

GROWTH DYNAMICS OF THE FINGERS AND THE TIMING OF THEIR CONGENITAL DEFECTS

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The fingers like the rest of the hand and other parts of the body undergo in childhood and adolescence a major change as regards growth and shape. In the period of infans I and at the beginning of infans II they are pronouncedly short and thick. In that time their shape is in correlation with the short and the then generally broad (brachycheirous or hyperbrachycheirous) hand (cf. K. Hajníš, in press). In the further development pronounced slimming, analogous to the elongation of the entire hand, which was again found in our already cited work, sets in as a result of the relatively greater growth of the length of the fingers than of their circumference. The entire postnatal-ontogenetic development of the shape of the fingers thus depends on the gradual transition from short and thick fingers to long and thin ones, characteristic for the hands of the overwhelming majority of Czechoslovak adolescent youth.

Despite considerable efforts we did not find in the relevant anthropological and anatomical literature a single paper dealing with the special problem of the growth of the absolute size of fingers. As a matter of fact, there exist a number of papers, especially of older date, dealing with the length ration of the individual fingers and determining for it various formulae (e.g. 342 or 324), but the results of the very studies are in reality practically unutilizable. They are primarily of a theoretical character and have rather a phylogenetic aspect of comparison with primates (cf. M. Ecker 1875, J. Kollmann 1886 and 1903, J. Ranké 1887, A. Rieber 1892, R. Virchow 1895, R. Weissenberg 1895, V. Volockij 1924, E. Koenner 1938, and others).

These papers found their continuation in Czechoslovakia in the studies by J. Jelínek (1950), L. Crhák (1957), M. F. Pospíšil (1959), and I. Dröbný (1959).

MATERIAL AND METHODS

For following the growth rhythmicity of the total length of all five fingers we used a set of 1707 children and youths of either sex (854 boys and 853 girls) of Prague.

The boys and the girls were divided into 28 age classes from their birth to their 18th year of age. The distribution of these classes is evident from the relevant tables and figures. The size of the age classes has been chosen in various periods according to the expected growth rate. This means that the smallest ones are in the time to three years and in the period of puberty and prepuberty.

For classification we availed ourselves of the so-called anthropological age.

Each of the age classes comprised minimum 30 probands.

In the present paper we are presenting only the results of the study of the growth of the overall length of the fingers; of course, we also dispose of data on the growth rate of the individual phalanges of all five fingers. The lengths were naturally examined separately for both hands. They were measured with a slide calliper according to R. Martin (R. Martin 1928, R. Martin — K. Saller 1957) between the points phalangion I — dactylion I, phalangion II — dactylion II, etc. (cf. Fig. 1). The

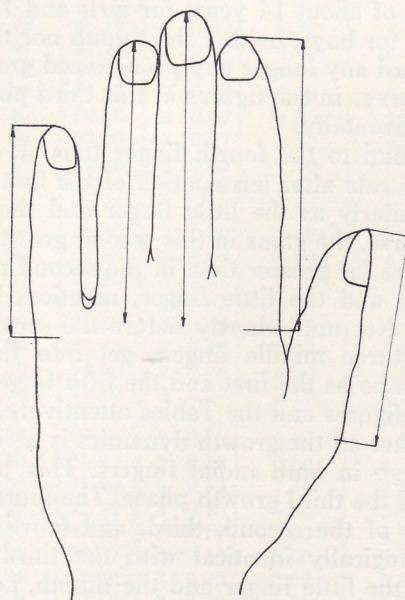


FIGURE 1
The length of fingers between the points phalangion and dactylion

control of correct measurement for the length of each finger was the sum of lengths of its individual phalanges which should equal the mentioned overall length.

The tables show, in addition to the number of probands (n) in each age class given, the mean values of the finger lengths with the triple error of this mean ($\bar{x} \pm 3 \cdot s_{\bar{x}}$), the standard deviation (s), the coefficient of variation (v), and the lowest and highest occurring individual values (min—max).

On the basis of the tables, the curve graphs of the dynamics of growth were worked out. Intentionally we did not smooth them in order not to erase their unevennesses important for the registration of the period of diminished growth or relative quiescent periods which are of top importance for practical use in surgery.

THE GROWTH OF THE FINGERS

If we study the growth dynamics of the length of the fingers on the left and right hands of boys and girls in our Tables 1 to 10 and in figures 1 to 4, it is to be seen that same has several phases. While the most intensive growth phase, lasting from birth to about the end of the first year of life, is common to all fingers, the thumb and the little finger differ in their further development from the second, third, and fourth fingers.

The first and the fifth finger, after termination of the mentioned introductory phase, characterized by minor gains, pass over in both sexes into the second phase. This takes about 15 to 15 and a half years in boys, while in girls it finishes a little earlier, i.e. around 14 years. The other half of this period, i.e. puberty, has somewhat greater gains than the first part of this phase, especially in boys, which can be well observed especially on the relevant figures. The steeper curve of growth in the period of puberty is more distinct in boys than in girls. From the mentioned age of about 14 years for girls and 15 to 15 and a half for boys, neither the thumb nor the little finger record any longer any pronounced growth, so that the curves in the figures in this third phase run almost horizontally.

The second to the fourth finger thus slow down the growth rate after termination of the first growth phase, similarly as the little finger and the thumb do. Of course, the gains in this second growth phase of theirs are far greater than in the second phase of the thumb and the little finger, mentioned in the foregoing. Not until shortly before the second year do these three middle fingers get into the same growth tempo as the first and the fifth finger. If we study the figures and the Tables attentively, we can see that after all the growth dynamics is here a little greater than in both radial fingers. This period is considered the third growth phase. The fourth phase of growth of the second, third, and fourth fingers is chronologically identical with the third growth period of the little finger and the thumb, i.e. it sets in at the age of 15 and a half in boys and 14 years in girls.

The described observations of partly different

dynamics of growth of both radial fingers, i.e. the thumb and the little finger on the one hand, and the middle three fingers on the other hand, draw attention to the functional division of the hand radii into these two groups. The more perfect muscular outfit of the thumb and the little finger compared with the other finger is probably connected with their extreme position on the hand and is perhaps one of the causes of their perfect gripping ability. The somewhat different functional load of the little finger and the thumb, appearing in man in comparison with the three middle fingers, might be the cause of the observed growth difference of these two groups and may also be the basis for their further phylogenetic change.

Together with the growth of the fingers can also be observed an increase of their differences in length. They are well to be seen in the figures, especially as regards their growth between the thumb and the little finger on the one hand and the other three fingers on the other hand. Also the originally insignificant mean difference in the length of the 2nd and 4th fingers in the earliest youth is gradually increasing to a few millimetres, even though the increase is not quite regular. The absolutely and percentally greatest differences between the individual fingers arise at the time of puberty. In the period of the last growth phases between both mentioned groups of fingers (1 + 5 and 2 + 3 + 4) the difference comprehensibly no more increases, because their length practically does not change any more.

If we judge the mutual, i.e. the relative length of the individual fingers of Czechoslovak children and young people to 18 years of age, we can see that it does not change throughout the entire period of development under observation. Longest is the third finger, as otherwise it is similarly the rule in man as in the majority of apes. The mean length after the third finger is stable in all age classes followed by the fourth finger and then by the second finger. Of the triphalangeal fingers, the little finger is the smallest one and as the shortest one in general the thumb is in agreement with its biphalangy.

