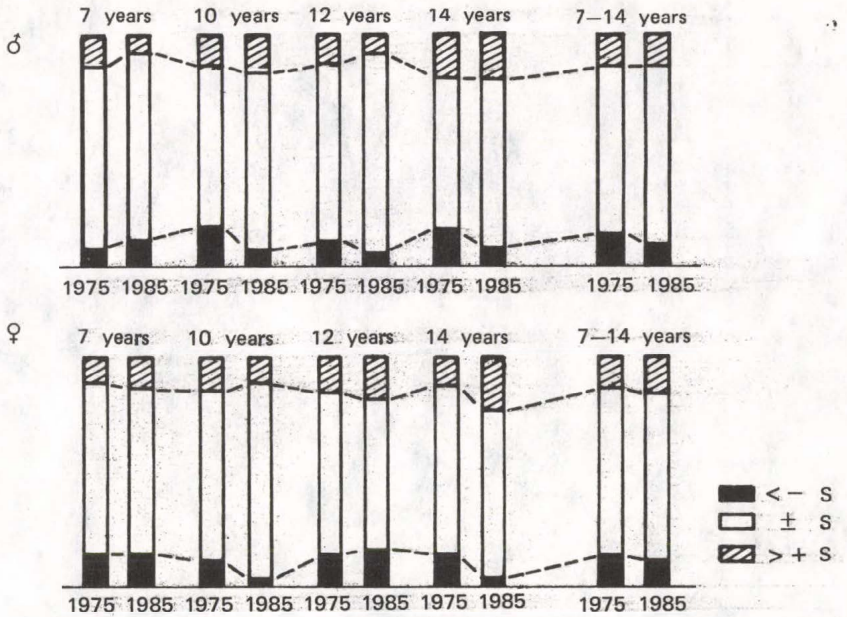

Fig. 6: Classes of body weight in Jena schoolchildren in 1975 and 1985

No homogeneous developmental trend was found but the percentage of the 3 formed classes shows age-dependent variations.

But an analysis of the whole material (7–14 years) suggests that in the 10 years in question the portion of very small and light individuals decreases whereas the percentage of very tall and heavy individuals increases. The number of probands within the ±1 SD limit is nearly constant (except the body weight of the boys).

Finally we want to make some remarks about the secular trend in choice head measurements, because they reflect very evident changes. With regard to the change in both head diameters and in the resultant head shape the following observations can be made for boys and girls (Fig. 7 and 8 show for example only the results for the male sex). Head length and head breadth have changed between 1944 and 1985 in inverse relation to each other: head length has increased in this time and head breadth has decreased in these four decades.

This inverse relation between head length and head breadth results in a progressive ovalisation of the head, a debrachycephalisation. This debrachycephalisation (Fig. 9, boys) is expressesd numerically as a reduction of the average cephalic index by 6.4 units in boys and 6.9 units in girls of all age groups between 1944 and 1985, – a phenomenon which can be also observed in other parts of Europe (Susanne et al. 1988). Debrachycephalisation corresponds with the development of slimmer constitution which can be seen to be a long-term trend in the Jena schoolchildren.

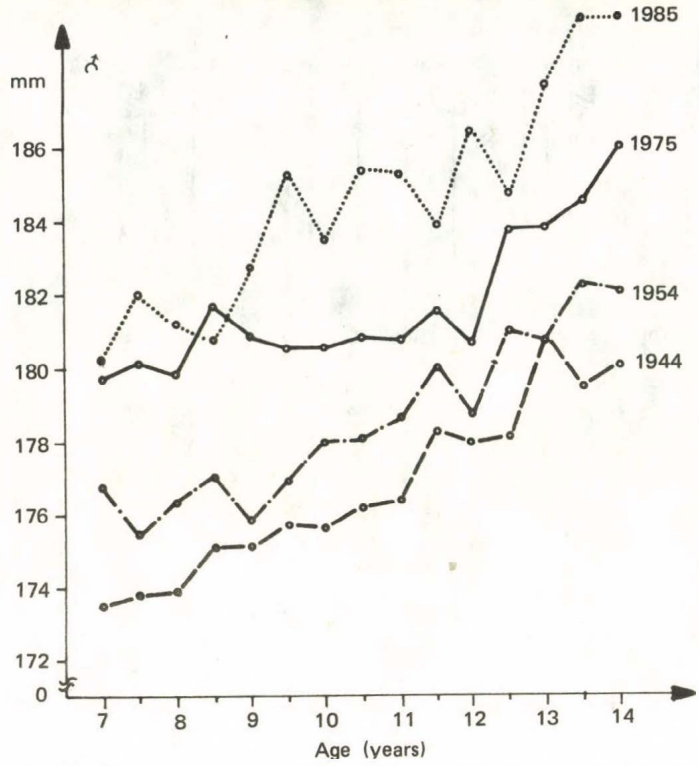

Fig. 7: Changes of the head length in Jena boys at the different investigations between 1944 and 1985

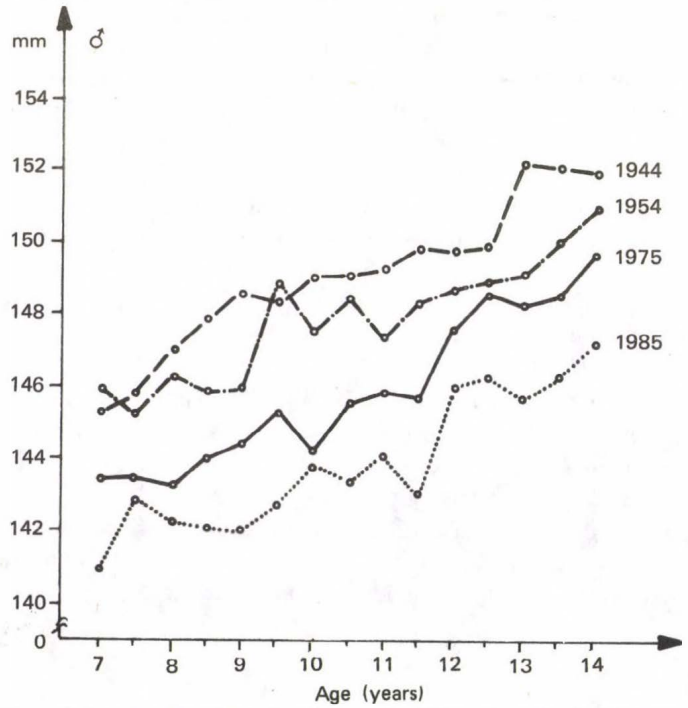

Fig. 8: Changes of the head breadth in Jena boys at the different investigations between 1944 and 1985

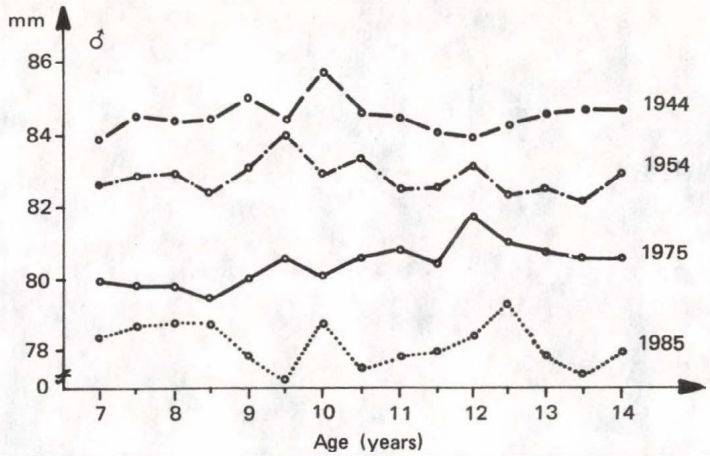

Fig. 9: Changes of cephalic index in Jena boys at the different investigations between 1944 and 1985

Generally the fact that the secular trend influences both body and head measurements again underlines the repeated demand that research into secular trend should be based on a wide range of characteristics of as many parts of the body as possible. This can not only be done by anthropologists but co-operation with other fields in also necessary and important. The secular trend is a complex event, based on a complex causal connection and therefore it should also be investigated in a complex way.

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GROWTH ACCELERATION IN THE NOVI SAD PUPILS

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Abstract: *It is well known that in our century stature and body weight of children of the same age tend to increase progressively. On the basis of the above statement, the present research was designed to analyze acceleration of somatic growth of pupils from Novi Sad.*

Data on stature and body mass of 7.095 pupils aged between 7–15 years are presented according to sex and age and compared with the results of anthropometric measurements of analogous groups of the Novi Sad pupils obtained 14 years ago.

A significant increase of stature and body weight in all age groups of both boys and girls is found. When average values of stature of boys and girls are compared, if is evident thaqt the period when girl stature values exceeded those of boys is advanced to an earlier ages and that it is shorter. Summarily, in the Novi Sad pupils of both sexes adolescence rise takes place earlier, i.e. the development tempo is faster.

Key words: *Acceleration;Stature; Body weight; Novi Sad pupils.*

Introduction

Investigations in many countries and also in this country have demonstrated that body height and weight of children of the same age tend to be greater progressively (Ljung et al. 1974, Prebeg 1978, Chinn and Rona 1984, Ivanović 1985, Tomazo-Ravnik 1986). The acceleration is manifested via two aspects: tempo of growth, as well as adult stature have increased. In certain populations however, the acceleration trend has been ceased (Tanner 1973).

Material and Method

The anthropometric studies were conducted according to the instructions given in the International Biological Programme, during 1981–1982. Investigations included measurements of 3.563 boys and 3.532 girls over the age range 6.5 to 15 years, selected at random from all city primary schools. Age of children was calculated according to birth date at the day of measuring while age groups were determined during half a year interval. Stature and body weight averages were calculated for each age group of boys and girls. Basic parameteres such as obtained were compared with the anthropometric data of analogous groups of the Novi Sad children of both sexes examined during 1967–1965 (Vuković, 1970).

Results

Average *height* of children measured in the period 1981–1982 in all age groups analyzed was significantly greater than in children of the same age measured in 1967–1968. The greatest difference (6 cm) was obtained with the oldest children (Table 1). Boys measured in 1981–1982 reached the same average height a half a year earlier up to the age of 10, than those measured in 1967–1968. In older children however, a greater shift was observed towards younger ones.

Table 1. **Average height (cm) of Novi Sad boys measured in 1967/68 and 1981/82**

Age	Generation 1967/68			Generation 1981/82			Increase	t-test
	N	x_1	SD	N	x_2	SD	x_2-x_1	
6.5	132	121.55	6.50	33	123.85	4.09	2.30	2.53^{xx}
7	400	122.40	6.65	205	124.24	5.52	1.84	3.61^{x}
7.5	426	124.70	6.20	259	128.05	5.61	3.35	7.27^{xx}
8	376	127.45	6.45	225	129.80	5.99	2.35	4.53^{xx}
8.5	441	130.50	6.50	153	132.50	5.83	2.00	3.55^{xx}
9	392	132.20	6.55	215	135.25	6.36	3.05	5.60^{xx}
9.5	410	135.55	8.20	204	138.85	6.47	3.30	5.44^{xx}
10	423	139.00	6.85	239	141.35	6.98	2.35	4.19^{xx}
10.5	410	140.30	6.25	170	143.90	6.69	3.60	6.01^{xx}
11	434	141.55	7.35	206	146.85	7.14	5.30	8.70^{xx}
11.5	439	145.10	7.10	221	148.50	7.00	3.40	5.86^{xx}
12	498	147.35	7.95	239	152.10	8.08	4.75	7.52^{xx}
12.5	497	150.23	9.30	171	154.55	8.25	4.30	5.69^{xx}
13	517	152.90	8.70	201	153.05	8.84	5.15	7.04^{xx}
13.5	559	156.35	9.05	194	161.70	9.51	4.75	6.59^{xx}
14	529	159.65	9.05	219	165.25	8.13	5.60	8.30^{xx}
14.5	467	162.80	9.60	279	167.54	8.56	4.54	5.95^{xx}
15	193	163.00	7.90	230	169.00	8.77	6.00	7.40^{xx}

Significance $^{x}p < 0.05$, $^{xx}p < 0.01$

On the average, the girls measured in 1981–1982 were found to be remarkably taller than those of the same age measured in 1967–1968 (Table 2). An absolute increase in stature during a 14 year interval was found to be smaller than in boys and ranges from 1.39 cm (7-year old) to 4.31 cm (12-year old girls).

Table 2. **Average height (cm) of Novi Sad girls measured in 1967/68 and 1981/82**

Age	Generation 1967/68			Generation 1981/82			Increase	t-test
	N	x_1	SD	N	x_2	SD	x_2-x_1	
6.5	119	120.00	5.95	35	123.29	4.13	3.29	3.71^{xx}
7	371	122.20	6.55	199	123.59	5.31	1.39	2.74^{xx}
7.5	418	123.20	6.00	231	126.58	5.54	3.38	7.22^{xx}
8	344	125.45	5.85	227	127.60	5.64	2.15	4.40^{xx}
8.5	370	128.50	5.60	187	133.07	6.54	4.57	8.16^{xx}
9	428	132.25	5.75	197	135.25	6.58	3.00	5.50^{xx}
9.5	394	134.50	6.66	220	138.20	6.04	3.70	7.01^{xx}
10	367	136.85	7.80	202	140.37	7.61	3.52	5.23^{xx}
10.5	394	140.80	7.45	208	142.64	6.83	1.84	3.04^{xx}
11	389	143.15	8.05	181	147.49	8.79	4.35	5.64^{xx}
11.5	464	146.70	8.50	234	149.60	7.08	3.10	5.03^{xx}
12	477	149.05	8.10	209	153.66	7.11	4.61	7.48^{xx}
12.5	441	153.20	7.90	204	155.12	7.58	1.92	2.95^{xx}
13	489	154.57	7.60	206	158.01	7.83	3.44	5.33^{xx}
13.5	526	156.95	7.40	189	158.90	6.10	1.95	3.55^{xx}
14	480	158.80	7.75	202	161.68	6.80	2.88	4.84^{xx}
14.5	419	159.35	6.60	183	161.99	6.07	2.04	4.78^{xx}
15	157	158.15	7.10	218	162.32	6.64	4.17	5.77^{xx}

Significance $^{x}p < 0.05$, $^{xx}p < 0.01$

Table 3. **Average body mass (kg) of Novi Sad boys measured in 1967/68 and 1981/82**

Age	Generation 1967/68			Generation 1981/82			Increase	t-test
	N	x_1	SD	N	x_2	SD	x_2-x_1	
6.5	132	23.30	7.80	33	25.00	3.00	1.70	2.00^{xx}
7	400	23.85	1.80	205	25.05	4.03	1.20	4.14^{xx}
7.5	426	24.90	4.05	259	27.15	4.85	2.25	6.08^{xx}
8	376	26.35	6.00	225	28.70	5.36	2.35	5.00^{xx}
8.5	441	27.30	5.40	153	29.54	5.70	2.24	4.23^{xx}
9	392	28.35	4.50	215	30.60	5.89	2.25	4.89^{xx}
9.5	410	30.05	6.90	204	33.24	6.36	3.19	5.60^{xx}
10	423	31.40	6.55	239	35.42	7.04	4.02	7.18^{x}
10.5	410	33.65	8.30	170	36.32	7.45	2.67	4.24^{xx}
11	434	34.35	8.55	206	39.08	7.65	4.73	7.06^{xx}
11.5	439	36.60	7.55	221	39.55	7.73	2.95	5.46^{xx}
12	498	39.55	7.30	239	42.72	9.70	3.17	4.46^{xx}
12.5	497	40.36	8.65	171	44.30	8.67	3.95	5.13^{xx}
13	517	41.50	11.45	201	46.67	8.94	5.17	6.38^{xx}
13.5	559	45.60	9.55	194	50.75	8.75	5.15	6.96^{xx}
14	529	46.35	10.25	219	52.74	9.81	4.39	5.49^{xx}
14.5	467	51.45	10.15	179	56.03	9.76	4.58	5.26^{xx}
15	193	52.25	9.25	230	57.61	10.45	5.36	5.64^{xx}

Significance $^{x}p < 0.05$, $^{xx}p < 0.01$

Table 4. **Average body mass (kg) of Novi Sad girls measured in 1967/68 and 1981/82**

Age	Generation 1967/68			Generation 1981/82			Increase	t-test
	N	x_1	SD	N	x_2	SD	x_2-x_1	
6.5	119	23.05	1.35	35	23.55	4.89	2.50	2.98^{xx}
7	371	23.20	1.35	199	24.62	3.75	1.42	5.26^{xx}
7.5	418	24.40	7.15	231	26.26	4.91	1.86	3.96^{xx}
8	344	24.85	4.50	227	28.15	6.85	3.30	6.35^{xx}
8.5	370	26.35	5.95	187	29.97	6.67	3.62	6.35^{xx}
9	428	28.95	8.30	197	30.36	5.69	1.41	2.43^{xx}
9.5	394	30.00	5.60	220	32.07	6.48	2.07	3.91^{xx}
10	367	31.15	7.40	202	34.48	7.30	3.33	5.20^{x}
10.5	394	34.25	8.95	208	36.56	7.31	2.31	3.40^{xx}
11	389	35.50	8.50	181	39.14	8.00	3.54	4.85^{xx}
11.5	464	38.36	8.15	234	42.18	7.63	3.93	6.34^{xx}
12	477	40.55	8.50	209	43.90	8.73	3.35	4.72^{xx}
12.5	441	48.40	8.40	204	45.96	8.89	2.56	3.46^{xx}
13	489	45.40	9.85	206	48.03	9.43	2.63	3.33^{xx}
13.5	526	47.80	8.35	189	49.71	8.91	1.91	4.06^{xx}
14	480	50.20	8.25	202	51.86	8.12	1.66	2.41^{xx}
14.5	419	50.95	7.20	183	53.39	7.63	2.44	3.70^{xx}
15	157	51.10	7.65	218	54.33	8.64	3.23	3.85^{xx}

Significance $^{x}p < 0.05$, $^{xx}p < 0.01$

By comparing average height of boys to that of girls of the same generations it seems likely that the period in which girls overtook boys was shorter in younger age group.

In the generation analyzed in 1967–1968, average height of both boys and girls was equalized at age 10.5, between age 11 and 13 girls were significantly than boys, at age 13.5 they were equalized again, and after age 14.5, significant sex differences were exhibited.

In children measured in 1981–1982, the growth curves of average height of boys and girls intersected at the age between 10.5 and 11, from 11 to 12.5 years girls were taller, and then crossing of the curves was obtained again at the age between 12.5 and 13, whereas at the age of 13.5 boys were significantly taller than girls. The finding suggests an earlier onset of adolescent growth spurt in younger generation of school children (boys).

Average *body weight*, as dependent upon age, increase remarkably in both sexes in a 14 ear period (Table 3, Table 4). Curves indicating average body weight of boys of both generations were almost parallel, where only an average increase of 2–3 kg in younger generation was obtained. In girls average weight was 3–3.5 kg greater than in those measured in 1967–1968.

Discussion

On the average, a remarkable growth of body height and weight of primary school children in Novi Sad measured in 1981–1982 when compared with children of the same age measured in 1967–1968 was found. In a 14-year interval, average height of boys aged between 6.5 and 9.5 years increased by 2–3 cm while average weight by 1–3 kg. In boys beyond the age of 10, greater differences amounting 4–6 cm and 3–5 kg, respectively, were recorded. In girls, at the age between 6.5 and 15, average height was greater by 1–5 cm while weight by 1–4 kg. Average growth of body height and weight, per decade, was 2.7 cm and 2.43 kg in boys, and 2.21 cm and 1.86 kg in girls, respectively.

Growth of stature and weight in the children groups analyzed was found to be greater than in anelogous groups in Western Europe (Ljung et al. 1974, Chinn and Rona 1984). With regard to the secular trend, however, similar results were obtained in the Yugoslavian populations of the same age (Prebeg 1978, Ivanović 1985, Tomazo-Ravnik 1986).

The growth acceleration in the Novi Sad school children is possibly conditioned by changes in the way of life and living standard since growth acceleration during body development is highly affected by the environmental factors (Tanner 1988). In Vojvodina Province, per capita income in the period of investigations increased app. two times according to 1972 prices (from app. 18227 in 1967 to app 37298 Millions Dinars in 1981). By comparing per capita income at birth in the oldest children investigated of both groups, it was found that per capita income increased app. four times (from app. 4705 in 1952 to app. 18382 Millions Dinars in 1966) (Savezni zavod za statistiku, 1980). A greater acceleration of body height in boys than in girls in the period considered was possibly due to a greater sensivity of males of the influence of the environmental factors during body growth and development.

Conclusion

On the basis of the results on body height and weight of primary chool children in Novi Sad ranging in age from 6.5 to 15 years which were measured in 1981–1982 and compared with the analogous groups of children measured in 1967–1968 one may conclude that a progressive growth of stature and body weight was established.

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STUDY OF THE SECULAR TREND AMONG THE MALE APPLICANTS TO THE UNIVERSITY OF PHYSICAL EDUCATION BUDAPEST

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Abstract: *Yearly cohort means of the stature, body weight and the somatotype components of Heath and Carter and their change were calculated for 1784 males (aged 18 to 19) applying for admission to the University of Physical Education between 1972 and 1986. Successive means of the studied parameters were analysed by fitting orthogonal polynomial regression curves. During the 15 year observation period stature and body mass showed linear growth trends. Relative fatness and body linearity changed in apparently periodic manner. Successive yearly means for Heath and Carter's IInd components did not display any evidence of trend.*

Key words. *Young adults; Somatotype; 15 year observation.*

Introduction

Our team has already reported on the anthropometric changes observed in the students applying for admission to our University in ten consecutive years (Mészáros et al. 1982). The likelihood of having found evidence for several aspects of a complex secular trend was also discussed as a part of the interpretation. Nevertheless, as the observation embraced merely ten years, it seemed advisable to continue the study.

The present report is thus a check-up of former findings which now have been extended to include all data from the years between 1972 and 1986, inclusively, for the height, body mass and the components of the Heath-Carter somatotype of the male applicants appearing at the entrance examination.

Material and Methods

The applicants to our University have always represented a group of youth that is physically more active than the peer group in general. They all possess a sports medical licence to participate in sports competitions, in addition. The number of the 18–19 year-old ones is between 101 and 160 among the applicants whose total number reported here was 1784.

The means of the anthropometric variables were analyzed for trends by using orthogonal polynomials up to the third power. The year of the application served as the independent variable.

Results and Discussion

The means and the standard deviation of the variables and the most meaningful results of the analysis of variance are tabulated.

In the studies of secular trend body height and mass are the most often analyzed factors (Wolanski 1978, Eiben and Pantó 1981, Gyenis and Till 1986).

Table 1. **Means and SD's for the anthropometric variables and the results of ANOVA**

Year	Stature		Body mass		Ist comp.		IInd comp.		III. comp.		
	x	s	x	s	x	s	x	s	x	s	N
1972	174.15	6.92	68.71	8.26	3.07	0.84	4.28	0.95	2.73	0.81	111
1973	174.54	6.57	68.57	7.34	2.82	1.06	4.96	0.93	2.69	0.76	102
1974	175.05	6.29	69.33	7.63	2.14	0.96	4.84	0.83	2.67	0.82	127
1975	175.91	7.70	69.89	8.04	1.34	0.61	5.46	0.90	2.70	0.87	141
1976	175.26	6.80	68.76	7.34	2.28	0.81	5.04	1.03	2.81	1.00	112
1977	175.21	5.93	69.55	5.95	2.21	0.67	4.97	0.96	2.61	0.87	106
1978	176.01	6.32	70.31	7.62	2.38	0.91	5.25	0.97	2.64	0.85	160
1979	176.59	6.12	70.65	6.53	2.91	0.70	4.79	1.19	2.73	0.85	120
1980	175.08	6.52	68.57	7.33	1.94	0.73	5.67	1.01	2.79	0.75	101
1981	176.51	7.14	69.55	7.30	2.46	0.80	4.88	0.89	2.95	0.82	119
1982	176.31	6.66	69.49	7.82	2.32	0.78	5.06	1.00	2.99	0.93	114
1983	177.86	6.22	71.10	7.77	2.41	0.78	5.50	1.28	2.91	1.01	113
1984	178.23	6.88	70.75	7.85	2.59	0.91	4.79	0.97	3.02	0.95	108
1985	177.22	6.35	70.51	8.02	2.48	0.84	5.04	1.12	2.88	1.00	113
1986	176.66	6.53	70.02	7.41	1.71	0.68	5.24	0.95	2.87	0.79	137

The successive yearly series of means for height and mass in our material showed a statistically significant trend of increase. It was the linear component that was significant for the trend of both variables. As for stature, the result of its continued increase simply restates our previous observation. The slight change in body mass means is, however, attributable to the larger means found for the period between 1983 and 1986 and exceeding 70 kg. Taller stature was also associated by larger mass. The inference drawn on the basis of these 15 years is therefore that the observed tendency has indeed been a part of the secular trend.

