

UMTRI-85-23

**CHILD ANTHROPOMETRY FOR RESTRAINT SYSTEM DESIGN**

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## INTRODUCTION

Child safety seats and other restraint systems must be designed to accommodate the sizes and dimensions of the full range of children who will use them, even though the restraints are typically crash tested with only the standard 6-month-old, 3-year-old, and sometimes the 6-year-old dummies. Over the last ten years, three anthropometric studies of children have been conducted at the University of Michigan Transportation Research Institute. The data from these studies are published separately, and the reports are referenced below. While several measurements are common to two or all three studies, other measurements were made in only one study.

The purpose of this document is to present, in English units, a compilation of the child anthropometry data from all three studies that are considered useful for child restraint design. Because measurement procedures were as consistent as possible among the studies, raw data for the same measures have been combined and are displayed as single data sets. In addition, dimensions unique to one study are presented along with measures taken in more than one study. Thus all the available measurements that are likely to be of interest to the restraint designer will be found in this single source, given in units more familiar to the U.S. designer.

Reports from the three studies, by date of publication, are as follows:

**1975.** Snyder, R.G.; Spencer, M.L.; Owings, C.L.; and Schneider, L.W. *Physical characteristics of children as related to death and injury for consumer product safety design.* The University of Michigan, Highway Safety Research Institute, Ann Arbor. Sponsor: Consumer Product Safety Commission. Reprinted by Society of Automotive Engineers, Warrendale, Pa., as SAE-SP-394, *Anthropometry of U.S. Infants and Children.*

**1977.** Snyder, R.G.; Schneider, L.W.; Owings, C.L.; Reynolds, H.M.; Golomb, D.H.; and Schork, M.A. *Anthropometry of infants, children, and youths to age 18 for product safety design.* The University of Michigan, Highway Safety Research Institute, Ann Arbor. Sponsor: Consumer Product Safety Commission.

**1985.** Schneider, L.W.; Owings, C.L.; Lehman, R.J.; Pflug, M.A.; and Cook, J. *Anthropometry and shape of children's heads, necks, and shoulders for product safety design.* The University of Michigan, Transportation Research Institute, Ann Arbor. Sponsor: Consumer Product Safety Commission.

The following table provides a list of the measurements in the order presented, as well as identification by date of the study(ies) from which the data were obtained. Figures following the table identify each measurement by number on a standing or seated child, as appropriate. (For infants, measurements were taken in a supine position with legs either straight or flexed.) This number is also used to identify the measurements on the succeeding pages, where the numerical data and scatter plots by age are given. Note that the plots have been truncated at age 10.0, but the numerical data include subjects through 10.5 years. For a few measurements, data are only available for a portion of the zero-through-ten age-range.

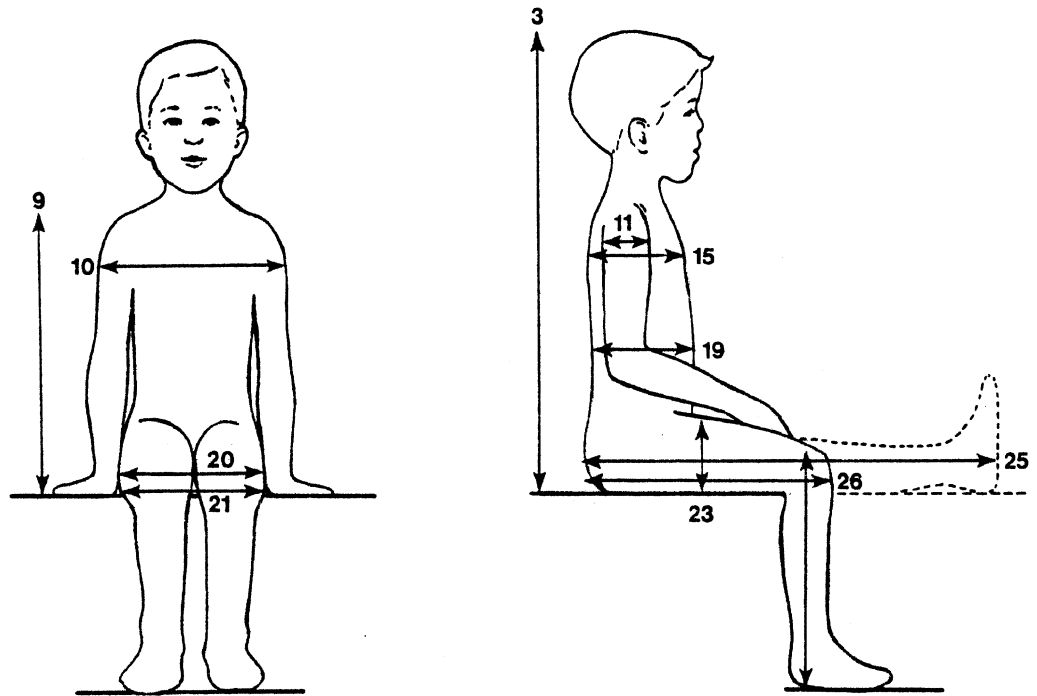
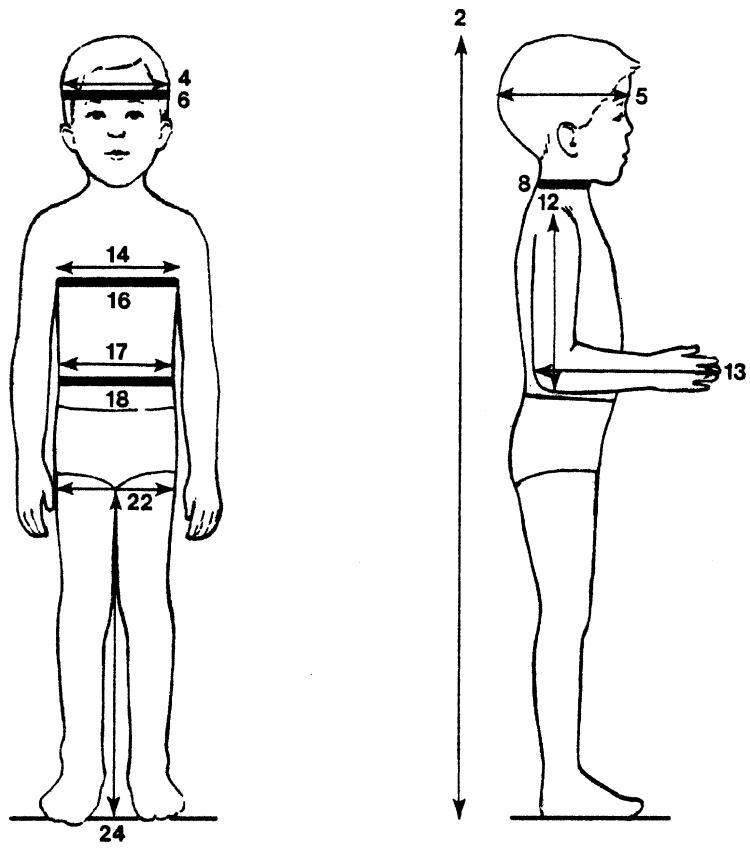
**TABLE OF MEASUREMENT SOURCES**

Measurement		1975	1977	1984
1	Weight	x	x	x
2	Height	x	x	x
3	Sitting Height	x	x	x
4	Head Breadth	x	x	x
5	Head Depth	x	x	x
6	Head Circumference	x	x	x
7	Neck Breadth		x	x
8	Neck Circumference	x	x	x
9	Shoulder Height, Seated	x		x
10	Shoulder Breadth	x	x	x
11	Shoulder Depth			x
12	Shoulder-Elbow Length	x	x	
13	Elbow-Hand Length	x	x	
14	Chest Breadth	x	x	
15	Chest Depth	x		x
16	Chest Circumference	x	x	
17	Waist Breadth	x	x	
18	Waist Circumference	x	x	
19	Abdominal Depth, Seated			x
20	Hip Breadth, Seated		x	
21	Thigh Breadth, Seated		x	
22	Thigh Breadth, Standing	x		
23	Thigh Depth, Seated		x	
24	Crotch Height	x		
25	Rump-Sole Length	x	x	
26	Rump-Knee Length	x	x	
27	Knee-Sole Length	x	x	

\*Calculated from other measurements.

\*\*Unpublished data.

# MEASUREMENT IDENTIFICATION FIGURES



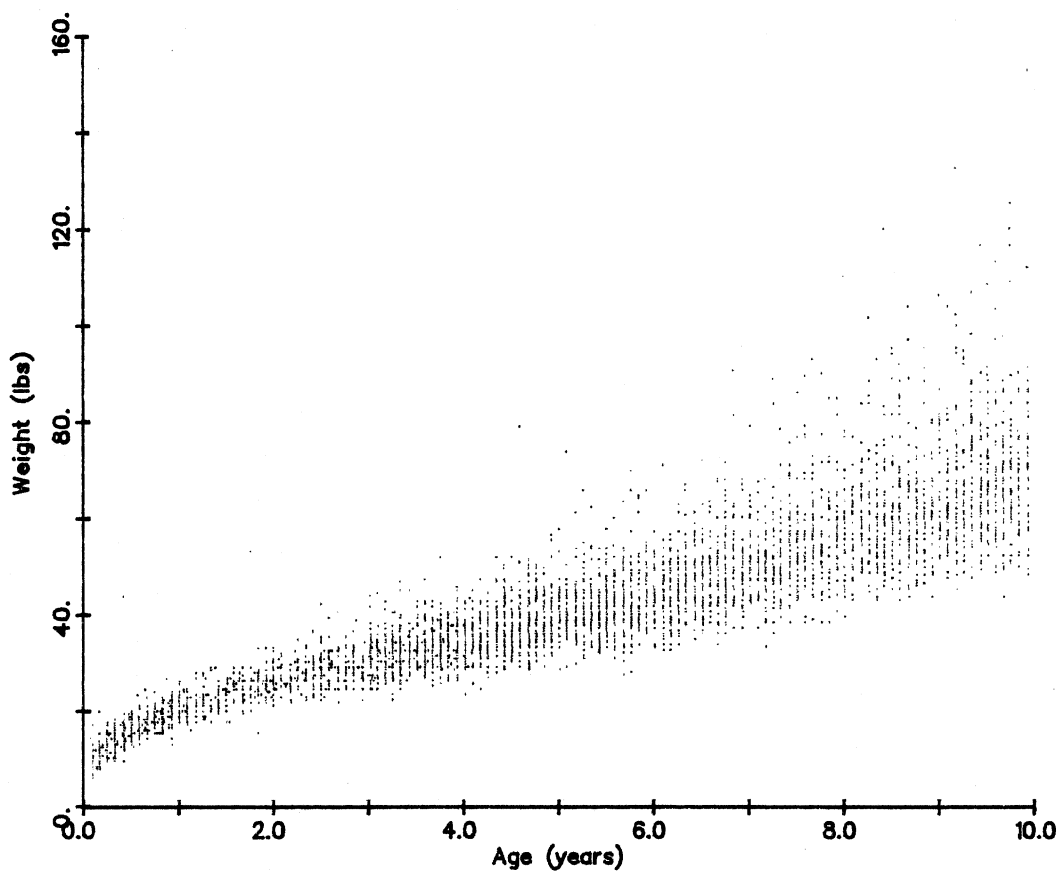
**MEASUREMENT DATA**



Weight (lbs)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	197	11.1	5.7	20.9	2.7
0.5 yr <sup>1</sup>	250	17.2	10.4	44.8	3.1
1.0 yr <sup>1</sup>	149	21.4	13.9	28.7	2.7
1.5 yr <sup>1</sup>	97	24.7	18.3	30.2	2.7
2.0 yr <sup>1</sup>	127	27.2	16.5	35.5	2.9
2.5 yr <sup>1</sup>	150	29.6	22.3	42.8	3.4
3.0 yr <sup>1</sup>	228	32.0	23.1	45.2	3.9
3.5 yr <sup>1</sup>	280	34.0	24.9	52.5	4.1
4.0 yr <sup>2</sup>	431	36.1	24.3	52.7	4.4
5.0 yr <sup>3</sup>	631	40.4	29.3	79.4	5.6
6.0 yr <sup>3</sup>	568	45.1	28.4	71.6	6.4
7.0 yr <sup>3</sup>	515	51.2	33.9	96.1	8.3
8.0 yr <sup>3</sup>	463	58.1	38.8	119.5	10.3
9.0 yr <sup>3</sup>	504	64.9	43.2	132.3	12.3
10.0 yr <sup>3</sup>	498	71.4	44.1	152.1	13.7

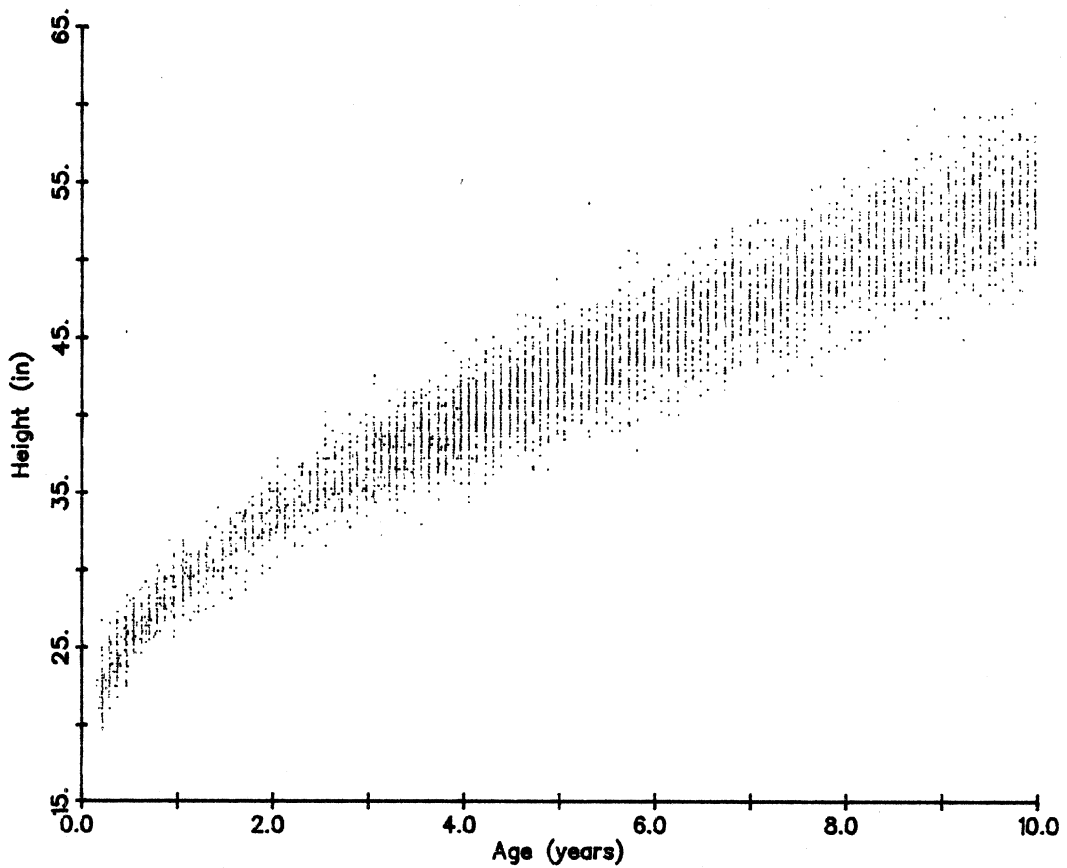
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Height (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	222	22.1	18.8	27.0	1.6
0.5 yr <sup>1</sup>	284	26.4	22.1	45.6	1.9
1.0 yr <sup>1</sup>	159	29.4	25.9	33.4	1.4
1.5 yr <sup>1</sup>	119	32.0	27.9	34.9	1.4
2.0 yr <sup>1</sup>	138	34.0	30.0	37.4	1.3
2.5 yr <sup>1</sup>	166	35.9	31.8	40.5	1.5
3.0 yr <sup>1</sup>	301	37.5	32.4	42.7	1.5
3.5 yr <sup>1</sup>	408	38.8	33.2	44.9	1.5
4.0 yr <sup>2</sup>	627	40.3	34.6	45.2	1.8
5.0 yr <sup>3</sup>	858	42.5	36.6	53.6	1.9
6.0 yr <sup>3</sup>	611	45.0	38.0	50.8	2.0
7.0 yr <sup>3</sup>	539	47.6	41.9	52.8	2.1
8.0 yr <sup>3</sup>	490	50.0	42.8	57.1	2.3
9.0 yr <sup>3</sup>	515	52.2	45.0	59.3	2.4
10.0 yr <sup>3</sup>	499	54.1	47.3	62.6	2.5