The problem of the relative length of fingers was dealt with especially in the second half of the past century by a number of authors already cited in the foregoing. Out of ignorance about the normal mutual ratio of the length of the index finger and the ring finger of man the length of fingers in the order of 342 was incorrectly considered by M. Ecker (1875) and J. Kollmann (1886) as primitive, because it is said to be a rule in some apes. Neither the opposite ratio of the length of the second and the fourth finger, i.e. the ratio of 324 cannot be regarded as inferior, because it occurs fairly frequently in all human populations and in some of them even prevails. Yet in the overwhelming majority of groups, investigated in this respect till now, the ratio of 342 (J. Jelínek 1950, L. Chráček 1957, M. F. Pospíšil 1959, I. Drobňák 1959, R. Weissenberg 1895, and others) is found most frequently (just as in Czechoslovak populations). R. Weissenberg (1895) reports that about 10

TABLE 1
The length of the thumb. Ph I.—da I. Boys

Age	sinistra					dexstra				
	n	X ± 3 . s _{x̄}	s	v	min—max	n	X ± 3 . s _{x̄}	s	v	min—max
1.5	30	26.90 ± 3 . 03	2.10	8.14	21—31	30	26.96 ± 3 . 04	2.30	8.53	20—30
4.5	30	28.43 ± 3 . 07	3.90	13.89	21—38	30	29.36 ± 3 . 07	3.90	13.52	22—39
7.5	30	30.63 ± 3 . 03	2.00	6.66	27—35	30	31.26 ± 3 . 03	1.90	6.20	28—35
10.5	30	34.20 ± 3 . 05	3.10	9.23	29—41	30	34.56 ± 3 . 05	2.80	8.18	29—40
15	30	35.36 ± 3 . 04	2.60	7.55	30—39	30	35.33 ± 3 . 04	2.40	7.01	30—40
21	30	36.30 ± 3 . 03	1.60	4.49	33—39	30	36.40 ± 3 . 03	1.50	4.04	33—39
27	30	36.46 ± 3 . 03	1.60	4.52	34—40	30	36.70 ± 3 . 02	1.60	4.46	34—40
33	30	37.80 ± 3 . 04	2.20	6.00	34—45	30	37.51 ± 3 . 04	2.40	6.47	34—45
36	30	38.80 ± 3 . 05	2.70	7.06	34—45	30	38.80 ± 3 . 05	2.70	6.90	34—44
4	30	39.33 ± 3 . 05	3.10	7.95	33—45	30	39.66 ± 3 . 05	2.80	7.16	33—45
5	30	40.70 ± 3 . 04	2.30	5.72	36—46	30	40.70 ± 3 . 04	2.20	5.42	36—46
6	30	42.30 ± 3 . 06	3.20	7.46	36—48	30	42.30 ± 3 . 06	3.30	7.71	36—48
7	30	43.80 ± 3 . 06	3.10	7.04	35—52	30	43.90 ± 3 . 05	2.70	6.10	38—52
8	30	46.80 ± 3 . 07	3.70	7.93	41—53	30	46.90 ± 3 . 07	3.70	7.91	41—54
9	30	47.60 ± 3 . 06	3.40	7.23	41—55	30	47.60 ± 3 . 06	3.40	7.16	41—55
10	30	48.50 ± 3 . 07	3.70	7.71	42—58	30	48.70 ± 3 . 06	3.50	7.21	42—56
11	30	51.70 ± 3 . 05	2.60	4.95	45—56	30	52.10 ± 3 . 04	2.40	4.67	44—61
12	30	52.20 ± 3 . 06	3.20	6.13	47—61	30	52.40 ± 3 . 06	3.20	6.16	47—61
13	30	56.40 ± 3 . 07	3.90	6.87	50—66	30	56.70 ± 3 . 07	4.00	7.08	50—66
14	30	60.80 ± 3 . 10	5.20	8.64	48—70	30	60.60 ± 3 . 11	5.80	9.65	48—72
14.3	30	61.80 ± 3 . 08	4.50	7.25	53—75	30	61.60 ± 3 . 08	4.70	7.57	52—75
14.9	30	61.60 ± 3 . 09	4.90	8.06	54—70	30	61.50 ± 3 . 08	4.20	6.78	52—70
15.3	30	65.30 ± 3 . 07	4.00	6.17	58—75	30	65.20 ± 3 . 07	3.90	5.96	58—74
15.9	31	65.40 ± 3 . 07	4.00	6.10	57—74	31	65.20 ± 3 . 07	3.70	5.77	53—71
16.3	34	65.50 ± 3 . 08	4.80	7.38	57—81	34	65.50 ± 3 . 07	4.10	6.44	57—72
16.9	39	64.90 ± 3 . 09	5.60	8.70	54—78	39	64.20 ± 3 . 09	5.40	8.48	52—75
17.3	30	65.00 ± 3 . 07	3.90	6.04	58—73	30	64.70 ± 3 . 07	3.70	5.77	60—74
17.9	30	65.60 ± 3 . 07	3.60	5.54	56—72	30	65.10 ± 3 . 07	3.90	6.09	56—72

TABLE 2
The length of the second finger. Ph II.—da II. Boys

Age	sinistra					dexstra				
	n	X ± 3 . s _{x̄}	s	v	min—max	n	X ± 3 . s _{x̄}	s	v	min—max
1.5	30	36.83 ± 3 . 04	2.40	6.57	31—42	30	36.76 ± 3 . 05	2.90	7.96	31—43
4.5	30	41.00 ± 3 . 07	4.30	10.56	33—49	30	41.73 ± 3 . 07	4.20	10.28	34—49
7.5	30	44.33 ± 3 . 03	2.00	4.71	41—49	30	44.80 ± 3 . 03	2.00	4.66	41—49
10.5	30	47.83 ± 3 . 04	2.50	5.41	42—56	30	48.26 ± 3 . 04	2.50	5.32	43—55
15	30	50.60 ± 3 . 06	3.70	7.41	45—58	30	50.56 ± 3 . 07	4.00	7.91	43—58
21	30	55.00 ± 3 . 07	3.80	6.94	54—64	30	55.20 ± 3 . 07	3.60	6.59	49—63
27	30	55.73 ± 3 . 05	2.70	4.97	50—62	30	55.86 ± 3 . 05	2.90	5.20	50—63
33	30	56.48 ± 3 . 06	3.70	6.55	49—60	30	56.54 ± 3 . 06	3.50	6.26	49—63
36	30	57.13 ± 3 . 04	2.60	4.67	52—64	30	57.13 ± 3 . 04	2.50	4.44	53—64
4	30	59.50 ± 3 . 06	3.40	5.66	54—66	30	59.30 ± 3 . 06	3.40	5.71	52—66
5	30	62.60 ± 3 . 06	3.10	4.91	55—70	30	62.60 ± 3 . 05	2.80	4.46	56—70
6	30	65.00 ± 3 . 07	3.70	5.73	56—72	30	65.10 ± 3 . 07	3.70	5.63	56—72
7	30	68.10 ± 3 . 07	3.60	5.35	61—77	30	68.10 ± 3 . 07	3.80	5.64	60—77
8	30	71.00 ± 3 . 09	4.90	6.89	60—82	30	71.40 ± 3 . 09	5.00	6.95	60—83
9	30	71.80 ± 3 . 10	5.40	7.60	63—82	30	71.90 ± 3 . 10	5.30	7.42	63—81
10	30	74.30 ± 3 . 08	4.70	6.27	67—82	30	74.60 ± 3 . 08	4.50	6.10	67—82
11	30	78.30 ± 3 . 07	3.70	4.69	69—85	30	78.80 ± 3 . 07	3.70	4.76	69—91
12	30	80.80 ± 3 . 11	6.10	7.50	71—92	30	81.10 ± 3 . 11	5.90	7.28	71—92
13	30	85.90 ± 3 . 10	5.30	6.18	76—97	30	86.40 ± 3 . 10	5.40	6.25	76—97
14	30	91.30 ± 3 . 10	5.40	5.95	79—105	30	91.90 ± 3 . 10	5.60	6.13	79—106
14.3	30	91.70 ± 3 . 13	7.40	8.12	78—107	30	91.70 ± 3 . 13	7.10	7.80	80—105
14.9	30	93.40 ± 3 . 10	5.60	5.99	84—106	30	92.90 ± 3 . 10	5.80	6.31	79—100
15.3	30	96.60 ± 3 . 10	5.50	5.72	87—105	30	97.30 ± 3 . 10	5.60	5.79	88—100
15.9	31	96.60 ± 3 . 09	5.00	5.18	82—106	31	96.90 ± 3 . 10	5.60	5.78	81—100
16.3	34	97.20 ± 3 . 08	5.00	5.10	90—107	34	97.20 ± 3 . 09	5.00	5.17	88—110
16.9	39	97.50 ± 3 . 10	6.40	6.55	84—118	39	97.10 ± 3 . 09	5.60	5.77	87—100
17.3	30	97.30 ± 3 . 09	5.20	5.34	88—110	30	97.00 ± 3 . 08	4.30	5.80	83—100
17.9	30	98.30 ± 3 . 10	5.60	5.73	85—108	30	98.30 ± 3 . 10	5.60	5.80	83—100