The series of relative fatness means only displayed random variability in the former ten-year period of observation. The results from the extended study showed a significant cubic trend. The successive means for the second component of the somatotype lacked any regularity both previously and for the 15-year study.

The interpretation of the absolute values of these means constitute another aspect, naturally. The means for relative fatness were favourably low and mostly attributable to physical activity level and young age. The means for the second component showing skeleto-muscular robustness were above average for similar reasons.

The differences between the respective means for the third component, body linearity, were slight. The result obtained for a significant linear and cubic trend coincides with our former result and can be best described by a slightly rising sinusoidal curve.

Summary

Successive yearly means of some anthropometric variables were analyzed for a statistical trend in the students applying for admission to the Hungarian University of Physical Education between 1972 and 1986, inclusively. A linearly increasing trend was found for body height and mass in the 15-year period of observation. The first component of the Heath-Carter somatotype showed a significant cubic trend. While no regularity could be evidenced in relative robustness, the trend in body linearity, as expressed by the third somatotype component, could be best approximated by a slightly rising sinusoidal curve. All these results demonstrate a continuation of the secular trend which has until now been linear for the basic variables while for the derived ones it has been a wave-like oscillation.

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A LONGITUDINAL STUDY OF THE BODY COMPOSITION AND THE PHYSICAL WORKING CAPACITY IN BUDAPEST PUPILS

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Abstract: *The authors studied the change of the body composition based on the LBM, TBF, BF% and E/P index, and the change of the physical working capacity on the basis of the PWC 170, PWC 170/BM and PWC 170/LBM in Budapest pupils between 11–13 years of age. The studied anthropological parameters show a significant increase by age. The significant differences of the body mass between the boys and the girls were caused by the different intensity of the TBF and the LBM. The mean values of the PWC were in each age of life significantly higher by the boys. The growth procession of the girls seemed to be equal in the studied age-intervals, while among the boys' between 12–13 years of age the increase of the body mass due to the significant rise in LBM was more intensive. The values of all of the three PWC parameters according to the passing age by girls were stagnated, but by the boys the PWC 170 have shown a steady increase while the PWC 170/BM and the PWC 170/LBM did not changed. On the basis of the simultaneous study of anthropological parameters and the working capacity, we may be concluded, that parallel with the increasing of the BF% decreases the working capacity, too.*

Key words: *Body composition; Working capacity; Budapest pupils.*

Introduction

The International Biological Programme involves investigations on various ecological systems. As a part of studies on the human adaptability, the human working capacity and physical fitness is assessed. Several authors dealt with the connection between human working capacity and various physiological and anthropological factors and search after parameters which could make easier the assessment of the human working capacity (Bar–OR et al. 1971, Kukkonen et al. 1982, Fraser et al. 1983, Ketkin et al. 1984, Wilson 1985). In Hungary, load tests are performed mainly for some selected groups (sportsmen, invalids, special employees, etc.).

The object of the present study is to survey the physical working capacity of 11 year old children and to follow its development in a subsequent period of 3 years. Though some standard values have been established in few European countries for the physical working capacity of children (Macek et al. 1973, Andersen et al. 1974, Rutenfranz et al. 1982), no Hungarian data are available for that of non-selected "healthy" children.

As another object, the characteristic differences between the male and female body compositions and physical working capacities as well as rates of their development are to be discovered in order to obtain information about the relations between the development in the body composition and in the physical working capacity.

Materials and Methods

The longitudinal investigation was started in 1982. 20 boys and 22 girls, 11 year old, were selected from inner district pupils of Budapest. Tests were repeated yearly for 3 years. Anthropometric data were recorded upon the IBP prescriptions (Tanner et al.

1969). For the analysis of the body composition the body-density was determined by the Durnin–Rahaman's is regression equation (1967) and the body fat percentage was calculated by the Siri's formula (1956). Lean body mass, middle arm area, calf area, muscle circumference, energy/protein indices of middle arm and calf were also determined.

The physical working capacity was tested by a bicycle ergometer, Type KE–11 (Medicor, Budapest), and by an electrocardiograph Type MR–11 (Medicor, Budapest). PWC 170 was determined according to the recommendations of WHO. The rising 6-min constant load level steps were adjusted to the sex, age, body mass, and constitution of the individual so that the pulse rate would be between 130 and 170 in at least two load steps. PWC 170 was then determined by linear extrapolation. Between the 6-min load steps, rest periods of 1 min were interposed. Pulse rate was recorded from the chest lead. Electrocardiograms were recorded during the 6th minute of each load step. Measured PWC 170 values were related to the body mass and lean body mass unit. Analitycal considerations are based on the results of Student's test, and paired sample test.

Results and Discussion

Statistical parameters of the physical working capacity characteristics are collected in Table 1.

The age-group average values of PWC 170 showed a significant uniform raise with the age of boys. PWC 170 values of girls, however, revealed no statistically significant change in this age period. The physical working capacities showed marked differences between boys and girls of the same age. PWC 170 related to the body mass was practically unchanged for boys during this age period, i.e. the rate of increase in PWC is parallel to that of the body mass. On the other hand, PWC 170 rose more rapidly than the lean body mass in the age from 11 to 12 while these two variables grew parallel from 12 to 13. In contrast, PWC 170 of girls, related either to the body mass or to the lean body mass, decreased consistently with the age.

PWC values, both to the body mass and to the lean body mass, were highly different between boys and girls in every examined age, in favour of boys.

The results concerning the body composition are collected also in Table 1. The body mass gain is significant for both sexes aged between 12 and 13 years. Girls are heavier in every age. However, the body mass gain of girls is steady during the range of age studied while that of boys is more rapid between 12 and 13 than from 11 to 12 as demonstrated statistically.

This sexual difference in body mass is resulted from the higher fat accumulation of girls in an earlier age. It is indicated by the greater gain in the body fat percentage of boys than that of girls in range of age studied.

While the average lean body mass shows no significant difference between the sexes, the rate of the lean body mass is different. The lean body mass of girls grows at a constant rate while that of boys increases much more rapidly between aged of 12 and 13 than from 11 to 12.

The results for the total body fat and for the lean body mass are supported by the age data for the cross-sectional areas of middle arm and calf, for the muscle area, and for the

Table 1. **Parameters of investigated body measurements**

Measurements	Age (in years) Mean and SD 11.0	12.0	13.0
PWC 170	♂ 76.90 ± 11.43	89.50* ± 20.34	100.55 ± 33.82
	♀ 71.14 ± 14.88	73.91* ± 13.54	72.59* ± 14.65
PWC 170/BM	♂ 1.97** ± 0.36	1.98** ± 0.36	1.91** ± 0.34
	♀ 1.57** ± 0.25	1.45** ± 0.23	1.33** ± 0.27
PWC 170/LBM	♂ 2.63* ± 0.37	2.84** ± 0.47	2.83** ± 0.82
	♀ 2.40* ± 0.35	2.33** ± 0.41	2.12** ± 0.41
Body mass (kg)	♂ 37.78* ± 6.53	42.60* ± 9.04	50.03 ± 10.48
	♀ 43.77* ± 12.67	49.61* ± 13.50	54.77 ± 13.48
Body Fat%	♂ 21.31** ± 5.96	25.22** ± 5.12	28.69** ± 3.41
	♀ 29.86** ± 6.50	32.57** ± 4.98	35.29** ± 3.87
Total body fat (kg)	♂ 8.36* ± 3.62	11.10* ± 4.44	14.64* ± 4.47
	♀ 13.98* ± 7.02	16.53* ± 6.95	19.88* ± 7.16
Lean body mass (kg)	♂ 29.42 ± 3.43	31.50 ± 5.13	35.59 ± 6.28
	♀ 29.80 ± 5.89	32.17 ± 6.30	34.80 ± 6.51
Middle arm area (cm^2)	♂ 35.87 ± 7.75	38.90 ± 10.29	44.07 ± 11.56
	♀ 38.97 ± 11.13	41.95 ± 11.55	45.63 ± 11.71
Middle arm muscle circumference (cm)	♂ 17.27 ± 1.63	16.57 ± 2.29	16.63 ± 2.69
	♀ 16.89 ± 1.48	16.47 ± 1.45	15.51 ± 1.71
Middle arm muscle area (cm^2)	♂ 23.95 ± 4.54	24.27 ± 6.52	25.58 ± 7.31
	♀ 22.90 ± 4.21	22.74 ± 3.96	23.40 ± 4.26
E/P index (arm)	♂ 1.60* ± 0.20	1.77 ± 0.18	1.88* ± 0.16
	♀ 1.73* ± 0.15	1.94 ± 0.41	1.98 ± 0.15
Calf area (cm^2)	♂ 71.96 ± 10.20	78.96 ± 13.46	85.63 ± 16.07
	♀ 77.79 ± 18.63	83.23 ± 19.28	88.43 ± 18.89
Calf muscle circumference (cm)	♂ 24.51 ± 1.59	25.10 ± 2.01	24.69 ± 2.51
	♀ 24.74 ± 1.72	25.10 ± 2.09	24.15 ± 2.32
Calf muscle area (cm^2)	♂ 48.03 ± 6.17	50.27 ± 7.84	59.04 ± 9.97
	♀ 48.40 ± 6.82	50.50 ± 8.52	53.86 ± 9.18
E/P index (calf)	♂ 1.56 ± 0.13	1.59* ± 0.10	1.70* ± 0.08
	♀ 1.62 ± 0.12	1.65* ± 0.09	1.75* ± 0.08

Significant level of difference between sexes: $^{*}p < 0.05$; $^{**}p < 0.001$

In order to decide whether a linear relationship exists between the body composition and the PWC, a correlation calculation was conducted (Table 2). The correlation of PWC 170/BM of boys was negative with the body fat percentage at age of 11. The correlation between the physical working capacity and the body composition of girls decreases or even disappears with the advancing age.

In spite of the methodological variations, the oxygen uptake of Budapest boys and girls at the age of 13 is attempted to compare to standard oxygen uptake values of some European countries (Rutenfranz et al. 1982) in Figure 1. The backwardness of the Hungarian boys is about 20 percent and that of the Hungarian girls is more than 50 percent to the average oxygen uptake in the European countries.

Table 2. **Correlation matrix of measurements**

	Age (year)	Body mass (kg) 11	12	13	Body Fat% 11	12	13	Total body fat (kg) 11	12	13	Lean body mass (kg) 11	12	13
Boys													
	11	0.41	0.42	0.34	0.16	0.21	0.26	0.28	0.34	0.35	0.49	0.45	0.34
PWC 170	12	0.59	0.62	0.61	0.33	0.24	0.31	0.42	0.43	0.53	0.68	0.72	0.67
	13	0.57	0.52	0.48	0.45	0.29	0.38	0.52	0.43	0.49	0.52	0.55	0.48
	11	-0.53	-0.51	-0.58	-0.63	-0.53	-0.38	-0.61	-0.55	-0.54	-0.36	-0.42	-0.55
PWC 170/BM	12	-0.23	-0.21	-0.23	-0.36	-0.40	-0.22	-0.35	-0.37	-0.27	-0.07	-0.60	-0.16
	13	-0.60	-0.60	-0.15	-0.60	-0.19	-0.10	-0.50	-0.12	-0.10	-0.07	-0.11	-0.12
	11	-0.30	-0.28	-0.34	-0.27	-0.15	-0.02	-0.29	-0.23	-0.25	-0.27	-0.29	-0.38
PWC 170/LBM	12	-0.04	-0.01	-0.28	-0.08	-0.11	-0.03	-0.11	-0.11	-0.02	0.04	0.08	0.02
	13	0.19	0.05	-0.03	0.10	-0.02	0.15	0.13	0.02	0.05	0.07	0.07	-0.40
Girls													
	11	0.67	0.70	0.68	0.66	0.67	0.65	0.62	0.58	0.67	0.71	0.53	0.68
PWC 170	12	0.67	0.70	0.68	0.61	0.69	0.61	0.62	0.61	0.66	0.69	0.53	0.70
	13	0.20	0.31	0.36	0.19	0.36	0.40	0.16	0.20	0.37	0.25	0.12	0.39
	11	-0.64	-0.60	-0.58	-0.51	-0.54	-0.50	-0.65	-0.63	-0.58	-0.61	-0.60	-0.55
PWC 170/BM	12	-0.72	-0.73	-0.74	-0.72	-0.71	-0.73	-0.74	-0.77	-0.76	-0.66	-0.75	-0.72
	13	-0.68	-0.61	-0.58	-0.64	-0.50	-0.45	-0.70	-0.65	-0.55	-0.63	-0.67	-0.58
	11	-0.23	-0.20	-0.18	-0.04	-0.11	-0.11	-0.22	-0.25	-0.18	-0.23	-0.27	-0.18
PWC 170/LBM	12	-0.15	-0.16	-0.14	-0.14	-0.08	-0.14	-0.19	-0.30	-0.16	-0.10	-0.43	-0.13
	13	-0.58	-0.50	-0.47	-0.51	-0.37	-0.32	-0.60	-0.54	-0.43	-0.53	-0.59	-0.48

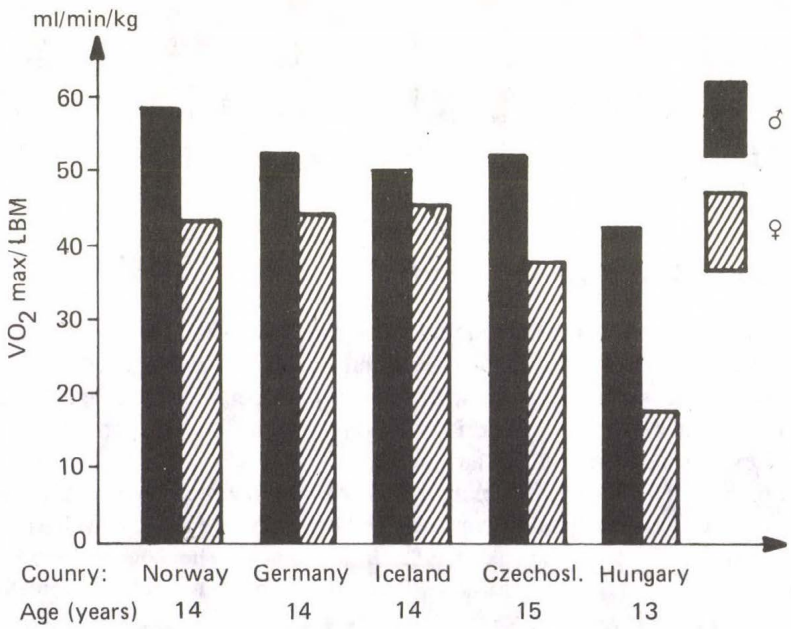

Fig. 1: Comparison of mean values of maximal aerobic power in 13–15 year old children from different countries

Considering the finding that the maximum oxygen uptake can be developed during the teenager period, later it can be maintained at most with an appropriated training (Frenkl 1977), it may be concluded that its main development takes place up to the completion of the pubertal growth spurt and not later. Just for this reason, everything must be done is this period of life for attaining the highest possible oxygen uptake in order to ensure the optimum cardiorespiratoric performance of children. This is the indispensable goal for preserving them from the growing risks, hazard factors, and stress effects of urbanization and, in addition, for prevention of cardiovascular diseases that occupy the first position on the list of causes of death in Hungary.

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ANTHROPOMETRIC ASSESSMENT OF 6–14–YEAR–OLD BUDAPEST CHILDREN IN 1987

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Abstract: *In 1987 height, weight and skinfold thicknesses (triceps, biceps, subscapular, abdomen, suprailiac, thigh, calf) were measured using Lange caliper in Budapest children (1562 boys, 1589 girls) 6–14 years. Percentile curves of the individual skinfolds Σ 7 and Σ 4 (subscapular, abdomen, suprailiac, thigh) skinfolds were related to height-age. Mean values of height and weight related to age were compared to Hungarian data (Eiben et al. 1968–1969, 1985) and our team's earlier study (1974). Based on the strong correlation between Σ 7 and Σ 4 skinfold thicknesses Σ 4 skinfold gives useful information about the nutritional state. A person may be considered obese if Σ 4 skinfold thicknesses related to height-age is above the 90th centile, overweight is between 75–90th centiles. The positive seculawr trend of Budapest children is still going on. (In 1987, boys in Budapest are 2.56 cm, girls 2.82 cm higher and boys weigh 1.92 kg, girls 1.82 kg more than in 1969.) Obesity seems to be more frequent in the capital than in the whole country (Budapest boys weigh 2.35 kg, girls 2.42 kg more than children in general).*

Key words: *Budapest children; Skinfolds; Secular trend; Obesity.*

Introduction

In social-pediatric practice height and weight measurements are basic data. In addition skinfold thicknesses give a good information of body composition. A few data are available about distribution of skinfold thicknesses of Hungarian children (e.g. Eiben–Pantó 1987/88). Therefore it seemed to be reasonable to study distribution pattern of skinfold thicknesses in Budapest children.

Subjects and methods

Heights, weights and 7 skinfold thicknesses (triceps, biceps, subscapular, abdomen, suprailiac, thigh, calf) on the left side were measured using Lange (1961) skinfold caliper in 3151 Budapest children: boys n = 1562, girls n = 1589, aged 6–14 years. The measurements were taken in May 1987. Heights and weights were compaired to Eiben's et al. (1968, 1987) and our team's earlier (1974) data. Percentile curves of the different skinfolds, Σ 7 and Σ 4 (subscapular, abdomen, suprailiac, thigh) skinfold thicknesses grouped according to sex were related to height-age. Relationships between Σ 7 and individual skinfold thicknesses as well as weight-for-height were calculated. The statistical analysis were made by SPSS (1983) computer programme.

Results

Comparing our data to those of Eiben et al. (1968–69, 1987) and our earlier study (1974) indicate a positive secular trend in height and weight (Fig. 1). In 1987, boys in Budapest are on an average 2.56 cm, girls 2.82 cm taller and boys' weight 1.92 kg, girls 1.82 more than in 1968–69. The average body height and weight of the children in Budapest of both sexes are above the average of the children of the whole country (boys 1.87 cm, girls 2.32 cm taller, boys weight 2.35 kg, girls 2.42 kg more).

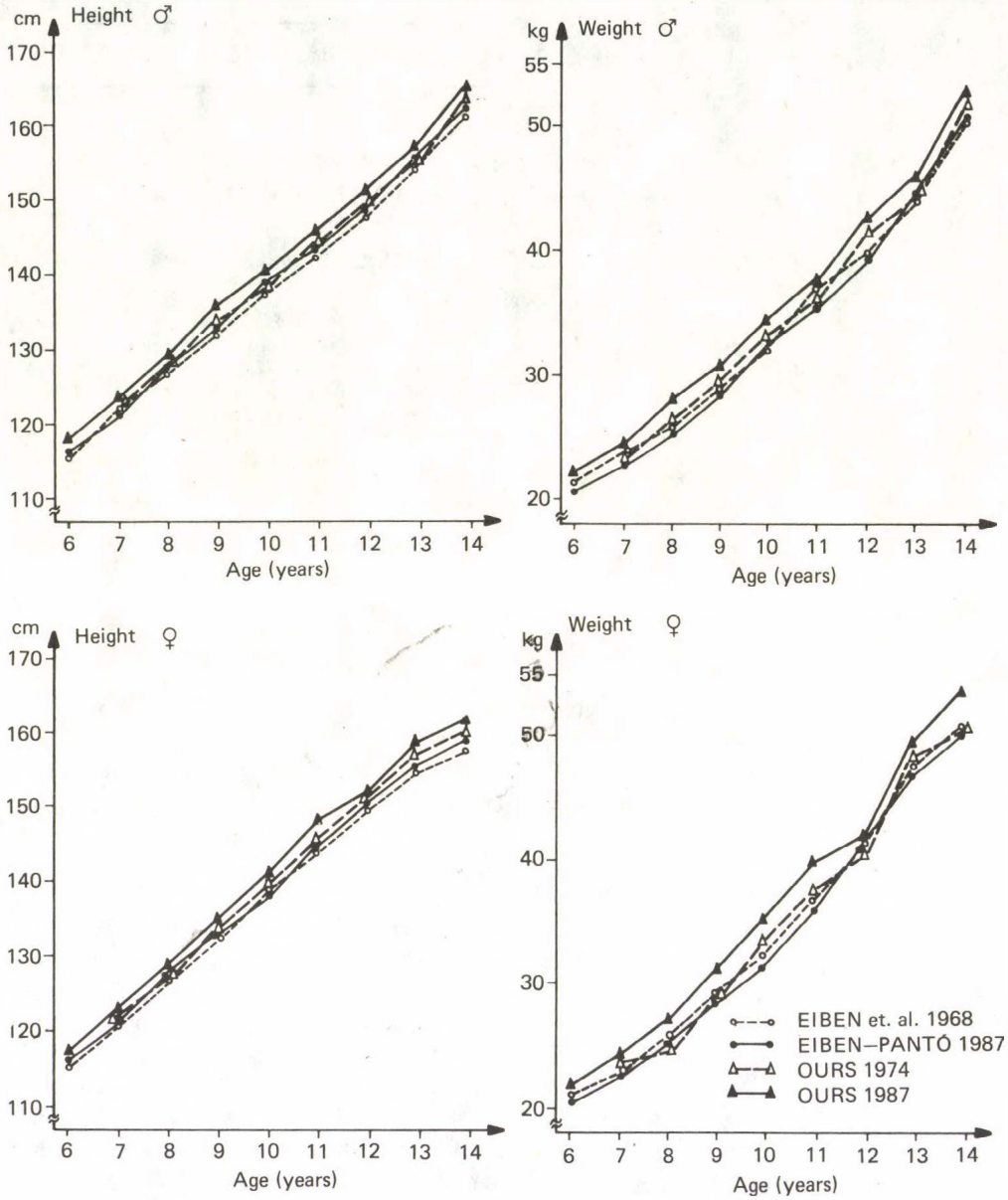

Figure 1: The mean values of body height and weight Budapest boys and girls studied by different authors in different years

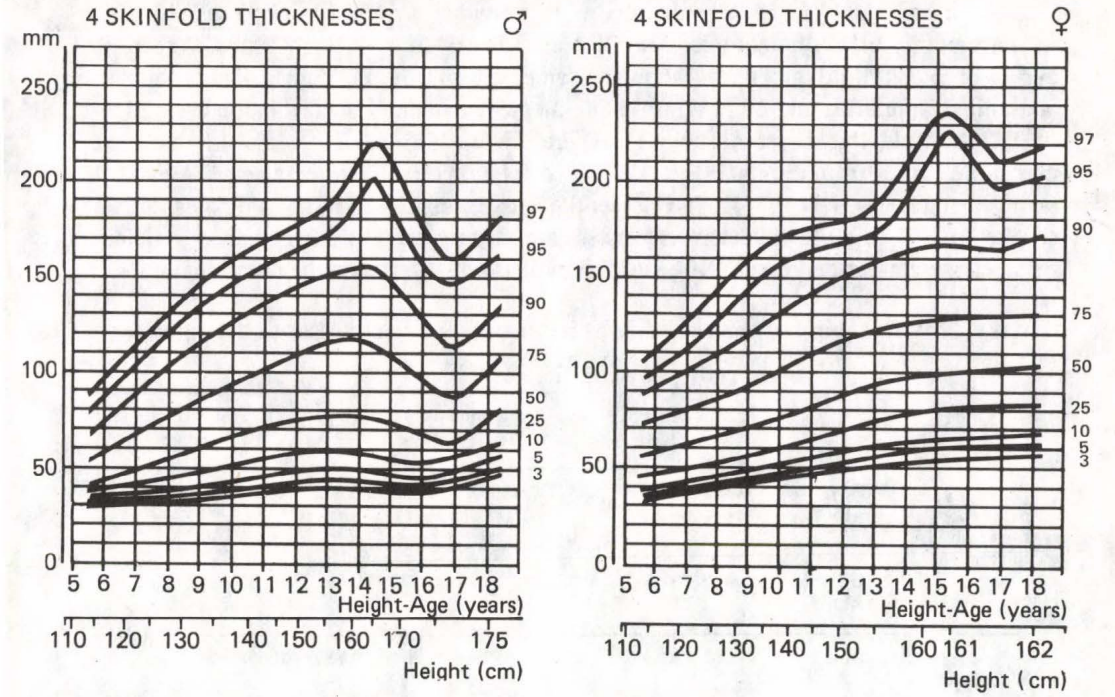

Figure 2: Percentile curves of Σ 7 skinfold thicknesses related to height-age

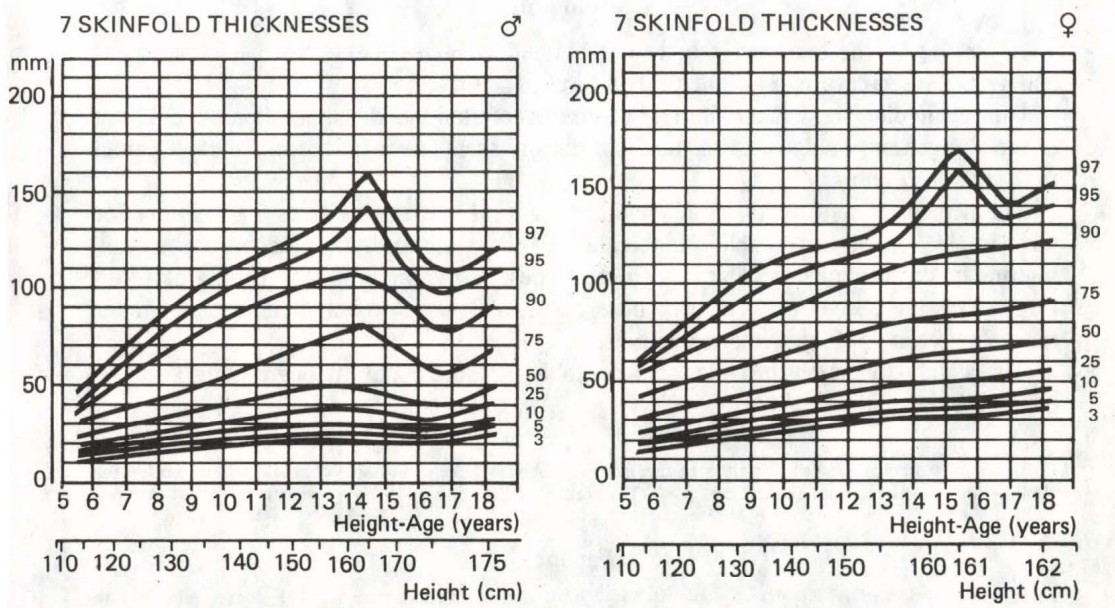

Figure 3: Percentile curves of Σ 4 skinfold thicknesses (subscapular, abdomen, suprailiac, thigh) related to height-age

Both in boys and girls percentile curves of individual skinfold thicknesses show an increase until the 13th height-age. After this age curves go in different ways. Percentile curves of Σ 7 skinfold thicknesses show the same pattern (Fig. 2). Values of subscapular, abdominal, auprailiac and thigh skinfold thicknesses gave the best correlation coefficient to Σ 7 skinfold thicknesses (Table 1). Therefore we formed Σ 4 skinfold thickness percentile curves from our data (Fig. 3). The correlation coefficient between Σ 7 and Σ 4 skinfold thicknesses is 0.974. The percentile curves of Σ 4 skinfold thicknesses run similar to Σ 7 skinfold thickness curves. There is only modest correlation coefficient between weight-for-height and Σ 7 skinfold thicknesses or between the individual ones.