<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo

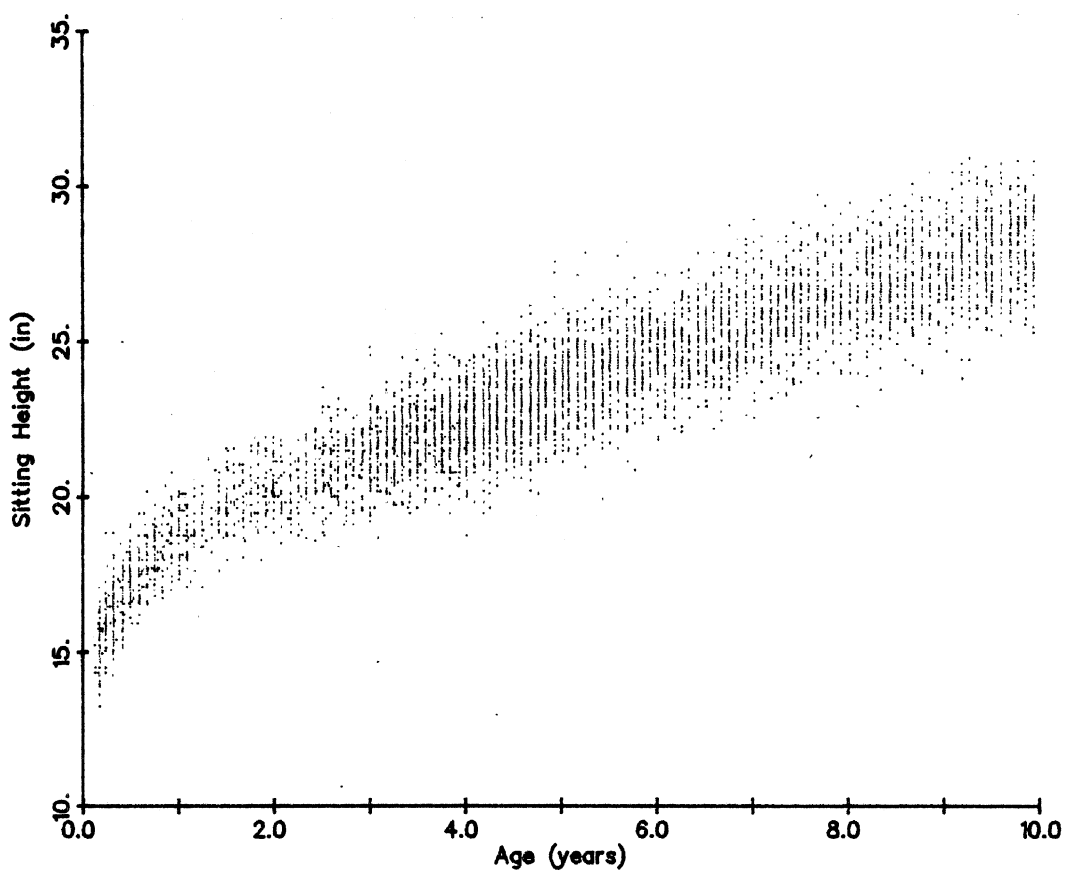


Sitting Height (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	212	14.9	12.4	18.9	1.2
0.5 yr <sup>1</sup>	270	17.3	14.3	25.2	1.1
1.0 yr <sup>1</sup>	142	18.9	16.9	21.3	0.9
1.5 yr <sup>1</sup>	110	19.9	17.6	22.0	0.9
2.0 yr <sup>1</sup>	136	20.3	18.0	22.1	0.8
2.5 yr <sup>1</sup>	162	21.0	18.4	23.6	1.0
3.0 yr <sup>1</sup>	298	21.5	14.8	25.0	1.0
3.5 yr <sup>1</sup>	401	22.1	19.6	25.4	1.0
4.0 yr <sup>2</sup>	627	22.6	18.8	25.8	1.1
5.0 yr <sup>3</sup>	851	23.6	20.0	27.9	1.1
6.0 yr <sup>3</sup>	610	24.7	20.9	28.2	1.1
7.0 yr <sup>3</sup>	541	25.7	22.3	28.9	1.2
8.0 yr <sup>3</sup>	490	26.7	22.6	29.8	1.1
9.0 yr <sup>3</sup>	510	27.6	23.9	30.9	1.2
10.0 yr <sup>3</sup>	493	28.3	24.4	32.1	1.3

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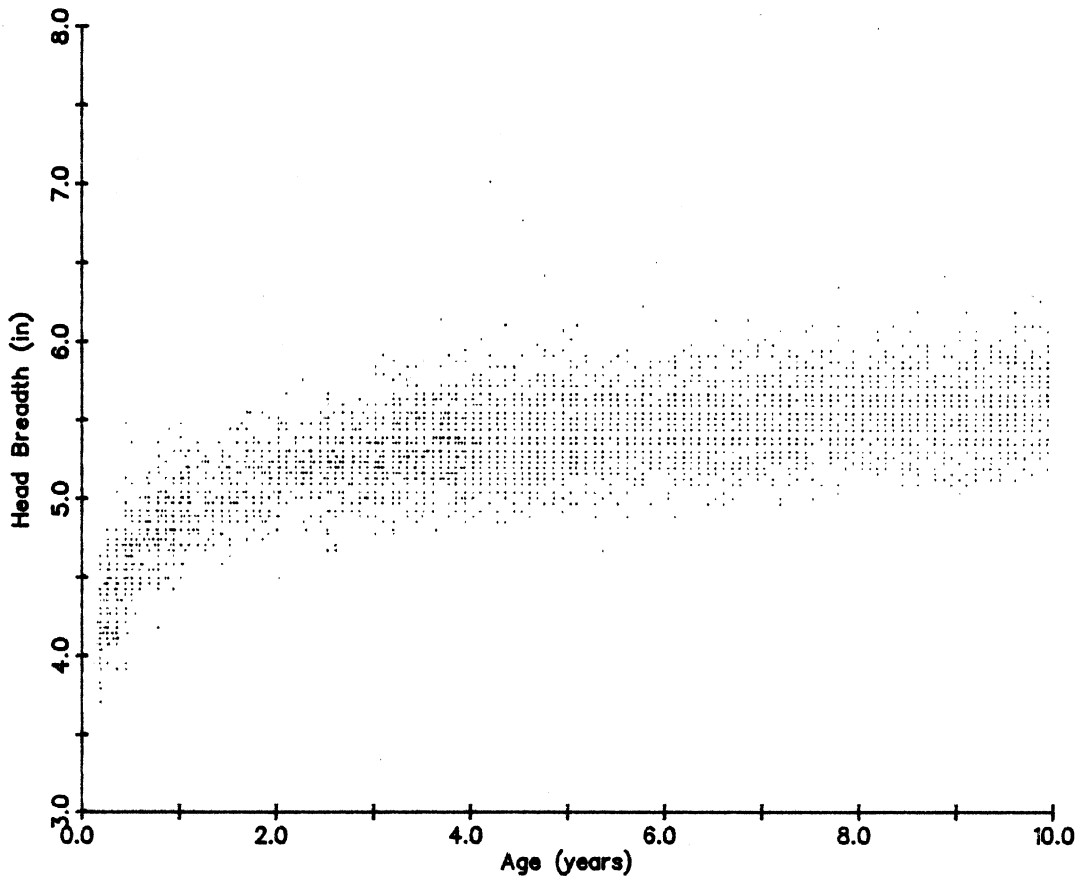
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Head Breadth (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	216	4.1	3.5	4.8	0.3
0.5 yr <sup>1</sup>	283	4.7	3.9	5.5	0.3
1.0 yr <sup>1</sup>	156	5.0	4.4	5.5	0.2
1.5 yr <sup>1</sup>	128	5.1	4.6	5.6	0.2
2.0 yr <sup>1</sup>	146	5.2	4.5	5.8	0.2
2.5 yr <sup>1</sup>	165	5.3	4.7	5.7	0.2
3.0 yr <sup>1</sup>	302	5.3	4.8	5.9	0.2
3.5 yr <sup>1</sup>	409	5.4	4.8	6.2	0.2
4.0 yr <sup>2</sup>	629	5.4	4.9	7.1	0.2
5.0 yr <sup>3</sup>	847	5.4	4.7	6.8	0.2
6.0 yr <sup>3</sup>	588	5.5	4.9	6.3	0.2
7.0 yr <sup>3</sup>	541	5.5	5.0	6.2	0.2
8.0 yr <sup>3</sup>	485	5.6	5.0	6.4	0.2
9.0 yr <sup>3</sup>	504	5.6	5.1	6.5	0.2
10.0 yr <sup>3</sup>	486	5.7	5.0	6.3	0.2

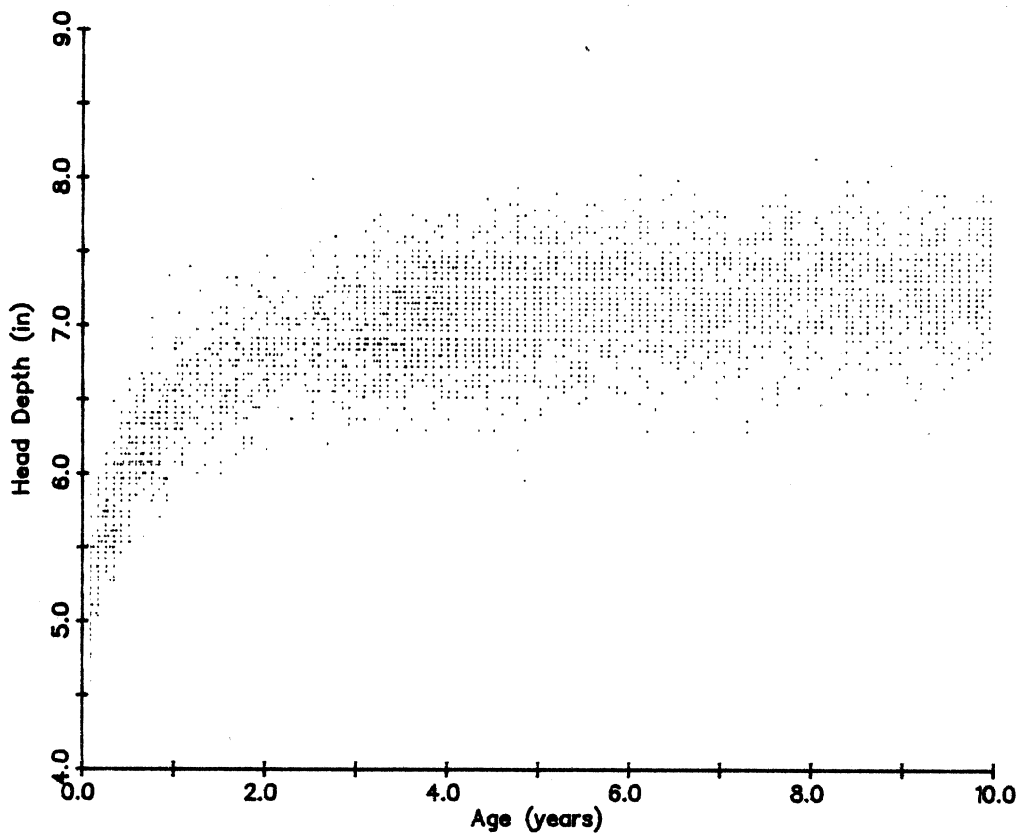
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Head Depth (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	216	5.3	4.4	6.1	0.4
0.5 yr <sup>1</sup>	279	6.0	5.3	7.1	0.3
1.0 yr <sup>1</sup>	155	6.5	5.7	7.4	0.3
1.5 yr <sup>1</sup>	126	6.7	6.0	7.3	0.3
2.0 yr <sup>1</sup>	129	6.9	6.2	7.5	0.2
2.5 yr <sup>1</sup>	125	7.0	6.2	8.0	0.3
3.0 yr <sup>1</sup>	242	7.0	6.3	7.8	0.3
3.5 yr <sup>1</sup>	342	7.0	6.3	7.8	0.3
4.0 yr <sup>2</sup>	520	7.1	6.3	7.9	0.3
5.0 yr <sup>3</sup>	682	7.1	6.0	7.9	0.3
6.0 yr <sup>3</sup>	449	7.2	6.3	8.0	0.3
7.0 yr <sup>3</sup>	407	7.2	6.3	8.0	0.3
8.0 yr <sup>3</sup>	362	7.3	6.5	8.1	0.3
9.0 yr <sup>3</sup>	348	7.3	6.3	8.1	0.3
10.0 yr <sup>3</sup>	323	7.3	6.4	7.9	0.3