TABLE 3
The length of the third finger. Ph III.—da III. Boys

Age	sinistra					dextra				
	n	X ± 3 . s _{x̄}	s	v	min—max	n	X ± 3 . s _{x̄}	s	v	min—max
1.5	30	41.09 ± 3 . 0.04	2.50	6.23	35—45	30	41.09 ± 3 . 0.05	2.80	6.96	35—45
4.5	30	46.10 ± 3 . 0.08	4.60	10.02	35—56	30	46.80 ± 3 . 0.08	4.50	9.61	36—55
7.5	30	49.26 ± 3 . 0.03	1.90	3.93	45—53	30	50.13 ± 3 . 0.03	1.70	3.55	46—53
10.5	30	54.83 ± 3 . 0.05	3.10	5.72	47—60	30	55.60 ± 3 . 0.05	2.90	5.25	48—61
15	30	57.63 ± 3 . 0.06	3.30	5.76	52—67	30	57.73 ± 3 . 0.06	3.30	5.77	52—66
21	30	61.23 ± 3 . 0.04	2.40	4.01	57—65	30	61.36 ± 3 . 0.04	3.30	3.82	56—66
27	30	61.80 ± 3 . 0.07	3.90	6.27	54—70	30	62.20 ± 3 . 0.07	3.80	6.15	54—70
33	30	62.87 ± 3 . 0.05	3.10	5.01	57—69	30	62.67 ± 3 . 0.05	3.10	4.94	57—69
36	30	64.36 ± 3 . 0.04	2.40	3.79	57—68	30	64.20 ± 3 . 0.04	2.40	3.86	58—68
4	30	66.40 ± 3 . 0.06	3.50	5.26	59—74	30	66.60 ± 3 . 0.06	3.30	5.02	60—74
5	30	69.10 ± 3 . 0.07	3.60	5.28	62—79	30	69.40 ± 3 . 0.06	3.10	4.50	63—75
6	30	71.80 ± 3 . 0.07	3.70	5.19	64—79	30	72.20 ± 3 . 0.06	3.60	5.00	65—79
7	30	75.50 ± 3 . 0.07	3.90	5.26	67—84	30	76.10 ± 3 . 0.07	4.10	5.44	67—85
8	30	79.10 ± 3 . 0.07	3.60	4.60	70—86	30	79.50 ± 3 . 0.07	3.80	4.74	70—87
9	30	80.00 ± 3 . 0.11	6.20	7.70	69—93	30	80.40 ± 3 . 0.11	6.10	7.61	71—93
10	30	82.40 ± 3 . 0.10	5.50	6.68	72—94	30	83.30 ± 3 . 0.10	5.50	6.57	73—95
11	30	87.40 ± 3 . 0.09	4.70	5.41	72—95	30	88.00 ± 3 . 0.09	4.80	5.48	78—97
12	30	89.00 ± 3 . 0.10	5.60	6.35	80—100	30	89.50 ± 3 . 0.10	5.70	6.42	80—100
13	30	94.50 ± 3 . 0.10	5.40	5.75	82—105	30	95.30 ± 3 . 0.10	5.50	5.81	85—107
14	30	101.30 ± 3 . 0.11	6.30	6.24	85—114	30	102.20 ± 3 . 0.12	6.60	6.51	86—116
14.3	30	103.50 ± 3 . 0.12	6.70	6.45	90—119	30	103.70 ± 3 . 0.12	6.80	6.72	86—118
14.9	30	104.40 ± 3 . 0.09	5.20	4.97	95—115	30	104.10 ± 3 . 0.09	5.00	4.87	94—116
15.3	30	107.90 ± 3 . 0.10	5.80	5.39	97—118	30	108.50 ± 3 . 0.10	5.70	5.28	96—118
15.9	31	108.00 ± 3 . 0.09	5.20	4.83	92—119	31	107.70 ± 3 . 0.10	5.90	5.55	95—118
16.3	34	108.30 ± 3 . 0.09	5.00	4.60	100—120	34	108.30 ± 3 . 0.09	5.40	5.05	100—119
16.9	39	108.00 ± 3 . 0.09	5.70	5.29	100—123	39	108.20 ± 3 . 0.10	6.00	5.53	100—123
17.3	30	108.40 ± 3 . 0.09	5.00	4.66	97—123	30	107.70 ± 3 . 0.08	4.40	4.12	100—116
17.9	30	108.60 ± 3 . 0.09	5.10	4.65	99—119	30	108.50 ± 3 . 0.10	5.40	4.98	96—119