Table 1. **Relationship between skinfold thicknesses, Σ 7 thicknesses and weight-for-height (r)**

		Triceps	Biceps	Sub-scapular	Abdomen	Supra-iliac	Thigh	Calf	Weight-for-height
Σ 7 skinfold thicknesses	Boys (n=1562)	0.875	0.874	0.877	0.932	0.915	0.882	0.693	0.724
	Girls (n=1589)	0.825	0.863	0.883	0.911	0.890	0.883	0.705	0.735
Weight-for-height	Boys	0.685	0.643	0.739	0.714	0.754	0.783	0.698	–
	Girls	0.711	0.687	0.754	0.736	0.718	0.739	0.696	–

Conclusions

According to the increase in body heights and weights measured in years 1968–69 and 1987 the secular trend in Budapest children is positive.

Our recent data show that children in Budapest are taller and heavier than the children of the Hungarian population. Frequency of obesity seems to be higher in the capital than in the whole country.

The percentile distribution of Σ 7 and Σ 4 skinfold thicknesses gives a possibility for the simple, quick, repeatable judgement of body composition. According to the internationally accepted standards a child is obese if the value of Σ 7 or Σ 4 skinfold thicknesses are above the 90th percentile curve, and has overweight if this parameter ranges between 75–90th percentile curves.

The weight-for-height provides an acceptable measure about the degree of obesity of the whole population.

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ANTHROPOMETRIC ASSESSMENT OF OBESE CHILDREN WITH SPECIAL REGARD TO THE DIFFICULTIES OF EARLY DIAGNOSIS AND CALCULATING BODY FAT PERCENTAGE

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Abstract: *Weight, height and seven skinfold thicknesses [triceps (a), biceps (b), subscapular (c), abdomen (d), suprailiac (e), thigh (f), calf (g)] were measured using Lange skinfold caliper in 1086 (466 boys, 620 girls) obese children aged 7–15 years. Percentile curves of Σ4 skinfolds (c, d, e, f) were formed according to the height-age and related to reference curves of Budapest children. Correlations between Σ7-, Σ4- and individual skinfold thicknesses and weight-for-height were analysed. In 788 Budapest-children, and 393 obese children aged 11–12 years body fat% was calculated using Parízková and Roth's, Durnin and Rahaman's and Brook's formulas and the results were compared to each other. Correlation between Σ7 and Σ4 skinfold thicknesses in obese children is r = 0.984. A slight relationship can be detected between Σ4 skinfold thickness and weight-for-height. Whereas Σ4 skinfold thickness determination is suitable to detect obese patients, height and weight measurements applied in Hungarian practice of pediatrics, and weight-for-height calculation is inadequate. This accounts for the fact that very few, if any, obese children sent our hospital have had Σ4 skinfold thicknesses value between 90–97 percentile. Different average body fat% calculated by four types of formulas in the same samples underline the necessity of using these with some reservation. The comparison of skinfold thicknesses with percentile curves during the treatment and control of obese children is more objective.*

Key words: *Body composition; Skinfolds; Obesity; Budapest children.*

Introduction

The degree of obesity in children sent to our outpatient clinic was detected comparing to the scores in percentile deviation of skinfold thickness in Budapest children (Halász, Blaltniczky, Kovács, Muzsnai and Péter, in this volume). Subsequently it was studied which skinfold values reflect body fat in the most optimum way, how informative was weight-for-height calculation and how comparable were the formulas generally used in Hungary for calculating body fat percent.

Subjects and methods

In a total of 1086, 7–15 year old obese children (466 boys, 620 girls), who were sent to our endocrine clinic by GPs, in addition to measuring height and weight, skinfold thicknesses were measured at 7 points on the left side of the body [triceps (a), biceps (b), subscapular (c), abdomen (d), suprailiac (e), thigh (f), and calf (g)] using the Lange skinfold caliper (Lange and Brožek 1961). Weight-for-height and height-age were calculated using Eiben and Pantó's data (1987). Values of Σ7 (a–g) and Σ4 skinfold thicknesses (c, d, e, f) and percentile division according to height-age were calculated and the latter was compared with the reference data of Budapest children. Correlation (r) of the Σ7-, Σ4- and individual skinfold thicknesses and weight-for-height were calculated in both sexes.

Body fat% was calculated from skinfold thickness values of the 11–12 years age Budapest children (377 boys, 414 girls) and obese children (149 boys, 244 girls) using

the formulas of Pařízková and Roth (1972), Durnin and Rahaman (1967) as well as that of Brook (1971) (Table 1) and the values obtained were compaired using unpaired *t* test.

Table 1. **Formulas used in calculation of body fat%**

Author(s)	Sex	Formulas	Recommended age (year)
Pařízková and Roth	♂	Fat% = 35.044xlog(tric.+bic.)–25.877 Fat% = 31.381xlog(tric.+bic.+subscap.+suprailiac+calf)–31.890	8–13
Pařízková and Roth	♀	Fat% = 41.329xlog(tric.+bic.)–34.862 Fat% = 36.688xlog(tric.+bic.+subscap.+suprailiac+calf)–39.570	8–13
Durnin and Rahaman*	♂	D = 1.1533–0.0643xlog(tric.+bic.+subscap.+suprailiac)	≥ 11
	♀	D = 1.1369–0.0598xlog(tric.+bic.+subscap.+suprailiac)	
Brook*	♂	D = 1.1690–0.0788xlog(tric.+bic.+subscap.+suprailiac)	≤ 11
	♀	D = 1.2063–0.0999xlog(tric.+bic.+supscap.+suprailiac)	

*Fat% was calculated by Siri's (1956) formula

Results

Data in Table 2. reveal that, in obese children, on the basis correlation between the Σ 7 skinfold and individual skinfold thicknesses, most revelant are in declining importance: suprailiac, subscapular, thigh, abdomen, on something like to Budapest children (Halász, Blatniczky, Kovács, Muzsnai and Péter, in press) but in alter sequence. The correlations between weight and the Σ 7-, Σ 4- and individual skinfold thicknesses in obese children are usualy slight.

Table 2. **Relationships (r) between Σ 7, Σ 4 skinfold, weight-for-height and individual thicknesses in obese children**

	Triceps (a)	Biceps (b)	Sub-scapular (c)	Abdomen (d)	Supra-iliac (e)	Thigh (f)	Calf (g)	Weight-for-height	Σ 4 skinfold thickness
Σ 7 skinfold thickness	0.71	0.63	0.76	0.74	0.79	0.76	0.70	0.52	0.988
	0.73	0.57	0.81	0.79	0.82	0.80	0.68	0.57	0.981
Weight-for--lenght	0.39	0.38	0.48	0.46	0.34	0.34	0.28	–	0.290
	0.51	0.29	0.56	0.50	0.44	0.41	0.25	–	0.366

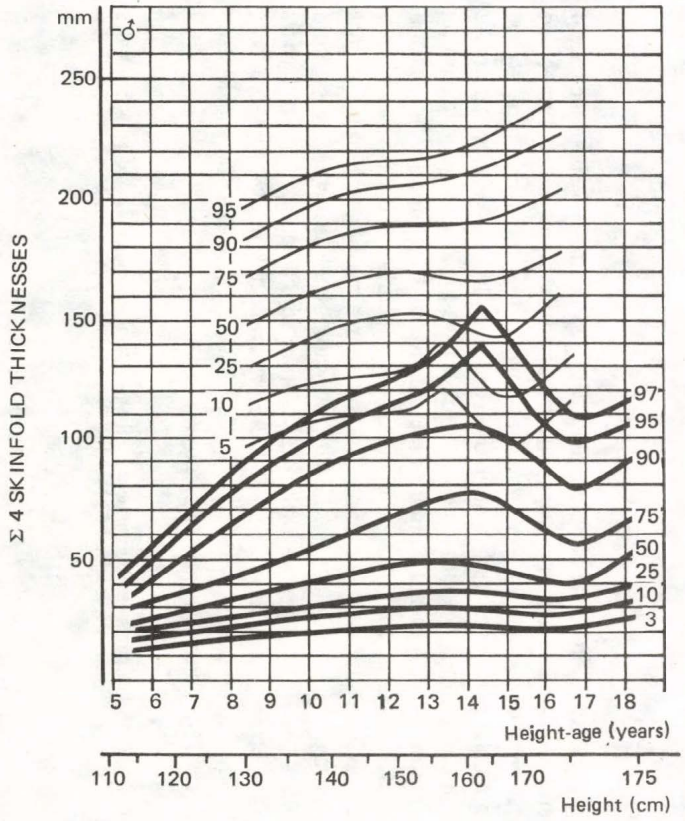

Figure 1: Percentile division of Σ 4 skinfold thicknesses in obese children (dotted lines) compared with the reference curves of Budapest children (solid lines) Boys

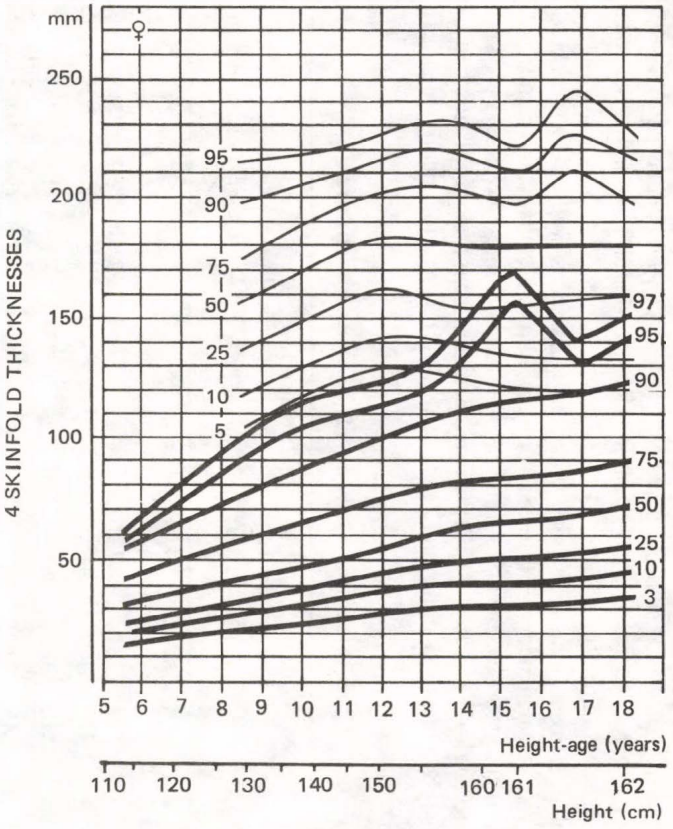

Figure 2: Percentile division of Σ 4 skinfold thicknesses of obese children compared with the reference curves of Budapest children (solid lines) Girls

As Figures 1 and 2 show, Σ 4 skinfold thickness of obese children under the 11 vs. 13 height-age groups were higher than the 97 centile reference values, that is, that the ones who are not sent to our clinic.

Data in Table 3 reveal that within the Budapest children as well as in the obese groups fat% values calculated by different formulas showed statistically significant differences in all comparisons. Brook's formula (1971) gives a highly deformed picture. The formula of Pařízková and Roth (1972) which calculates from 5 skinfold thicknesses and the one suggedsted by Durnin and Rahaman (1967) give biologically identical results.

Table 3. **Calculated body fat% in 11–12 years old children**

Author(s)	Body fat%							
	Budapest children				Obese children			
	boys $\bar{x}$	(n=377) ± s	girls $\bar{x}$	(n=411) ± s	boys $\bar{x}$	(n=149) ± s	girls $\bar{x}$	(n=244) ± s
Pařízková and Roth								
(2 skinfolds)	19.4	7.0	19.7	6.6	34.6	2.7	36.7	3.2
(5 skinfolds)	21.6	6.1	24.4	5.9	37.9	2.7	42.2	2.5
Durnin and Rahaman	21.1	6.5	26.4	5.0	37.5	2.1	40.8	2.1
Brook	24.4	8.0	24.8	8.31	45.0	2.7	49.9	2.1

$p < 0.05$ in all comparison

Conclusions

Four skinfold thicknesses in obese children gives enough information about the extent of obesity, whereas – if it includes the values measured on the trunk – helps to screen the children who are increasingly at risk from the viewpoint of metabolic differences. Weight-for-height calculation in obese children does not seem to be objective. Therefore moderately obese children or the ones who have excess weight cannot be detected by discriminating upon body height and weight in the practice of Hungarian pediatrics and this fact excludes the possibility of treating them in an early phase of the illness. Formulas for calculating fat% give deformed information. One of the reasons is that advancing height-age, taking place with the physiological growth of skinfold thicknesses, cannot be effectively proved in a calculation which includes several years and is made on the basis of stiff formulas. We therefore think that in everyday practice, primarily during the treatment and control of one child, the comparison of skinfold thicknesses with reference curves is more objective.

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THE PHYSIQUE OF THE STUDENTS APPLYING FOR ADMISSION TO THE UNIVERSITY OF PHYSICAL EDUCATION BUDAPEST IN RESPECT OF THE PARENTS' EDUCATIONAL QUALIFICATION

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Abstract: *The connection between the physique and the educational qualification of the parents in 241 female and 286 male applicants at the University of Physical Education were studied. Educational level was divided into 5 subgroups. The applicants' mean age was 18.69 year. Stature, body mass and the Conrad's growth type described by the metric and plastic indices were analyzed. Body fat content was estimated by Parízková's method and the applicants' vital capacity also was measured. Basic statistics and analysis of variance were used. No significant difference was found in the female subroups but there were two marked differences in the males, namely, in their vital capacity and the plastic index values in connection with parents' educational qualification.*

Key words: *University candidates; Physique; Parents' educational qualification.*

Introduction

Now we try for the first time to report our investigation about one factor of the socio-economical background, namely, the parents' educational qualification, in the candidates at the University of Physical Education, in connection with their physique.

Though we may gain interesting information indirectly about the students' motivation in choosing that profession, and the influence of the parents till this time no reference could be found for this respect of the theme.

There are a great number of publications concerning the body build and motor performance of the university students and especially, physical education students in Hungary, e.g. Farmosi (1985) and Reigl (1983), as well as in the international literature (Bale 1985, Carter et al. 1973, Skibinska et al. 1976). In the two latter reports the physique of physical education students in the several countries also was compared. At an earlier conference, in 1986, we reported on the physique and motor performance scores studied in the applicants at the Hungarian University of Physical Education, Budapest (Farkas et al. 1986).

This time the aim of our study is to answer the questions whether the level of the parents' educational qualification has any influence on the applicants' choosing our university and if the physique of the applicants categorized by this level would differ in this respect.

Material and Methods

The subjects were 241 female and 286 male applicants taking part in the admission procedure in 1986 and 1987. The applicants were divided into five subgroups by their parents' educational qualification. The first group was where both parents had a university-level qualification, while the families where only one of the parents had that degree belonged to the second group. When both parents were skilled workers, they

were assigned to the third group, when only one of them was a skilled worker they belonged to the fourth group. The last was a mixed group in which parental cases we could not range into the above-mentioned groups were placed. When grouping, the higher degree was taken into account in every case in which the parents' qualification differed.

The studied parameters were: decimal age, stature, body mass, body fat content described by Parízková's method, the metric and plastic indices of Conrad's growth type and vital capacity. In taking the body measurements the recommandations of Tanner et al. (see Weiner and Lourie 1969) were observed. In addition to the basic statistics ANOVA was used.

Results and Discussion

Table 1 shows the numbers of the applicants in the five subgroups and also the percentage distribution values. It can be seen that there were more male applicants than females, and there were more applicants in the first plus the second groups than in the other three together. So, we might say that the children of parents with a higher level of education want to graduate in greater number at our university, in both sexes.

Table 1. **The number of the applicants in the subgroups according to the educational level of their parents**

Educational qualification groups		1	2	3	4	5	Altogether
Females	N:	63	58	38	27	55	241
	%	26	24	16	11	23	100
Males	N:	83	79	32	39	53	286
	%	29	28	11	13	19	100

Table 2 contains the means and standard deviations of the studied characteristics in the *girls* and the results of the F-test at the 5% level of significance.

By the decimal age values it may be stated that in all the five subgroups there were more applicants who came to the university for the second or third time, as they were allowed to take part in the admission procedure for the first time when they were 18 years old. The higher the decimal mean age, the more times the applicants have taken part in the admission procedure. As indicated by the abbreviation n.s., there were no significant differences between the subgroups in any of the studied parameters in the girls, in connection with the parents' educational qualification.

Table 3 shows the same characteristics of the *males*. The observed decimal age means and the high values of the standard deviations again were explained by the fact that some of the boys came for the second or third times to gain admission to the university. In contrast with the girls, in the males there were two marked differences in connection with the parents' educational level. Namely, for the plastic index and vital capacity significant F-test values were found, presumably caused by the glaring differences in the

third group applicants. Although they were neither significantly taller, nor heavier than their peers, they had a greater plastic index and vital capacity. Since vital capacity is more explicitly structural than a functional characteristic, there must be some hidden quality in their physique and also some unknown effects that may explain these phenomena in the group where both parents are qualified as skilled workers.

Table 2. **The means and standard deviations of the characteristics in the females***

Educational qualification groups		DA	ST	BM	BF%	MIX	PLX	VC
1	x	18.61	167.52	59.01	18.22	-1.25	78.49	3.76
	s	1.17	5.72	7.62	4.23	0.34	3.80	0.49
2	x	18.49	165.06	56.40	17.57	-1.19	77.86	3.69
	s	0.86	5.95	5.94	4.39	0.46	3.91	0.47
3	x	18.94	166.02	59.24	18.42	-1.11	79.12	3.77
	s	0.92	5.63	6.39	4.83	0.37	2.72	0.50
4	x	18.71	166.81	58.22	16.10	-1.28	78.38	3.79
	s	0.94	8.21	10.58	5.28	0.41	3.95	0.81
5	x	18.71	167.20	59.42	18.51	-1.22	78.91	3.76
	s	1.01	6.27	6.62	4.56	0.42	3.08	0.47
F		n.s.	n.s.	n.s.	n.s.	n.s.	n.s.	n.s.

*Where: DA = decimal age; ST = stature; BM = body mass; BF% = body fat content in per cent of the body mass; MIX = metric index; PLX = plastic index; VC = vital capacity; F-test n.s. = non significant

Table 3. **The means and standard deviations of the characteristics in the males***

Educational qualification groups		DA	ST	BM	BF%	MIX	PLX	VC
1	x	18.61	178.53	70.58	11.02	-1.09	88.25	5.15
	s	0.87	5.56	6.45	3.68	0.38	3.48	0.60
2	x	18.74	176.64	69.81	11.04	-1.11	88.49	4.94
	s	0.98	7.09	7.54	3.54	0.32	3.32	0.55
3	x	19.03	178.91	72.75	10.34	-0.96	90.41	5.31
	s	1.45	7.17	8.62	3.17	0.36	3.69	0.60
4	x	18.69	178.15	70.74	10.32	-1.04	88.53	5.16
	s	0.92	5.93	6.71	3.48	0.34	3.62	0.65
5	x	18.63	177.49	68.98	9.55	-1.16	88.29	4.96
	s	1.00	6.22	7.38	2.66	0.32	3.22	0.54
F		n.s.	n.s.	n.s.	n.s.	n.s.	**	**

*Where: DA = decimal age; ST = stature; BM = body mass; BF% = body fat content in per cent of the body mass; MIX = metric index; PLX = plastic index; VC = vital capacity; F-test n.s. = non significant; ** = significant difference at 5% level

It might be that the boys in that surroundings move much more than the others and the physical activity proper, because of the parents' example still has its deserved honour. Or, are there any other reasons, for this kind of physique? It is not easy to be answered by that one study, so we cannot tell exactly what the real explanation is, at that moment.

In our study the applicants' physique in the five subgroups formed by their parents' educational qualification was described.

We found that in the females there were no significant differences between the subgroups while the male candidates differed in two of the characteristics, i.e. in the plastic index and in vital capacity.

Since the girls did not differ in any case we might say that their physique was the same, statistically, irrespective of whether the parents were high-educated or skilled workers, or belonged to the mixed group.

The highest values of the standard deviations in the chronological age, found in the first group girls and in the third group male candidates, show that they came repeatedly for the admission procedure and tried again and again their luck. We might say they had the will-power to insist for years till they could gain admission, though it was not certain that they finally would succeed.

We are going to repeat the investigation in other groups of applicants in the next years to get more evidence and to gain more information about the connection between the number of the applicants in the subgroups, their physique and the educational qualification of their parents.

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BODY BUILD AND MOTOR PERFORMANCE OF MALE UNIVERSITY STUDENTS OF PHYSICAL EDUCATION

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Abstract: *Changes in somatotype, growth type, body fat content and motor performance in tests of physical endurance, speed strength and coordination were analyzed in 45 male students. The purpose was to clarify if the curricular changes of education could effectively modify the perviously observed unfavourable trend.*

A significant increase was observed in stature, body fat content and in the anthropometric variables related to depo fat. Mean performance in 60 m run become poorer, those of the 1000 m run and medicine ball throw improved in the two-years period of study. It was infered that the more reasonable distribution of the practical lessons of the curriculum while it solved the deterioration of performance, failed to stop the previously noted increase in body fat.

Key words. *PE students; Body dimensions; Motor test scores.*

Introduction

Though of the slight extent only, Mészáros (1979) and Mészáros et al. (1986) reported differences on body build and body dimensions between successful and rejected applicants for admission to the Testnevelési Főiskola (University of Physical Education) Budapest. Success in meeting the complex requirements of the entrance procedure, nevertheless, depends more on the motor abilities and on the equally level of knowledge in the science subjects than on the specifics of physical constitution (Farkas et al. 1986).

Another previous study has shown that both body composition and cardio-circulatory endurance undergo unfavourable changes during the four years of university studies, despite that the admitted students represent a group which had been subjected to a multi-aspect process of selection (Frenkl and Mészáros 1979). One of the factors held responsible for such changes was the ill-proportionate distribution of the practical lessons in the curriculum.

So when this latter also was changed by the new order of education, the question of whether the new distribution of the practical lessons would modify the mentioned unfavourable trend had arisen immediately.

Material and Methods

The anthropometric and motor properties of the subjects were first recorded concurrently with the aptitude test procedure in April 1985. The follow-up study took place in the spring of 1987 by which time the 45 studied male students had finished the fourth semester. All of them had a valid sports medical license to participate in competitions, although merely six of them were Class I or better qualified athletes.