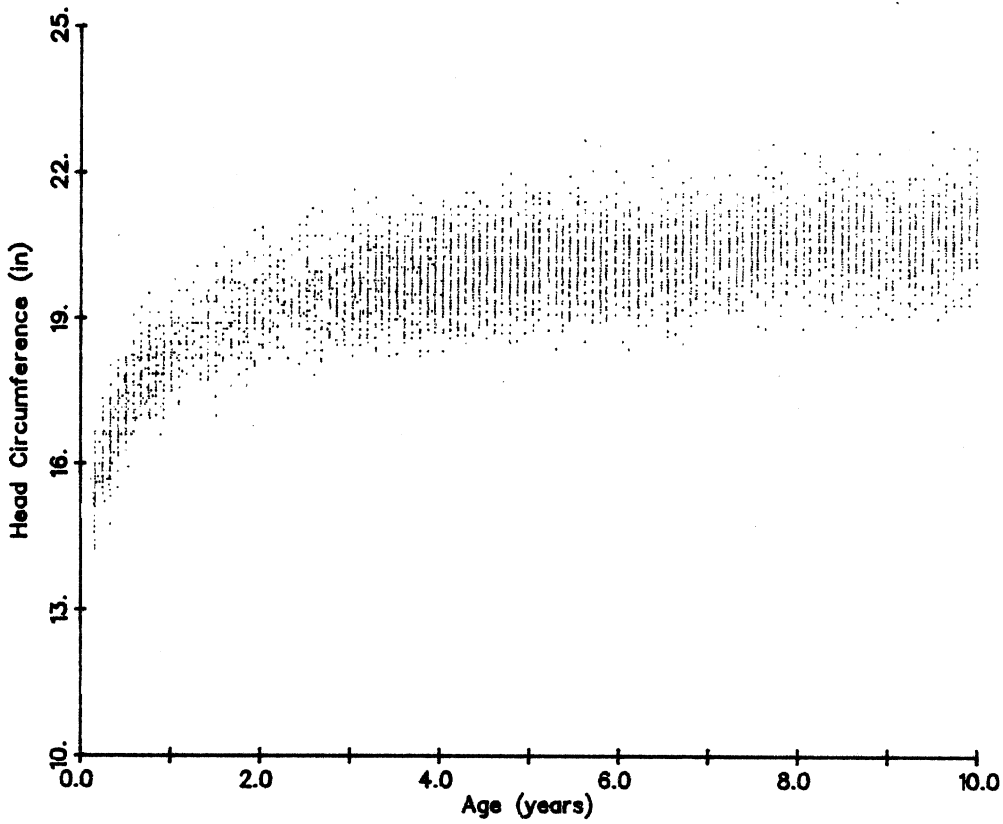
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Head Circumference (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	205	15.1	12.9	17.3	0.9
0.5 yr <sup>1</sup>	262	17.2	14.7	20.7	0.8
1.0 yr <sup>1</sup>	143	18.2	16.5	20.1	0.6
1.5 yr <sup>1</sup>	120	18.8	17.0	20.4	0.7
2.0 yr <sup>1</sup>	142	19.2	17.6	20.8	0.6
2.5 yr <sup>1</sup>	163	19.5	17.8	21.2	0.6
3.0 yr <sup>1</sup>	299	19.6	18.2	21.6	0.6
3.5 yr <sup>1</sup>	409	19.8	18.2	21.5	0.6
4.0 yr <sup>2</sup>	623	19.9	18.3	21.6	0.6
5.0 yr <sup>3</sup>	838	20.1	18.4	22.0	0.6
6.0 yr <sup>3</sup>	577	20.2	18.4	22.7	0.6
7.0 yr <sup>3</sup>	530	20.3	18.5	22.2	0.6
8.0 yr <sup>3</sup>	475	20.6	18.8	22.6	0.6
9.0 yr <sup>3</sup>	503	20.6	18.9	22.9	0.6
10.0 yr <sup>3</sup>	485	20.9	19.0	22.6	0.6

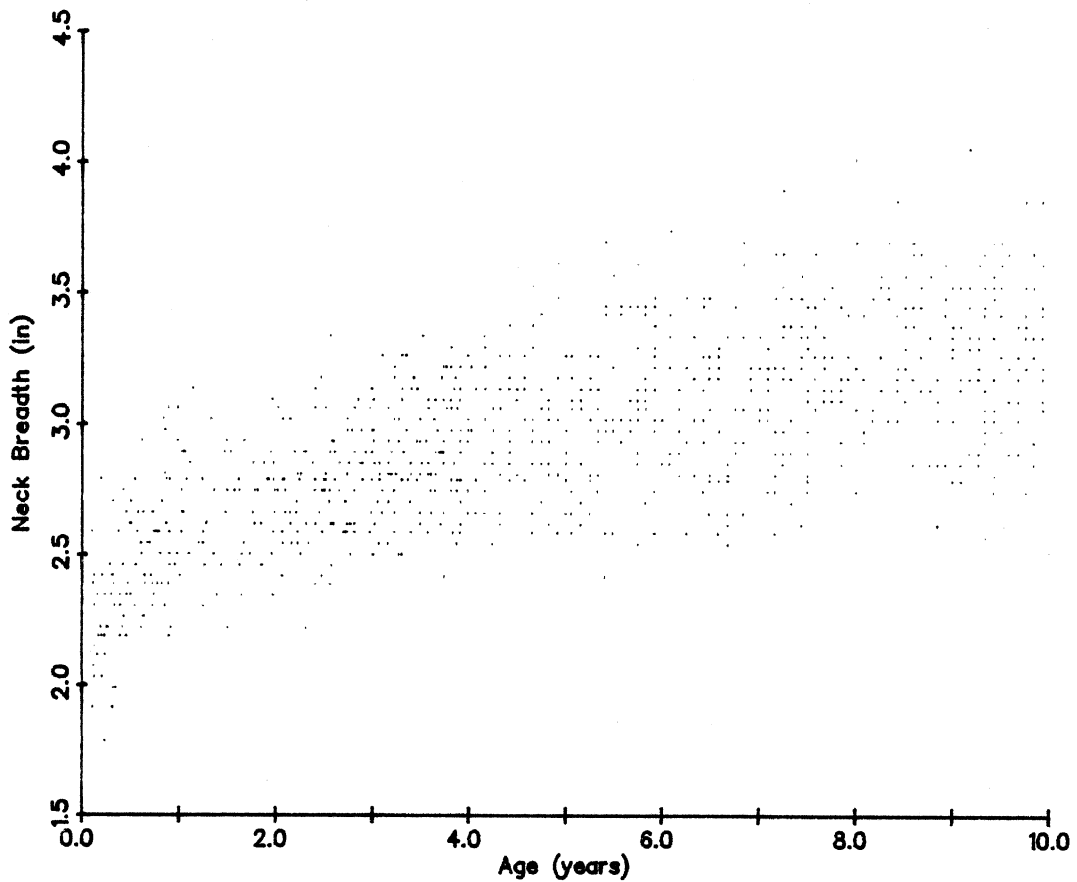
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Neck Breadth (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	30	2.3	1.8	2.8	0.2
0.5 yr <sup>1</sup>	58	2.5	1.9	2.9	0.2
1.0 yr <sup>1</sup>	42	2.7	2.2	3.1	0.2
1.5 yr <sup>1</sup>	26	2.7	2.2	3.0	0.2
2.0 yr <sup>1</sup>	42	2.7	2.4	3.1	0.2
2.5 yr <sup>1</sup>	50	2.8	2.2	3.4	0.2
3.0 yr <sup>1</sup>	57	2.9	2.5	3.3	0.2
3.5 yr <sup>1</sup>	57	2.9	2.4	3.4	0.2
4.0 yr <sup>2</sup>	72	3.0	2.6	3.4	0.2
5.0 yr <sup>3</sup>	91	3.0	2.4	3.7	0.3
6.0 yr <sup>3</sup>	79	3.1	2.6	3.7	0.3
7.0 yr <sup>3</sup>	86	3.1	2.6	3.9	0.3
8.0 yr <sup>3</sup>	68	3.3	2.8	4.0	0.3
9.0 yr <sup>3</sup>	91	3.3	2.6	4.1	0.3
10.0 yr <sup>3</sup>	84	3.3	2.8	3.9	0.3

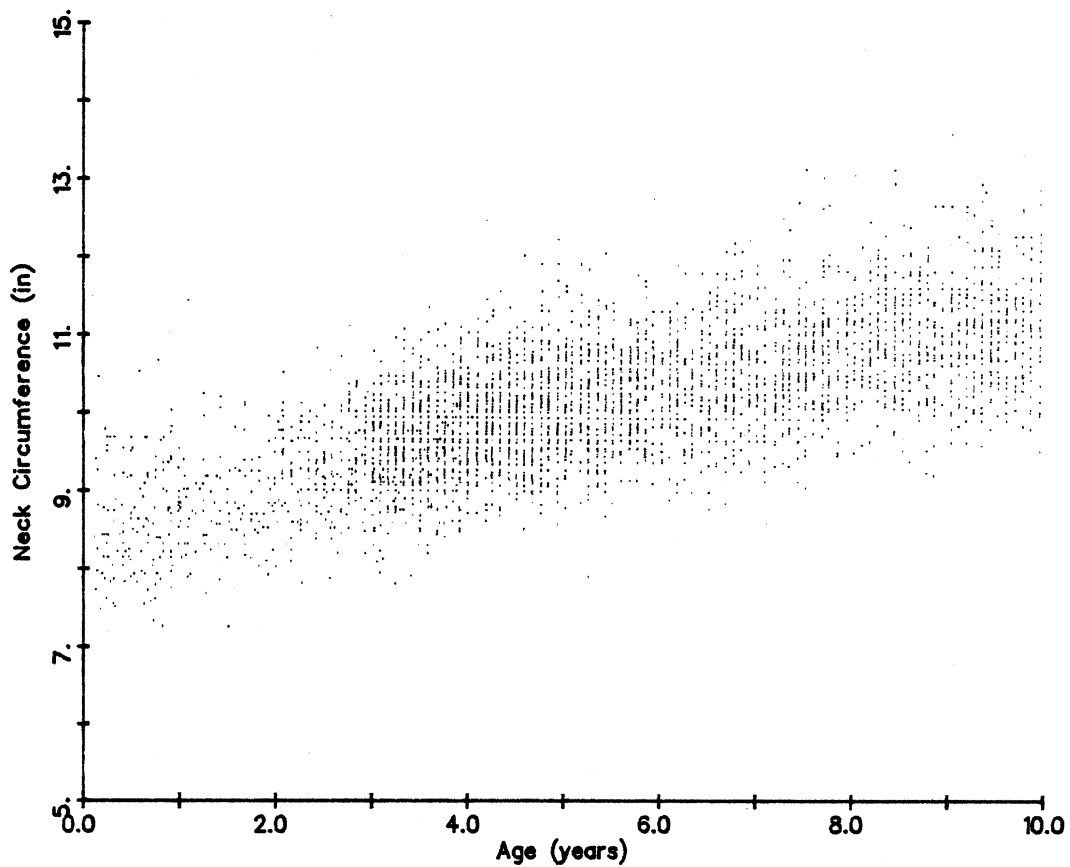
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Neck Circumference (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	38	8.5	7.2	10.5	0.9
0.5 yr <sup>1</sup>	79	8.7	7.4	10.7	0.7
1.0 yr <sup>1</sup>	71	8.9	7.3	11.5	0.7
1.5 yr <sup>1</sup>	54	8.9	7.3	10.3	0.6
2.0 yr <sup>1</sup>	78	9.2	7.9	10.6	0.6
2.5 yr <sup>1</sup>	116	9.4	7.9	11.2	0.6
3.0 yr <sup>1</sup>	235	9.6	7.9	11.1	0.6
3.5 yr <sup>1</sup>	335	9.8	8.0	11.4	0.6
4.0 yr <sup>2</sup>	518	10.0	8.5	11.6	0.6
5.0 yr <sup>3</sup>	673	10.1	8.0	12.3	0.6
6.0 yr <sup>3</sup>	434	10.4	8.9	12.8	0.6
7.0 yr <sup>3</sup>	388	10.6	8.9	12.8	0.7
8.0 yr <sup>3</sup>	356	11.0	9.1	13.2	0.7
9.0 yr <sup>3</sup>	340	11.1	9.3	13.7	0.7
10.0 yr <sup>3</sup>	317	11.3	9.4	13.5	0.7

<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo

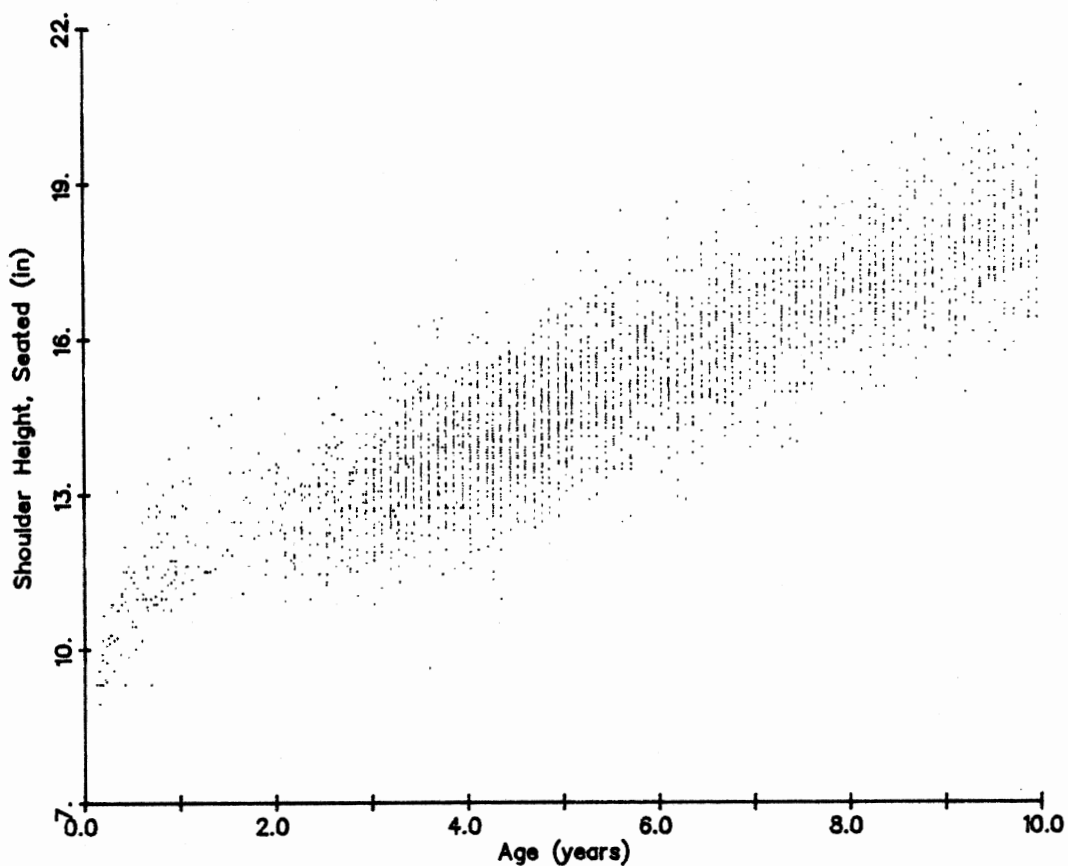




Shoulder Height, Seated (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	30	9.9	7.7	10.9	0.7
0.5 yr <sup>1</sup>	57	11.4	9.4	13.2	0.9
1.0 yr <sup>1</sup>	42	12.1	10.8	14.5	0.9
1.5 yr <sup>1</sup>	26	12.8	11.1	14.9	1.0
2.0 yr <sup>1</sup>	55	12.6	11.0	14.2	0.7
2.5 yr <sup>1</sup>	98	12.9	11.0	15.1	0.9
3.0 yr <sup>1</sup>	210	13.2	10.9	16.0	0.8
3.5 yr <sup>1</sup>	310	13.7	9.7	16.4	0.9
4.0 yr <sup>2</sup>	459	14.0	11.0	17.6	0.9
5.0 yr <sup>3</sup>	588	14.7	12.1	17.7	0.9
6.0 yr <sup>3</sup>	370	15.4	12.5	18.7	1.0
7.0 yr <sup>3</sup>	315	16.2	13.9	19.0	1.0
8.0 yr <sup>3</sup>	293	17.0	14.6	19.8	0.9
9.0 yr <sup>3</sup>	255	17.7	15.0	20.3	1.0
10.0 yr <sup>3</sup>	236	18.3	15.8	21.5	1.1