TABLE 4
The length of the fourth finger. Ph IV.—da IV. Boys

Age	sinistra					dextra				
	n	X ± 3 . s _{x̄}	s	v	min—max	n	X ± 3 . s _{x̄}	s	v	min—max
1.5	30	37.64 ± 3 . 0.04	2.40	6.45	34—42	30	37.87 ± 3 . 0.04	2.50	6.83	32—43
4.5	30	41.76 ± 3 . 0.08	4.80	11.49	31—54	30	42.50 ± 3 . 0.08	4.60	10.82	32—53
7.5	30	44.86 ± 3 . 0.04	2.50	5.75	39—49	30	45.53 ± 3 . 0.04	2.30	5.13	40—50
10.5	30	49.63 ± 3 . 0.06	3.40	6.97	43—57	30	50.13 ± 3 . 0.06	3.40	6.88	44—58
15	30	53.30 ± 3 . 0.06	3.40	6.37	47—60	30	53.30 ± 3 . 0.06	3.30	6.30	46—59
21	30	55.16 ± 3 . 0.05	3.00	5.43	50—63	30	55.60 ± 3 . 0.04	2.50	4.64	51—62
27	30	57.80 ± 3 . 0.07	3.90	6.69	50—65	30	58.00 ± 3 . 0.07	3.80	6.58	50—66
33	30	58.20 ± 3 . 0.03	2.10	3.60	55—63	30	58.30 ± 3 . 0.03	1.80	3.15	54—62
36	30	58.90 ± 3 . 0.04	2.50	4.39	55—64	30	58.80 ± 3 . 0.04	2.70	4.72	54—60
4	30	62.30 ± 3 . 0.06	3.20	5.20	56—70	30	62.40 ± 3 . 0.06	3.30	5.33	56—70
5	30	64.70 ± 3 . 0.06	3.10	4.87	59—71	30	64.80 ± 3 . 0.06	3.20	5.01	60—72
6	30	67.50 ± 3 . 0.06	3.60	5.27	61—74	30	67.70 ± 3 . 0.07	3.60	5.35	61—74
7	30	70.80 ± 3 . 0.07	3.80	5.34	62—81	30	71.00 ± 3 . 0.07	3.90	5.56	62—81
8	30	73.90 ± 3 . 0.07	3.50	4.78	66—82	30	74.20 ± 3 . 0.07	3.60	4.90	66—83
9	30	74.60 ± 3 . 0.11	6.10	8.22	63—87	30	74.90 ± 3 . 0.11	6.00	8.02	66—86
10	30	77.10 ± 3 . 0.10	5.60	7.33	68—89	30	77.20 ± 3 . 0.10	5.60	7.28	68—89
11	30	81.00 ± 3 . 0.08	4.50	5.54	68—90	30	81.60 ± 3 . 0.08	4.70	5.80	72—94
12	30	82.80 ± 3 . 0.10	5.50	6.59	73—94	30	83.20 ± 3 . 0.10	5.30	6.37	73—93
13	30	88.60 ± 3 . 0.10	5.60	6.38	76—100	30	89.10 ± 3 . 0.10	5.60	6.34	78—100
14	30	94.70 ± 3 . 0.11	6.20	6.50	78—105	30	95.40 ± 3 . 0.12	6.50	6.87	79—107
14.3	30	96.10 ± 3 . 0.16	8.90	9.17	80—111	30	96.40 ± 3 . 0.14	7.80	8.03	85—110
14.9	30	97.90 ± 3 . 0.11	5.90	6.05	88—110	30	97.70 ± 3 . 0.09	5.00	5.11	90—108
15.3	30	102.50 ± 3 . 0.10	5.70	5.58	90—113	30	102.30 ± 3 . 0.09	4.80	4.74	90—110
15.9	31	101.50 ± 3 . 0.12	6.50	6.38	82—113	31	101.40 ± 3 . 0.12	6.80	6.72	79—114
16.3	34	102.60 ± 3 . 0.09	5.10	4.89	95—119	34	102.60 ± 3 . 0.08	4.60	4.47	94—111
16.9	39	102.30 ± 3 . 0.09	5.60	5.37	91—114	39	102.00 ± 3 . 0.09	5.80	5.68	92—117
17.3	30	102.80 ± 3 . 0.09	4.70	4.57	95—113	30	102.80 ± 3 . 0.10	5.60	5.46	88—112
17.9	30	102.70 ± 3 . 0.10	5.40	5.25	90—115	30	102.80 ± 3 . 0.10	5.60	5.46	88—112

TABLE 5
The length of the fifth finger. Ph V.—da V. Boys

Age	sinistra					dextra				
	n	X ± 3 . s _x	s	v	min—max	n	X ± 3 . s _x	s	v	min—max
1.5	30	31.61 ± 3 . 06	3.60	11.54	27—37	30	31.93 ± 3 . 05	3.20	10.11	26—38
4.5	30	35.16 ± 3 . 07	4.00	11.57	28—43	30	36.00 ± 3 . 07	4.10	11.38	28—42
7.5	30	37.93 ± 3 . 02	1.40	3.82	35—41	30	38.66 ± 3 . 02	1.30	3.54	36—42
10.5	30	40.46 ± 3 . 04	2.50	5.88	38—43	30	42.96 ± 3 . 04	2.30	5.44	39—49
15	30	43.30 ± 3 . 04	2.60	6.18	40—49	30	43.40 ± 3 . 05	2.70	6.38	39—49
21	30	44.20 ± 3 . 06	3.50	8.04	35—54	30	44.30 ± 3 . 06	3.50	7.91	35—54
27	30	45.30 ± 3 . 04	2.50	5.54	39—50	30	45.53 ± 3 . 04	2.50	5.60	40—51
33	30	46.30 ± 3 . 05	3.20	7.04	43—56	30	46.40 ± 3 . 06	3.30	7.11	43—56
36	30	47.22 ± 3 . 05	2.90	6.31	41—54	30	47.38 ± 3 . 05	2.90	6.24	41—54
4	30	48.60 ± 3 . 05	2.90	6.07	43—55	30	48.40 ± 3 . 06	3.20	6.71	41—55
5	30	50.30 ± 3 . 06	3.20	6.36	44—58	30	50.20 ± 3 . 05	2.90	5.88	45—56
6	30	52.40 ± 3 . 05	2.60	5.02	48—58	30	52.40 ± 3 . 05	2.60	4.94	48—58
7	30	55.20 ± 3 . 07	3.90	7.09	47—64	30	55.20 ± 3 . 07	3.80	6.97	46—64
8	30	56.80 ± 3 . 06	3.50	6.09	51—65	30	56.90 ± 3 . 06	3.60	6.27	51—65
9	30	57.70 ± 3 . 08	4.70	8.11	50—67	30	57.70 ± 3 . 08	4.50	7.88	50—66
10	30	60.70 ± 3 . 07	4.10	6.82	53—70	30	60.90 ± 3 . 07	4.00	6.58	54—72
11	30	61.90 ± 3 . 08	4.20	6.85	52—68	30	61.90 ± 3 . 07	4.10	6.62	52—72
12	30	63.90 ± 3 . 09	4.90	7.68	57—74	30	64.20 ± 3 . 08	4.70	7.30	58—74
13	30	70.40 ± 3 . 08	4.20	6.04	62—79	30	70.50 ± 3 . 07	4.10	5.87	62—79
14	30	74.20 ± 3 . 10	5.60	7.49	63—87	30	74.80 ± 3 . 10	5.60	7.49	64—88
14.3	30	74.90 ± 3 . 12	6.80	9.06	60—85	30	75.70 ± 3 . 11	6.30	8.33	61—89
14.9	30	76.40 ± 3 . 12	6.40	8.39	66—90	30	76.90 ± 3 . 11	6.20	8.09	67—92
15.3	30	79.80 ± 3 . 10	5.70	7.09	64—90	30	80.40 ± 3 . 09	5.00	6.29	67—91
15.9	31	81.90 ± 3 . 11	6.10	7.47	70—96	31	81.50 ± 3 . 10	5.60	6.90	70—96
16.3	34	81.20 ± 3 . 08	4.70	5.75	74—90	34	81.10 ± 3 . 07	4.00	5.01	72—89
16.9	39	79.80 ± 3 . 08	5.30	6.63	64—88	39	79.70 ± 3 . 08	5.00	6.24	70—90
17.3	30	80.20 ± 3 . 07	3.70	4.57	70—89	30	80.60 ± 3 . 08	4.20	5.18	73—90
17.9	30	81.10 ± 3 . 10	5.40	6.67	67—93	30	80.80 ± 3 . 10	5.30	6.56	70—95