The somatotype of the subjects was assessed by the Heath–Carter technique (1971) and their growth type by Conrad's method (1963). Body fat expressed as a percentage of

body mass was estimated as suggested by Parízková (1961). Motor profiency was approached by the following test items:

– 60 m run assess speed. Track rules were observed; running time was measured to the nearest tenth of a second.

– 1000 run to assess cardio-respiratory endurance. Execution started from upright position; time was measured to the nearest tenth of a second.

– Backward throw of a 5 kg medicine ball to assess power and coordination of arms, trunk and legs. Distance was measured to the nearest 5 cm.

The differences between the respective means of 1985 and 1987 were tested by Student's t for dependent samples.

Results and Discussion

The means, standard deviations and the respective t-values are tabulated (Table 1).

The most marked changes in the anthropometric variables were observed in body fat content. The very favourable percentage found in 1985 was by no means specific to this sample. Farmosi et al. (1987) reported on similar volumes of body fat in the first-term PE-students of the previous years. Although the increase in body fat amounted to 3%; a 13–14% content of fat is not uncommon even among national team members (soccer players; Mohácsi and Mészáros 1987).

Table 1. **Means and standard deviations of the studied variables in male PE-students (N = 45)**

Variables	1985			1987	
	x	s	t	x	s
Stature	177.58	6.59	+	178.51	6.87
Body weight	68.77	6.79	+	74.06	8.06
Metric index	-1.16	0.38	–	-1.10	0.36
Plastic index	88.40	3.18	+	89.39	3.33
Ist component	2.28	0.70	+	2.93	0.80
IInd component	4.63	0.80	–	4.91	1.06
IIIrd component	3.19	0.83	+	2.51	1.00
Body fat%	10.82	2.92	+	13.73	3.00
60 m run	7.18	0.30	+	7.52	0.25
1000 m run	193.09	9.62	+	178.55	14.46
Medicine ball throw	11.84	1.33	+	13.18	1.34

t = significance of t-test at 5% level for dependent samples

Thus, it is not the absolute fat mass that is worth considering, but the very fact of an increase: This fat deposition occured in subjects involved in intense physical activity of at least 4–5 hours daily. A two-factor explanation is suggested: increased appetite due to the high-intensity exercise and a dietary regimen of inappropriate composition namely, mensa meals of high fat and CHO and low fibre content.

Stature was found to have grown by nearly 1 cm. Ranging between 0.4 and 1.6 cm this increase was statistically significant. Beyond the age of 18, it was reasoned, this extent of increase in stature was most likely due to an exercise-inducted rise in the

growth hormone level (Shephard and Sidney 1975). This mechanism is assumed to be important even when one appreciates the fact that most of the exertion-inducted HGH is metabolized by the liver in 30 to 60 min after physical activity had ended (Sutton and Lazarus 1976). Elevated HGH levels occuring several times daily are very likely to exert effects that cannot be neglected. One has to assume that in order to lead to a measurable increase in stature, tissue hormones may also contribute to the effect of excess HGH (Winter 1978). It is noted that the mean stature of our subjects did not exceed appreciable even in 1987 height of the technology students reported by Gyenis and Till (1981).

The increase of more than 5 kg in body mass was significant, naturally. About 90% of it was attributable to the accumulation of depot fat and taller stature.

Neither the plastic index representing the robustness of the growth type nor the Ist component of the somatotype are independent of fat deposition; their change is consequential in our opinion. It is noted in this respect that at the time of the first study the body build of the observed students was comparable to that of the players of the first league of the national championship (Mészáros and Mohácsi 1982, Farmosi et al. 1984, Mohácsi and Mészáros 1987).

The times measured in the running speed test of 60 m became considerably longer after two years. One reason for that is obviously fat apposition. Yet, it would be wrong to leave out of account that the efforts necessary to achieve an acceptable level in the complex skills and aptitude required by the university surriculum scarcely favour even a maintenance of running speed acquired previously. Any further improvement in speed, moreover, even a stabilization of the previously attained speed, would need special training at this level of performance.

Cardio-respiratory endurance and coordinated power as reflected by the employed test items were found to improve in our subjects. The means are naturally better than in the students of other faculties (Reigl 1983). It is added, however, that while the 60 m times are comparable to the standards of the Hungarian system of qualification, the results of the 1000 m run do not meet competition requirements.

A joint interpretation of the observed data has led us to the inference that the previously common "derangement" in the students' physical performing capacity has been mitigated or stopped by the redistribution of the curricular lessons of practice and theory. Nevertheless, the previously observed tendency of unfavourable changes in body composition still persists.

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DISCRIMINANT ANALYSIS OF BODY MEASUREMENTS IN PATIENTS WITH DOWN SYNDROME

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Abstract: *The aim of this study was to differentiate the patients with Down syndrome from the normal control group based only on the body sizes. 16 measurements of 740 patients and a control group with 2040 children were analysed by discriminant analysis. The calculations were carried out in three groups of age. As it was expected, both of the direct and indirect influences of length measurements were the highest.*

Key words: *Down-syndrome patients; Discriminant analysis.*

Introduction

There are only a few number of multivariate analysis published on Down syndrome patients' data. The result of body measurements and those of personality and socialization traits were analyzed by Kääriäinen (1975). His anthropological data were referred to five factors; the head, the studiness, the index factor, the vertical height, and the widths. The first and the fifth factors had the greatest weight in the discriminant analysis.

The characteristics of growth and the development of cognitive functions of patients with Down syndrome were studied by Cronk (1981) using longitudinal factor analysis. She found, that the first factor was the magnitude of growth data and the mental age. The second one characterized the growth changes of the body sizes. Data of different nature have been used in this analysis, therefore it is difficult to interpret results on a common basis.

There are no data on the multivariate analysis only of body sizes for patients with Down syndrome. The aim of this work was to study the influences of body measurements on the discrimination of Down syndrome and control groups, if this discrimination is possible on the basic of body measurements only.

Material and method

464 male and 276 female patients with Down syndrome whose age ranged from 4 years to adulthood have been examined. They represent the trisomic and the translocation form of the syndrome, the mosaic patients were excluded from the study. The control was randomly selected from the Hungarian National Growth Study (Eiben and Pantó 1986).

A detailed anthropometric program of 32 body measures was carried out. The data were evaluated from several points of view, considering the growth, body proportions, physique and they were analyzed by the multivariate method, too. The principal components analysis and the discriminant analysis were used.

Discriminant analysis is a method to distinguish two or more groups according qualitative or quantitative characteristics, based on quantitative data. In the analysis, the Z individual discriminator value is computed from the original p variables (Sváb 1971):

$$Z = w_1X_1 + w_2X_2 + ... + w_iX_i + ... + w_pX_p,$$

where w_i = the discriminant coefficient of ith variable, and X_i = the standard form of ith individual variable.

The difference of group means of the discriminator is the Mahalanobis D^2:

$$D^2 = Z_A - Z_B,$$

where Z_A = mean of individual discriminators in group A, and Z_B = mean of individual discriminators in group B.

As the first step, principal component analysis was carried out for the evaluation of our data. Two additional principal components concerning the extremities can be found for the Down syndrome group compared to the normal one.

Results and Discussion

Drawing the Down and the control groups together, the data are clearly separated into two groups according to the first two individual principal components (Fig. 1). Encouraged by this fact, discriminant analysis was used to decide weather it is possible to distinguish a patient with Down syndrome from a "normal" child, based on the body sizes only.

The results of analysis are shown in Table 1. The F values of Mahalanobis D^2 are highly significant in all age groups. The percent of correct classification increases by the age and in the two elder groups it is higher than 95%. It is worth to note, that these values are less than 70% if the Down syndrome patients are compared with severe mentally retarded ones, even if there are no genetically disturbed children in the last group.

Table 1. **Discriminant analysis**

	Age groups (year)		
	–10	11–17	18–
D^2	2.7127	2.1090	3.9161
F	103.02	203.22	123.81
DF	13;1180	11;1207	9;290
Percent of correct classification:			
Down-control	87.7	95.8	97.5
Control-down	92.7	95.7	99.3

The discriminant coefficients of the different body measures (Table 2) can be used for diagnostical purpose. We multiply the body measures of a child by the appropriate

coefficients, then reduce the products and the constant. If the result has positive sign, the child belongs to the Down syndrome group. If the sign is negative, the child is so called "normal".

Table 2. **Discriminant coefficients**

Body measurements	Age groups (year)		
	–10	11–17	18–
Body height	0.10805	-0.06553	-0.09771
Upper extremity length	0.14441	0.03486	–
Widths biacromial	-0.29145	-0.16779	-0.18924
bi-iliocristal	0.50964	0.36708	0.19230
humerus	-0.49975	–	0.70965
femur	-1.21243	-0.60242	-0.61609
Girths chest	0.08763	–	–
upper arm (flex)	1.43852	0.85137	0.23059
upper arm (ext.)	-1.44984	-0.69121	–
calf	-0.10417	-0.06123	–
Skinfolds subscapular	1.28384	0.72339	0.79340
tricep	-0.71053	-0.68371	-0.79431
suprailiac	-0.67740	-0.45203	-0.72642
Constant	6.33491	13.00219	13.18861
Mean Down	0.90	1.38	1.82749
Mean control	-1.82	-2.07	-2.08856

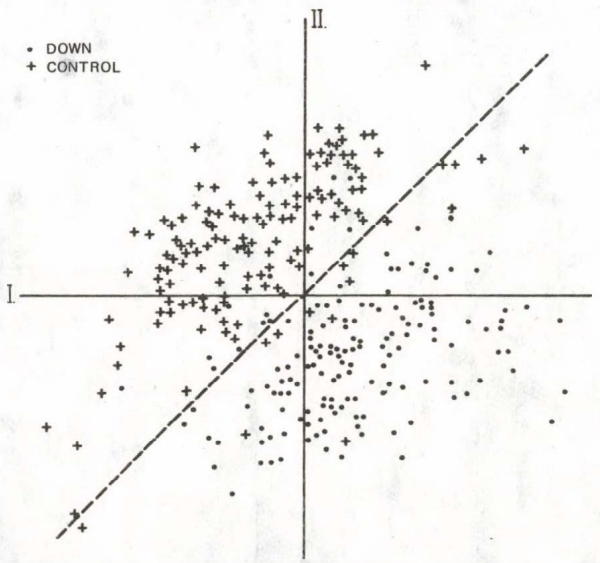

Fig. 1: Distribution of Down syndrome and control group on function of the I. and II. individual principal components

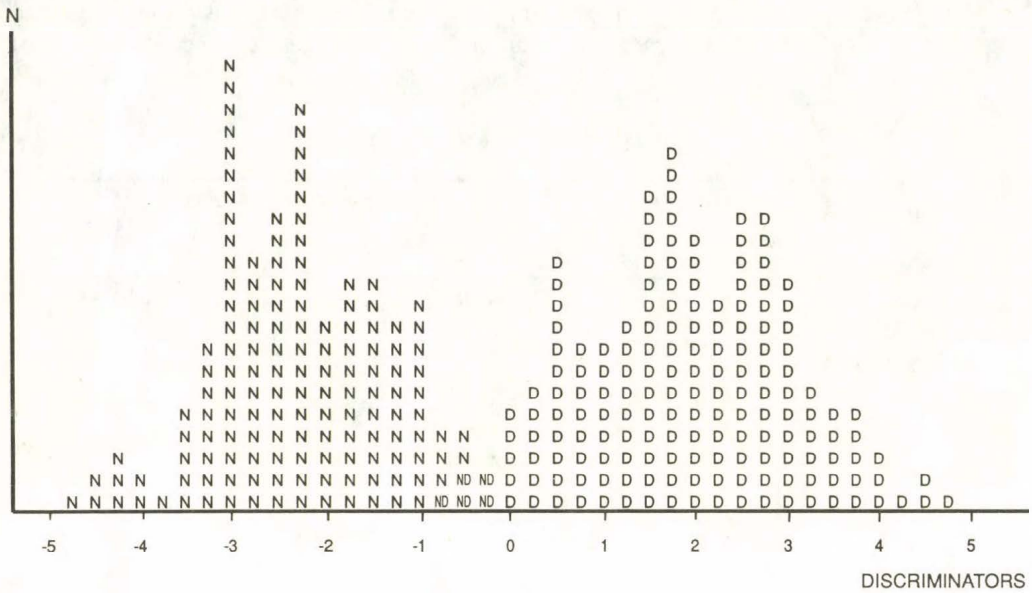

Fig. 2: Distribution of the eldest group on the function of individual discriminators

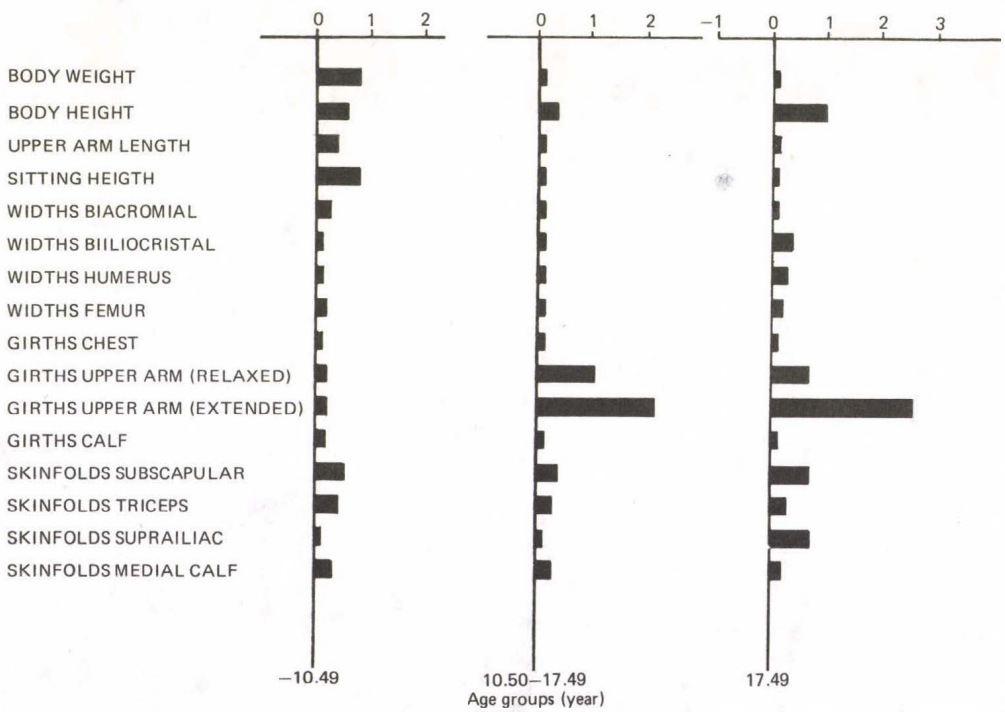

Fig. 3: Direct influences of body measurements

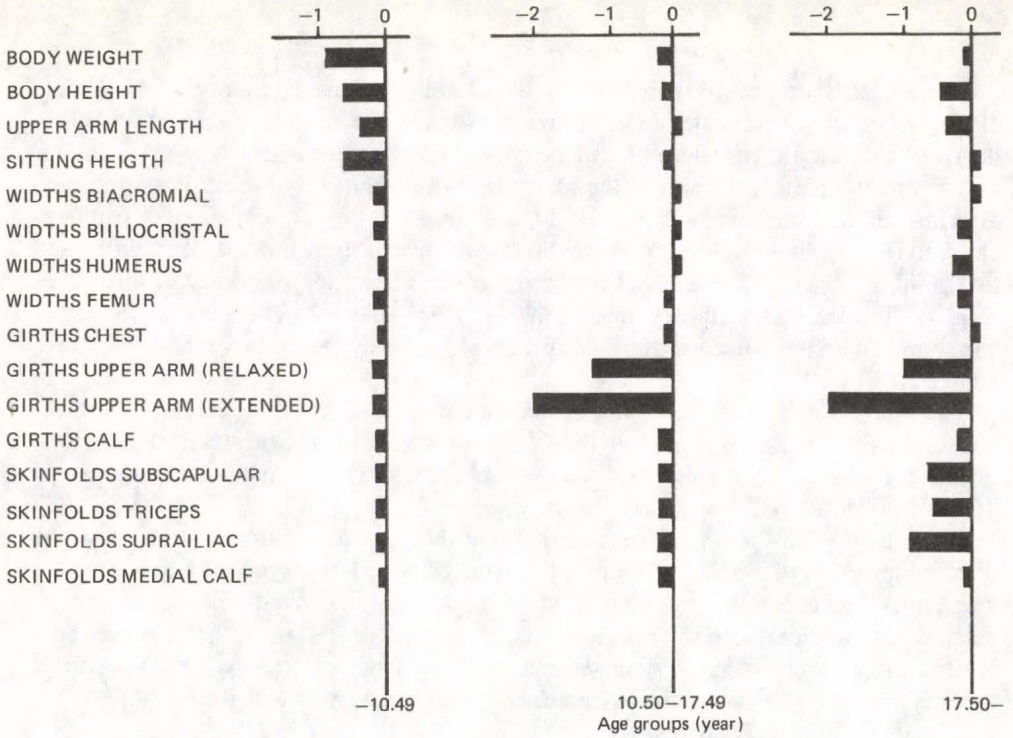

Fig. 4: Indirect influences of body measurements

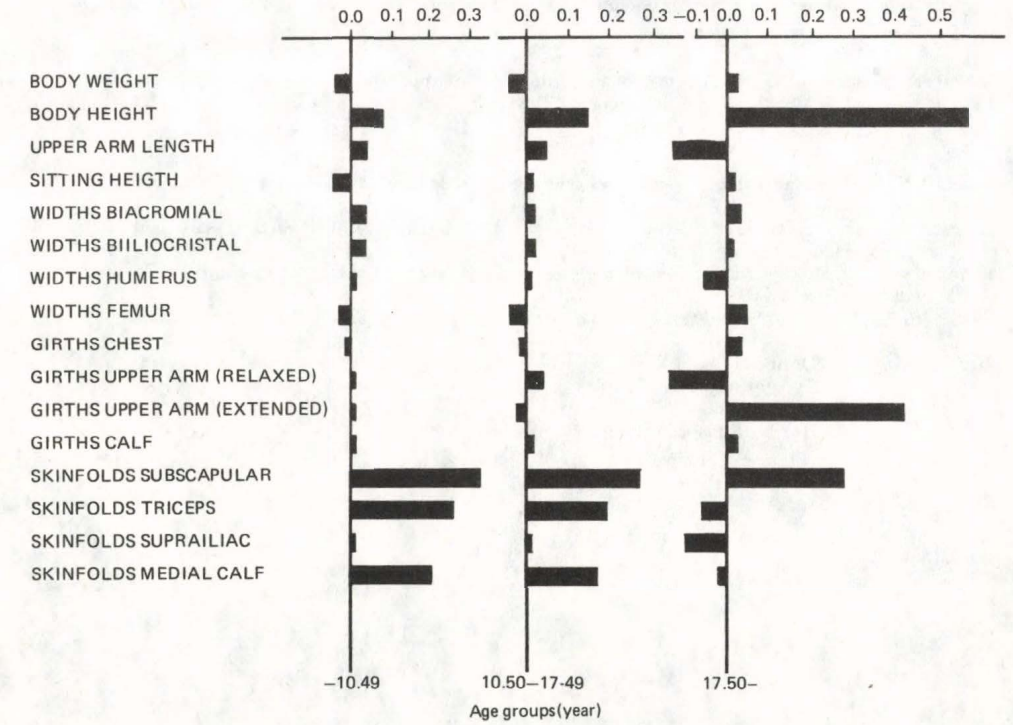

Fig. 5: Total influences of body measurements

The Fig 2. shows the distribution for the eldest group as a function of individual discriminators. As it was mentioned above, this is the best separated sample, therefore the overlap of the Down syndrome and the control groups is the least.

The most important question is the importance of certain body measures at the group discrimination. The lengths have the highest direct influence among the youngest children (Fig 3). In the oldest group the direct influence of the stature, the arm girths and two skinfolds was the highest. All of these measures have negative indirect influences (Fig 4). The indirect influence means the influence of a variable through the other variables. Therefore influence of the measures which have highest direct influence, were depreciated by other ones.

The total influences are one order of magnitude less than either direct or the indirect ones (Fig 5). As it was expected those measures have the highest direct and total influences which have the highest differences between the Down syndrome patients and the control ones.

24 patients (3.24%) were excluded from the Down syndrome group by the discriminant analysis. These persons proved to be the Down syndrome group at the reexamination, although some important symptoms of the syndrome could not be detected as muscle hypotony or loose joints. However it was striking that most of these patients have taken part in systematic and intensive physical activity for a long time. Due to this work, the physique of these children has changed and it differs from the physique of a "regular" patients.

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BIRTHWEIGHT OF INFANTS WITH PHENYLKETONURIA

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Abstract: *The birthweights of 113 Hungarian children with PKU (56 boys and 57 girls) were compared with the birthweights of controls from the Hungarian Standard. The mean value for boys was 3188.9 g (SD = 345.0), which is 30.3 g lower than the control's. The mean value for girls was 3241.0 g (SD = 366.8), which is 149.8 g higher than the average value of the controls. 16.8% of the newborns with PKU (11 boys and 8 girls) had a birthweight under the 10th percentile (10.98% in controls). The lower rate of pre-term deliveries (5,7% in PKU, 14.4% in controls) and still-births (0.4% in PKU, 0.8% in controls), furthermore spontaneous abortion (11.8% in PKU, 13.3% in controls) shows, that a heterozygote advantage can be presumed in PKU, which maintains the high frequency of homozygotes for PKU, but the PKU gene does not influence unambigouosly the birthweight.*

Key words: *Infants with phenylketonuria; Borthweight.*

Introduction

Since 1968, when direct screening of the newborns was introduced the incidence of PKU in Hungary found to be 1/8302 live births (Szabó–Somogyi–Máté 1985). Furthermore a number of genetic hyperphenylalaninemias have become known. Before the introduction of dietary treatment the reproductive fitness of homozygotes for the PKU gene was very close to zero, because in untreated classical PKU the I.Q. is almost always very low (Woolf 1986, Vogel 1984). The observed frequency of homozygotes for PKU is much too high to be maintained by fresh mutations, which typically have a maximum frequency of 1 in 100 000. The most plausible reason for this phenomenon is heterozygote advantage, well-known for instance for the sickle-cell gene, leading to a higher reproductive fitness. The nature of this possible advantage for PKU heterozygotes is still unknown. Although heterozygotes for PKU do not deviate visibly from normal homozygotes, recognizable pecularities have been reported: they show deviations in I.Q., for instance (Thalhammer et al. 1977), and have higher fasting plasma phenylalanine levels (Kang–Paine 1963, Woolf 1986). The best way to find such a heterozygote advantage appears to be the direct comparison of effective fertility between heterozygotes and normal homozygotes. It is believed that the higher plasma phenylalanine level in heterozygotes, which increases during pregnancy (Kang–Paine 1963), protects the foetus against protein deficiency or toxic substances (Anonymous 1977, Woolf et al. 1975).

The advantage might be expressed in a lower rate of abortions and still-births, fewer problems during pregnancy and at birth, and higher average birthweights, too (Woolf et al. 1975). On the other hand there are reports of an increased rate of reproductive incompetence manifest by abortions, bleeding during pregnancy, pre-term births, lower average birthweights and more still-births in heterozygotes for PKU (Blyumina 1974, Saugstad 1972).

The present work gives further informations about the birthweights of Hungarian children suffering from PKU and the distribution of their percentile values compared with controls from the Hungarian Standard (Joubert 1983).

Further data are presented about the rates of abortions and still-births, the total number of pregnancies per mother, about the rate of bleeding and other problems during pregnancy (pregnancy of risk), premature deliveries and perinatal or postnatal problems.

Materials

The material analysed includes 113 (56 boys and 57 girls) offsprings with PKU from 104 obligatory phenylketonuric heterozygous mothers. The children are from the material of the Screening Centre in Budapest. They were born between 1972 and 1986 in Western-Hungary or in Budapest.

Results

Birthweights were analysed for 51 boys and 50 girls with PKU. Eight newborns (2 boys, 6 girls) of pre-term, and four (3 boys, 1 girl) of post-term deliveries were excluded. The average birthweights are presented in Table 1.

The mean value for boys with PKU was 30.3 g lower than the normal group's birthweight, that of girls 149.8 g higher, and this difference was significant.

19 newborns (16.8%) were found with a birthweight under the 10th percentile and seven (6.2%) over the 90th percentile. The distribution of the levels above the 50th percentile was 42.9% in the boys and 54.4% in the girls (Table 2).

Table 3 gives the comparison of the fertility between 104 obligatory heterozygous mothers and normal homozygotes. The total number of pregnancies is higher in the heterozygous mothers. Futhermore the rate of abortions, pre-term deliveries, still-births, pregnancies of risk and complicated deliveries is lower than in the general population.