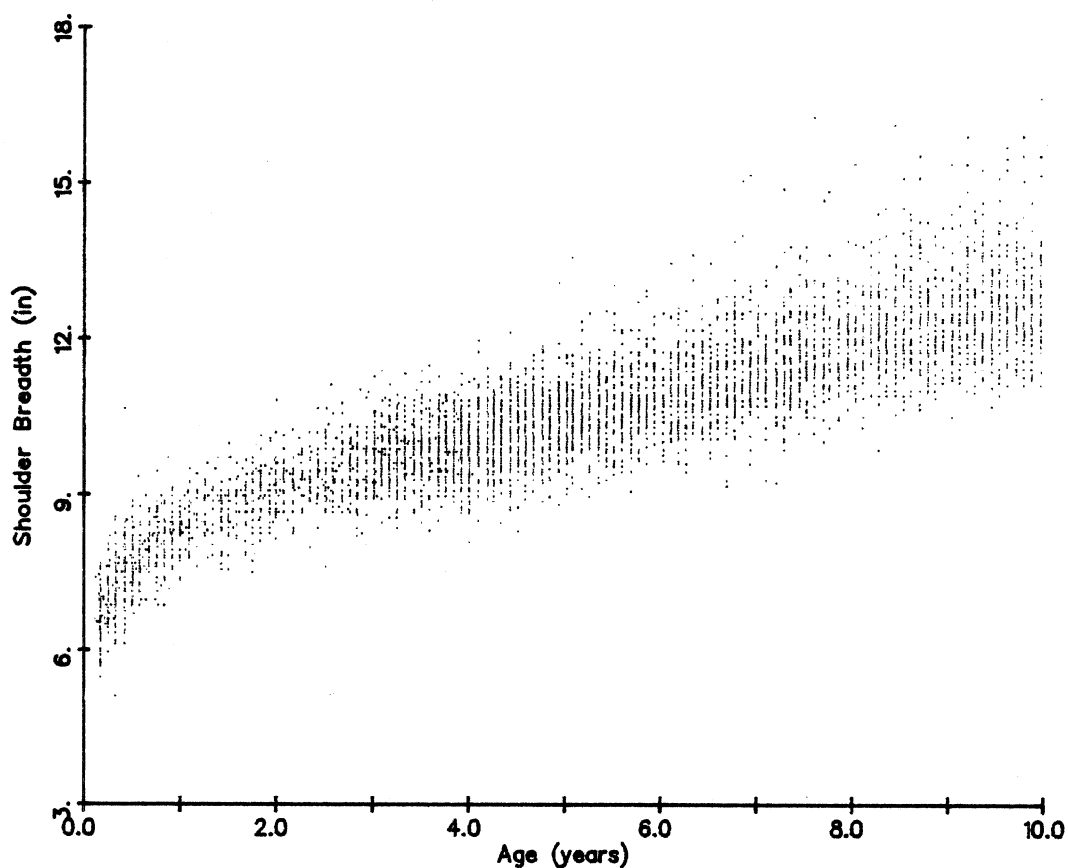
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Shoulder Breadth (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	212	6.4	4.2	8.2	0.7
0.5 yr <sup>1</sup>	275	7.7	5.2	10.7	0.6
1.0 yr <sup>1</sup>	146	8.4	6.9	9.8	0.5
1.5 yr <sup>1</sup>	123	8.8	7.5	10.0	0.5
2.0 yr <sup>1</sup>	138	9.2	8.1	10.9	0.5
2.5 yr <sup>1</sup>	163	9.5	7.6	11.1	0.5
3.0 yr <sup>1</sup>	300	9.7	8.1	11.4	0.6
3.5 yr <sup>1</sup>	398	9.9	8.3	11.5	0.5
4.0 yr <sup>2</sup>	614	10.1	8.1	12.2	0.6
5.0 yr <sup>3</sup>	838	10.5	8.3	13.6	0.6
6.0 yr <sup>3</sup>	582	11.0	9.1	13.6	0.7
7.0 yr <sup>3</sup>	536	11.5	9.2	15.2	0.8
8.0 yr <sup>3</sup>	480	12.0	9.9	16.3	0.8
9.0 yr <sup>3</sup>	493	12.5	10.6	15.9	0.9
10.0 yr <sup>3</sup>	479	13.0	10.9	16.7	1.0

<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo

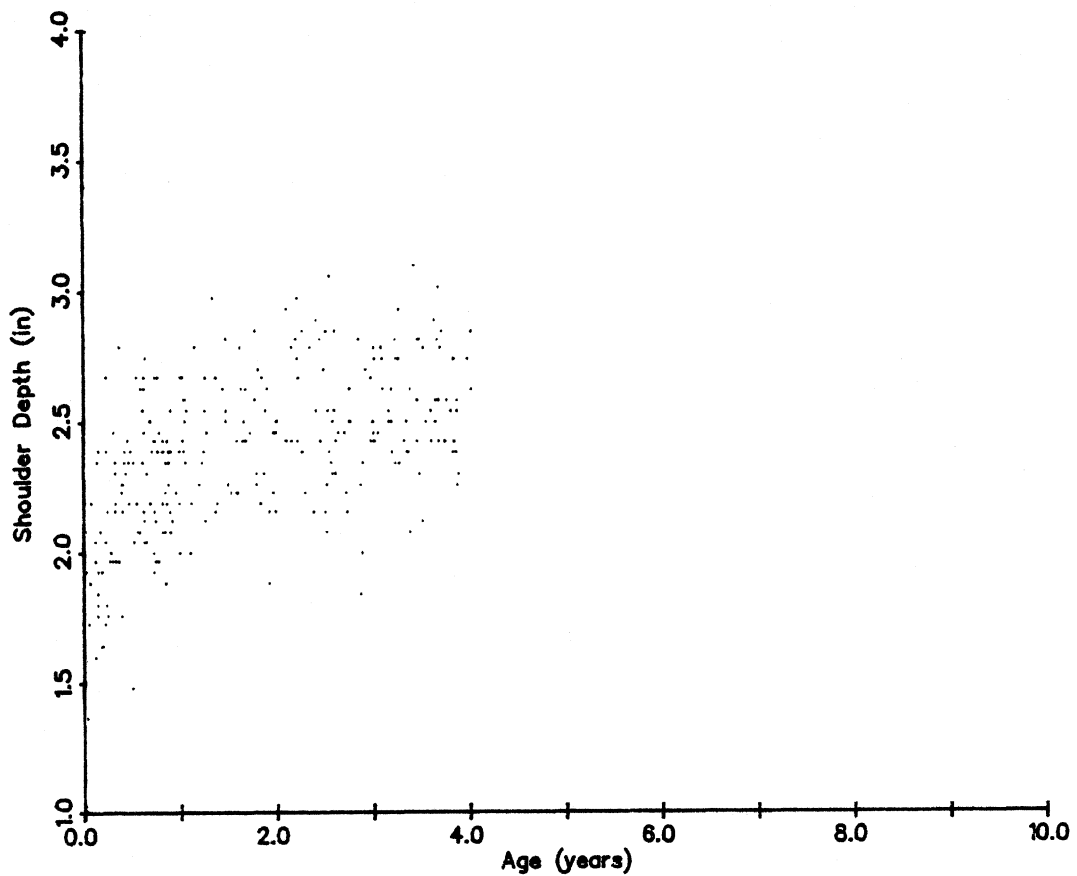


Shoulder Depth (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	30	2.0	1.4	2.7	0.3
0.5 yr <sup>1</sup>	58	2.3	1.5	2.8	0.3
1.0 yr <sup>1</sup>	42	2.4	1.9	2.8	0.2
1.5 yr <sup>1</sup>	26	2.5	2.2	3.0	0.2
2.0 yr <sup>1</sup>	28	2.5	1.9	3.0	0.3
2.5 yr <sup>1</sup>	31	2.5	2.1	3.1	0.3
3.0 yr <sup>1</sup>	31	2.6	1.9	2.9	0.2
3.5 yr <sup>1</sup>	31	2.6	2.1	3.1	0.2
4.0 yr <sup>2</sup>	13	2.5	2.3	2.9	0.2
5.0 yr <sup>3</sup>	0	0.0	0.0	0.0	0.0
6.0 yr <sup>3</sup>	0	0.0	0.0	0.0	0.0
7.0 yr <sup>3</sup>	0	0.0	0.0	0.0	0.0
8.0 yr <sup>3</sup>	0	0.0	0.0	0.0	0.0
9.0 yr <sup>3</sup>	0	0.0	0.0	0.0	0.0
10.0 yr <sup>3</sup>	0	0.0	0.0	0.0	0.0

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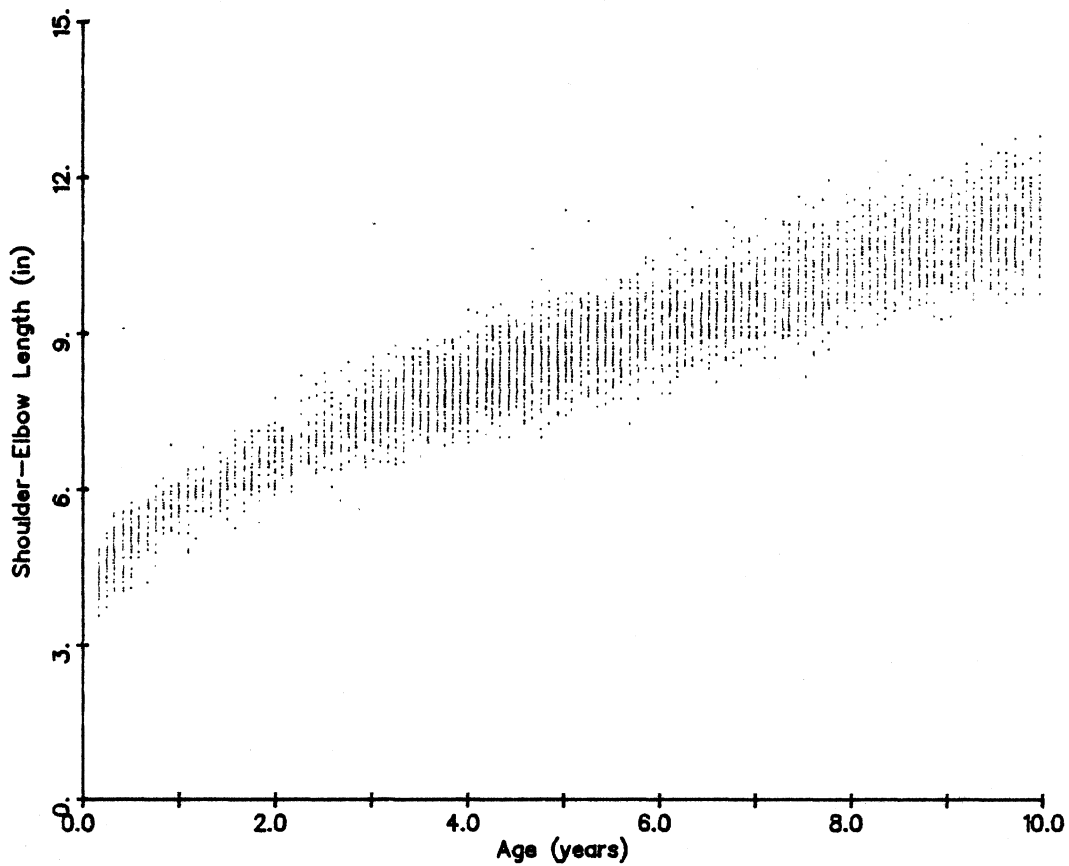
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Shoulder-Elbow Length (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	187	4.3	3.5	5.3	0.4
0.5 yr <sup>1</sup>	226	5.1	4.2	9.2	0.5
1.0 yr <sup>1</sup>	118	5.9	4.9	7.0	0.4
1.5 yr <sup>1</sup>	102	6.3	5.4	7.2	0.4
2.0 yr <sup>1</sup>	115	6.8	5.5	8.3	0.4
2.5 yr <sup>1</sup>	133	7.2	5.9	8.5	0.4
3.0 yr <sup>1</sup>	269	7.6	6.5	8.9	0.4
3.5 yr <sup>1</sup>	373	7.9	6.6	8.9	0.4
4.0 yr <sup>2</sup>	602	8.2	7.0	9.6	0.5
5.0 yr <sup>3</sup>	842	8.7	7.1	11.4	0.5
6.0 yr <sup>3</sup>	584	9.2	7.4	11.5	0.5
7.0 yr <sup>3</sup>	540	9.8	8.1	11.7	0.6
8.0 yr <sup>3</sup>	486	10.4	8.3	12.4	0.6
9.0 yr <sup>3</sup>	504	10.9	9.4	12.7	0.6
10.0 yr <sup>3</sup>	487	11.3	9.7	13.4	0.6