TABLE 6
The length of the thumb. Ph I.—da I. Girls

Age	sinistra					dextra				
	n	X ± 3 . s _x	s	v	min—max	n	X ± 3 . s _x	s	v	min—max
1.5	30	24.80 ± 3 . 03	1.90	6.77	22—29	30	25.25 ± 3 . 02	1.50	6.17	22—29
4.5	30	23.80 ± 3 . 03	2.10	8.90	18—29	30	24.83 ± 3 . 03	1.70	6.88	22—29
7.5	30	28.50 ± 3 . 04	2.60	9.33	23—35	30	29.26 ± 3 . 04	2.30	7.96	24—35
10.5	30	30.50 ± 3 . 05	2.90	9.60	25—38	30	30.83 ± 3 . 05	2.80	9.11	26—30
15	30	33.78 ± 3 . 04	2.70	8.14	29—39	30	33.87 ± 3 . 04	2.50	7.64	31—35
21	30	35.30 ± 3 . 05	2.80	7.80	30—42	30	35.60 ± 3 . 04	2.50	6.96	32—42
27	30	36.43 ± 3 . 03	1.90	5.18	35—43	30	37.20 ± 3 . 04	2.40	6.50	33—42
33	30	37.76 ± 3 . 03	2.00	5.44	33—40	30	37.70 ± 3 . 03	1.90	5.06	34—42
36	30	38.63 ± 3 . 03	1.90	5.04	35—43	30	38.66 ± 3 . 03	1.80	4.75	36—43
4	30	38.60 ± 3 . 04	2.40	6.35	34—44	30	38.60 ± 3 . 04	2.50	6.50	34—44
5	30	39.80 ± 3 . 05	2.50	6.33	36—45	30	39.80 ± 3 . 04	2.40	6.16	35—44
6	30	41.70 ± 3 . 06	3.10	7.44	37—50	30	41.60 ± 3 . 06	3.10	7.52	37—50
7	30	44.00 ± 3 . 06	3.10	7.04	37—48	30	44.40 ± 3 . 05	2.90	6.64	39—48
8	30	46.50 ± 3 . 07	3.70	8.00	40—53	30	46.50 ± 3 . 07	3.70	7.88	41—52
9	30	47.20 ± 3 . 06	3.40	7.29	40—54	30	47.10 ± 3 . 06	3.20	6.88	40—54
10	30	47.70 ± 3 . 09	4.80	10.12	39—56	30	47.90 ± 3 . 09	4.80	9.97	39—56
11	30	52.00 ± 3 . 08	4.40	8.38	44—61	30	52.10 ± 3 . 08	4.20	8.07	46—56
12	30	54.30 ± 3 . 07	3.90	7.14	48—63	30	54.50 ± 3 . 07	3.60	6.70	48—62
12.3	30	56.70 ± 3 . 07	3.70	6.64	48—64	30	56.20 ± 3 . 07	3.80	6.77	46—65
12.9	30	57.30 ± 3 . 08	4.30	7.62	45—63	30	57.20 ± 3 . 07	3.70	6.51	50—66
13.3	30	58.40 ± 3 . 06	3.10	5.45	53—65	30	57.80 ± 3 . 07	3.70	6.34	50—66
13.9	30	59.20 ± 3 . 07	3.70	6.28	52—70	30	59.20 ± 3 . 05	3.00	5.15	54—67
14.3	31	58.70 ± 3 . 07	3.80	6.48	50—67	31	58.40 ± 3 . 06	3.40	5.86	51—65
14.9	30	59.00 ± 3 . 07	3.50	6.06	50—67	30	59.60 ± 3 . 07	3.60	6.33	52—67
15.3	31	59.30 ± 3 . 07	3.70	6.36	53—67	31	58.40 ± 3 . 06	3.40	5.87	52—64
15.9	36	58.90 ± 3 . 06	3.60	6.10	53—64	36	58.40 ± 3 . 06	3.90	6.62	51—65
16.6	35	59.80 ± 3 . 05	3.00	5.14	54—64	35	59.70 ± 3 . 06	3.50	5.78	53—67
17.6	30	60.30 ± 3 . 07	3.70	6.19	54—70	30	60.20 ± 3 . 06	3.60	5.92	50—6

TABLE 7
The length of the second finger. Ph. II.—da II. Girls

Age	sinistra					dextra				
	n	X ± 3 . s _{x̄}	s	v	min—max	n	X ± 3 . s _{x̄}	s	v	min—max
1.5	30	35.67 ± 3 . 04	2.60	7.42	30—42	30	35.93 ± 3 . 03	2.10	6.03	31—40
4.5	30	35.68 ± 3 . 05	2.70	7.85	31—41	30	36.16 ± 3 . 05	3.00	8.40	32—42
7.5	30	41.33 ± 3 . 04	2.30	5.78	37—46	30	41.80 ± 3 . 05	2.80	6.74	36—47
10.5	30	45.50 ± 3 . 05	3.10	6.94	38—53	30	45.53 ± 3 . 05	3.20	7.05	39—52
15	30	48.62 ± 3 . 06	3.90	7.91	43—57	30	48.90 ± 3 . 06	3.70	7.58	43—57
21	30	53.66 ± 3 . 05	3.20	6.03	47—60	30	53.70 ± 3 . 06	3.20	6.12	46—59
27	30	54.40 ± 3 . 07	3.70	6.73	48—64	30	54.50 ± 3 . 07	3.70	6.86	48—65
33	30	54.46 ± 3 . 05	3.10	5.74	49—60	30	54.76 ± 3 . 05	3.00	5.62	50—60
36	30	57.00 ± 3 . 05	3.20	5.61	51—65	30	57.06 ± 3 . 05	3.10	5.55	52—65
4	30	58.60 ± 3 . 05	2.60	4.48	54—64	30	58.70 ± 3 . 05	2.70	4.62	54—64
5	30	61.70 ± 3 . 06	3.40	5.57	52—68	30	61.70 ± 3 . 06	3.60	5.82	52—69
6	30	64.40 ± 3 . 07	3.60	5.62	58—73	30	64.60 ± 3 . 07	3.70	5.70	58—74
7	30	67.60 ± 3 . 07	4.00	5.96	59—75	30	68.00 ± 3 . 07	3.80	5.56	60—75
8	30	71.30 ± 3 . 08	4.50	6.28	62—83	30	71.40 ± 3 . 08	4.40	6.10	63—83
9	30	72.90 ± 3 . 07	4.00	5.50	62—81	30	73.30 ± 3 . 07	3.80	5.18	63—80
10	30	74.50 ± 3 . 10	5.50	7.45	64—89	30	74.80 ± 3 . 10	5.30	7.11	65—88
11	30	79.10 ± 3 . 10	5.30	6.66	69—91	30	79.50 ± 3 . 10	5.20	6.54	69—85
12	30	82.10 ± 3 . 10	5.70	6.99	67—98	30	82.60 ± 3 . 10	5.60	6.81	67—98
12.3	30	84.60 ± 3 . 13	7.10	8.50	70—97	30	84.70 ± 3 . 09	4.80	5.65	76—93
12.9	30	85.10 ± 3 . 08	4.80	5.26	75—94	30	84.80 ± 3 . 09	4.90	5.78	76—97
13.3	30	86.60 ± 3 . 07	3.90	4.52	77—94	30	86.20 ± 3 . 09	4.70	5.47	78—96
13.9	30	88.00 ± 3 . 09	4.80	5.53	80—95	30	87.30 ± 3 . 11	6.30	7.22	78—98
14.3	31	88.70 ± 3 . 08	4.60	5.24	80—98	31	88.90 ± 3 . 11	6.40	7.25	62—96
14.9	30	88.30 ± 3 . 07	3.70	4.17	81—96	30	88.60 ± 3 . 08	4.50	5.15	80—99
15.3	31	88.50 ± 3 . 08	4.70	5.37	81—98	31	89.00 ± 3 . 09	4.90	5.55	80—98
15.9	36	88.50 ± 3 . 07	4.40	4.99	76—97	36	89.00 ± 3 . 07	4.30	4.85	82—100
16.6	35	88.80 ± 3 . 08	4.90	5.51	73—97	35	89.40 ± 3 . 07	4.30	4.84	80—98
17.6	30	89.10 ± 3 . 08	4.60	5.20	81—99	30	90.10 ± 3 . 10	5.30	5.97	82—102