Table 1. **Comparison of average birthweights (g)**

	Boys		Girls	
	Hungarian Standard	PKU	Hungarian Standard	PKU
n	448574	51	421319	50
x (g)	3219.2	3188.9	3091.2	3241.0*
SD	325.3	345.0	312.3	366.8

* $p < 0.05$

Table 2. **Percentile values of birthweights from children suffering from PKU**

Percentile	Boys (%)	Girls (%)
< 10	14.4	10.2
> 50	42.9	54.4
> 90	7.0	5.4

Table 3. **Comparison of the fertility between heterozygote mothers and normal homozygotes**

	Hungarian average population	Obligatory heterozygous mothers (n=104)
total number of pregnancies per mother	2.2	2.3
spontaneous abortions	13.3%	11.8%
still-births	0.8%	0.4%
pre-term deliveries	14.5%	5.7%
pregnancy of risk	29.0%	7.9%
complicated deliveries	7.5%	4.7%

Discussion

Our results are in good agreement with observations of other authors. Cabalska et al. (1982) in Poland, Rothman–Pueschel (1976) in USA and Smith et al. (1978) found only small differences in birthweight, too. Only Saugstad (1972) observed in a Norwegian sample an increased birthweight, which may be an effect of one or two large sibships, in which birthweights were high. Our own data suggest, that the PKU gene does not influence unambiguously the birthweight of infants with PKU.

On the other hand it seemed possible that the slightly higher phenylalanine concentration in the blood of pregnant heterozygotes might favour foetal and neonatal survival, particulary in protein malnutrion (Woolf et al. 1975). This fact leads to a lower proportion of spontaneous abortions and still-births in heterozygotes for PKU, which has been found by other authors, too (Cabalska et al. 1982, Smith 1978, Woolf 1986, Woolf et al. 1975).

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GROWTH AND NUTRITIONAL CONDITIONS OF DIABETIC CHILDREN

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Abstract: *We have studied a sample of 185 diabetic children type I aged 3 3/12 and 18 year old, in order to evaluate their growth and nutritional condition considering the metabolic control degree, puncture zone and period of the diabetes evolution. We have measured 7 auxological variables and calculated 3 derived indices. The sample has been distributed according to their prepubertal maturing and pubertal one, comparing, these subgroups: one another, with the healthy population, according to sexes, HbA1C levels and with the evolution period. It seems that the period of disease evolution and the zone of puncture do not affect the considered anthropometric variables. The subjects have a good nutritional condition. Sexual dimorphism is shown much more intensively in adiposity. If HbA1C level is maintained under 10.0% we are sure that the development will be produced in a way closer to normality.*

Key words: *Growth, Nutrition, Skinfold, Diabetes mellitus type I.*

Introduction

It has been accepted that chronical illness have negative effects on the children growth and development (Kappy 1987).

Insulin-dependent diabetes mellitus (IDDM) is probably one of the most profound metabolic disturbance of childhood and adolescence (Joslin 1985). One of the goal of treatment is to intend attain the best possible metabolic control of the disease, in order to reach a development closer to normality (Clarson, Daneman and Ehrlich 1985).

The fact that the study of the anthropometric traits have a fundamental interest in the pediatric endocrinological clinics and, also the discrepancy existing in what concerns their dependence from the diabetes metabolic control (Beal 1948, Larsson and Sterky 1962, Birbeck 1972, Drayer 1974, Brink 1987, Salardi, Tonioli, Tassoni, Tellarini, Mazzanti and Cacciari 1987, Wilson 1987), have decided by us to develop the present cross-sectional study based on a sample of IDDM children.

Subjects and Methods

We have studied a sample of 185 diabetic children (Table 1), grouped taking in consideration their pubertal situation (using criteria described by Tanner 1962) and the period of the disease evolution (≤ 5 years and ≥ 5 years). All the patients were submitted to a treatment combining long and short acting insulin and, also to an adequate diet to their chronological age and have been taught suitably on the selfcontrol techniques.

Seven anthropometrical measures: supine length, sitting height, leg length (supine length – sitting height), retrotricipital, subscapular and suprailiac skinfolds, upper arm circumference and weight have been recorded following the International Biology Programme (Weiner and Lourie 1969). All these measurements, have been obtained using a Holtain stadiometer, a weighing machine (showing 100 grs differences), a

Holtain skinfold caliper and a steel tape. We have calculated the Quetelet's index (Weight/Height^2) x 10, cormic index as per Giuffrida-Ruggeri's formula (sitting height x 100/supine length) and segment ratio (sitting height/leg length). The obtained data have been compared with the standards reported by sempé (1979).

Glycosylated hemoglobin levels (HbA1C) have been measured using mini-column chromatography (BIORAD test). Intra- and interassay coefficients of variation were 2.7% and 2.8%, respectively, that have allowed us to define three groups depending on the metabolic control degree: fair control (HbA1C ≤ 0.0%), intermediate control (8.1% – 10.0%) and poor control (HbA1C ≥ 10.1%).

The data have been analyzed in the VAX/VMS computer from the "Centre de Càlcul" in the "Universitat Autonoma de Barcelona". The statistical analysis was made with the package SPSSx, using U Mann-Whitney test and Spearman correlation coefficient. It has been considered valid a probability P ≤ 0.05.

Table 1. **Sample of IDDM children**
(N = 185 IDDM children Chronological Age from 3 years 3 months to 18 years)

	Boys		Girls	
Maturing situation	N = 104 C. A. 3 3/12 – 18 years		N = 81 C. A. 3 3/12 – 18 years	
	Period of disease evolution		Period of disease evolution	
Prepubertal	≤ 5 years	> 5 years	≤ 5 years	> 5 years
66 boys	N = 48	N = 18	N = 27	N = 5
32 girls	C. A. 3 years 8/12 – 12 years		C. A. 3 years 3/12 – 11 years	
Pubertal	N = 18	N = 20	N = 27	N = 22
38 boys 49 girls	C. A. 12 years 1/12 – 18 years		C. A. 11 years 1/12 – 18 years	

Results

In all groups, HbA1C level do not surpass 9.0% (Table 2). Supine length and weight show higher significant values than reference population. Prepubertal boys show lower mean values of segment ratio (P ≤ 0.001) than reference values but they have also higher values of leg length and no significant difference in their sitting height. Quetelet's index mean values are higher than reference population in all subgroups (P ≤ 0.05). Sexual dimorphism, and evolution of the skinfolds are normal, but these patients show higher significant values in prepuberty. Arm circumference values are higher (P ≤ 0.001) in all subgroups except in pubertal boys in which muscularity is very important.

Comparing the sex subgroups (Table 3), we found that sexual dimorphism is evidenced in skinfolds, leg length, cormic and Quetelet-s indexes and segment ratio.

Table 2. **Comparison with the healthy population, means (Sempé, 1979)**

Variable	Prepubertal boys	Pubertal boys	Prepubertal girls	Pubertal girls
Chronological age (months)	108.0	175.2	94.9	169.4
Supine length (cm)	134.0**	161.3	128.8**	156.3
Weight (kg)	30.7***	49.6	28.2***	49.5
Sitting height (cm)	71.2	83.4*	69.7***	82.4*
Leg length (cm)	62.8**	77.8*	59.2*	73.8*
Skinfolds (cm):				
Retrotricipital	11.4***	9.7	13.6***	17.3***
Subscapular	6.0***	6.6	7.3***	12.0***
Suprailiac	5.5***	7.2*	7.2***	11.2***
Arm circumference (cm)	20.2***	23.6	20.5***	24.9***
Quetelet's index	169.2*	187.8*	166.2*	200.2*
Cormix index	53.2	51.7	54.3	52.8
Segment ratio	1.142***	1.073	1.195	1.120
HA1C (%)	8.1	8.3	8.2	8.9
Period of disease (mts)	40.8	67.8	32.2	62.0

* $P \leq 0.05$ ** $P \leq 0.01$ *** $P \leq 0.001$

Table 3. **Comparison in order to sex subgroups**

	Prepub/ prepub	Pub/ Pub
Supine length	NS	NS
Weight	NS	NS
Sitting height	NS	NS
Leg length	NS	$P < 0.05$
Retrotricipital skinfold	NS	$P < 0.001$
Subscapular skinfold	NS	$P < 0.001$
Suprailiac skinfold	$P < 0.05$	$P < 0.001$
Arm circumference	NS	NS
Qetelet's index	NS	$P < 0.05$
Cormic index	$P < 0.05$	$p < 0.05$
Segment ratio	$p < 0.05$	$p < 0.001$

Table 4. **Spearman correlation coefficients**

Spearman correlation coefficient between the puncture zone and the body implicated areas

Variable	Prepuber	Puber	Prepuber	Puber
Triceps	0.0861	-0.1215	-0.0140	0.2531
Subscapula	0.2162	-0.1013	0.0140	0.0896
Suprailiac	0.1387	-0.0624	-0.2029	0.0844
Arm circumference	0.3072	-0.0471	-0.3429	0.1318

Spearman correlation coefficient between the period of disease evolution and the body implicated areas

Variable	Prepuber	Puber	Prepuber	Puber
Triceps	0.2293	0.1139	0.4373	0.0925
Subscapula	0.2846	0.3710	0.1793	0.1281
Suprailiac	0.2677	0.1563	0.3165	0.1214
Arm circumference	0.2131	0.2675	0.6813	0.2631

It has not been observed any significant correlation between the zone of puncture and the implicated body areas and neither between the period of disease evolution and the implicated body areas (Table 4).

It has not been found any difference in none auxological variable considered between HbA1C levels subgroups.

Discussion

The period of disease evolution and the zone of puncture it seems that do not affect the considered anthropometric variables. On the other hand, the subjects have a good nutritional condition, so, this fact suggests that the teaching programme we use secures a good control of diabetes.

The progression of the different auxological considered variables do not differ from the healthy population, in disagreement with previous studies (Wilson 1987).

Sexual dimorphism is shown much more intensively in nutritional conditions. Diabetic girls show more adiposity than girls from the reference population.

If HbA1C level is maintained under 10.0% we are sure that the development will be produced in a way closesr to normality.

*

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AGE CHANGES IN HEAD AND FACE MEASUREMENTS OF ADULT SCHEDULED CASTE FEMALES OF PUNJAB

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Abstract: *In the present paper an attempt has been made to study the age associated changes in head and face measurements in a cross-sectional sample of 483 Sikh Harijan, 439 Hindu Harijan Females of Punjab ranging in age from 20–80 years. A trend of increase is observed in all the head and face measurements up to 45–49 years and 50–54 years in both caste groups and followed by a decrease with intermittent fluctuations up to last age group.*

Key words: *Head length; Head breadth; Bigonial breadth; Bizygomatic breadth; Nose length; Nose breadth; Sikh Harijana; Hindu Harijans; Punjab.*

Introduction

The patterns of change are related to the osteological changes, apposition ectocranially and resorption endicranially throughout adulthood and senescence alter the skull dimensions (Susanne 1980). Most transverse studies show an increase of head length with age (Pfitzner 1899, Saller 1930, 1931, Tarcho 1935, Büchi 1950, Lasker 1953, Susanne 1977). Büchi (1949), Coon (1950), Goldstein (1943), Lasker (1953) and Signal (1979) reported an increase in head length, head breadth, facial length, bizygomatic breadth, bigonial breadth with advancement of the age except for the last age groups where the trend is reversed. Nose length and nose breadth also increases throughout the life (Goldstein 1936, Hooton and Dupertuis 1951, Lasker 1953, Damon et al. 1972, Singal 1979).

The aim of the present study is to report age-changes in head and face measurements among the Scheduled caste females of Punjab because no such report is yet available in the published literature on this community.

Material and Methods

The present study is based on a cross-sectional sample of 483 Sikh Harijan and 439 Hindu Harijan females of Punjab ranging in age from 20 to 80 years. All the subjects were drawn from the Harijan settlements inand around Moga, which is the tehsil headquarter of District Faridkot in the Punjab State. The data were collected during the years 1977–1979.

Head and face measurements i.e. head length, head breadth, bigonial breadth, bizygomatic breadth, nose length, nose breadth have been studied. The whole sample has been grouped in ten age groups, each of five duration, except the last age group which includes all subjects beyond the age of 65 years. All the measurements have been taken by following a standard technique given by Weiner and Lourie (1969).

Sikh Harijans mostly work as agricultural labourers and industrial workers whereas the hereditary occupation of Hindu Harijans is scavening and sweeping. Socio-economic

status of Scheduled castes is very low compared to other communities of Punjab. Further details about Scheduled castes have already beden described by Sidhu & Sidhu (1988).

Results and Discussion

Like other body measurements the head and face measurements also undergo many changes with the advancement of age. All the head and face measurements of various age groups of Scheduled caste females of Punjab are presented in Table 1.

It is apparent from Table 1 that at age 20–24 years the mean value of *head length* is 180.7 mm and 180.1 mm among Sikh and Hindu Harijans, respectively. After this there is a general trend of increase in head length up to age group 50–54 years followed by a decline up to last age group among both castes. Maximum decline of 23 and 31 mm is observed from age group 50–54 to 55–59 among Sikh Harijans and Hindu Harijans, respectively. *Head breadth* also increases with aging, attaining maximum value of 135.6 mm and 134.7 mm at the age of 40–44 years followed by decline in next age group and again there is slight increase in head breadth up to age group 55–59 followed by decline in subsequent age groups. Maximum decline per five years in head breadth is 20 mm and 25 mm among Sikh and Hindu Harijans, respectively from age group 55–59 to 60–64. Goldstein (1936), Lasker (1953), Singal (1979) and Singal & Sidhu (1986) also reported increase in head length and head breadth with age.

Bizygomatic breadth also increases up to age group 45–49 years, after this there is slight decrease up to age group 60–64, where it attains the value of 122.0 mm and 121.1 mm, after this there is sharp decline and value becomes 120.7 mm and 119.8 mm at the age of 65 years and over among Sikh and Hindu Harijans, respectively. At age 20–24 years the *bigonial breadth* is 93.7 mm and 91.7 mm which increases to 97.2 mm and 94.3 mm up to age group 45–49 years in Sikh asnd Hindu Harijans, respectively (Table 1). Afterwards there is a general trend of decrease from age group 45–49 to 65+ but decrease in bigonial breadth is very slow. Coon (1950), Singal (1979) observed an increase up to fourth decade but Goldstein (1936) and Lasker (1953) reported that bizygomatic and bigonial breadths increases at least up to fifties in Mexican females.

In the present sample *nose length* and *nose breadth* increases up to mid fifties (Table 1). After this there is slight decrease up to 65+ years of age. Goldstein (1936), Hooton & Dupertuis (1951), Lasker (1953), Damon et al. 1972), Singal (1979), Singal & Sidhu (1986) also observed a trend of increase in nose length and breadth with age and reported that elongation of the nose may be attributed to loss of elasticity of cartilage in old age.

There is strong suggestion that increased size of the head and face may be to some extent be caused by appositional growth of bone although there may be possible some change in overlying soft tissue with aging (Laskesr 1953).

On the average Sikh Harijan women has slightly higher values of all head and face measurements than the Hindu Harijan females but differences are statistically significant only in few age groups and pooled data (Table 2).

Table 1. **Mean, standard deviation of head length, head breadth, bizygomatic breadth, bigonial breadth, nose length, and nose breadth in Sikh and Hindu Harijan females (mm)**

Age (year)	N	Head length		Head breadth		Bizygomatic breadth		Bigonial breadth		Nose length		Nose breadth	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Sikh Harijan													
20 – 24	38	180.7	27	132.2	29	121.0	22	93.7	29	47.0	40	33.3	32
25 – 29	60	182.7	45	132.9	51	120.3	55	96.6	44	49.0	41	34.1	33
30 – 34	41	182.5	44	133.1	42	120.1	54	96.3	55	50.9	34	33.5	23
35 – 39	41	184.0	65	135.0	39	122.5	35	96.6	49	51.7	30	34.8	27
40 – 44	64	184.0	33	135.6	45	122.6	52	97.0	44	51.8	39	35.0	33
45 – 49	80	185.3	47	134.4	38	124.0	46	97.2	52	51.9	35	35.3	21
50 – 54	40	186.5	45	135.2	46	123.8	40	96.7	58	52.0	42	37.0	32
55 – 59	39	184.2	50	135.5	28	122.2	40	96.4	56	51.9	50	35.9	42
60 – 64	37	182.7	38	133.5	40	122.0	63	96.0	47	51.3	51	35.3	30
65+	43	182.2	57	133.0	44	120.7	50	95.3	47	51.4	50	34.8	44
20 – 65+	483	183.4	46	133.7	43	122.7	48	96.1	56	51.2	44	35.1	34
Hindu Harijan													
20 – 24	39	180.1	23	130.4	26	120.2	20	91.7	22	46.2	41	32.7	37
25 – 29	34	180.5	19	131.2	25	121.5	22	92.9	25	48.6	40	33.1	26
30 – 34	39	181.6	79	132.1	26	121.1	37	93.5	33	49.7	37	33.5	33
35 – 39	52	181.9	38	132.5	35	121.8	45	93.9	49	48.9	48	34.0	29
40 – 44	39	184.1	39	134.7	48	122.0	47	94.0	48	50.9	41	34.9	31
45 – 49	49	184.9	48	132.8	41	122.5	63	94.3	33	51.7	40	34.0	36
50 – 54	44	185.2	30	134.8	26	122.0	55	93.6	37	51.8	48	35.8	36
55 – 59	43	182.1	41	134.9	36	121.8	47	93.1	25	47.1	41	34.7	28
60 – 64	50	181.3	21	132.4	47	121.1	54	92.9	24	48.7	34	3.43	20
65+	50	180.5	20	131.2	36	119.8	49	92.0	42	45.9	50	32.9	32
20 – 65+	429	182.9	42	132.5	39	121.2	49	93.0	36	46.9	48	33.8	32

Table 2. **Comparison of some head and face measurements of Sikh and Hindu females from the value of 'D' (Difference between two means in mm) and Student's 'T' value**

Age group (year)	Head length		Head breadth		Bizygomatic breadth		Bigonial breadth		Nose length		Nose breadth	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
20 – 24	6	1.50	18	3.60*	8	2.00*	20	4.00*	8	1.00	6	0.85
25 – 29	22	3.66*	17	2.42*	12	1.71	37	3.70*	4	0.57	10	1.66
30 – 34	9	0.75	10	1.66	10	0.20	28	3.11*	12	1.71	0	0.00
35 – 39	1	0.47	25	3.57*	7	0.14	27	3.00*	28	4.00*	8	2.00*
40 – 44	-1	-0.16	9	1.12	6	0.66	30	3.75*	9	1.28	1	0.20
45 – 49	4	0.57	15	2.14*	15	1.66	29	4.14*	2	0.33	13	3.25*
50 – 54	13	1.62	4	0.57	18	2.00*	31	3.44*	2	0.28	12	2.00*
55 – 59	21	2.33*	6	1.00	4	0.44	33	4.12*	48	5.33*	12	1.71
60 – 64	14	2.33*	11	1.22	9	0.75	31	4.42*	26	3.25*	10	2.00*
65+	17	2.12*	18	2.57*	9	1.00	33	3.66*	55	5.50*	19	2.71*
20 - 65+	5	2.50*	12	6.00*	15	7.50*	31	15.50*	23	11.50*	13	6.50*

*Statistically significant at 5% level

Summary

Age-associated changes in the head and face measurements in the adult Scheduled caste females of Punjab have been studied in the present paper. The resujlts are based on a cross-sectional data collected on 483 Sikh Harijan and 439 Hindu Harijan females ranging in age from 20–80 years. Most of the Sikh Harijans work as agricultural labourers and industrial workers and the hereditary occupation of Hindu Harijans is scavenging and sweeping. In the presewnt sample there is a trend of increase in all the head and face measurements up to 45–49 years and 50–54 years in both caste groups and followed by a decrease with intermittent fluctuations up to last age group.

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A CROSS-SECTIONAL GROWTH STUDY OF TRANSVERSE AND ANTEROPOSTERIOR DIMENSIONS IN BENGALI BOYS OF CALCUTTA, INDIA

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Abstract: *This is the first report on cross-sectional growth of six nonlinear dimensions, namely, biacromial diameter (N = 775), bi-iliocristal diameter (N = 755), transverse chest (N = 757), anteroposterior chest (N = 762), bicondylar femur (N = 773), and wrist breadth (N = 775) in the Bengali boys of Calcutta from 7.0 to 16.0 years. In four transverse traits, the age interval of peak annual increment (12.0 – 13.0 years), together with ages of increased standard deviation (12.0 – 14.0 years), give some indirect evidence for the onset of adolescent growth spurt from 12.0 years. Calcutta boys are similar to the Indian boys (ICMR 1972) in hip width, but larger than the semi-urban Bengali boys (Das 1985) in both shoulder and hip width. The results presented could be utilized as a reference data for the contemporary Bengali urban boys.*

Key words: *Body measurements; Cross-sectional growth study; Bengali boys.*

Introduction

In the nation-wide growth survey of the Indian children, carried out by the Indian Council of Medical Research (ICMR 1972), the Bengali children were not included. Therefore, in 1982–83, a cross-sectional growth study of 25 anthropometric measures was undertaken following Weiner and Lourie (1969) on 825 Bengali boys in Calcutta from the Indian Statistical Institute. We partly presented before, growth data of thirteen anthropometric variables so obtained, on the Bengali boys between 7.0 to 16.0 years (Pakrasi, Dasgupta and Dasgupta 1987, Pakrasi, Dasgupta, Dasgupta and Majumder 1988, Dasgupta and Das, unpublished).

The present communication deals with cross-sectional growth of six more anthropometric variables, namely biacromial diameter, bi-iliocristal diameter, transverse chest, anteroposterior chest, bicondylar femur and wrist breadth in the same sample of Bengali boys.

Subjects and Methods

The anthropometric data were collected from one school situated at the northern part of the city of Calcutta. The socio-economic and demographic characteristics of the sample boys and their families, method of age grouping of data, the reason for occurring unequal sample size in different measurements, etc. have been mentioned in details in Pakrasi, Dasgupta and Dasgupta (1987) and Pakrasi, Dasgupta, Dasgupta and Majumder (1988).

All the six anthropometric measurements (in cm) were taken by the author following the techniques suggested in Weiner and Lourie (1969). Biacromial and bi-iliocristal diameter, transverse and anteroposterior chest were measured by the anthropometer, while bicondylar femur and wrist breadth were measured by the sliding caliper on the left side of the subjects with wearing light pants only.

Technical error of the anthropometric measurements $(\sqrt{\frac{\Sigma D^2}{2N}})$ as computed on double observations, were 0.10 for biacromial diameter, 0.04 for bi-iliocristal diameter, 0.10 for anteroposterior chest, 0.17 for transverse chest, 0.03 for bicondylar femur, and 0.02 for wrist breadth.

Age specific means, standard deviations were calculated for all the six anthropometric characters. The whole year increments have been calculated by substracting the mean of the preceding age from that of the succeeding years which gave us the presented mean annual gain.

Processing of data tabulation and statistical analysis were performed by a Russian third generation computer (EC 1033) by using the BMDP package programme (Dixon and Brown 1978).

The results were compared, where possible, with the mixed-longitudinal data of the Bengali boys (Das 1985) analysed cross-sectionally at the Brussels Computer Centre (CDC CYBER 858). In addition, the present findings have also been compared with the boys from other parts of the country, wherever possible.

Results and Discussion

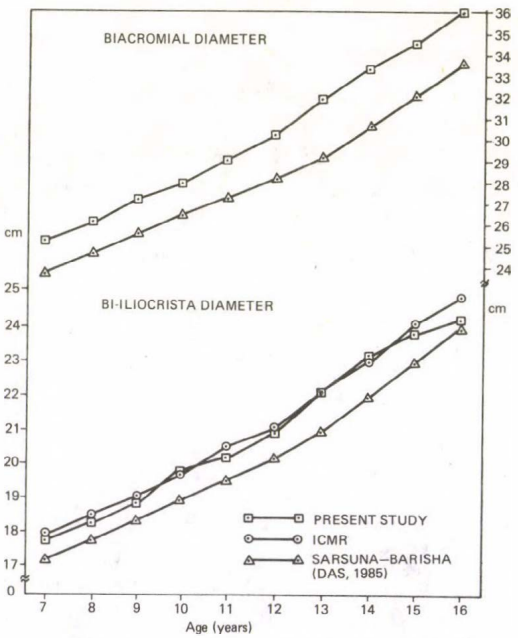

Fig. 1: Mean biacromial and bi-iliocristal diameters of the Calcutta boys (present study) compared with the means of indian (ICMR 1972) and semi-urban Bengali boyls (Das 1985)

Age specific sample size, mean, standard deviation and mean annual increments of the six anthropometric characters from 7.0 to 16.0 years are presented in Table 1.

The results show that the mean values of all other traits increase with age, except anteroposterior chest, where from 7.0 to 8.0 years only the value decreases slightly. As biologically expected, the yearly increments, as a whole, are greater for biacromial diameter than bi-iliocristal diameter. It is also observed that the curve of bi-iliocristal diameter (Fig. 1) tends to become flat from 15.0–16.0 years while between the same ages biacromial diameter still tends to increase. The greater annual increments as well as duration of growth in biacromial than bi-iliocristal diameter among the boys, are established masculine characteristics, used for explaining the phenomena of sexual dimorphism (Tanner 1962, 1978).