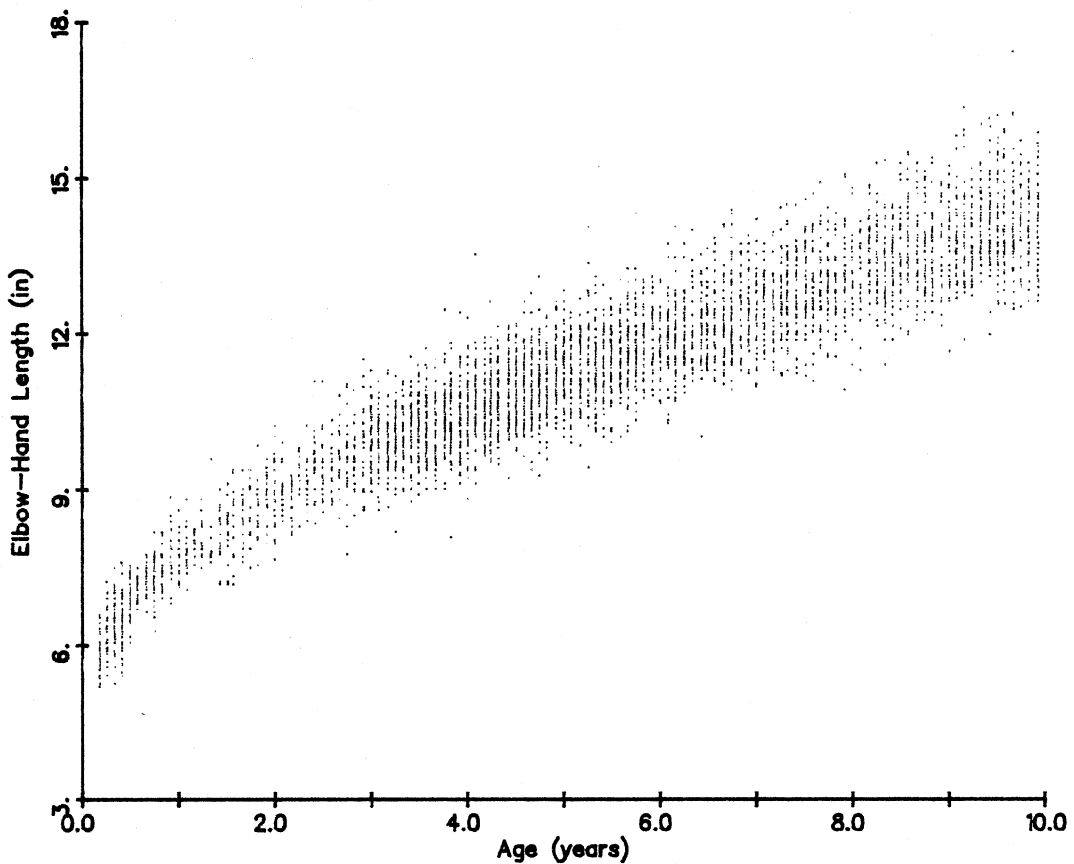
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Elbow-Hand Length (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	186	5.9	4.0	7.3	0.5
0.5 yr <sup>1</sup>	223	6.9	5.4	12.4	0.6
1.0 yr <sup>1</sup>	111	7.8	6.9	8.9	0.4
1.5 yr <sup>1</sup>	102	8.4	7.3	9.7	0.5
2.0 yr <sup>1</sup>	114	9.0	7.6	10.3	0.5
2.5 yr <sup>1</sup>	133	9.6	7.8	11.2	0.6
3.0 yr <sup>1</sup>	272	10.0	8.3	11.6	0.6
3.5 yr <sup>1</sup>	370	10.3	8.8	12.5	0.6
4.0 yr <sup>2</sup>	602	10.7	8.1	13.6	0.6
5.0 yr <sup>3</sup>	846	11.2	9.4	14.1	0.6
6.0 yr <sup>3</sup>	585	11.9	10.0	14.4	0.7
7.0 yr <sup>3</sup>	539	12.5	11.0	14.6	0.7
8.0 yr <sup>3</sup>	485	13.2	11.0	15.4	0.7
9.0 yr <sup>3</sup>	505	13.8	11.7	16.4	0.8
10.0 yr <sup>3</sup>	488	14.4	12.6	17.5	0.8

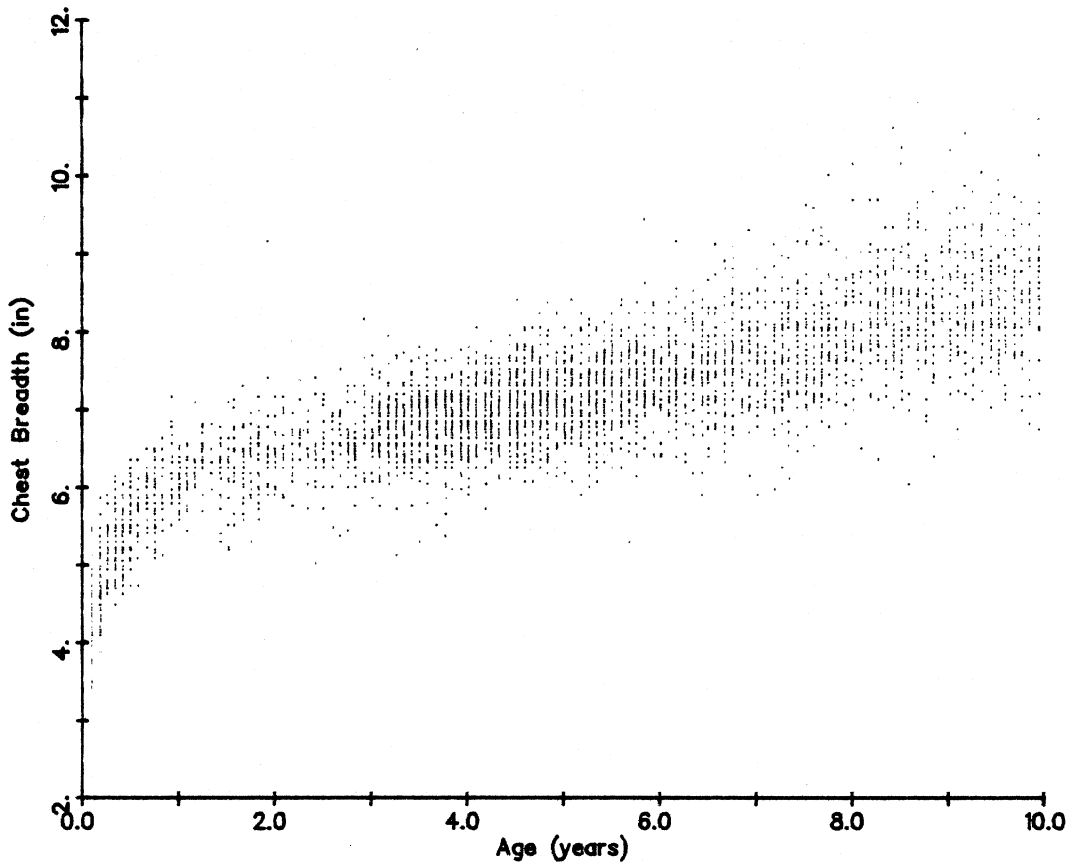
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Chest Breadth (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	182	4.7	3.5	6.0	0.5
0.5 yr <sup>1</sup>	218	5.6	4.6	6.6	0.4
1.0 yr <sup>1</sup>	106	6.2	5.2	7.2	0.4
1.5 yr <sup>1</sup>	97	6.3	5.3	7.4	0.4
2.0 yr <sup>1</sup>	92	6.6	5.7	9.2	0.5
2.5 yr <sup>1</sup>	93	6.6	5.1	7.6	0.4
3.0 yr <sup>1</sup>	204	6.8	5.2	8.2	0.4
3.5 yr <sup>1</sup>	300	6.9	5.4	7.9	0.4
4.0 yr <sup>2</sup>	491	7.0	5.8	8.1	0.4
5.0 yr <sup>3</sup>	673	7.2	6.0	8.5	0.4
6.0 yr <sup>3</sup>	446	7.5	5.4	9.5	0.5
7.0 yr <sup>3</sup>	398	7.7	6.0	9.3	0.6
8.0 yr <sup>3</sup>	357	8.1	6.4	10.6	0.6
9.0 yr <sup>3</sup>	328	8.4	6.1	11.0	0.7
10.0 yr <sup>3</sup>	306	8.6	6.8	11.5	0.7

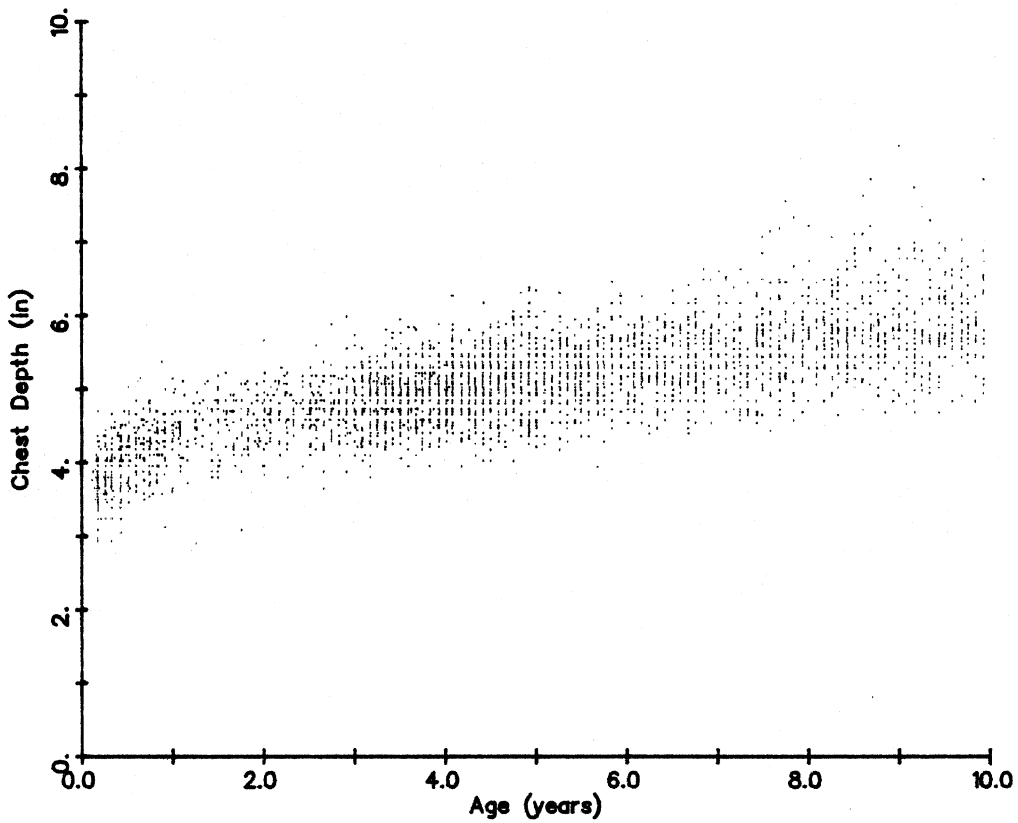
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Chest Depth (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	164	3.6	2.1	4.6	0.4
0.5 yr <sup>1</sup>	199	4.0	2.9	5.1	0.4
1.0 yr <sup>1</sup>	104	4.3	2.9	5.4	0.4
1.5 yr <sup>1</sup>	79	4.5	3.1	5.2	0.4
2.0 yr <sup>1</sup>	96	4.6	3.8	5.6	0.4
2.5 yr <sup>1</sup>	101	4.7	3.6	5.9	0.4
3.0 yr <sup>1</sup>	212	4.8	3.8	6.0	0.4
3.5 yr <sup>1</sup>	310	4.9	3.9	5.9	0.4
4.0 yr <sup>2</sup>	456	5.0	3.9	6.3	0.4
5.0 yr <sup>3</sup>	585	5.1	4.0	6.4	0.4
6.0 yr <sup>3</sup>	369	5.3	3.9	6.5	0.4
7.0 yr <sup>3</sup>	312	5.4	4.4	6.6	0.4
8.0 yr <sup>3</sup>	287	5.7	4.4	7.6	0.5
9.0 yr <sup>3</sup>	244	5.8	4.6	8.3	0.6
10.0 yr <sup>3</sup>	222	6.0	4.7	8.3	0.6

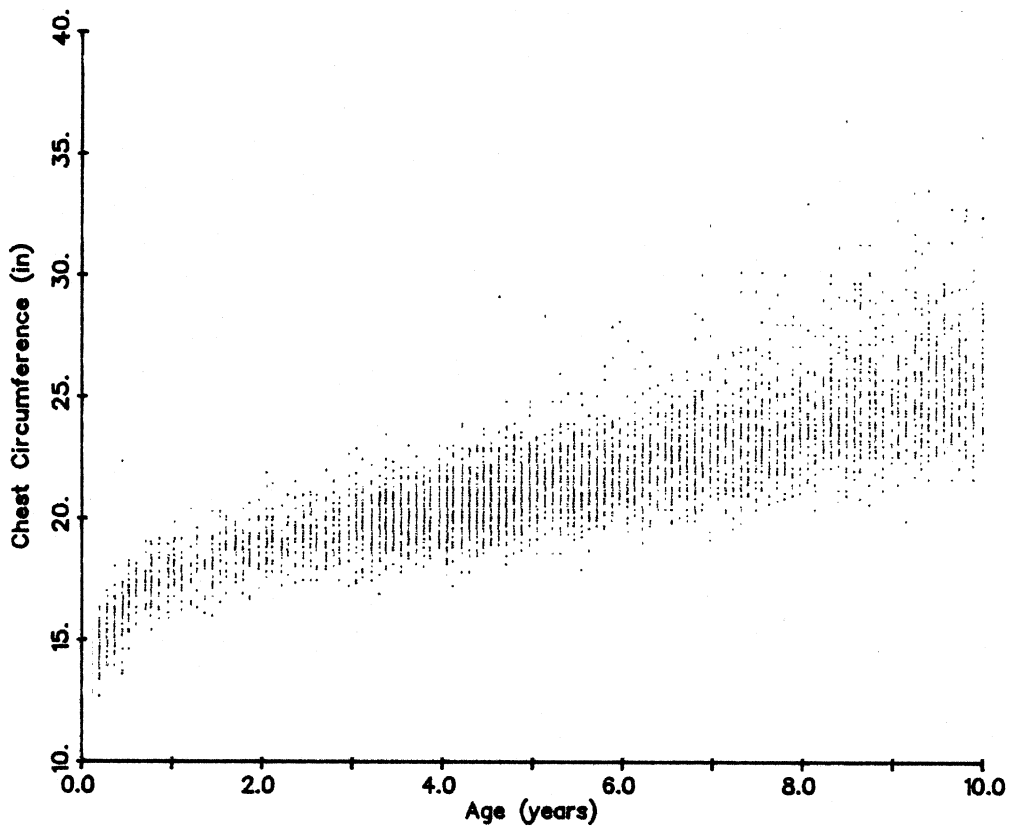
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Chest Circumference (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	175	14.4	10.9	17.2	1.2
0.5 yr <sup>1</sup>	206	16.7	13.9	22.5	1.1
1.0 yr <sup>1</sup>	98	18.0	16.1	20.6	0.9
1.5 yr <sup>1</sup>	95	18.6	16.2	20.6	0.9
2.0 yr <sup>1</sup>	114	19.2	16.9	22.1	0.9
2.5 yr <sup>1</sup>	132	19.6	17.6	22.1	0.9
3.0 yr <sup>1</sup>	266	19.9	17.1	23.1	1.0
3.5 yr <sup>1</sup>	368	20.3	18.1	23.7	0.9
4.0 yr <sup>2</sup>	609	20.7	17.5	24.1	1.0
5.0 yr <sup>3</sup>	838	21.4	18.4	29.3	1.2
6.0 yr <sup>3</sup>	573	22.2	18.1	28.3	1.3
7.0 yr <sup>3</sup>	525	23.2	19.4	32.2	1.7
8.0 yr <sup>3</sup>	475	24.2	20.6	36.4	1.8
9.0 yr <sup>3</sup>	482	25.2	20.2	33.6	2.0
10.0 yr <sup>3</sup>	472	26.2	21.9	35.8	2.2