TABLE 8
The length of the third finger. Ph III.—da III. Girls

Age	sinistra					dextra				
	n	X ± 3 . s _{x̄}	s	v	min—max	n	X ± 3 . s _{x̄}	s	v	min—max
1.5	30	39.61 ± 3 . 03	1.90	4.89	36—45	30	40.16 ± 3 . 02	1.40	3.48	37—45
4.5	30	40.53 ± 3 . 06	3.70	9.35	33—46	30	41.46 ± 3 . 06	3.70	9.06	34—47
7.5	30	47.30 ± 3 . 05	2.70	5.85	41—53	30	48.06 ± 3 . 04	2.70	5.61	42—53
10.5	30	52.66 ± 3 . 07	3.90	7.53	44—59	30	52.60 ± 3 . 07	4.00	7.73	45—59
15	30	55.50 ± 3 . 07	4.30	7.78	48—64	30	55.46 ± 3 . 07	4.00	7.23	48—63
21	30	58.90 ± 3 . 05	2.70	4.60	55—65	30	60.16 ± 3 . 04	2.50	4.30	55—65
27	30	60.90 ± 3 . 07	3.70	6.00	53—70	30	61.00 ± 3 . 07	3.70	6.02	53—70
33	30	61.23 ± 3 . 05	3.10	5.20	56—68	30	61.43 ± 3 . 05	3.10	5.06	57—68
36	30	63.00 ± 3 . 04	2.40	3.90	58—68	30	63.00 ± 3 . 04	2.40	3.87	58—68
4	30	66.00 ± 3 . 05	2.90	4.40	62—71	30	66.20 ± 3 . 05	2.70	4.03	63—71
5	30	67.90 ± 3 . 06	3.60	5.26	60—74	30	68.40 ± 3 . 07	3.70	5.47	61—74
6	30	71.70 ± 3 . 06	3.40	4.73	65—79	30	72.10 ± 3 . 06	3.40	4.72	65—80
7	30	75.30 ± 3 . 08	4.30	5.72	68—82	30	75.60 ± 3 . 07	4.20	5.50	69—82
8	30	79.10 ± 3 . 09	5.20	6.62	71—90	30	79.70 ± 3 . 09	5.00	6.25	71—90
9	30	80.80 ± 3 . 07	4.10	5.11	69—88	30	81.40 ± 3 . 07	4.10	5.02	70—89
10	30	82.20 ± 3 . 11	5.90	7.22	72—94	30	82.80 ± 3 . 10	5.70	6.83	72—95
11	30	87.70 ± 3 . 09	5.20	5.96	78—88	30	88.20 ± 3 . 09	5.10	5.75	72—96
12	30	90.80 ± 3 . 10	5.50	6.02	79—104	30	92.00 ± 3 . 10	5.50	5.98	80—104
12.3	30	93.80 ± 3 . 13	7.00	7.40	83—108	30	94.20 ± 3 . 11	6.30	6.65	68—108
12.9	30	94.70 ± 3 . 09	5.20	5.46	82—103	30	94.60 ± 3 . 10	5.40	5.80	81—103
13.3	30	97.00 ± 3 . 09	5.30	5.45	89—100	30	97.20 ± 3 . 10	5.20	5.43	88—108
13.9	30	99.00 ± 3 . 10	5.50	5.59	90—108	30	99.00 ± 3 . 09	4.90	5.01	91—107
14.3	31	99.00 ± 3 . 08	4.50	4.56	90—109	31	99.00 ± 3 . 09	4.90	4.90	91—110
14.9	30	98.80 ± 3 . 09	5.00	5.10	90—108	30	99.20 ± 3 . 08	4.40	4.45	91—111
15.3	31	99.20 ± 3 . 09	4.90	5.00	89—108	31	100.00 ± 3 . 10	5.80	5.80	87—112
15.9	36	99.00 ± 3 . 07	4.00	4.03	91—107	36	99.20 ± 3 . 07	4.40	4.49	90—108
16.6	35	100.20 ± 3 . 07	4.20	4.22	89—107	35	100.30 ± 3 . 06	3.90	3.91	92—110
17.6	30	101.00 ± 3 . 10	5.50	5.42	92—116	30	101.10 ± 3 . 09	5.30	5.30	91—114

TABLE 9
The length of the fourth finger. Ph IV.—da IV. Girls

Age	sinistra					dextra				
	n	X ± 3 . s _{x̄}	s	v	min—max	n	X ± 3 . s _{x̄}	s	v	min—max
1.5	30	36.29 ± 3 . 0.04	2.20	6.28	30—43	30	36.74 ± 3 . 0.03	2.10	5.77	32—43
4.5	30	37.63 ± 3 . 0.07	4.10	10.97	30—44	30	38.40 ± 3 . 0.07	4.00	10.62	31—45
7.5	30	43.53 ± 3 . 0.03	2.10	4.98	40—49	30	44.10 ± 3 . 0.04	2.20	5.12	40—49
10.5	30	46.40 ± 3 . 0.06	3.60	7.75	40—53	30	46.70 ± 3 . 0.06	3.60	7.77	40—53
15	30	48.96 ± 3 . 1.00	5.90	12.07	31—57	30	49.93 ± 3 . 0.08	4.70	9.43	42—58
21	30	54.33 ± 3 . 0.05	2.90	5.42	49—61	30	54.23 ± 3 . 0.05	2.90	5.51	49—60
27	30	56.70 ± 3 . 0.07	3.80	6.75	50—64	30	56.70 ± 3 . 0.07	3.80	6.68	50—64
33	30	57.23 ± 3 . 0.04	2.70	4.71	53—63	30	57.20 ± 3 . 0.05	2.70	4.86	52—63
36	30	58.30 ± 3 . 0.05	2.90	4.99	51—64	30	58.13 ± 3 . 0.05	2.90	5.00	51—64
4	30	61.50 ± 3 . 0.06	3.20	5.23	55—67	30	61.80 ± 3 . 0.05	2.90	4.76	56—68
5	30	64.10 ± 3 . 0.06	3.40	5.35	55—70	30	64.20 ± 3 . 0.06	3.40	5.23	56—69
6	30	67.20 ± 3 . 0.06	3.40	5.12	60—75	30	67.30 ± 3 . 0.06	3.30	4.93	60—75
7	30	69.90 ± 3 . 0.07	3.90	5.59	62—77	30	70.10 ± 3 . 0.07	3.90	5.60	62—77
8	30	73.60 ± 3 . 0.10	5.30	7.24	64—86	30	73.90 ± 3 . 0.09	5.20	7.00	64—87
9	30	75.90 ± 3 . 0.07	4.00	5.26	63—82	30	76.20 ± 3 . 0.07	4.10	5.41	64—83
10	30	76.20 ± 3 . 0.10	5.70	7.48	67—90	30	76.80 ± 3 . 0.10	5.40	7.10	68—90
11	30	81.30 ± 3 . 0.10	5.70	7.03	70—95	30	81.90 ± 3 . 0.10	5.40	6.60	69—92
12	30	84.50 ± 3 . 0.09	5.20	6.21	47—98	30	85.20 ± 3 . 0.10	5.70	6.65	75—99
12.3	30	87.80 ± 3 . 0.12	6.70	7.55	75—99	30	88.00 ± 3 . 0.13	7.10	8.08	75—100
12.9	30	88.60 ± 3 . 0.09	4.70	5.28	75—100	30	88.80 ± 3 . 0.09	5.00	5.63	80—99
13.3	30	90.50 ± 3 . 0.09	4.60	5.14	83—100	30	90.50 ± 3 . 0.09	5.00	5.51	82—107
13.9	30	92.40 ± 3 . 0.11	6.00	6.53	80—104	30	92.20 ± 3 . 0.09	5.00	5.49	83—103
14.3	31	92.60 ± 3 . 0.08	4.50	4.86	84—102	31	92.50 ± 3 . 0.09	4.70	5.13	83—100
14.9	30	92.30 ± 3 . 0.09	5.10	5.48	81—102	30	92.60 ± 3 . 0.09	5.30	5.74	81—111
15.3	31	92.50 ± 3 . 0.12	6.70	7.21	84—102	31	93.10 ± 3 . 0.06	3.20	3.47	81—103
15.9	36	92.50 ± 3 . 0.09	5.30	5.76	80—104	36	93.00 ± 3 . 0.07	4.20	4.25	85—103
16.6	35	93.70 ± 3 . 0.08	4.60	4.93	80—102	35	93.60 ± 3 . 0.07	4.10	4.35	84—104
17.6	30	94.00 ± 3 . 0.09	5.40	5.75	84—107	30	93.50 ± 3 . 0.09	4.90	5.21	85—104