Table 1. **Age specific sample size (N), means (x), standard deviations (SD) and annual increments (cm) in six anthropometric characters of the Bengali boys from 7.0 to 16.0 years**

Age (years)	(i) *Biacromial diameter* n	$\bar{x}$	SD	Increment	(ii) *Bi-iliocristal diameter* n	$\bar{x}$	SD	Increment	(iii) *Transverse chest* n	$\bar{x}$	SD	Increment
7.0	59	25.35	1.56		58	17.86	1.10		58	17.04	1.20	
				0.80				0.40				0.36
8.0	82	26.15	1.36		79	18.26	1.03		79	17.40	0.96	
				1.12				0.62				0.60
9.0	93	27.27	1.61		88	18.88	1.05		91	18.00	1.22	
				0.73				0.92				0.68
10.0	69	28.00	1.66		65	19.80	1.72		68	18.68	1.85	
				1.10				0.39				0.50
11.0	92	29.10	1.96		89	20.19	1.26		91	19.18	1.46	
				1.08				0.78				0.69
12.0	92	30.18	2.08		91	20.97	2.00		92	19.87	1.43	
				1.70				1.13				1.04
13.0	94	31.88	2.50		91	22.10	1.47		91	20.91	1.53	
				1.47				0.99				0.58
14.0	90	33.35	2.51		91	23.09	1.58		87	21.49	1.65	
				1.14				0.73				0.73
15.0	71	34.49	1.98		71	23.82	1.51		69	22.22	1.53	
				1.42				0.29				0.52
16.0	33	35.91	1.98		32	24.11	1.40		31	22.74	1.67	
All ages	775				755				757			

Age (years)	(iv) *Anteroposterior chest* n	$\bar{x}$	SD	Increment	(v) *Bicondylar femur* n	$\bar{x}$	SD	Increment	(vi) *Wrist breadth* n	$\bar{x}$	SD	Increment
7.0	58	11.99	1.04		59	7.19	0.45		59	3.65	0.30	
				−0.11				0.24				0.18
8.0	82	11.88	0.77		83	7.43	0.43		83	3.83	0.28	
				0.46				0.22				0.12
9.0	93	12.34	1.02		92	7.65	0.42		94	3.95	0.26	
				0.41				0.18				0.11
10.0	66	12.75	1.04		68	7.83	0.45		68	4.06	0.30	
				0.41				0.28				0.14
11.0	90	13.16	1.15		95	8.11	0.54		95	4.20	0.35	
				0.32				0.17				0.12
12.0	93	13.48	1.42		93	8.28	0.58		93	4.32	0.35	
				0.38				0.35				0.27
13.0	90	13.86	1.20		92	8.63	0.45		92	4.59	0.25	
				0.50				0.17				0.20
14.0	89	14.16	1.32		89	8.80	0.45		89	4.79	0.36	
				1.01				0.11				0.15
15.0	70	15.17	1.35		69	8.91	0.38		69	4.94	0.27	
				0.02				0.13				0.06
16.0	31	15.19	1.17		33	9.04	0.45		33	5.00	0.31	
All ages	762				773				775			

Moreover, in this cross-sectional sample 4 transverse characters, namely, biacromial diameter, bi-iliocristal diameter, bicondylar femur and wrist breadth have exhibited the maximum annual gain consistently between 12.0 to 13.0 years. Similarly, standard deviation values in these four characters, are also noticed to be relatively higher in and around 12.0 to 14.0 years. This phenomena has occurred probably due to the presence of early, average and late maturing type of boys during these ages in this sample (Pakrasi, Dasgupta, Dasgupta and Majumder 1988). After these age periods, the increments as well as standard deviations tend to decline gradually in the succeeding ages.

Despite the cross-sectional nature of the data, these two criteria together give some indication for the occurrence of adolescent spurt in the transverse traits from 12.0 years, as also noticed previously for all the five linear traits (Pakrasi, Dasgupta, Dasgupta and Majumder 1988, Dasgupta and Das, unpublished).

In transverse chest, although the maximum yearly gain is noticed between 12.0–13.0 years, however, the pattern of standard deviation over the ages, differ in it from the pattern of the other four transverse characters. On the contrary, in anteroposterior chest, although, unlike the transverse dimensions, the maximum yearly gain is noticed later between 14.0–15.0 years, nevertheless, the trends of variability are more or less alike with four of the five transverse dimensions (Table 1).

Hip width of the Bengali boys of Calcutta are more or less similar to the Indian boys (ICMR 1972) at the corresponding ages (Fig. 1). But they are with wider shoulder and hips than the Sarsuna–Barisha boys (Das 1985). In these two dimensions, the Calcutta boys have also exhibited earlier onset of maximum annual gain with greater peak values than the Sarsuna–Barisha boys. The difference in size between the two Bengali sample may be attributed to the socio-economic conditions. The Sarsuna–Barisha boys are closer to the socioeconomic class III of the ICMR (Hauspie, Das, Preece and Tanner 1980 lwhile the Calcutta boys represent middle to upper middle class urban families.

In both the dimensions of chest, considered here, the Calcutta boys are larger than the Gaddi Rajput boys (Singh 1980) during the corresponding ages.

Due to paucity of age specific data of the anthropometric characters studied, the results generated in the paper for the first time, may be utilized as a reference population data for the urban middle class Bengali boys. Goldstein and Tanner (1980) have recently emphasized that such studies are better prefered than where there are no available standards at all.

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MORPHOFUNCTIONAL STATUS OF LITHUANIAN CHILDREN AGE DYNAMICS, FACTOR PATTERN, SECULAR TREND IN VILNIUS CHILDREN

(A Summary)

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This candidate thesis deals with the problems of growth, development and secular trend of Lithuanian children and youth, gives a complex analysis of morphological, functional traits, sexual development, physical activity and morbidity. Data presented are based on a growth study carried out in Vilnius secondary schools and kindergartens. The sample consists of 3792 children 2 to 18 years of age. Standard anthropometric and physiometric methods (Martin & Saller 1957) were used. Data were computed using linear and multiple analyses (statistical packages BMDP).

The results of this study allowed to make such conclusions:

(1) *Morphological status of Lithuanian children is as follows:*

Pubertal growth spurt (PGS) of body height and the other longitudinal measurements occours at the age between 13 and 16 years in boys and between 11 and 14 in girls. During the age period between 2 and 18 years the body height in boys increases from 89.2 to 179.6 cm, in girls from 87.8 to 165.6 cm.

Peak weight velocity (PWV) seems to be at the age between 14 and 16 years in boys (it coincides with the growth spurt of lean body mass – LBM) and between 12 and 13 years in girls (coincides with PGS of LBM and body fat – BF). From 2 to 18 years of age body mass increases from 13.1 to 70.7 kg in boys and from 12.3 to 60.0 kg in girls. During the period from 7 to 18 years absolute amount of LBM in boys grows from 20.5 to 58.0 kg, and in girls from 19.4 to 43.0 kg.

Sexual dimorphism of body composition is distinct since the middle of adolescence period. From 7 to 12 years of age BF% in boys varies from 18.9 to 21%, in girls from 19.4 to 20.9%. Later the rapid increment of LBM% occurs in boys: BF% decreases to 16.8% at the age 18, while in girls BF% grows until the age of 18 and achieves 28.7%.

Cluster analysis showed different influences of various skinfolds on body fat through all the 7–18 year old period: BF% has the high correlation with all skinfolds in both sexes till the middle of adolescence, while later BF% in boys depends mostly on skinfolds of trunk and in girls of limbs and abdomen.

Big body mass did not always coincide with high BF%, especially in boys. Till the middle of pubertal period obesity occured more often in tall children, while later it is more common in little children. It must be stressed, that boys and girls small in height and mass have usually high LBM%. Therefore height and mass can't reflect the functional possibilities of organism.

The main indices of proportions of the body are normal.

(2) *Functional characteristics can be summed up as follows:*

PGS of blood pressure, vital capacity, hand grip occurs as usually at the moment of the growth spurt of the main morphological indices. During the period between 7 and 18 years blood pressure increased from 101.0/59.4 to 127.6/79.8 mmHg in boys and from 97.8/57.8 to 126.8/81.6 mmHg in girls. Vital capacity increased from 1391.0 to 4338.0 ml, and from 1207.0 to 3096.0 ml, resp.; Hand grip of right hand changed from 10.3 to 46.5 kg, and from 8.0 to 27.6 kg, respectively.

Relative indices of strength and vital capacity changed with age differently (compared to the absolute amounts) and were connected with the body composition more closely. These indices in boys were higher than in girls and showed greater functional possibilities of male organism, more expressively than absolute amounts.

PGS of sexual maturation in boys occurs between 15 and 16 year of age (Pollutio = 14.80 year) and in girls between 13 and 14 year (Menarche = 13.37 year). The earliest second sexual trait in boys is Pubes (12.5 y.), the latest one Barba (> 18 y.). In girls, first of all hip becomes wider (9.0 y.), then occurs Pubes (11.12 y.), Mamma (11.49 y.) and Axillary hair (12.19 y.); hip widen not finishes at the age of 18. Children great in height and mass have more higher degree of maturation than small ones. Sexual dimorphism is especially distinct in body composition and in functional characteristics.

(3) *Factor analysis of morphofunctional development* including morphological indices, body composition, sexual maturation, physical activity and morbidity reveals that factor pattern depends on age and sex and shows the hierarchy of various indices:

There are no sex differences in factor pattern of physical development until beginning of adolescence (at 12 y. of age in girls and 13 y. in boys). The first factor describes fatness (body fat, girths, some transverse indices). The second factor influences body size (the principal factor loadings fall on LBM, height, the other length measurements, biacromial and bicristal diameters).

From the beginning of adolescence growth spurt sexual dimorphism of factor model is distinct: the first factor in girls describes body fat while in boys it influences body size.

With some exceptions, separate and not connected factors influence morphological, functional characteristics and morbidity.

(4) *Secular trend in Lithuanian children* between 1965 and 1985 has positive and negative affet on various morphofunctional indices:

It was revealed the positive tendency of height with maximal values in the middle of adolescence, it is especially expressed in boys. As it concerns body mass and chest circumference, it should be mentioned only increment of absolute values in boys, while these indices in recent girls (compared to height) are less.

Gracilization and leptosomization of head and the upper part of the body in recent children is evident, while bi-iliocristal diameter during the two past decades increased proportionally to body height. This process is more expressed in girls.

All the functional characteristics have negative tendency since 1965. Therefore negative changes were found in growth and development of Lithuanian children during

the last two decades. The most striking factor is the bad ecological situation in Lithuania. It must be stressed also such negative factors as decreasing physical activity, wrong nutrition, sharp socio-economic changes.

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MEGEMLÉKEZÉS

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IN MEMORIAM JÁNOS NEMESKÉRI

Az objektív tényeket figyelembe véve, legyen szabad szubjektív módon megemlékeznem Nemeskéri Jánosról. Úgy gondolom, hogy erre kettős indok jogosít fel.

Az egyik az, hogy egész élete, munkássága, sűrítetten szubjektív jellegű volt. Minden tettét a szubjektivizmus határozta meg; más szóval: sajátos egyénisége. Ennek köszönhető tisztelőinek, munkatársainak, barátainak és ellenfeleinek, ellenségeinek nagy száma; tiszavirág életű és hosszantartó szakmai kapcsolatainak váltakozása; párhuzamosan több kutatási nézőpont és módszer iránti fogékonysága; szükségszerű tudománypolitikai taktikázása; személyiségéhez mágnesesen tapadó rendkívül gazdag sokarcúságán nyugvó szakmai eredményessége. Szubjektív megemlékezésem stílusosan kapcsolódik egyéniségének meghatározó stílusához.

A másik indok az, hogy munkatársi–baráti kapcsolatunk csúcsán (mintegy húsz évvel ezelőtt) egy Farkasréti hivatalos temetést követően, Nemeskéri János felhatalmazott és megkért arra, hogy leendő temetésén csak egy ember, ha lehet, én emlékezzem meg életéről és munkásságáról. E mindenki által érthető, de nyilvánvalóan meg nem valósítható kérésének is csak a magam módján, tehát szubjektíven tudok most eleget tenni.

Egész életművét, életstílusát figyelembe véve, Nemeskéri János többszörösen kiérdemli a "Janus arcú" jelzőt.

Térben és időben egyaránt otthonosan igazodott el mindig. Több kontinensről származó és különböző korú embertani lelet vizsgálatát végezte el. Egyaránt nyitott volt a természettudományok, valamint a társadalomtörténeti tudományok irányába. Mert és tudott, idősebbekkel és nála jóval fiatalabbakkal együtt gondolkodni és együtt kutatni. A magyar parasztok között ugyanolyan természetes egyszerűséggel és otthonosan volt képes viselkedni, mint a nemzetközi nagyságok társaságában. A vele történtek egyaránt tartoztak a valóság és a mese világához. Ugyanúgy szerette az élet nyílt és titkos örömeit, mint ahogy ezeken felülemelkedve, meg is tudta vetni ezeket. Egyik pillanatról a másikra volt képes durcás emberpalánta, és professzorosan bölcs igehirdető lenni. Nagyon tudott hirtelen megsértődni, és mindezt gyorsan elfelejtve, meg nem történtté

tenni a dolgokat. Tudott uralkodni és engedelmeskedni. Szellemi függetlenségét megtartva találta meg – ha erre rákényszerült – a konstruktív belátás, megalkuvás szakmai–emberi–etikai Rubicon-ját. Tudott nagyon félni, és saját szavai szerint: "Úgy látom, hogy magunk között vagyunk!" felkiáltással, gyanús közegben is a legvadabb dolgokat bátran kimondani.

János – Janus! Tudta és merte vállalni, hogy egyszerre legyen kis ember és nagy ember.

Összegezve: rendkívül sokárnyalatúan volt színes ember színtelen világunkban.

Hivatalos szakmai élete egy hatalmas fejesugrással kezdődött. Professzora a székesfehérvári középkori királyi bazilika sírjainak feltárása mély vízébe dobta, ahol – egykorú, kézzel írt ásatási jegyzőkönyve adatai alapján – olyan lelkiismeretesen bontotta fel az akkor Albert király sírkamrájának tartott kriptában még korábban elhelyezett mintegy 40 ember csontvázleletét, amely egy idősebb szakembertől sem várható el, és napjainkig is példamutató csúcsteljesítmény volt.

A Magyar Nemzeti Múzeumba kineveztetvén, került először szorosabb kapcsolatba a régészekkel. Nyugat-Magyarország területén és a Felvidéken több helyen is végzett kollégáival együtt olyan honfoglalás- és Árpádkori temetőfeltárásokat, amelyek eredményeképpen nemcsak a Ligeti Lajos szerkesztette *"Magyarság őstörténete"* című tanulmánykötetben írhatta meg 1943-ban *"Az embertan és a magyar őstörténet"* című igen korrekt összegező tanulmányát, hanem e tudatos gyűjtőtevékenységével egyidejűleg alapozta meg a II. világháború után a vezetésével létrejött Természettudományi Múzeum Embertani Tár szakmai törzsanyagának egyik jelentős pillérét. A Magyar Nemzeti Múzeumban eltöltött évei közül kiemelkedően fontos volt az 1945-ös ostrom alatti magatartása, amikor kollégáival együtt, maga is tevékeny szerepet vállalt az elsajátítástól és tűztől veszélyeztetett nemzeti kincseink megmentésében.

A II. világháború után megindult normális életben szinte megszállottan igényelte a teljes temetőfeltárásokat, hogy a korábbi régész–antropológus együttműködési gyakorlattól eltérően, a teljes egykori népességet jobban megismerve, annak *demográfiai rekonstrukcióját* is elvégezhesse. A nem könnyen biztosítható anyagiakat mindig megszervezve, harcolta ki Fiad-Kérpuszta, Halimba, majd pedig később még számos más, sokszáz síros temető teljes feltárását.

Korai cikkeiben egyedül, majd később orvosokkal, régészekkel szövetkezve tudta a *paleopatológiai* kutatásokat, a korábbiakhoz viszonyítva tovább szélesíteni és magasabb szintre emelni.

Hogy korrektebb alapadatokkal tudjon dolgozni, először a pontosabb biológiai életkor meghatározásának alapkutatását kezdte el munkatársaival, amely a ±2,5 év hibahatáros becsléssel záródó eredménnyel rendkívül fontos tudományos értéket jelentett itthon és külföldön egyaránt.

A közösen végzett csontfűrészelések során észlelt illat alapján döbbent rá arra, hogy az egykori fehérjeállomány valóban megmaradhatott a csontban. Újabb munkatársakkal szövetkezve, így indította útjára hazánkban a *paleoszerológiai* kutatásokat.

Újabb munkatársakat bevonva lépett ismét előre Nemeskéri János akkor, amikor a sexualizáltság fokozatait meghatározva, a *nem-meghatározást* tudta árnyaltabbá tenni.

Végezetül a tudományos alapadatok hitelességi fokmérőjét igyekezett munkatársaival együtt megfogalmazni, amikor a *történeti népességek rekonstrukciós lehetőségeinek reprezentációs értéke* fogalmát és számokkal kifejezhető skáláját dolgozta ki, mint az elérhető, illetve elért eredmények ellenőrzésének, a korábbiakhoz viszonyított objektívebb lehetőségét.

Nemeskéri János tudományos tevékenysége során hol ösztönös, hol tudatos, de eredményét tekintve mindig megtermékenyítő és élesztő szerepet töltött be. Rendkívüli értéke, hogy mert közös névvel megjelentetni közös kutatási eredményt. Merte vállalni akkor is szellemi játéktársait, amikor az egy névvel megjelent cikk, tanulmány vagy könyv volt a szakmai tudás bizonyításának hivatalos fokmérője.

Tudományos szemléletét és elért eredményeit a Magyar Nemzeti Múzeum épületében az 1960-as években munkatársaival együtt rendezett, majd rövid idő után értelmetlenül és sajnálatosan napjainkban is hiányzóan lebontott, állandó embertani kiállításon tárta a nagyközönség elé.

Az ELTE Bölcsészettudományi Karán egy teljes régész-generációt oktatott az embertani alapismeretekre, és oltotta beléjük az emberi biologicum megismerhetőségének igényét, formai-tartalmi ismérveit. Sőt, anyagilag is támogatta azokat a hallgatókat, akikre rá merte bízni a legkisebb sérülést is elkerülő feltárást és csomagolást, személyesen betanítva őket e munkálatokra.

Nemeskéri János életének két utolsó évtizedében olyan helyen dolgozott, ahol az élő magyar társadalom egyéneivel, kisebb-nagyobb csoportjaival kellett foglalkoznia. Az elmúlt néhány évben azonban háromszor fordulhatott vissza, a szakmai életének kezdetén fő hivatásának, kutatási területének választott történeti embertani kutatáshoz, mindhárom esetben a tágabb értelemben vett régészethez kapcsolódó tevékenységhez. Mindhárom esetben – utólag nézve furcsa összecsengésben – történeti személyek exhumálásában vett részt. Mindegyik esetben ugyanazt a szakmai szeretetet, tudást és felelősséget volt módomban tapasztalni részéről, mint 1953-ban, első, közösen végzett feltárásunk során, majd azt követően oly sokszor.

1984-ben a székesfehérvári királyi bazilikában 1936/37-ben részben mások, részben általa feltárt, majd az ugyancsak általa 1938-ban egy közös kriptában elhelyezett mintegy 400 ember csontvázleleteit tartalmazó 83 láda régészeti módszerrel történő megfigyelését, feltárását végezte rendkívül nagy fizikai és szellemi erőkifejtéssel, de felelősségteljesen és örömmel. Ugyanebben az évben a budavári Nagyboldogasszony főplébánia templomban elhelyezett királyi házaspár, III. Béla és Antiochiai Anna, valamint az ugyancsak a székesfehérvári bazilikából származó további 16 egyén embertani leleteinek exhumálását, anatómiai nyilvántartásba vételét, majd kutatását végezte, 70 évesen.

Végzetes betegsége előtt 4 nappal bontottuk ki szemerkélő esőben a rákoskeresztúri új köztemető 301. számú parcellájában Losonczy Géza földi maradványait. Itt és ekkor sem hátrált meg. Tette amit szükségesnek tartott tenni. 75 évesen ment le a sírgödörbe létrán, és bontókésével szabadította ki a koponyát a földből.

Úgy gondolom, hogy a magyar régészek, a Magyar Nemzeti Múzeum, a Királysír Bizottság és a magam nevében úgy emlékezhetünk Nemeskéri János professzor úrra,

mint aki ebben a mesterségesen eltorzított, a gondolkodó és cselekvőképes individuumot nehezen elviselő, sőt azt üldöző társadalomban egyén mert és tudott lenni. Olyan sajátos egyén, aki magával ragadó személyi varázsával vonzotta magához, kutatási témáihoz a legkülönbözőbb szakembereket, és a magyarországi antropológiai szakterület életének legnehezebb évtizedeiben volt szűkebb és tágabb értelmű szakmájának, itthon és külföldön egyaránt tiszteletet és elismerést megérdemlő, vezető reprezentánsa.

*

Elhangzott a Magyar Biológiai Társaság Embertani Szakosztályának 1989. október 16-i szakülésén.

Kralovánszky Alán

Anthrop. Közl. *32;* 239–246. (1989/90)

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SZAKIRODALMI MUNKÁSSÁGÁNAK JEGYZÉKE*
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Összeállította: ***Dr Éry Kinga***

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KITÜNTETÉS

Belga Királyság (ország-címer)
A Korona-Rend
adományozó levele

A Közoktatásügyi Miniszter előterjesztésére ŐFELSÉGE A KIRÁLY, tetszése szerint, 1988 szeptember 28-án kelt rendeletével, szolgálatainak elismeréséül a KORONA-REND *Parancsnoki Fokozatát* adományozta THOMA ANDOR Úrnak, a Louvain-la-Neuve-i Katolikus Egyetem Professzorának. — Leo Tindemans külügyminiszter.

Örömmel számolunk be Thoma Andor professzor magas kitüntetéséről. További jó erőt, egészséget, töretlen alkotókedvet és sok sikert kívánunk kedves kollégánknak!

A szerkesztő

*

A MAGYAR BIOLÓGIAI TÁRSASÁG EMBERTANI SZAKOSZTÁLYÁNAK MŰKÖDÉSE AZ 1988—1990. ÉVBEN

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262. szakülés, 1989. április 11.

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DR. NEMESKÉRI JÁNOS c. egyetemi tanár emlékére rendezett szakülés

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BUDAY JÓZSEF — KAPOSI ILONA: Értelmi fogyatékos gyerekek növekedése (egy longitudinális vizsgálat alapján)

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A MBT EMBERTANI SZAKOSZTÁLY tisztújító szakülése

Beszámoló a Szakosztály működéséről 1985—1990

Szakosztályi tisztújítás

Az embertani Szakosztály új vezetősége: elnök: dr. Gyenis Gyula; titkár: dr. Susa Éva; jegyző: dr. Ferencz Márta; vezetőségi tagok: dr. Farkas Gyula, dr. Nyilas Károly, dr. Oláh Sándor

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269. szakülés, 1990. november 5.

GYENIS GYULA: Egyetemisták fejméretei.

PAP ILDIKÓ: Beszámoló a "Third Symposium on Upper Palaeolithic, Mesolithic and Neolithic Populations and the Mediterranean Basin" (Budapest, 1990. September) konferenciáról.

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S. É.

KÖNYVISMERTETÉSEK

Anthrop. Közl. *32;* 251–258. (1989/90)

KNUßMANN, R. (Ed.): *Anthropologie. I. Wesen und Methoden der Anthropologie. 1. Wissenschaftstheorie, Geschichte, morphologische Methoden.* (742 oldal, 375 ábra és 89 táblázat. — Gustav Fischer Verlag, Stuttgart — New York, 1988. Ára: DM 384.– ISBN 3–437–30505–0).

Egy dinamikusan fejlődő tudományágnak elengedhetetlenül szüksége van olyan kézikönyvre, amely mind az elméleti, mind a gyakorlati, módszertani kérdéseket a kor színvonalán, igényesen és részletesen bemutatja. Az antropológiában erre több példát ismerünk, különösen német nyelvterületről. Rudolf Martin 1914-ben megjelent *"Lehrbuch der Anthropologie"*-jában kísérletet tett arra, hogy a kor színvonalán összefoglalja a "biológiai" antropológiát, és részletes módszertant, elsősorban antropometriát adjon. Nem annyira tankönyv (=Lehrbuch) volt ez a vaskos kötet, mint sokkal inkább a szakemberek számára írott kézikönyv. Mint minden könyvnek, ennek is megvolt a maga utóélete. A jelen könyv immár a negyedik kiadás első kötete. Érdemes visszaidézni a korábbi kiadásokat.