<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo

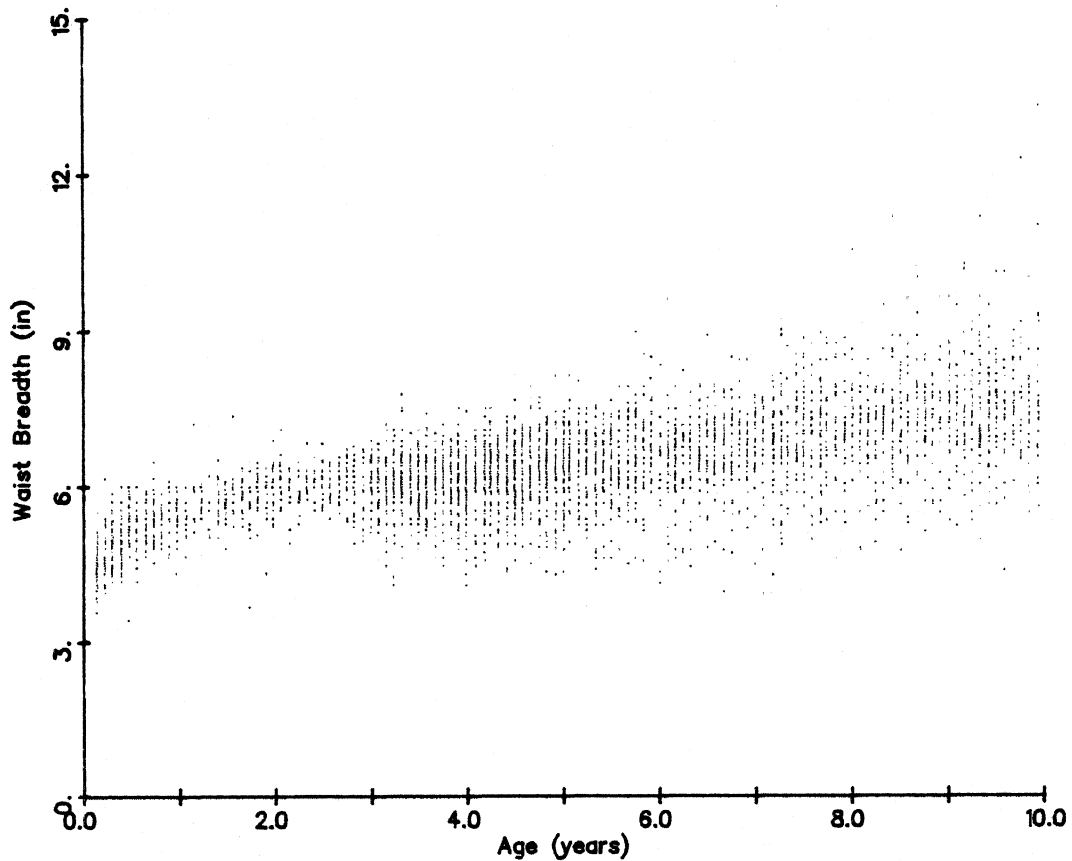




Waist Breadth (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	180	4.3	3.1	6.1	0.5
0.5 yr <sup>1</sup>	216	5.1	3.4	6.5	0.5
1.0 yr <sup>1</sup>	103	5.4	4.3	7.2	0.4
1.5 yr <sup>1</sup>	93	5.7	3.7	7.4	0.5
2.0 yr <sup>1</sup>	90	5.9	4.3	7.1	0.4
2.5 yr <sup>1</sup>	94	6.1	5.3	6.9	0.3
3.0 yr <sup>1</sup>	202	6.0	4.1	7.2	0.5
3.5 yr <sup>1</sup>	299	6.1	4.5	7.8	0.6
4.0 yr <sup>2</sup>	493	6.2	4.1	7.6	0.6
5.0 yr <sup>3</sup>	669	6.4	4.3	8.2	0.7
6.0 yr <sup>3</sup>	435	6.6	4.2	9.6	0.7
7.0 yr <sup>3</sup>	394	6.8	3.9	9.7	0.8
8.0 yr <sup>3</sup>	357	7.2	4.6	11.2	0.9
9.0 yr <sup>3</sup>	332	7.5	4.8	11.2	1.0
10.0 yr <sup>3</sup>	309	7.8	4.4	13.4	1.0

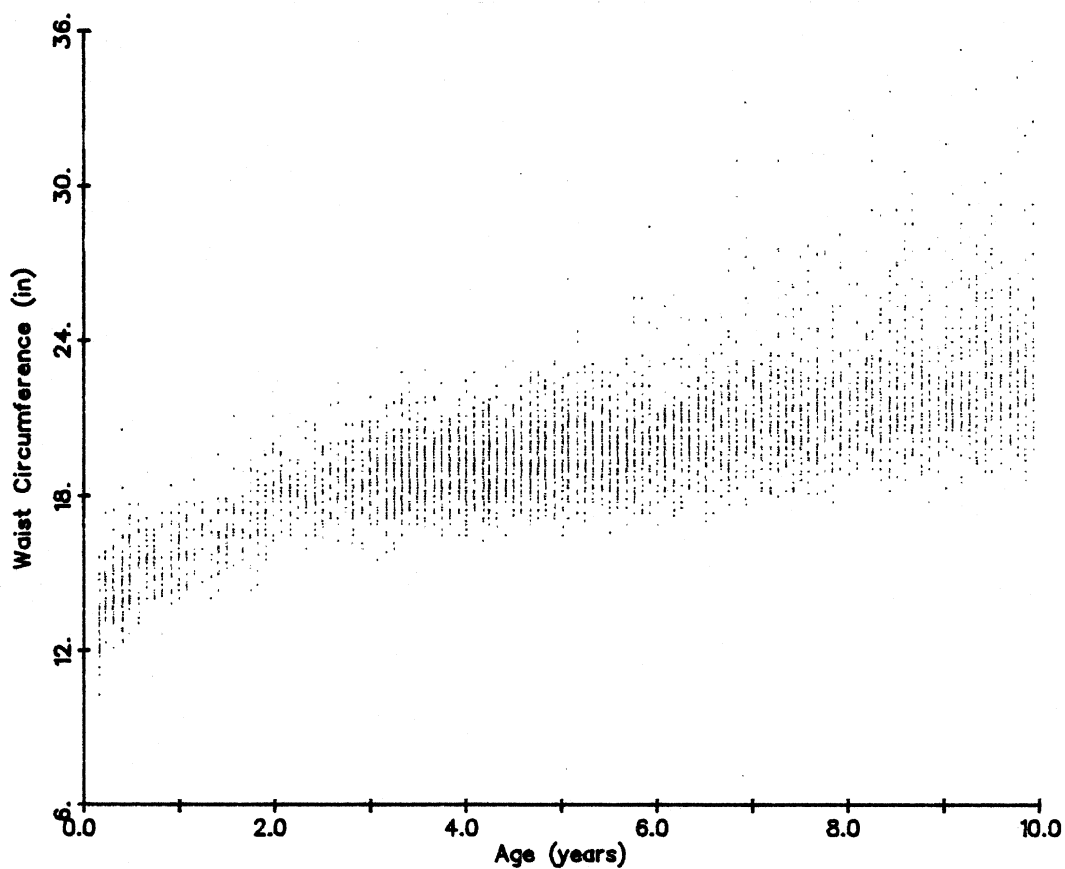
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Waist Circumference (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	172	12.6	8.9	18.1	1.6
0.5 yr <sup>1</sup>	198	15.1	12.2	20.6	1.3
1.0 yr <sup>1</sup>	93	16.0	12.8	18.8	1.2
1.5 yr <sup>1</sup>	91	16.9	14.1	21.1	1.3
2.0 yr <sup>1</sup>	109	18.1	14.6	22.1	1.2
2.5 yr <sup>1</sup>	133	18.6	15.3	22.5	1.2
3.0 yr <sup>1</sup>	262	18.9	15.7	23.9	1.2
3.5 yr <sup>1</sup>	371	19.2	16.6	23.0	1.1
4.0 yr <sup>2</sup>	604	19.3	16.4	23.0	1.1
5.0 yr <sup>3</sup>	841	19.9	16.6	30.5	1.3
6.0 yr <sup>3</sup>	571	20.2	16.7	28.5	1.4
7.0 yr <sup>3</sup>	527	21.1	17.1	33.3	1.9
8.0 yr <sup>3</sup>	476	21.8	17.9	33.7	2.1
9.0 yr <sup>3</sup>	492	22.6	17.8	35.3	2.4
10.0 yr <sup>3</sup>	483	23.4	18.7	34.9	2.5

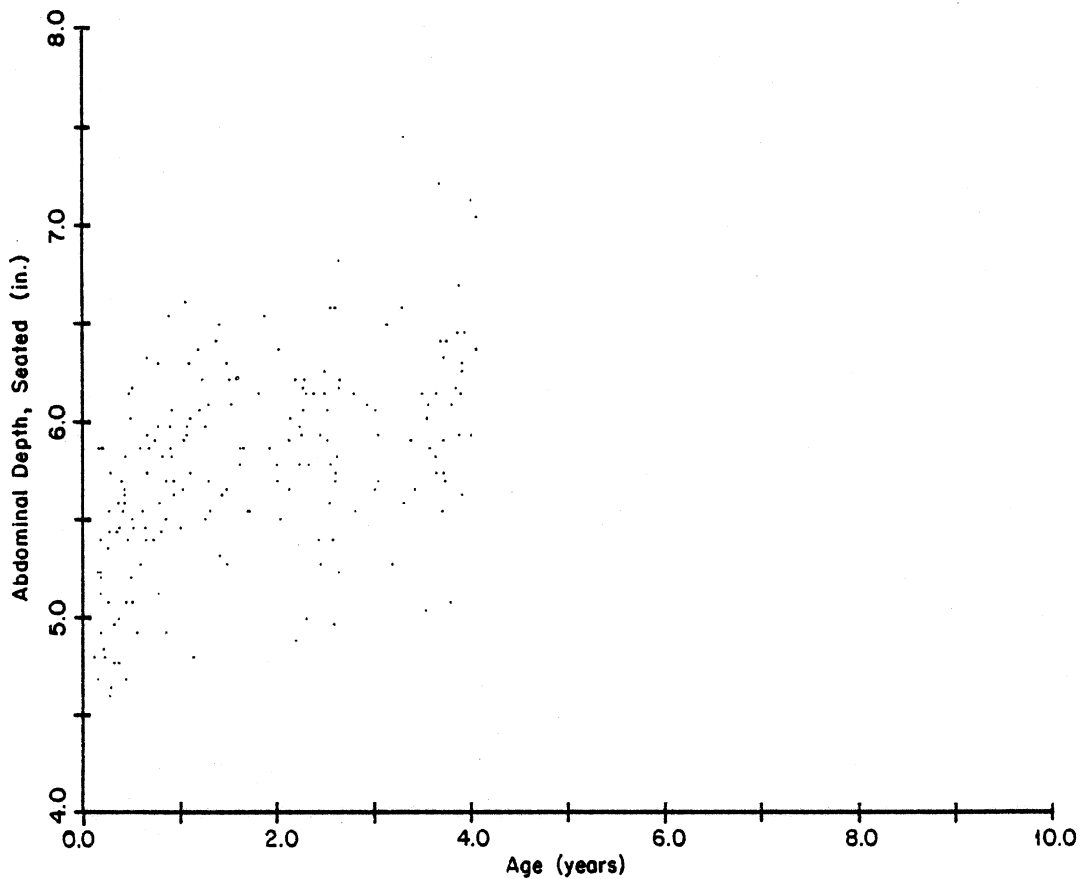
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Abdominal Depth, Seated (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	23	5.2	4.6	5.9	0.41
0.5 yr <sup>1</sup>	39	5.6	4.7	6.3	0.40
1.0 yr <sup>1</sup>	30	5.9	4.8	6.6	0.41
1.5 yr <sup>1</sup>	15	5.9	5.3	6.5	0.39
2.0 yr <sup>1</sup>	20	5.9	4.9	6.5	0.41
2.5 yr <sup>1</sup>	23	5.9	5.0	6.8	0.47
3.0 yr <sup>1</sup>	10	6.1	5.3	7.4	0.62
3.5 yr <sup>1</sup>	18	6.0	5.0	7.2	0.45
4.0 yr <sup>2</sup>	15	6.2	5.1	7.1	0.51
5.0 yr <sup>3</sup>	0	0.0	0.0	0.0	0.0
6.0 yr <sup>3</sup>	0	0.0	0.0	0.0	0.0
7.0 yr <sup>3</sup>	0	0.0	0.0	0.0	0.0
8.0 yr <sup>3</sup>	0	0.0	0.0	0.0	0.0
9.0 yr <sup>3</sup>	0	0.0	0.0	0.0	0.0
10.0 yr <sup>3</sup>	0	0.0	0.0	0.0	0.0