TABLE 10
The length of the fifth finger. Ph V.—da V. Girls

Age	sinistra					dextra				
	n	X ± 3 . s _{x̄}	s	v	min—max	n	X ± 3 . s _{x̄}	s	v	min—max
1.5	30	30.19 ± 3 . 0.03	1.70	5.76	27—35	30	30.45 ± 3 . 0.03	1.80	5.91	27—33
4.5	30	31.80 ± 3 . 0.07	4.20	13.30	25—40	30	32.30 ± 3 . 0.07	4.00	12.41	26—41
7.5	30	35.70 ± 3 . 0.03	1.70	4.98	32—40	30	36.06 ± 3 . 0.03	2.10	5.85	31—41
10.5	30	38.53 ± 3 . 0.04	2.40	6.33	32—43	30	38.63 ± 3 . 0.04	2.70	7.06	31—43
15	30	41.28 ± 3 . 0.06	3.40	8.38	36—48	30	41.37 ± 3 . 0.06	3.70	8.96	36—48
21	30	43.00 ± 3 . 0.07	3.80	8.81	35—49	30	43.00 ± 3 . 0.07	3.80	8.80	35—49
27	30	44.50 ± 3 . 0.05	2.70	6.26	39—49	30	44.83 ± 3 . 0.04	2.30	5.14	41—48
33	30	47.16 ± 3 . 0.04	2.70	5.78	43—54	30	47.00 ± 3 . 0.04	2.70	5.78	42—54
36	30	47.86 ± 3 . 0.06	3.40	7.12	40—57	30	47.83 ± 3 . 0.06	3.40	7.15	40—56
4	30	47.20 ± 3 . 0.04	2.40	5.05	42—51	30	47.30 ± 3 . 0.05	2.50	5.33	42—52
5	30	49.20 ± 3 . 0.06	3.10	6.28	41—54	30	49.20 ± 3 . 0.05	2.90	5.99	42—54
6	30	51.50 ± 3 . 0.06	3.20	6.31	45—57	30	51.40 ± 3 . 0.06	3.30	6.42	43—57
7	30	54.50 ± 3 . 0.08	4.60	8.38	44—63	30	54.60 ± 3 . 0.08	4.50	8.31	45—63
8	30	57.50 ± 3 . 0.08	4.50	7.83	50—68	30	57.60 ± 3 . 0.08	4.20	7.31	51—68
9	30	58.60 ± 3 . 0.09	4.70	7.99	47—66	30	58.90 ± 3 . 0.09	4.90	8.30	47—67
10	30	59.00 ± 3 . 0.09	5.10	8.64	51—76	30	59.60 ± 3 . 0.09	5.00	8.47	52—76
11	30	63.10 ± 3 . 0.09	4.90	7.78	50—72	30	63.20 ± 3 . 0.09	4.90	7.83	52—68
12	30	65.00 ± 3 . 0.07	3.70	5.59	59—73	30	65.40 ± 3 . 0.07	3.70	5.56	60—74
12.3	30	68.90 ± 3 . 0.09	4.80	6.94	60—77	30	69.30 ± 3 . 0.09	5.10	7.35	56—78
12.9	30	68.60 ± 3 . 0.07	3.80	5.62	57—77	30	69.60 ± 3 . 0.07	4.00	5.75	62—78
13.3	30	71.10 ± 3 . 0.09	4.90	6.94	63—87	30	71.10 ± 3 . 0.09	4.70	6.59	60—82
13.9	30	72.50 ± 3 . 0.08	4.60	6.29	64—84	30	72.50 ± 3 . 0.09	4.70	6.53	64—84
14.3	31	72.20 ± 3 . 0.07	4.20	5.78	62—80	31	72.50 ± 3 . 0.08	4.50	6.16	62—82
14.9	30	72.40 ± 3 . 0.08	4.20	5.80	66—87	30	73.00 ± 3 . 0.10	5.20	7.21	67—81
15.3	31	72.30 ± 3 . 0.07	4.50	6.35	62—81	31	72.70 ± 3 . 0.08	4.40	6.11	63—83
15.9	36	72.30 ± 3 . 0.08	4.30	5.98	65—81	36	73.00 ± 3 . 0.08	4.70	6.47	66—82
16.6	35	72.40 ± 3 . 0.07	4.30	5.87	63—82	35	72.80 ± 3 . 0.07	4.00	5.58	64—81
17.6	30	73.60 ± 3 . 0.07	3.80	5.16	67—81	30	73.60 ± 3 . 0.08	4.20	5.77	66—82

TABLE 11
The periods of the lower growth activity or relative
growth stillstand in the length of fingers of the hand

Finger	Boys	Girls
1	1 3/4—2 1/4, 8—10, 11—12, 15 1/2 →	3—5, 8—10, 15 →
2	1 3/4—2 1/4, 8—9, 15 1/2 →	1 3/4—2 3/4, 8—9, 14 1/2 →
3	1 3/4—2 3/4, 8—9, 11—12, 15 1/2 →	2 1/4—2 3/4, 8—10, 14 →
4	2 1/4—2 3/4, 8—9, 11—12, 15 1/2 →	2 1/4—2 3/4, 9—10, 14 →
5	2 1/4—2 3/4, 8—9, 10—11, 16 →	3—4, 8—10, 14 1/2 →

to 15 per cent of men and 20 to 25 per cent of women have a different ratio of finger lengths on both hands. J. Jelínek (1950) gives this length asymmetry in 43 per cent of boys and 9 per cent of girls, while M. F. Pošpíšil (1959) in 15.82 per cent of boys and 20.52 per cent of girls.

The established ratio of the length of fingers occurring most frequently in Czechoslovak populations may be, together with the ascertained size norm, a valuable aid in their surgical reconstruction. The absolute length of the individual fingers in various age classes of Czechoslovak populations is determined by the mean values in Tables 1 to 10.

One of the most important questions for the surgery of the hand is whether in the study of its growth dynamics can be found some period of diminished growth activity, or even a period of so-called relative growth rest. We believe that these periods of smaller size increases, or the period of growth rest will be able to be used for various operations of the hand, especially of its skeleton, mainly in congenital developmental defects.

We looked for such periods also in the tables and on the given curve graphs of the growth of all five fingers. Table 11 presents them in brief outline.

As it is to be seen from the figures and from this Table, mutually first diminution of the growth activity was found together in the three radial fingers already after 21 months of life. While in the case of the thumb and the index finger it lasts only about 27 months, this period continues for the middle finger until about 33 months. At the age of 2 and a quarter years an analogous diminution of the growth rate sets in also for the remaining two fingers, i.e. the ring finger and the little finger, and lasts until 33 months just as in the case of the third finger. A further period of diminution of the growth rate of all five fingers sets in bilaterally symmetrically at about the eighth year of age, but lasts only one year, till about 9 years. Only the thumb has a longer time of diminished increases, because it lasts until 10 years. We should like to stress still another, roughly one year's period, when the curve of growth exhibits a more gentle slope in boys. This is between the 11th and the 12th year for the thumb, the middle finger, and the ring finger. For the index finger we cannot infer upon this period at all, because the growth curve displays at this time a fairly steep ascent, and precedes for the little finger one year, i.e. it lasts approximately from 10 to 11 years.

The growth process ends for the first four fingers of boys after about 15 and a half years, the little finger not exhibiting any increase until after about the 16th year.