A második kiadást R. Martin özvegye, Stefanie Oppenheim rendezte sajtó alá, még Martin elgondolása szerint. Ez a kiadás három évvel Martin halála után, de az ő nevével, 1928-ban jelent meg, három kötetben. A 3. kötet az antropológia bibliográfiáját, irodalomjegyzéket, tárgymutatót és a szerzők névmutatóját tartalmazta (634 oldal terjedelemben). Az első két kötet (összesen 1182 oldal terjedelemben) ma is logikusnak elfogadható beosztásban adta közre az antropológia szinte minden, akkor létező módszerét: (I. kötet:) I. Általános rész A) Általános bevezető. Az antropológia története. A problémák áttekintése, B) Antropológiai módszerek. II. Somatologia A) Somatometrria, B) Somatoskopia, C) Általános testalkattan, D) Kültakaró, E) A fej és az arc lágyrészei. (II. kötet:) III. Kraniologia A) Kraniometria, B) Kraniográfia, C) Kranioskopia, D) A koponya mint egész, E) Agykoponya, F) Az agykoponya egyes csontjai, részei, G) Az arckoponya részei, H) Az arckoponya részei. IV. Osteologia A) Osteometria, B) A csontváz általában, C) A törzs csontjai, D) Végtagcsontok.

Ebben a könvben az általános bevezető fejezetek alig 10%-ot tettek ki, míg a könyv 90%-a az antropológia módszertanát tárgyalta (somatometria és somatoskopia 10%, a test morfológiája 29%, kraniologia, osteologia 51%).

A harmadik kiadást Karl Saller szerkesztette, és 10 év alatt négy kötetben (1957, 1959, 1962 és 1966), Martin — Saller névvel jelentette meg. Saller professzor több kollégáját bevonta a kézikönyv megírásának munkájába, több új témakört felvett a tematikába, — nem minden esetben szerencsés kézzel. A 3. kiadás felépítése is érzékelteti, hogy a "teljességre törekvő" bővítés nem használt a könyvnek: (I. kötet:) I. Általános antropológia, II. Általános módszertan, III. Rendszeres antropológia, A) Somatikus antropológia, 1. Módszertan; (II. kötet:) 2. Táplálkozás, 3. Testalkat, 4. Csonttan, 5. Központi idegrendszer; (III. kötet:) 6. Vérfehérjék, vércsoportok, 7. Lágyrészek. B) Pszichológiai antropológia, (IV. kötet:) C) Alkati antropológia, IV. Alkalmazott antropológia.

Ez a négykötetes mű már nem "a Martin" volt. Ez a "Martin — Saller" elvesztette az eredeti Martin-kézikönyv számos értékes tulajdonságát (pl. hogy az egyes módszertani leírások általában egy helyen voltak megtalálhatók), ugyanakkor kevésbé lehetett felfedezni benne a Saller-társszerzőségtől elvárható előnyöket. A IV. kötetben, az utószóban Saller kifejtette, hogy az antropológia szisztematikus bemutatását nem csupán a Hominidák természettörténetére, de azok jelenkori természetrajzára és jövőbeli alakulására építette. Úgy látszik, ez nem teljesen sikerült. Ezt érzékelték a harmadik kiadást ért elmarasztaló kritikák is.

Az 1980-as évekre megérett a helyzet, hogy egy új, valóban modern szisztematikus antropológiai kézikönyv jelenjék meg, amely mind a legújabb tudományos eredményeket, mind pedig az összes, fejlett technikán alapuló módszereket közreadja.

Háromnegyed évszázaddal R. Martin Lehrbuch-ja után Rainer Knußmann professzor vállalkozott arra, hogy R. Martin szellemében egy új kézikönyvet szerkesszen. E munkájában Ilse Schwidetzky professzorasszony, Hans W. Jürgens és Gerfried Ziegelmayer professzorok voltak a társai. A szerkesztők szándékára utal a könyv nagyon általános címe, *"Anthropologie"*, de a megadott alcím, *"Handbuch der vergleichenden Biologie des Menschen"* is.

Ezt a negyedik kiadást három kötetre tervezik a szerkesztők: I. Wesen und Methoden der Anthropologie, II. Allgemeine Anthropologie, és III. Spezielle Anthropologie. Az I. kötet 1. része, amelyet most tárgyalunk, a tudományelméleti és -történeti kérdéseket és a morfológiai módszereket mutatja be, az I/2. kötet pedig — amely előkészületben van — a fiziológiai, a pszichológiai, a genetikai és a matematikai módszereket fogja tárgyalni. A II. kötetet ugyancsak két részre tervezik: az emberi test részeit és a szervrendszereket a variabilitás szemszögéből dolgozzák fel. A genetikai és környezeti tényezők, a populációbiológiai hatások, a filogenetikai és ontogenetikai változások képezik ennek az általános antropológia kötetnek az anyagát. A III. kötet a hominid evolúció kérdéseit tárgyalja majd, a földrajzi elterjedéssel és a populációk differenciálódásával bezárólag.

Az I/1. kötet megírásában 32 szerző vett részt (az akkori NSZK-ból és Nyugat-Berlinből, továbbá Ausztriából, Belgiumból, Svédországból és az Amerikai Egyesült Államokból). Kötetüket — nemes gesztussal

— a német nyelvterületen élő és dolgozó antropológusok két nesztorának, Emil Breitinger (Wien) és Ilse Schwidetzky (Mainz) professzoroknak ajánlották.

Knußmann professzor az I. kötethez írott előszavában hangsúlyozza, hogy bár a könyvet Martin szellemében kívánják megírni és kiadni, a szakma több évtizedes fejlődése a nézőpontok és hangsúlyok megváltozását eredményezte, és az anyag újfajta elrendezését kívánja meg. Ez elsősorban a módszertan kibővítését jelenti, és egyben indokolja, hogy a terjedelmes I. kötet két részben lásson napvilágot.

Az I/1. kötet két részt tartalmaz: egy 126 oldalas bevezető fejezettel indul, amely az antropológia mai képét rajzolja meg, és az antropológia történetét tekinti át.

A *mai antropológiát* R. Knußmann úgy definiálja, hogy a (biológiai) antropológia tárgya a Hominidák variabilitásának kauzalitásokat elemző leírása, az embernek az állattal a nem-patológiás jellegek tekintetében való összehasonlítása, természettudományos eszközökkel. Ebben a szellemben vizsgálja az összes lehetséges rokon- és segédtudományt, ill. az antropológia részterületeit. Áttekinti a világ antropológiai intézményeit, ill. mindazokat a laboratóriumokat, amelyekben antropológiai/humánbiológiai munka folyik, országok szerint. Magyarországról igen részletes felsorolást olvashatunk. Információkat kaphatunk továbbá a legfontosabb kutatásokról, antropológiai társaságokról és az antropológiai, humánbiológiai folyóiratokról.

Az *antropológia történetét* I. Schwidetzky írta meg, rendkívül részletesen. Áttekintést ad a kezdetektől, a romantikus filozófiai megközelítésektől az anatómiai és orvosi munkákon, az utazók leírásain át a mai antropológia kialakulásáig. Részletesen leírja az antropológia ma működő intézményeit földrészek, ill. országok szerint. Ebben a fejezetben a magyarországi helyzet ismertetése — sajnos — téves. Ez olvasható ugyanis a 73. oldalon: "Der einzige ordentliche Lehrstuhl besteht heute in Szeged...". Ez még átmenetileg sem volt így, hiszen a budapesti tanszék soha nem veszítette el önállóságát, még akkor sem, amikor megbízott igazgatója volt. Hogy ez az állítás téves vagy tendenciózus beállítású információn alapul-e, azt a recenzens nem tudja eldönteni. Azt azonban szomorúan kérdezi: kinek állhatott érdekében a hamis információ kiküldése? — Mindenesetre nehéz vállalkozás egy ilyen "világ-áttekintés" megírása, hiszen mire megjelenik az írás, a valóságos helyzet már megváltozhat. — A továbbiakban még az antropológia résztudományainak, ill. kutatási területeinek kifejlődéséről olvashatunk e fejezetben.

Csak utalunk arra, hogy a könyvnek ez az első része milyen élénk visszhangot váltott ki egyes német antropológusok körében. Elvárták volna ugyanis, hogy a Harmadik Birodalomban a nácikkal együttműködő német antropológusokat, azok tendenciózus "rasszantropológiai" kutatásait, az ezekre épült rasszideológiát stb. e könyvben határozottabban elmarasztalják a szerzők (v.ö. Walter, H.: Anthrop. Anz. *47;* 87–95. 1989).

Az I/1. kötet túlnyomó többségét a 636 oldalnyi *módszertani* rész adja. Ez a II. rész az *antropológia módszertanának* és *az antropológiai segédtudományoknak* hét főbb területét dolgozza fel.

(A) G. Bräuer és R. Knußmann ad egy *antropometriai alapvetést*, az alapfogalmak, a mérési technika és a mérőeszközök, vizsgáló eljárások leírását. Ezt követi a G. Bräuer által megírt részletes osteometria, ill. a R. Knußmann által megírt somatometria. Mindkét fejezet igen részletes, alapos és bőven illusztrált. A testfelület, a testtérfogat és a testösszetétel fejezetét J. Brozek és munkatársai, az ipari antropológia speciális vizsgáló módszereit H. W. Jürgens és I. Matzdorf írta meg, mindannyian a kérdéses problémakör kitűnő szakemberei. A fotogrammetriai módszerek (B. Jacobshagen et al.) ismertetésével zárul ez a rész.

(B) A *pigmentáció* vizsgálati módszertanának igen vázlatos leírása érinti a bőr, a haj és a szem színének vizsgálatát (A. Leguebe).

(C) A *morfológiai–diagnosztikai módszerekről* összeállított rész eléggé heterogén. I. Schwidetzky és R. Knußmann vázolja fel a típusdiagnózis morfológiai vonatkozásait, amelyeket azután R. Knußmann bont ki az igazságügyi antropológia morfológiai összehasonlító módszertanának fejezetében. Ez a terjedelmes fejezet mind a származásmegállapítás ("atyasági vizsgálatok"), mind a kriminalisztikai személyazonosítás (bankrabló felismerése videofelvétel alapján) módszereit felöleli, bár ez utóbbi rész szakmailag kevésbé megalapozottnak tűnik. — Az élő ember érésének diagnosztizáló módszereit W. Bernhard írta meg. A recenzens nem mehet el szó nélkül amellett, hogy a csontérés tárgyalásánál a szerző Fochem — Klumair (1976) atlaszmódszerét ismerteti (409–410. oldal), bár tény, hogy megemlíti a TW2 módszert is. Ha a humánbiológus ma atlaszmódszerrel becsülné a gyermekek skeletalis életkorát, az kétségkívül módszertani visszalépést, azaz szakmai hibát jelentene. Sajnálatos meglepetés, hogy a fogérésről csupán 17 sor olvasható, Demirjian nevének említése nélkül. E fejezet egyes témáit egy kézikönyvben talán érdemes lett volna bővebben is tárgyalni. — A csontváz életkor-meghatározásához J Szilvássy, míg a csontváz nem-meghatározásához T. Sjøvold ad módszertani leírást. Az utóbbi két fejezet igen jelentősen épül a magyar kutatásokra, Nemeskéri és munkatársai eredményeire. — M. Schultz a paleopatológiai diagnosztikus módszereket ismerteti e rész utolsó dolgozatában.

(D) A *dermatoglifiai módszerek* leírása alkotja a negyedik blokkot, amely a lenyomatok felvételét (G. Hauser és G. Mull), ill. azok kiértékelését (G. Hauser) tárgyalja. Ez utóbbi fejezet igen részletes, és a téma kétségkívül alapos összefoglalását adja. A fejezethez tartozó irodalomjegyzék magyar szerzőket is idéz, de szívesen olvasnánk e jegyzékben Susa német nyelvű monográfiáját is, amelyet viszont, sajnos, nem említ.

(E) Az ötödik fő fejezet a *rekonstrukció*, a *konzerválás* és a *reprodukció* módszereit ismerteti. M. Kunter a sírokból előkerülő csontanyag megmentését és restaurálását, H. Piepenbrink és B. Hermann a túlélő lágyrészek kezelését, B. Hermann a hamvasztásos temetkezésekből előkerülő csontmaradványok feldolgozását ismerteti. — F. W. Rösing igényes áttekintést ad a csontvázak alapján történő termetbecslés módszereiről. — E.–M. Winkler röviden vázolja a plasztikus lágyrészrekonstrukciót. Ez a 6 oldalas, igénytelen fejezetecske nyilván csak a teljesség kedvéért került a könyvbe, inkább csak kuriozumként, és nem szakmai információ gyanánt. —

C. Niemitz a konzerválás és preparálás, E. Reuer pedig a lemintázás, az öntőforma-készítés módszertani kérdéseit tárgyalja. Hasznos fejezet a rajzos rekonstrukciós technika (E. Burger és G. Ziegelmayer) és a fototechnikai eljárások (B. Jacobshagen) bemutatása, még akkor is, ha ma már rendszerint hivatásos fényképészek segítik az antropológus munkáját.

(F) A hatodik fő fejezet a *datációs módszerekkel* foglalkozik. J. L. Franzen a kronológia geológiai, paleontológiai módszereit és a stratigráfia kérdéseit, H. Ziegert a kronológia régészeti módszereit, míg M. A. Geyh a fizika és kémia kronológiai módszereit tárgyalja. Mindhárom fejezet korrekt áttekintést ad a témáról, de — a dolog természetéből adódóan — kevés ahhoz, hogy valaki ennek alapján kezdjen el dolgozni e területeken.

(G) A kötet utolsó fő fejezete a *röntgen* (B. Hermann) és a *fény- és elektronmikroszkópos* (M. Schultz) *módszereket* tárgyalja. Olyan modern vizsgáló módszerek is helyet kaptak itt, mint a komputer-tomográfia vagy a raszter–elektronmikroszkópiai technika.

A kötet egy 12 oldalnyi név- és tárgymutatóval zárul.

Az eddigiekből kiderül, a recenzens el tudja fogadni az antropológia módszertanának Martin-féle feldolgozását, kiegészítve a Knußmann által ígért változtatásokkal, azaz bizonyos nézőpont- és hangsúly-eltolódásokkal, vagyis az újonnan bevezetett vizsgáló módszerek részletes ismertetésével. E vonatkozásban azonban bizonyos hiányérzete marad, és helyenként aránytalanságokat is érez a könyv szerkezetében.

Néhány elírás zavarja az olvasás élvezetét, és ez különösen szerző-neveknél bántó (pl. "Garray, Levine u. Castro" olvasható a 110. oldalon, de Garay, Levine u. Carter helyett).

Összefoglalásul elmondható, hogy az *Anthropologie* a jónevű szerzőkből álló nemzetközi team igéretes vállalkozása. Az I/1. kötet — kisebb-nagyobb fogyatékosságai ellenére is — impozáns munka. A szerzők túlnyomó többsége igényesen, alaposan kidolgozta az általa vállalt fejezetet, a szerkesztő pedig egységbe foglalta azokat. A fejezetek többsége mind a kitűnő szakmai színvonala, mind pedig didaktikus felépítése és jó stílusa révén tankönyvi funkciót is képes betölteni. A sok jó ábra és informatív táblázat ezt ugyancsak elősegíti.

A G. Fischer Verlag a tőle megszokott elegáns formában jelentette meg e könyvet.

Kívánjuk, hogy a további kötetek is mielőbb megjelenhessenek, és reméljük, hogy azokat minél több magyar antropológiai/humánbiológiai munkahely képes lesz megszerezni.

Dr. Eiben Ottó

PAPP, Z.: *Obstetric Genetics* (J. M. Opitz előszavával. Akadémiai Kiadó, Budapest, 1990. 48 táblázattal és 218 ábrával. Ára: 1590 Ft.)

A könyv 1986-ban látott napvilágot a Medicina könyvkiadó gondozásában (584 oldal, 48 táblázattal, 223 ábrával, 290 Ft, magyarul: *Szülészeti Genetika* címmel, Lampé L. professzor előszavával).

Valóban hézagpótló műről van szó, amely 80 fejezetre tagolódik. Rendkívül színes és széles a szerző palettája. Koncepciója: a modern szülészet fontos hivatása közé tartozik a veleszületett rendellenességek, betegségek megelőzése. Etikai meggondolások mellett hangsúlyozza azt is, hogy a magzati diagnosztika, valamint a genetikai szűrések költségkihatása lényegesen kisebb annál, amit egy értelmileg károsodott vagy gyógyíthatatlan betegségben szenvedő gyermek jelent a családnak, ill. a társadalomnak.

Figyelemre méltó az a körülmény, hogy a non-invasiv módszerek mennyire előtérbe kerültek a diagnosztikai eljárásokban. Az ultrahang-vizsgálat lassacskán minden kórismézésben kiegészítő eljárássá válik.

A DNS-analízis, a magzatvíz kémiája, annak citológiája, a különböző fejlődési rendellenességek, a citogenetika szülészeti vonatkozásai kellő arányokban jelentkeznek. Természetesen a mendeli genetika is kellő helyet kapott. Minden egyes mendeli kórkép McK számmal van ellátva (McKusik katalógus-száma).

A kromoszómák géntérképére vonatkozó irodalom az 1989-es adatokat tartalmazza.

A könyv az antropológus számára is nyújt értékes adatokat. Miután döntő fontosságúvá vált a terhes méh ultrahang vizsgálata, kibontakozóban van az antropometriának egy sajátos új fejezete, nevezetesen a prenatalis antropometria. A 17. fejezet a magzat UH anatómiájával foglalkozik. A 38. fejezet a dysmorphiák értékelésére vonatkozó fontosabb arcméreteket tárgyalja. A 39. fejezetben a magzat hetenkénti tömeggyarapodását percentilis táblázatban közli. Az 52. fejezet a magzat különböző hosszú csöves csontjának (humerus, ulna, radius, femur, tibia, fibula) alakulását percentilis táblázatban közli a terhesség 13. és 40. hete közötti mérések alapján.

Papp professzor 20 év tapasztalatát írja meg azzal, hogy minden fejezetet alapismeretekkel vezet be, amelynek segítségével a szülész, a gyermekgyógyász, a genetikus, de az orvostanhallgató, valamint a védőnők is könnyen eligazodhatnak.

Dr. Horváth László

SEN, TULIKA: *Growth and Development of Bengalee Girls.* (Anthropological Survey of India, Calcutta, 1988. 134 oldal)

Az utóbbi évtizedek intenzív indiai növekedésvizsgálatai között fontos helyet foglal el Tulika Sen monográfiája a bengáli leányok növekedéséről, éréséről. Calcuttai iskolás és főiskolás leányokat vizsgált (N=2536;

9–20+ évesek) részletes antropometriai program szerint (14 testméret), és rögzítette a menarchekort és az állandó fogak, különösen a második és harmadik moláris áttörési idejét. A bengáli leányok növekedését, fejlődését néhány, nemzetközileg ismert növekedésvizsgálat adataihoz hasonlította.

A menarche vizsgálata mellett a szerző részletesen elemzi a testmagasság, a testtömeg, az ülőmagasság, a végtagok, a szélességi és kerületi méretek és a bőr/zsírredők növekedési változásait, valamint a relatív testméretek viselkedését és a fogak áttörési rendjét.

A bengáli leányoknál korán jelentkezik a menarche, amelyet még kb. fél évig kísér a testméretek növekedési ütemének intenzív szakasza. A növekedési görbe 9 és 13 év között kevésbé meredeken emelkedik. Ez kétségtelenül mutatja, hogy ezeknél a leányoknál nemcsak a növekedési folyamat retardált egy relatíve korai életkorban, hanem a növekedési ráta is lassúbb.

A 12, 48 éves átlagos menarchekor egyébként nem mutat jelentős szekuláris változást az utóbbi száz évben. Ezt a szerző a szocioökonomikus státusz változatlanságával magyarázza.

A serdülési növekedési lökés és a menarchekor közötti összefüggést jól mutatja ez a vizsgálat is. A serdülési növekedési lökés csúcsa az esetek többségében kb. másfél évvel előzi meg a menarchet. A második molaris áttörésének átlagos ideje, a 14. életév, egybeesik az összes testméret növekedési sebességének lelassúlásával.

A szerző felvázolja azokat a problémákat, amelyeket további vizsgálatra fontosnak tart. Így elsőként annak az életkornak a megállapítását, amelyben a testméretek növekedése befejeződik, amikor az egyedről elmondható, hogy elérte a felnőttkort. A vizsgált bengáli leányok ugyanis még 18 éves koruk után is nőttek, és hasonló észlelésekről számoltak be más szerzők is.

A másik érdekes probléma annak kiderítése lehet, hogy mi okozza a bengáli leányok kisebb értékeit szinte minden testméretben más csoportokhoz képest, kivéve a 9–10 éveseket, ahol a bengáliak még kedvező képet mutatnak. Rosszabb táplálkozási viszonyokkal aligha magyarázható a jelenség, felvetődik inkább a populációgenetikai különbözőség. A szerző feltételez egy "juvenilis növekedési lökést" a 6–8 éves kor táján.

A kötet közel kétszáz tételes irodalomjegyzékkel zárul. E monográfia joggal tarthat számot a növekedéskutatók érdeklődésére.

Dr. Eiben Ottó

SINGH, SWINDER PAL — MALHOTRA, PROMILA: *Kinanthropometry. Human Size, Shape, Proportion, Composition, Maturation and Gross Function.* (Lunar Publications, Patiala/India, 1989. Ára: 75 Rs)

Az indiai humánbiológiai kutatások egyik legfontosabb központjának, a patialai Punjabi Egyetem Humánbiológiai tanszékének két fiatal, ambiciózus munkatársa kitűnő kézikönyvet adott közre. Az a kétévtizedes céltudatos szakmai munka, amelyet L. S. Sidhu professzor neve fémjelez, immár szép termést hozott. A szerzők dedikációja megemlékezik mindazokról, akik jelentősen hozzájárultak a kinantropometria kifejlesztéséhez.

A könyv alcíme utal a tematikára: az emberi test nagyságát, méreteit, arányait, összetételét, növekedését és érését tárgyalja, mégpedig a legkorszerűbb felfogásban, a legújabb eredmények figyelembevételével.

A bevezető fejezetben megadják a kinantropometria fogalmi definícióját, a második fejezetben pedig szisztematikus szomatometriai leírást adnak. A harmadik fejezetben a testarányokat tárgyalják, bemutatják a Ross — Wilson-féle (1974) unisex human fantomot, a Ross — Ward-féle (1984) O-skálát stb. Mind terjedelmében, mind színvonalában legjelentősebb a negyedik fejezet, amely a testösszetételt tárgyalja. A. Behnke-től kiindulva áttekintést kaphatunk itt a testösszetétel-kutatás kifejlesztéséről, az idők folyamán kidolgozott elméletekről, alkalmazott módszerekről, a mai taktikáról stb. Ugyancsak részletes és didaktikusan megírt a következő, a szomatotipizálással foglalkozó fejezet. A szerény zárófejezet a növekedésről, az érésről és a fizikai teljesítményről ad vázlatos képet. — Részletes irodalomjegyzék segít a további tájékozódásban.

Jó szívvel ajánlható ez a nagyon informatív, ügyes kézikönyv minden humánbiológusnak.

Dr. Eiben Ottó

SIDHU, L. S. — SODHI, H. S. — BHATTACHARYYA, A. K. — BANERJEE, A. K. — SINGH, A. (Eds): *Trends in Sports Sciences.* (Indian Association of Sports Scientists and Physical Educationists [IASSPE], Patiala/India, 1988. 251 oldal. Ára: 150 Rs.)

Ez a tanulmánykötet az indiai sport- és testneveléstudományi társaság (IASSPE) harmadik, Kalyani-ban (Ny-Bengália) 1987. januárjában mintegy 80 résztvevővel megrendezett konferenciájának 28 előadását tartalmazza. A szerkesztők az anyagot hat témakör köré csoportosították: Testnevelés és sport; Edzésmódszerek; Kinantropometria és biomechanika; Sportélettan; Sportbiokémia; Sportpszichológia és -szociológia.

Az első rész dolgozatai a testnevelés és sport, az olimpiai részvétel, az iskolai testnevelés kérdéseit, múltját és jövőjét elemzik, és a szükségesnek vélt változásokat és tennivalókat vázolják fel. Először kapunk adatokat az indiai és az olimpiai atléták összehasonlításáról, mint ahogyan indiai edzésmódszertani tanulmányok is először ebben a kötetben jelentek meg.

A kinantropometriai részben Sodhi és munkatársai adnak kitűnő áttekintést a kinantropometria modern perspektíváiról. Mokha és Sidhu indiai röplabdázók, Bose et al. footballisták, Singal et al. gyephokizó nők testalkatát és testösszetételét mutatják be. Sodhi et al. kilenc sportág indiai élsportolónőinek menstruációs ciklusát vizsgálta. Az átlagos menarchekor ("re-call" módszerrel) 13.8 év. A megkérdezett 138 sportolónő 63.5%-ának nem változott a sportteljesítménye a ciklus ideje alatt, 28,5%-uké csökkent, és csak 8,0%-uknál javult a teljesítmény. — Ugyanezt a kérdést elemzi S. Banerjee et al. a motoros és a cardiorespiratorikus teljesítmény oldaláról, — már a sportfiziológiai fejezetben.