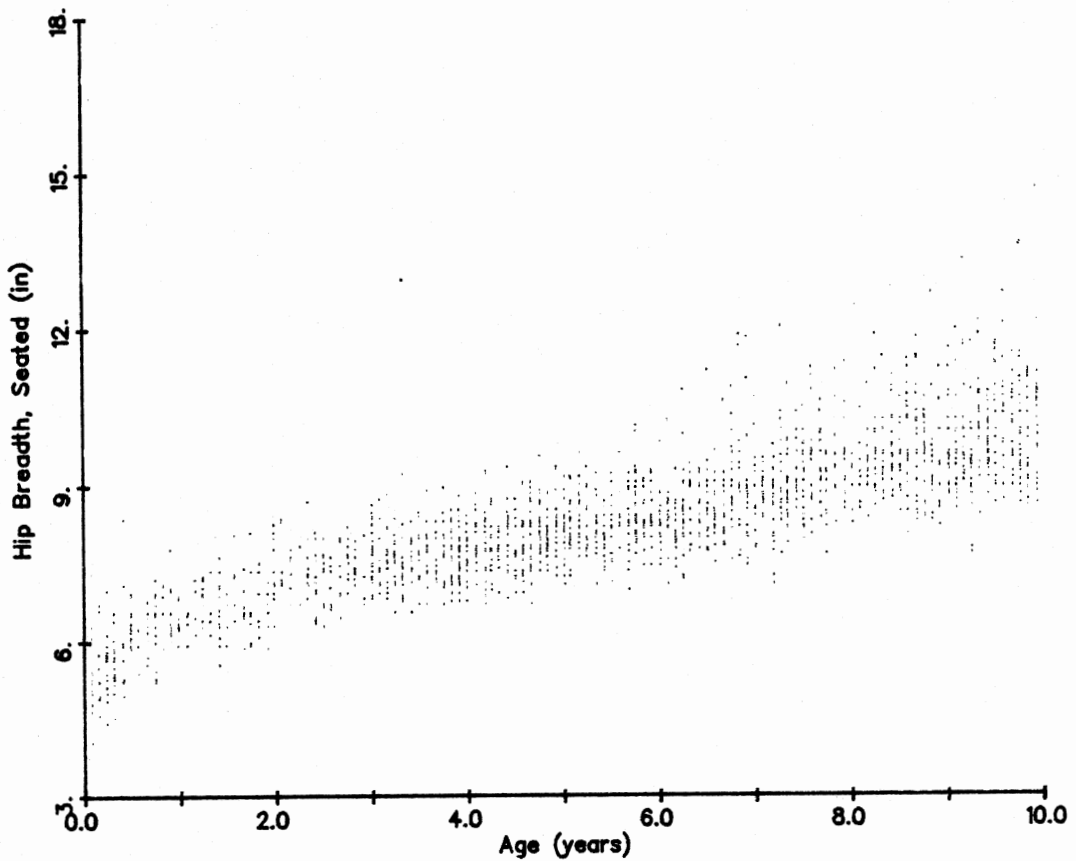
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Hip Breadth, Seated (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	47	5.3	4.1	7.4	0.8
0.5 yr <sup>1</sup>	74	6.1	4.6	8.4	0.6
1.0 yr <sup>1</sup>	42	6.7	5.9	7.8	0.4
1.5 yr <sup>1</sup>	44	6.7	5.5	8.1	0.6
2.0 yr <sup>1</sup>	44	7.3	5.9	8.5	0.6
2.5 yr <sup>1</sup>	58	7.4	6.3	8.7	0.5
3.0 yr <sup>1</sup>	88	7.6	6.6	8.9	0.5
3.5 yr <sup>1</sup>	94	7.7	6.6	9.3	0.5
4.0 yr <sup>2</sup>	164	7.9	6.8	9.4	0.5
5.0 yr <sup>3</sup>	256	8.1	6.8	9.7	0.5
6.0 yr <sup>3</sup>	214	8.5	7.1	10.9	0.6
7.0 yr <sup>3</sup>	225	8.9	7.2	12.1	0.8
8.0 yr <sup>3</sup>	190	9.4	7.7	12.8	0.8
9.0 yr <sup>3</sup>	249	9.8	7.7	13.4	0.9
10.0 yr <sup>3</sup>	251	10.2	8.5	14.8	1.0

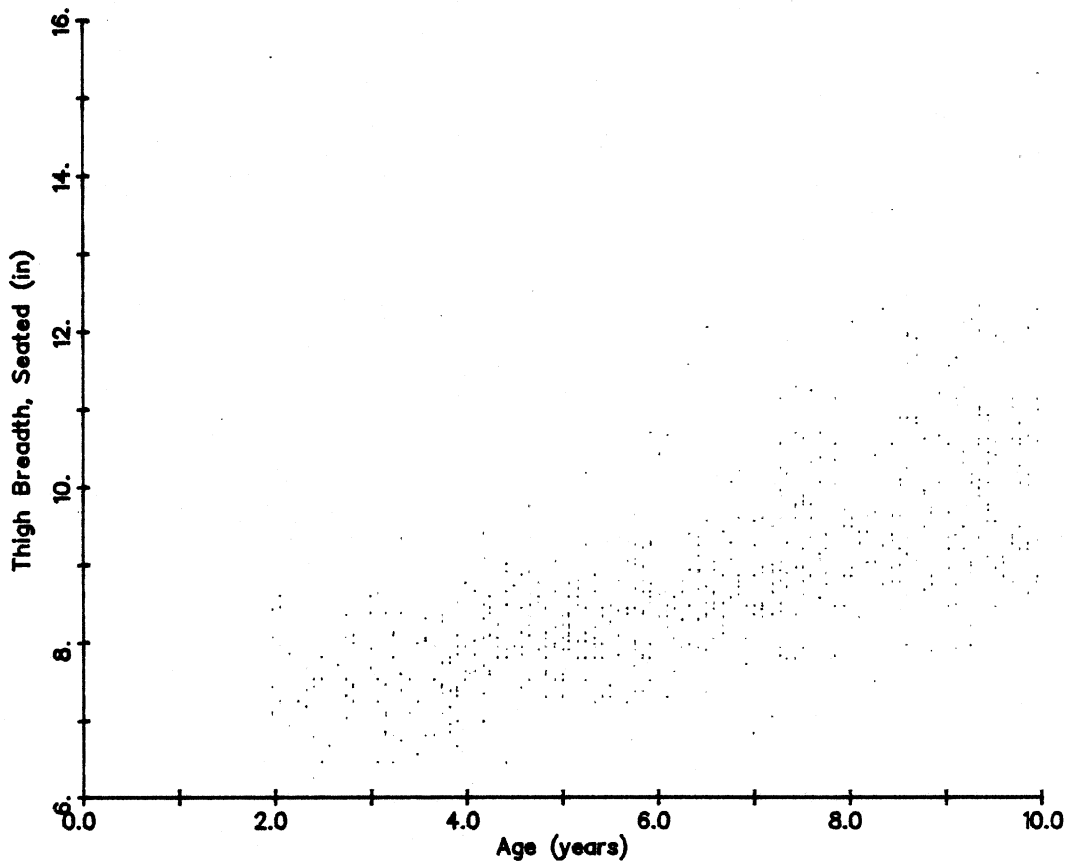
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Thigh Breadth, Seated (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	0	0.0	0.0	0.0	0.0
0.5 yr <sup>1</sup>	0	0.0	0.0	0.0	0.0
1.0 yr <sup>1</sup>	0	0.0	0.0	0.0	0.0
1.5 yr <sup>1</sup>	0	0.0	0.0	0.0	0.0
2.0 yr <sup>1</sup>	13	7.6	6.9	8.6	0.6
2.5 yr <sup>1</sup>	18	7.3	6.3	8.4	0.5
3.0 yr <sup>1</sup>	25	7.6	6.5	8.6	0.6
3.5 yr <sup>1</sup>	24	7.6	6.6	9.3	0.6
4.0 yr <sup>2</sup>	50	7.9	6.5	9.4	0.6
5.0 yr <sup>3</sup>	85	8.2	7.2	10.2	0.5
6.0 yr <sup>3</sup>	76	8.5	7.3	10.7	0.7
7.0 yr <sup>3</sup>	87	8.9	6.9	12.1	0.9
8.0 yr <sup>3</sup>	65	9.6	7.6	13.6	1.0
9.0 yr <sup>3</sup>	88	10.1	7.9	12.4	1.1
10.0 yr <sup>3</sup>	84	10.4	8.1	15.3	1.3

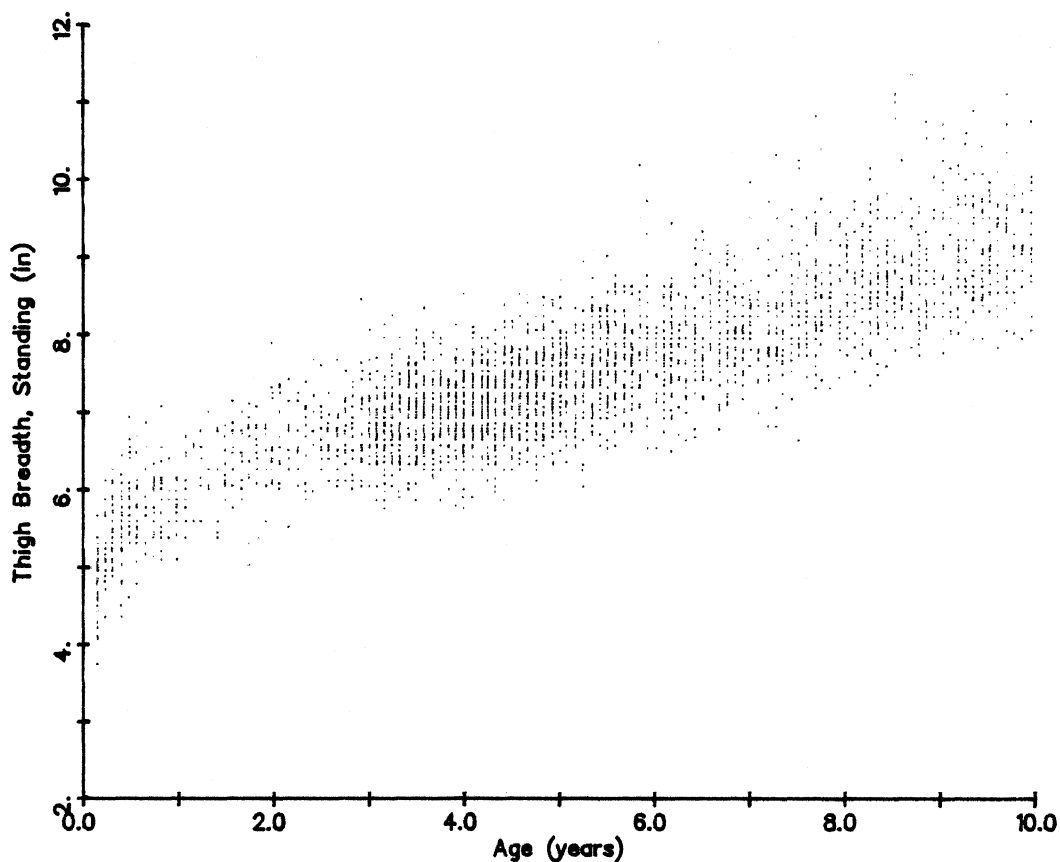
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Thigh Breadth, Standing (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	132	4.6	3.3	6.2	0.6
0.5 yr <sup>1</sup>	138	5.7	4.4	7.0	0.5
1.0 yr <sup>1</sup>	56	6.0	5.2	7.1	0.4
1.5 yr <sup>1</sup>	50	6.4	5.1	7.2	0.5
2.0 yr <sup>1</sup>	61	6.6	5.6	7.9	0.5
2.5 yr <sup>1</sup>	71	6.7	5.9	7.7	0.4
3.0 yr <sup>1</sup>	177	6.9	5.8	8.5	0.5
3.5 yr <sup>1</sup>	265	7.1	5.9	8.4	0.5
4.0 yr <sup>2</sup>	417	7.1	5.8	8.6	0.4
5.0 yr <sup>3</sup>	562	7.4	6.1	10.2	0.5
6.0 yr <sup>3</sup>	353	7.8	6.6	10.2	0.6
7.0 yr <sup>3</sup>	288	8.2	6.9	10.4	0.6
8.0 yr <sup>3</sup>	261	8.7	6.7	10.9	0.6
9.0 yr <sup>3</sup>	217	9.0	7.8	11.4	0.7
10.0 yr <sup>3</sup>	197	9.4	7.8	12.0	0.7

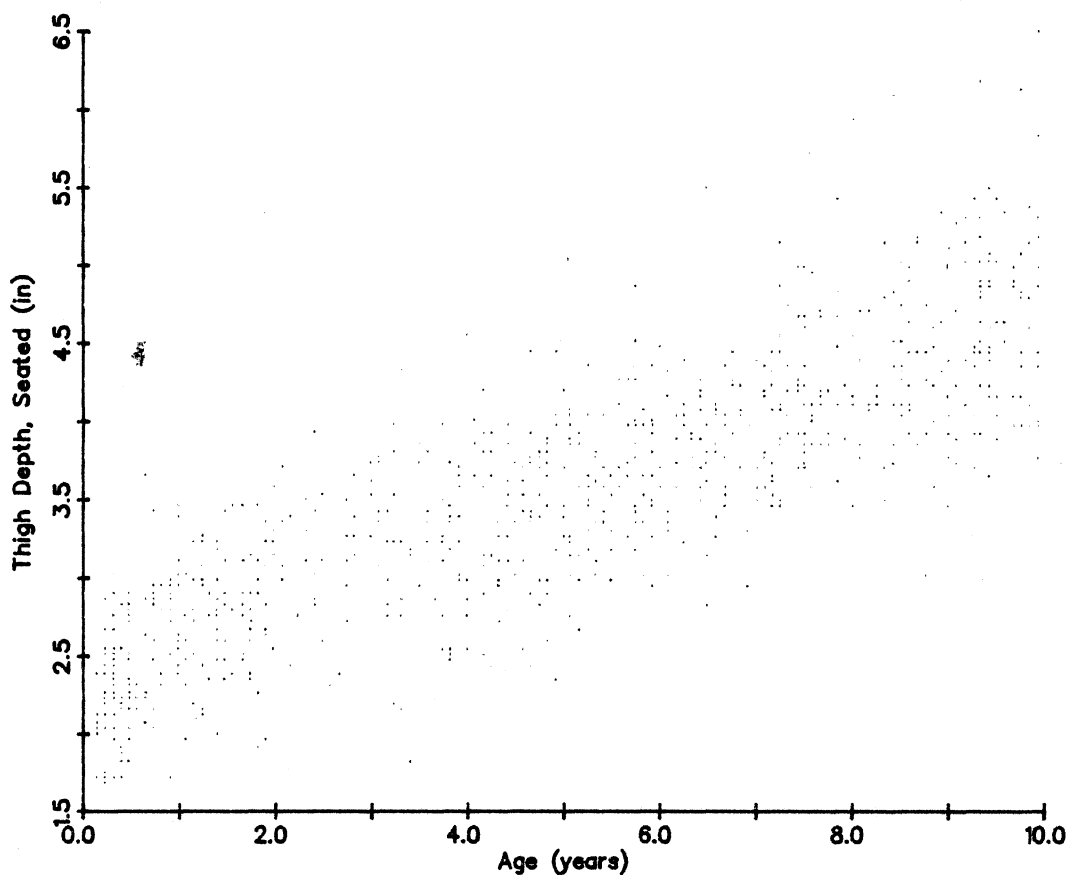
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Thigh Depth, Seated (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	43	2.1	1.5	2.9	0.3
0.5 yr <sup>1</sup>	73	2.5	1.7	3.7	0.4
1.0 yr <sup>1</sup>	46	2.7	1.7	3.5	0.4
1.5 yr <sup>1</sup>	45	2.8	2.0	3.5	0.3
2.0 yr <sup>1</sup>	28	3.0	1.9	3.7	0.4
2.5 yr <sup>1</sup>	19	3.1	2.3	3.9	0.4
3.0 yr <sup>1</sup>	26	3.3	2.2	4.0	0.4
3.5 yr <sup>1</sup>	26	3.2	1.9	4.3	0.6
4.0 yr <sup>2</sup>	57	3.3	2.4	4.6	0.5
5.0 yr <sup>3</sup>	89	3.5	2.4	4.4	0.4
6.0 yr <sup>3</sup>	78	3.8	2.9	4.9	0.4
7.0 yr <sup>3</sup>	84	4.0	2.8	5.5	0.5
8.0 yr <sup>3</sup>	66	4.3	3.5	6.1	0.5
9.0 yr <sup>3</sup>	87	4.5	3.0	6.2	0.5
10.0 yr <sup>3</sup>	83	4.7	3.8	6.5	0.6