The first period of diminution of the mean length increases is displayed on the hands of girls by the index finger, and that again between 21 and 23 months. Half a year later, i.e. at 2 and a quarter years, a period of diminished growth activity sets in also for the third and fourth fingers. This period lasts just as long as for the second finger till about two and three quarters of a year.

The little finger and the thumb have, as far as the length is concerned, a beginning of a complete quiescent growth period at three years. This, of course, lasts for the fifth finger only one year, i.e. till four years, while for the thumb perhaps till five years. The other period of growth activity of the length of finger diminished to a considerable extent begins in girls everywhere except for the fourth finger after about the eighth year of life. In the case of the index finger it does not begin until nine years and can be observed only till the completion of the tenth year, similarly as for the first, third, and fifth fingers. In the case of the index finger this period of diminished mean increases lasts also one year and already after the ninth year a more rapid growth can be registered again.

The attainment of such mean values, which, in essence, no more differ from the lengths measured in the last age classes of both sets of ours, lies for the individual fingers of a girl's hand between 14 and 15 years. This finding does not exclude the possibility that in the following, i.e. after 15 years of age, no more length increases would take place. The length of all fingers is still increasing in that time, similarly as probably still even after 18 years, of course only insignificantly. The same holds good for the hands of boys.

Our findings on the time of termination of the growth of the hand (K. Hajniš in press) and its fingers, especially in girls, are in agreement with the generally earlier completion of bodily growth than in former populations to whom our attention had been drawn (J. A. Valsik, oral communication).

DISCUSSION

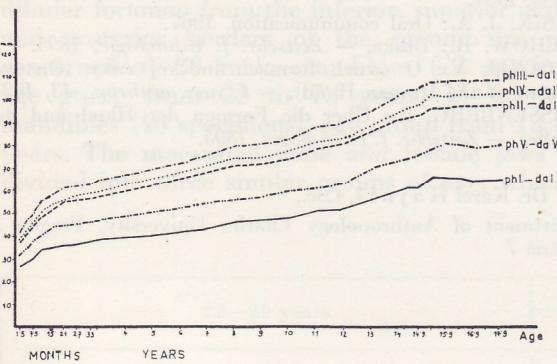
Already M. D. Bunnell (1944) and later again J. H. Boyes (1964) stressed the importance of the

surgical period for the hand and its finger in the case of congenital defects.

For good reason it can be assumed that the period of diminished growth activity of the length of the fingers established by our analysis can practically be utilized for their operation in the case of the most varied types of congenital defects occurring more frequently in boys than in girls (G. Micali 1965). On the basis of a minute analysis of the growth curves (see figures) we can recommend all the periods mentioned. Yet we consider the mentioned third period in boys, i.e. from 10 to 11 or from 11 to 12 years (Table 11), merely as an auxiliary one and recommend its use only in urgent cases. Also the performance of corrective operations on the fingers, especially as regards the phalanges, we recommend to carry them out after a certain lapse of time following the age which on the average was ascertained for attaining the practically final length.

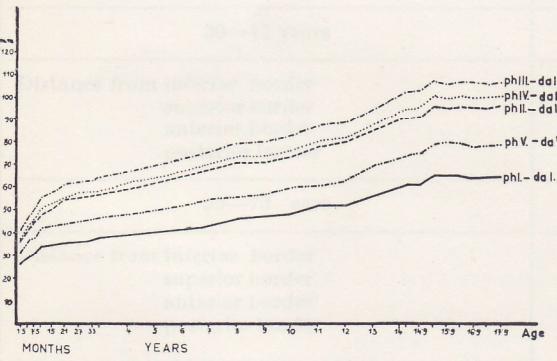
We believe that the quiescent period of growth and the period of diminished growth activity are most opportune for surgery. The growth of the hand, just as of other parts of the body, as a matter of fact, conditions mainly the growth of its skeleton. Possible surgical interventions on the skeleton of the phalanges which might cause a diminution of the growth in the time of its great intensity, or its complete stop, probably cannot act on the organism in the time of little or no growth so as in the time of violent growth dynamics.

In the literature only very few concrete data on



GRAPH 1

The growth of length of the fingers. Left hand. Boys



GRAPH 2

The growth of length of the fingers. Right hand. Boys

the time of surgery on the fingers are presented.

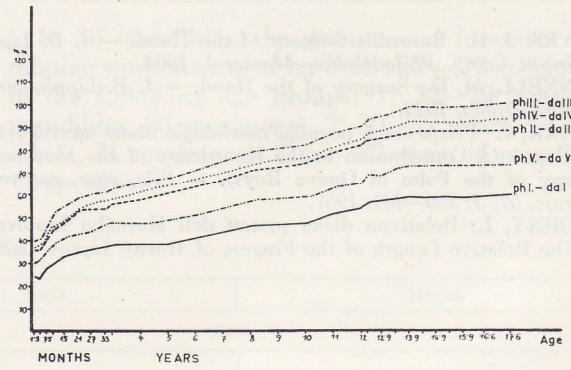
H. Neumann (1965) recommends for surgery of the thumb in the case of triphalangy the end of the second and the beginning of the third year. This period overlaps exactly with the time of the first diminished growth activity of the thumb which we found in boys, but precedes, the period of relative growth stillstand by one year in girls.

The established growth dynamics of the fingers is, among others, also of importance for fixing the time of surgery of syndactyly and other congenital defects of the fingers and the hand, requiring their reconstruction, or they may in whatever way negatively influence their normal growth. B. Rypláček (1951) reports that it is better to wait with surgery of syndactyly until the fourth to the sixth year and later. J. Geldmacher (1967) thinks that syndactyly should be removed till ten years at the latest. Otherwise hypoplasia of the fingers may occur. Also H. Milliesi (1965) points to the risk of a belated surgical intervention which may result in stoppage of the growth of the length of fingers and thus in brachydactyly.

SUMMARY

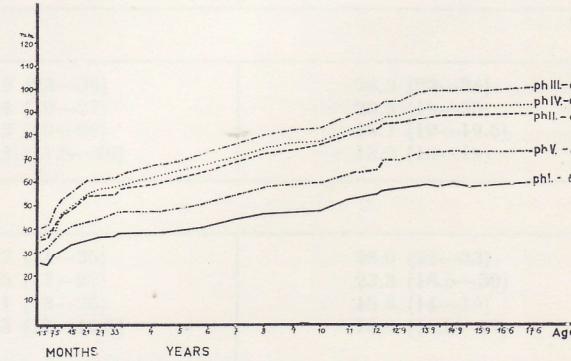
The study of the size and growth dynamics of fingers of both sexes of Prague children and young people from birth to the 18th year of age furnished the following results:

1. Norms for the length of all fingers in the indi-



GRAPH 3

The growth of length of the fingers. Left hand. Girls



GRAPH 4

The growth of length of the fingers. Right hand. Girls

vidual age classes, separately for the left and the right hand, were established for boys and girls (Tables 1–10).

2. The mean relative length of fingers during the postnatal ontogenetic development is always in the order of 34251.

3. Through analysis of the growth curves, the period of diminished growth activity or relative growth stillstand of the length of fingers, which may be used in surgery of their congenital developmental defects, was determined (Table 11). The data we measured and also further innumerable chronological information presented show that syndactyly and other congenital developmental defects of fingers can be expediently operated on primarily between 8 and 9 or 8 and 10 years.

4. The growth dynamics of all fingers is not the same. For the first and the fifth finger three growth phases were found, while for the second, third, and fourth fingers four growth phases were established.

5. The different growth dynamics of both radial fingers (1 + 5) from the three middle fingers (2 + + 3 + 4) can perhaps be explained partly by the different function of the two groups resulting from their position on the hand. The varying dynamics of growth in both groups may be in the further development a basis also for the phylogenetic division of the radii of the hand into these two groups, similarly as it was the case in other animal taxons (cf. e.g. Ungulata).

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