A sportbiokémiai részben a C-vitamin hasznosításáról, a vér–laktátszintről, a vérben edzés hatására végbemenő változásokról olvashatunk tanulmányokat. Az utolsó fejezet az ígéretesnek induló indiai sportpszichológia és sportszociológia néhány vizsgálatát mutatja be.

Az igen aktív patialai kinantropometriai munkacsoportnak nagy szerepe volt e tanulmánykötet kiadásában.

Dr. Eiben Ottó

REILLY, T. — SECHER, N. — SNELL, P. — WILLIAMS, C. (Eds): *Physiology of Sports.* — E. and F. N. Spon; Chapman and Hall, London, New York, Tokyo, Melbourne, Madras. 1990. 495 oldal.

Az utóbbi évtizedekben szerte a világon végzett intenzív kutatások révén a sportfiziológia tisztes polgárjogot nyert az "akadémikus" tudományok között. Az 1920-as évektől kezdve az olimpiai játékokon végzett sportorvosi, sportantropológiai vizsgálatok sorában egyre nagyobb helyet követelt magának a sportfiziológia. Kutatási eredményei nagyban hozzájárultak a sporteredmények állandó javulásához. A jelen tanulmánykötet is ezt a célt szolgálja, mind elméleti, mind gyakorlati vonatkozásban.

A könyv szerkesztői nemzetközileg ismert sporttudósok, a szerzők zöme az angol nyelvterületről adódik.

A könyv négy részre osztva 15 tanulmányt ad közre.

Az első rész az általános fiziológiai hátteret tárgyalja, így a testedzés során végbemenő anyagcsereváltozásokat (C. Williams), ill. az izomrendszernek az erőfejlesztő edzésekhez való adaptálódását (K. Klausen).

A második rész öt tanulmányának szerzői a sportmozgások fiziológiai kérdéseit vizsgálják, a vágtázókon (P. F. Radford), a középtávfutókon (P. Snell, aki maga is kétszeres olimpiai bajnok középtávfutó), a maratonifutókon (R. J. Maugham), a gyaloglókon (R. O. Ruhling és J. A. Hopkins), ill. a kerékpározókon (E. R. Burke et al.). Az elemzések egy része kiterjed az antropometriai, testalkati, testösszetételbeli jellemzőkre is.

A harmadik részben a vízisportok, ill. a jégen űzött sportok kerülnek sorra. Kiemelkedik T. Reilly-nek az úszásról írott referátuma, amely részletesen elemzi mind az egyes izmok, izomcsoportok részvételét az úszás mozgássorozataiban, mind az úszók testalkati tulajdonságait. A további tanulmányok az evezés (N. Secher), a vitorlázás (R. J. Shephard), ill. a jégkorongozás, a gyorskorcsolyázás és műkorcsolyázás fiziológiai problémáit tárgyalják (H. A. Quinney).

A negyedik részben a sportjátékok fiziológiai kérdéseiről olvashatunk tanulmányokat, elsőként T. Reilly tanulmányát az ütővel űzött sportokról (a teniszről, a tollaslabdáról, a fallabdáról stb.). A football számos változatával is terjedelmes tanulmány foglalkozik, ugyancsak Reilly-től. A kosárlabda és a röplabda fiziológiai kérdései képezik a következő tanulmány témáját (D. MacLaren). Végül Reilly és Secher ad áttekintést a sportfiziológia aktuális kutatási irányairól és perspektíváiról. E tanulmányukban a tipikusan sportfiziológiai problémák mellett jól sikerült a humánbiológiai ("sportantropológiai") kutatások felvázolása is.

A kötet valamennyi tanulmánya referátum-jellegű, és bőséges irodalomjegyzéket is ad, a kötet maga pedig jól használható tárgymutatóval zárul.

A szép kiállítású tanulmánykötet az antropológusok/humánbiológusok érdeklődésére is joggal tarthat számot. Különösen érvényes ez a kelet–közép-európai (volt "szocialista") országokra, ahol az "élsport" eredményessége politikai követelmény volt, és így a "sporttudományos" kutatások kiemelt állami támogatást élvezhettek, tehát eléggé intenzívek voltak.

Dr. Eiben Ottó

BYRNE, K. P.: *Understanding and Managing Cholesterol. A Guide for Wellness Professionals.* (Human Kinetics Books, Champaign, Ill. 1991. ISBN: 0–87322–309–8. 344 oldal. Ára: $ 35.00.)

"Gutta cavat lapidem non vis, sed saepe cadendo." Ez a motto hűen tükrözi a cholesterin problémakör és annak jelentőségteljes, fokozatos beépülését a köztudatba, részben a tömegtájékoztatás, részben a preventív egészségügyi ellátás, felvilágosítás keretében. Dr. Kevin P. Byrne könyve ehhez rendkívül hasznos, racionálisan tagolt, színes kézikönyv, melyet haszonnal forgathatnak mind a lipidológusok, mind az e témakörrel intimebb kapcsolatba kerülő orvosok is, de egyes fejezetei az antropológusok/humánbiológusok érdeklődésére is számot tarthatnak.

Amerikában a cholesterol, ill. annak preventálható, központi szerepét az ischaemiás szívbetegségek prevalenciájában (a hazai viszonyokkal összevetve) már jó két évtizeddel ezelőtt a kérdés fontosságát megillető módon kezelték. (A máig legjelentősebb, úttörő-jellegű epidemiológiai vizsgálat 1948-ban indult.) Ennek ellenére az USA-ban évente közel 800 ezer az ischaemiás jellegű halálozás, az atherosclerosis kb. 7 millió

amerikait érint, és kb. 100 milliárd dollárt költenek az ez irányú egészségügyi ellátásra, amely összeg részben megtakarítható lenne a megfelelő prevencióval.

A könyv négy didaktikus, egymást logikusan követő részben, 13 fejezetben, két nagy gyakorlati fontosságú appendixszel kiegészítve tárgyalja a fenti témakört.

Az első rész áttekintő, lényegi háttérinformációkkal szolgál a serum-cholesterol etiopathogenetikai szerepéről az atherosclerosis-formáció mind molekuláris, mind morfológiai aspektusait tekintve. A megértést gyorsan áttekinthető, szemléletes ábrák, grafikonok szemléltetik. E didaktikus egység végén a serum-cholesterol szintet csökkentő beavatkozások, diéta, testsúly-kontroll, gyógyszeres, érsebészeti beavatkozások szerepelnek.

A második rész sorra veszi az atherogenesis egyéb maior (HLP, dohányzás, hypertonia), ill. minor rizikófaktorait (cukorbetegség, stress, hereditás, alacsony védőfaktor-szint, magas Lipoprotein-a), nem, súlyos-fokú elhízás (ideális testsúly felett 30%-kal), mozgásszegénység kérdését.

Impresszionáló hasonlattal élve, egy 55 éves férfinek, aki legtöbb maior, ill. minor rizikó-faktorral rendelkezik, kb. 50–50% esélye van arra, hogy szívinfarktust kapjon, ill. megússza azt, azaz hasonlít az orosz rulettet félig töltött revolverrel játszó hazardirozóra. Az egyes rizikó-tényezőket nemcsak támadáspont szerint veszi sorra, hanem bemutatja ezek antropometriai eloszlását, gyakoriságát az egyes rasszokban a Föld egyes speciálisan érintett régióiban. Különösen érdekes az obesitas-típusok bőrredő, ill. egyéb morfometriás paraméterek szerinti felosztása, amely computer-tomográfiás denzitometriai vizsgálatok és anyagcsere-tesztelések alapján jól korrelált a zsigeri steatosis mértékével, ill. az egyes típusokban differenciált anyagcsere-státusszal jár.

A harmadik részben a cholesterin-csökkentő módszerek táplálkozástudományi lehetőségei (egyszeresen–többszörösen telítetlen zsírsavak, növényi rostanyagok, halhús-olaj) kerülnek terítékre, mindenki számára könnyen és gyorsan áttekinthető táblázatokkal, biokémiai háttérrel szemléltetve.

A negyedik, befejező rész a prevenció, az egészséges életmódra nevelés kérdéseit tárgyalja társadalmi méretekben (a tömegtájékoztatás, az élelmiszeripar, az állami ösztönzők és végül, de nem utolsósorban a tömegméretű, populációs szintű cholesterol-mérés kivitelezése tekintetében). Különösen hasznos és érdekes a ma használatos, tömegméretű cholesterol-szűrésre alkalmas műszerek ismertetése, a mérés helyének, idejének, a vizsgálati helyszín kiválasztásának (az eszközöknek a mérés helyén történő legcélszerűbb elrendezése), a gyakorlatban leginkább kivitelezhető formáinak körvonalazása.

Zárásul két, a gyakorlatban nagy segítséget nyújtó appendix található, melyek a hyperlipidaemiások legmodernebb kezelési algoritmusát, ill. a standard terheléses vizsgálatoknál elérendő küszöbértékeket tartalmazzák.

Összefoglalóan a könyv külön erénye a világos, racionális taglalás, a legújabb kutatási eredmények színes, olvasmányos, tömör összefoglalása, ill. a téma minden oldalról, egymásba szorosan kapcsolódó fejezetekkel történt körüljárása. A munka egyedüli hátrányát talán az adja, hogy a kérdéssel már kissé régebb óta foglalkozó szakembert az elméleti háttér lapidáris, ám lényegre törő ismertetése teljességgel nem elégíti ki, inkább általános orvosi szinten limitált, bár ez utóbbit ellensúlyozza az egyes fejezetek végén megadott referenciák után felsorolt, a témához kapcsolódó részletesebb teoretikus munkák jegyzéke.

Dr. Pados Gyula — Dr. Németh Attila

FEUSTEL, R.: *Abstammungsgeschichte des Menschen.* (6. Auflage. VEB Gustav Fischer Verlag, Jena, 1990, 292 oldal 117 ábrával és 3 nagyméretű táblával. Ára: DM 23.–)

Ha összevetjük ezt a 6. kiadást a könyv 1976-ban megjelent első kiadásával, akkor egy kissé elcsodálkozhatunk azon, hogy miért is szerepel a cím alatt az, hogy "átdolgozott és bővített kiadás". A két kiadás szerkezetében, tartalmában és terjedelmében ugyanis csak jelentéktelen mértékben különbözik egymástól. Megváltozott néhány fejezet címe, például "Heutige Menschenrassen und ihre Entstehung"-ról "Rassen und Rassismus"-ra, és természetesen megtalálhatók benne az első kiadás óta nevezetessé vált újabb leletek és lelőhelyeik (Rudabánya, Lufeng, Turkana-tó stb.). Ugyanakkor egy olyan jelentős eredmény, mint a Bräuer-féle "Ádám-hipotézis" a modern Homo sapiens kialakulásáról, nem szerepel benne, annak ellenére, hogy az irodalomjegyzékbe bekerült. A legjelentősebb változás talán a három nagyméretű ábrában található, amelyek most sokkal áttekinthetőbbek és szemléletesebbek, mint az első kiadásban.

Nem változott azonban a recenzens véleménye sem: Feustel könyve az ember származásáról a német nyelvterületnek még mindig a legjobb ilyen témájú összefoglalása.

Dr. Gyenis Gyula

FELGENHAUER, F. — SZILVÁSSY, J. — KRITSCHER, H. — HAUSER, G.: *Stillfired. Archaologie – Anthropologie.* (Veröffentlichungen des Museums für Ur- und Frühgeschichte Stillfried, Sonderband 3, Stillfried 1988. 200 oldal, számos fotótábla, szövegközti ábra és táblázat)

Az 1874., de főleg az 1969. évtől megindult rendszeres régészeti munkák eredményeként az alsó-ausztriai Stillfried körzetében a felső paleolitikumtól a középkorig szinte valamennyi történeti periódus lelőhelye is-

mertté vált. A jelen kiadvány e lelőhelyek jellegét és történeti jelentőségét bemutató kiállítás vezetőjeként jelent meg. — A kötet gerincét a Hallstatt-kori Urnasíros kultúra egyik gödréből származó 7 csontváz embertani ismertetése képezi Szilvássy, J., Kritscher, H. és Hauser, G. tollából. Az embertani módszereknek az átlagolvasó számára írt hosszabb bemutatása után, a szerzők a hét egyén rokonsági kapcsolatait megállapítva, részletesen ismertetik azokat a megfigyelhető epigenetikai jellegeket, melyekre eredményeiket alapozták. — A széles nagyközönségnek szánt, és így az ismeretterjesztő munkák olvasmányos nyelvezetén megírt hasznos tanulmánynak (melyben a szerzők egy későbronzkori uralkodó családnak mérgezéssel és részbeni élve-eltemetéssel történt kiirtását tételezik fel) köteten belüli középpontba-állításából fakad viszont a kiadvány szerkezeti logikátlansága. A stilllfriedi körzet geológiai (Rögl, F. — Summesberger, H.) és régészeti (Felgenhauer, F.) bemutatása a kötet végére szorult; a bronzkori "tömegsír" leletkörülményeinek leírása és történeti értékelése (Eibner, C.) csak az embertani ismertetés után következik, megelőzve viszont így a körzet felsőpaleolitikumtól középkorig tartó periódusainak vázlatos bemutatását szolgáló egyéb kisebb tanulmányokat, hogy azután szerepeljen csak Pucher, E. cikke a későbronzkori állattemetkezésekről és Sauter, F. főleg bronzkori problematikát érintő vegyi elemzésekről írt cikke. Az így felborított sorrend megnehezíti a tájékozódást, szétszakítja az egymással összefüggő egységeket. Pedig a különböző ismertetések adatait egyeztetve kiderül, hogy a területen, ugyanabból a korból egy nagyobb, 15 csontvázas tömegsír is feltárásra került, a lakótelep több objektumában önálló koponyaleletekre is bukkantak, vadállatok csontvázait tartalmazó áldozati gödrök is ismertté váltak, sőt az egyik gödör gyermekkoponya-lelete emberáldozatra utal. Az embertanilag ismertetett "tömegsír" tehát — családirtással kombinált hatalmi harcok helyett — inkább a fentebbi jelenségekkel lehetett kapcsolatban, annál is inkább, mivel az Urnasíros kultúra népe halottait törvényszerűen hamvasztotta, és a falut körülvevő sáncrendszeren kívüli kb. 2000 síros temetőben temette el.

K. Dr. Zoffmann Zsuzsanna

Bones. Treasuries of Human Experience in Time and Space. Newsletteer, 1988. 1. (Department of Anthropo-osteology, Rijksuniversiteit Utrecht, The Netherlands; ed. W. R. K. Perizonius).

A fenti címen útnak indított, közel 100 oldalas, fényképekkel és ábrákkal gazdagított periodika nemcsak külsejében, de tartalmát tekintve is igényt tarthat minden olyan intézmény vagy kutató érdeklődésére, aki csontvázleletek vizsgálatával foglalkozik, bármilyen szempont szerint is. Mert miként arra Perizonius bevezető tanulmánya is utal, az osteológiai leletekben olyan információk rejlenek, amelyek a legkülönbözőbb tudományágak érdeklődésére és együttműködésére tarthatnak számot. Erre az első számban Bruintjes, Haneveld, továbbá Fuldauer — Bracht — Perizonius paleopatológiai, Vermeer, valamint Ulrich — Perizonius paleogenetikai, Perizonius — Kaspers orvostörténeti, Spoor — Sondaar paleontológiai, valamint Bosga — Perizonius parapszichológiai vonatkozású cikkei utalnak. E szép kiadványt a recenzor mindazonáltal mélabúval forgatja, mert noha bármennyire is hasznos lenne annak beszerzése valamennyi hazai osteológiai műhely számára, kérdés, hogy az erre szolgáló devizakeret rohamos csökkenése milyen mértékben fogja azt lehetővé tenni.

Dr. Éry Kinga

MILES, H. B. and STILL, E. (Eds): *The Health and Development of Children.* Proceedings of the Twenty-First Annual Symposium of the Eugenics Society 1984. (110 oldal, táblázatokkal, ábrákkal. — The Eugenics Society by Nafferton Books Ltd., Nafferton, Driffield, North Humberside, 1986. Ára: £ 4.95. ISBN 0–905484–46–0)

Az angliai Eugenics Society hagyománya, hogy nagy figyelemmel kíséri azokat a körülményeket, amelyek az ifjúság egészséges felnőttkori állapotát segítik elő. A Társaság 21. szimpóziuma a gyermekek egészségének, testi fejlődésének kérdéseit, a létező genetikai, perinatalis, szociális, nevelési és demográfiai jelenségeket, történéseket és trendeket vitatta meg. A kötet kilenc előadás anyagát tartalmazza.

J. O. Forfar áttekintést ad a mai uralkodó gyermekbetegségekről, bemutatva a változásokat, amelyek a század eleje óta napjainkig végbementek mind a morbiditas, mind a mortalitas tekintetében. — M. A. Preece azt bizonyítja, hogy a növekedési adatok, mind az egyéni értékek, mind a gyermekcsoportok átlagértékei, az egészségi státusz jó indikátorai. Ebből a szempontból vizsgálja a betegségek, ill. a rosszul-tápláltság növekedésre gyakorolt hatását. — K. S. Holt a nyomorék gyermekek problémáit elemzi, és D. Donnai ad ehhez további áttekintést az orvosgenetikus szemével. — Két szociálpediátriai tanulmány foglalkozik a gyermekkori betegségek társadalmi rétegek szerinti (J. Colding), ill. az egymást követő generációkban észlelt előfordulási gyakoriságáról (M. E. J. Wadsworth). — H. McC. Giles a gyermekek jövőbeni egészségét, az ezzel kapcsolatos jóslatokat és a realitásokat latolgatja, különböző bizottsági elemzésekre, jelentésekre támaszkodva. — R. Gulliford a fogyatékos gyermekek nevelési koncepciójához, S. M. K. Barry pedig az egészségnevelés kérdéseihez általában szól hozzá.

Mindezeket a problémákat, amelyeket e tanulmányok elemeznek, könnyen viszonyíthatjuk a hazai helyzethez is, így ez a kis kötet számot tarthat a különböző szakterületeken dolgozó magyar kollégák érdeklődésére, a humánbiológiától a gyermekgyógyászaton keresztül a demográfiáig, gyógypedagógiáig.

Dr. Eiben Ottó

HITCHCOCK, N. E. — GRACEY, M. — GLIMOUR, A. I. — OWLES, E. N.: *Nutrition and Growth in Infancy and Early Childhood. A Longitudinal Study from Birth to Five Years.* — Monographs in Paediatrics, Vol. 19. (92 oldal, 34 táblázat és 13 ábra. — Karger, Basel, 1986. Ára: SFr 79.– ISBN 3–8055–4223–2)

A nemzetközi humánbiológiai irodalomban kevés olyan tanulmányt ismerünk, amely a korai gyermekkorban zajló növekedés és a táplálkozás összefüggéseit elemzi. Ezért is örömmel üdvözölhetjük ezt a könyvet. Ez a kis monográfia összefoglalja a "Perth Growth Study" eredményeit, amelyek közül a legszembetűnőbb az a jelentős összefüggés, amely a korai gyermekkori növekedés és a táplálkozás között ismerhető fel. Erre mutat rá a kötethez írott előszavában F. Falkner professzor is.

A kutatást 1979-ben kezdték meg a szerzők az ausztráliai Perth-ben, 205 másodgenerációs ausztráliai csecsemővel, akik teljes családban éltek, zavartalanul kihordott terhességből, 2500 g-nál nagyobb súllyal születtek. A gyermekek 41%-a első-, 41%-a másodszülött volt. A szerzők 5 éves korukig követték nyomon a gyermekek testi fejlődését.

Leírják a vizsgált minta jellemzőit; a csecsemők, majd kisgyermekek táplálási, étkeztetési mintáit; táplálkozásuk összetételét és energiafelvételüket; növekedési értékeiket a testmagasságra, testtömegre és fejkerületre vonatkozóan és mozgásfejlődésüket; fogfejlődésük előrehaladását; morbiditásukat.

Hangsúlyozzák a szerzők (az ausztráliai társadalomban egyre népszerűbb) anyatejjel való táplálás előnyeit. A mesterségesen táplált (ún. "humanizált") gyermekek testtömegbeli gyarapodása ugyanis elmaradt az anyatejjel táplált kortársaiké mögött. A szerzők tapasztalataikon alapuló ajánlásokat tesznek a korai gyermekkorban kialakítandó helyes "táplálkozási–növekedési mintára", amely — szerintük — elősegíti a "normális" növekedést.

Bizonyosra vehető, hogy ez a könyv sikeres lesz mind a humánbiológusok, mind a gyermekgyógyászok körében.

Dr. Eiben Ottó

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TARTALOM — CONTENTS

Folytatás a borító 2. oldaláról

6. A táblázatok címeit, az ábraaláírásokat, a táblák címeit és azok minden szöveges részét két példányban külön is mellékelni kell a kézirathoz az idegen nyelvű fordításhoz.

7. A tanulmányok statisztikai feldolgozásánál alkalmazott matematikai képletek jelöléseinek pontos magyarázatát meg kell adnia a szerzőnek. Ugyanez vonatkozik görög betűs vagy egyéb speciális jelölésekre is. Általában a *Biometriai Értelmező Szótár* (Szerk.: Jánosy A.–Muraközy T.–Aradszky G. – Mezőgazdasági Kiadó, Budapest, 1966.) előírásait, jelöléseit célszerű követni.

8. A tanulmányok tagolásában az alábbi beosztási elvek követését tartjuk kívánatosnak: 1. Bevezetés (a probléma felvetése, mai állása). 2. Anyag és módszer. 3. A vizsgálat, kutatás eredményei és azok (összehasonlító) értékelése. 4. Összefoglalás.

9. A tanulmány, közlemény végén irodalomjegyzéket kell megadni, de csak azok a művek idézhetők, amelyeknek adatait vagy megállapításait a szerző tanulmányában valóban felhasználta, akár a szöveges részben, akár a táblázatok vagy ábrák elkészítésénél. Az irodalomjegyzéket a szerzők nevének "abc" sorrendjében kell összeállítani. A szövegben a szerző neve után (zárójelbe) tett évszámmal utalunk a megfelelő irodalomra.

A folyóiratok címeinek rövidítésére a szakirodalomban kialakult és elfogadott rövidítéseket alkalmazunk.

Az irodalomjegyzék összeállításához az alábbi példák szolgálnak útmutatásul:

Folyóiratcikkeknél a szerző(k) vezetékneve, rövidített utóneve, a megjelenési év zárójelben, kettőspont, a közlemény címe, a folyóirat hivatalos rövidítése, a kötetszám arab számmal, aláhúzva, pontosvessző, oldalszám, pl.:

BARTUCZ, L. (1961): Die internationale Bedeutung der ungarischen Anthropologie. Anthrop. Közl. *5;* 5–18.

Könyveknél a szerző(k) neve, a kiadási év zárójelben, kettőspont, a könyv címe, a kiadó neve, a kiadás helye, pl.:

BARTUCZ, L. (1966): A praehistorikus trepanáció és orvostörténeti vonatkozású sírleletek (Palaeopathologia III. kötet). Országos Orvostörténeti Könyvtár és Medicina Kiadó, Budapest.

Másodidézeteknél — ha azok el nem kerülhetők — az idézett szerző neve után *cit.* szócskát írunk, és a fenti módon idézzük a könyvet vagy a folyóiratcikket, ill. *in* szócskát írunk, ha tanulmánykötetben megjelent cikket idézünk.

Ha egy szerzőnek ugyanabból az évből több tanulmányát idézzük, akkor az évszám mellé írt *a, b, c* betűkkel különböztetjük meg őket.

10. A szerzők a nyomdai tipografizálásra vonatkozó kívánságaikat a kézirat másodpéldányán jelölhetik be ceruzával, a nyomdai előírásoknak megfelelően.

Kérjük szerzőinket, hogy a fenti alaki előírásokat – a tanulmányok gyorsabb megjelenése érdekében is – tartsák meg. Az előírásoktól eltérő kéziratokat a szerkesztőbizottság nem fogad el.

A kéziratokat a szerkesztő címére kell beküldeni, aki a tanulmány beérkezését visszaigazolja. A közlésről – a lektori vélemények alapján – a szerkesztőbizottság dönt. Erről értesítik a szerzőt.

A közlésre kerülő dolgozatok korrektúráját az ábralevonatokkal együtt megküldjük a szerzőknek. A javított korrektúrát az esetenként megadott határidőig kérjük vissza. A megadott időpontig vissza nem juttatott dolgozatot kénytelenek vagyunk kihagyni a készülő számból.

A szerzőknek 50 db. különlenyomatot adunk. Ennek előfeltétele, hogy a szerző a kézirattal együtt pontos címét (irányítószámmal) és személyi számát is bejelentse a szerkesztőnél.

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