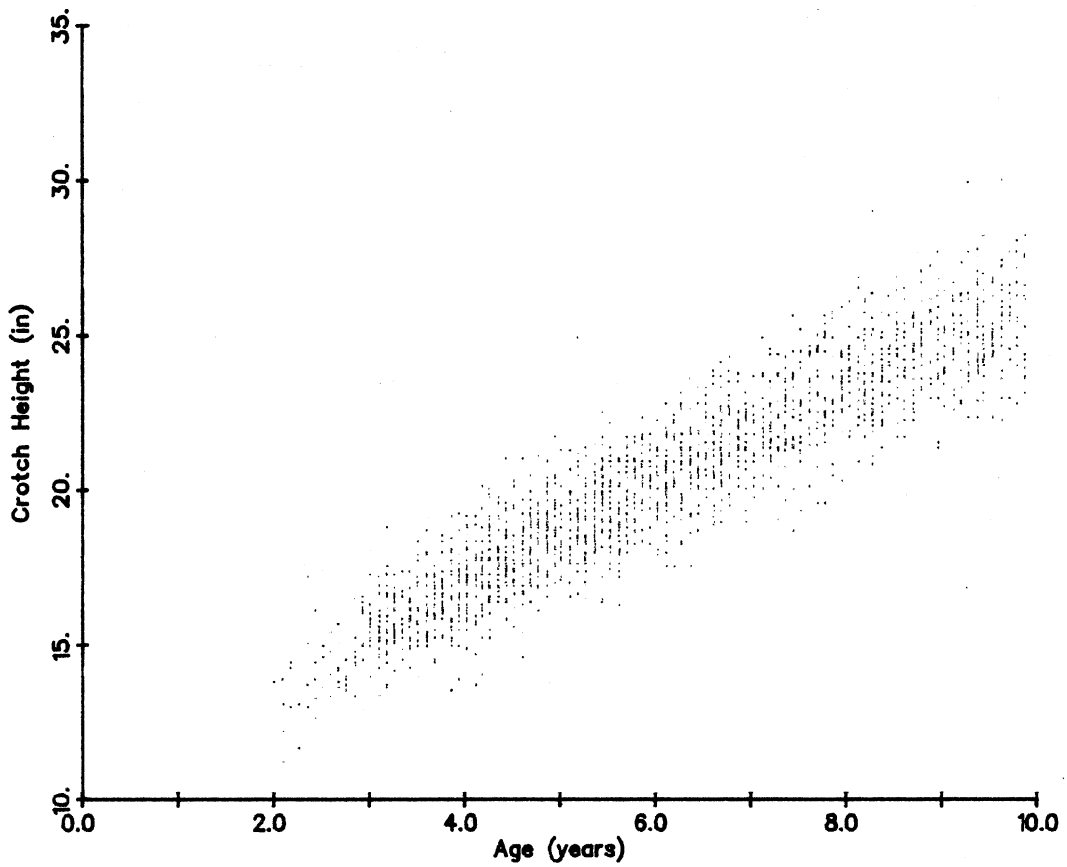
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Crotch Height (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	0	0.0	0.0	0.0	0.0
0.5 yr <sup>1</sup>	0	0.0	0.0	0.0	0.0
1.0 yr <sup>1</sup>	0	0.0	0.0	0.0	0.0
1.5 yr <sup>1</sup>	0	0.0	0.0	0.0	0.0
2.0 yr <sup>1</sup>	8	13.4	11.5	14.6	1.1
2.5 yr <sup>1</sup>	25	14.3	11.9	17.3	1.2
3.0 yr <sup>1</sup>	79	15.5	13.1	18.9	1.1
3.5 yr <sup>1</sup>	123	16.2	14.1	18.8	0.9
4.0 yr <sup>2</sup>	213	17.3	13.7	20.3	1.2
5.0 yr <sup>3</sup>	340	18.7	14.8	25.0	1.2
6.0 yr <sup>3</sup>	292	20.2	16.4	23.7	1.3
7.0 yr <sup>3</sup>	261	21.8	18.8	25.0	1.3
8.0 yr <sup>3</sup>	236	23.4	18.9	29.1	1.5
9.0 yr <sup>3</sup>	215	24.8	21.5	29.9	1.4
10.0 yr <sup>3</sup>	185	25.9	22.4	30.0	1.5

<sup>1</sup> ±3 mo,   <sup>2</sup> -3, +6 mo,   <sup>3</sup> ±6 mo

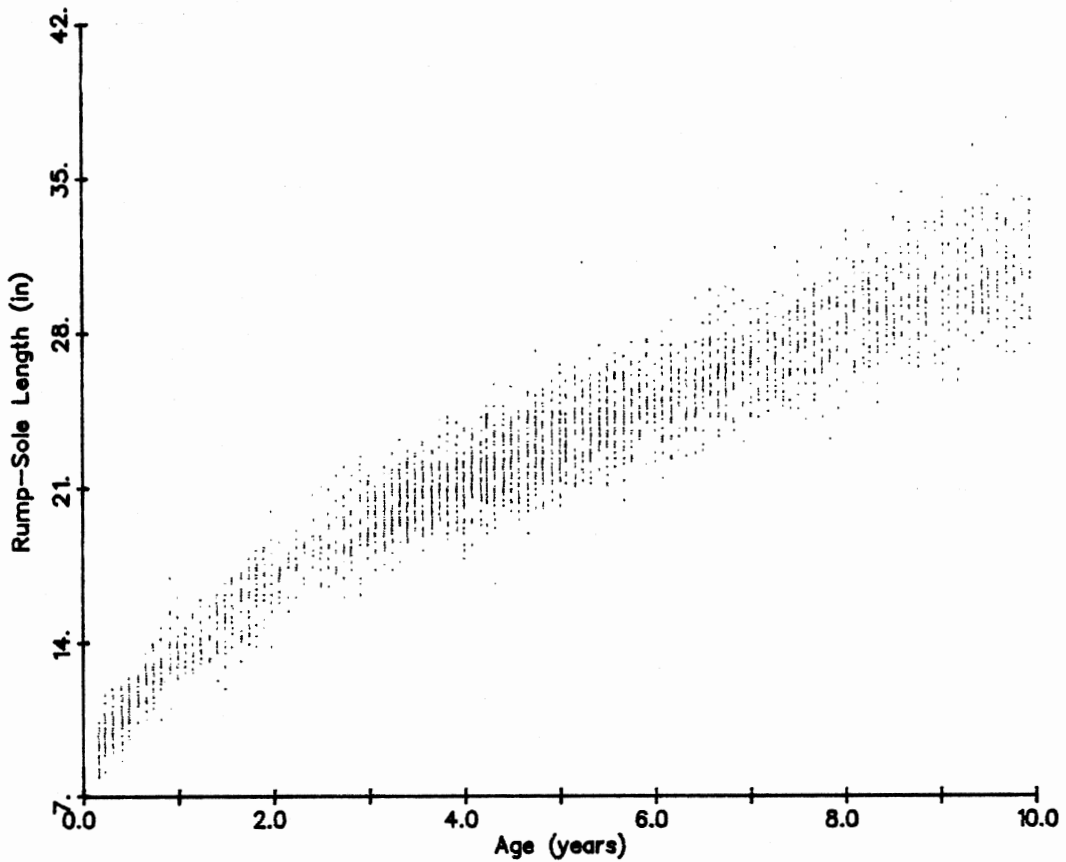




Rump-Sole Length (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	178	9.3	7.4	11.9	0.8
0.5 yr <sup>1</sup>	205	11.6	9.1	14.1	1.0
1.0 yr <sup>1</sup>	99	13.9	10.8	17.1	1.0
1.5 yr <sup>1</sup>	90	15.5	12.2	18.0	1.2
2.0 yr <sup>1</sup>	71	17.1	14.1	20.1	1.2
2.5 yr <sup>1</sup>	66	18.8	16.3	22.1	1.3
3.0 yr <sup>1</sup>	180	19.9	16.3	22.7	1.1
3.5 yr <sup>1</sup>	268	20.8	17.9	24.2	1.1
4.0 yr <sup>2</sup>	412	21.7	17.0	25.9	1.2
5.0 yr <sup>3</sup>	565	23.1	19.2	31.3	1.4
6.0 yr <sup>3</sup>	353	24.9	20.6	29.6	1.4
7.0 yr <sup>3</sup>	286	26.6	22.9	31.9	1.4
8.0 yr <sup>3</sup>	262	28.5	23.4	34.7	1.7
9.0 yr <sup>3</sup>	223	30.0	25.9	36.5	1.8
10.0 yr <sup>3</sup>	205	31.2	27.1	37.7	1.9

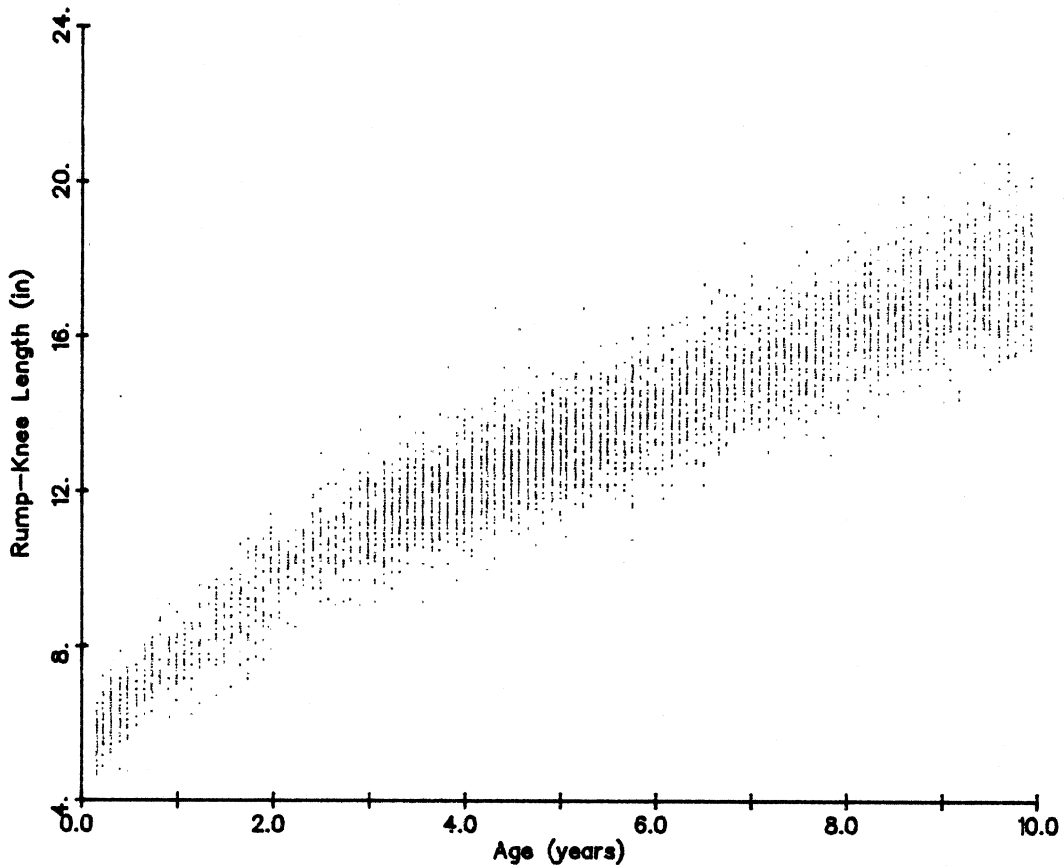
<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Rump-Knee Length (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	178	5.5	4.3	7.3	0.6
0.5 yr <sup>1</sup>	208	6.7	4.8	14.5	0.8
1.0 yr <sup>1</sup>	98	7.8	6.2	9.6	0.6
1.5 yr <sup>1</sup>	89	8.7	6.8	10.8	0.8
2.0 yr <sup>1</sup>	104	9.8	7.7	11.4	0.8
2.5 yr <sup>1</sup>	130	10.7	9.1	12.9	0.7
3.0 yr <sup>1</sup>	266	11.2	9.1	13.6	0.7
3.5 yr <sup>1</sup>	362	11.7	9.2	14.1	0.7
4.0 yr <sup>2</sup>	581	12.3	9.7	16.8	0.8
5.0 yr <sup>3</sup>	836	13.1	10.6	16.8	0.8
6.0 yr <sup>3</sup>	601	14.1	10.8	16.6	0.9
7.0 yr <sup>3</sup>	530	15.2	12.2	18.9	0.9
8.0 yr <sup>3</sup>	469	16.1	12.9	19.5	1.0
9.0 yr <sup>3</sup>	479	17.1	14.4	20.6	1.1
10.0 yr <sup>3</sup>	463	17.9	15.3	22.1	1.1

<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo



Knee-Sole Length (in)

<u>Age</u>	<u>N</u>	<u>Mean</u>	<u>Minimum</u>	<u>Maximum</u>	<u>Std Dev</u>
0-3 mo	185	5.7	4.5	7.1	0.5
0.5 yr <sup>1</sup>	221	6.9	5.1	14.5	0.7
1.0 yr <sup>1</sup>	108	8.0	6.7	9.5	0.5
1.5 yr <sup>1</sup>	98	8.8	7.4	9.9	0.6
2.0 yr <sup>1</sup>	113	9.6	8.1	11.1	0.6
2.5 yr <sup>1</sup>	130	10.4	9.3	12.4	0.6
3.0 yr <sup>1</sup>	266	10.9	9.3	12.6	0.6
3.5 yr <sup>1</sup>	368	11.4	9.3	13.9	0.6
4.0 yr <sup>2</sup>	585	11.9	8.7	14.1	0.7
5.0 yr <sup>3</sup>	817	12.7	10.3	16.4	0.7
6.0 yr <sup>3</sup>	578	13.6	11.3	16.0	0.8
7.0 yr <sup>3</sup>	534	14.5	12.2	17.2	0.8
8.0 yr <sup>3</sup>	479	15.5	12.8	19.0	0.9
9.0 yr <sup>3</sup>	500	16.3	13.6	19.5	1.0
10.0 yr <sup>3</sup>	480	17.0	14.4	21.0	1.0

<sup>1</sup> ±3 mo,    <sup>2</sup> -3, +6 mo,    <sup>3</sup> ±6 mo

