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#### THE PENNSYLVANIA STATE COLLEGE

THE GRADUATE SCHOOL

DEPARTMENT OF HOME ECONOMICS

NURSERY SCHOOL STUDY NUMBER 4

NUTRITIONAL STATUS OF NURSERY SCHOOL

CHILDREN FROM LOW INCOME FAMILIES

A Thesis

by

WOOT TSUEN NG

Submitted in partial fulfillment of

the requirements for the degree of

MASTER OF SCIENCE

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AUGUST, 1937

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# 185495

#### INTRODUCTION

The present study is the fourth in a series of investigations on the nutritional status of pre-school children from families of low income level, conducted by graduate students in the Department of Home Economics at The Pennsylvania State College. The first study was begun in February, 1936, by Providencia Urgell (M. S. in Home Economics, The Pennsylvania State College, June, 1936) (1), who studied the nutritive status of the nursery school children in Lytle Addition Federal Emergency Nursery School, together with a control group from other families of low income level. She found that the nursery school children were superior in nutritive status, after they had been in the school about three months, to their status on entering, and also to that of the control group

1.

measured at the same time. The only difference in environmental circumstances between the two groups was the fact that the nursery school children were fed at the Federal Emergency School during the mid-morning, at mid-day, and at mid-afternoon, under the direction of a trained dietitian.

The second study was a continuation of the first, this being carried on during the Summer and early Fall of 1936, by Mary Leonie Malley (2), who used some of the same children, and other children from the same types of families as controls, for the purpose of comparing how much progress the children continued to make following the measurements by Urgell. She showed that, after a three-month and again after a six-month lapse of time, the nursery school children were superior to the control group. In the majority of points for which measurements were made, she found also that the mursery school children had improved since the time of the previous measurements. Exceptions to this will be mentioned later in this report.

The third study was carried on for the purpose of comparing 22 children from the nursery school at The Pennsylvania State College, coming from families of medium and high income levels, with the preschool children in the Federal Emergency School and the control groups of low income level, in order to find the differences in nutritional status between the two groups of children. This was carried on during the Spring and Summer of 1936, by Anne Theresa O'Brien (3).

In the present study, the work with the children at the Lytle Addition Federal Emergency Nursery School was continued, and the nursery school children, together with controls, were measured at approximate three-month intervals during the school year 1936-7. The 2.

measurement periods came during November, 1936, February-March, 1937, and June, 1937.

An additional reature was added to the work of the previous investigation during the last three-month period, in that the author visited the nursery school each day during the meal preparation and meal serving time, and kept quantitative records of the kinds and amounts of foods consumed by each child at the school.

### EXPERIMENTAL PROCEDURE

5.

#### HOME CARE OF CHILD

In order to have a detailed study of the child's home care, home diets, physical home, family education, and family income, visits were made at all of the homes, and the mothers of all of the children were interviewed in order to obtain the information outlined in the outline reprinted below. This information was secured for the purpose of finding the diets which the children received, together with the family income and other facts which might have a bearing on the nutritional status of the children.

The home visit questionnaire follows:

HOME CARE RECORD OF CHILD

FAMILY

CASE NO.

ADULTS:

CHILDREN:

MOTHER'S NATIONALITY:

FATHER'S NATIONALITY:

FAMILY INCOME

NUMBER OF WAGE EARNERS IN FAMILY: OCCUPATIONS OF WAGE EARNERS: MONEY INCOME: SOURCES OF MONEY INCOME: ADDITIONAL INCOME (gifts, charity, etc.)

FAMILY RATING ON BASIS OF INCOME:

EDUCATION OF ADULT MEMBERS OF FAMILY:

FAMILY RATING ON BASIS OF EDUCATION OF ADULT MEMBERS:

#### PHYSICAL HOME

(Rating Scheme for Physical Home)

SIZE OF HOME (Number of rooms \_\_\_\_)

1 point for each room up to 12

(Note whether roomers or not)

FURNITURE

10 points for entirely adequate furniture (in good condition) for the size of the house; number of points adjusted downward at discretion of grader; 6 points is the maximum to be given if furniture is adequate, but not in good condition

CLEANLINESS

Sleeps alone - 8 points

Sleeps with one other child - 7 points

Sleeps with one adult - 6 points \_\_\_\_\_\_ Sleeps with two other children - 4 points \_\_\_\_\_\_ Sleeps with three other children - 1 point \_\_\_\_\_\_ <u>EXTERIOR OF HOUSE WELL KEPT</u> - Maximum 10 points \_\_\_\_\_\_ <u>POSSESSION OF ADEQUATE YARD FOR PLAY</u> - Maximum 10 points \_\_\_\_\_\_ <u>POSSESSION OF GRASS AND FLOWERS</u> - Maximum 5 points \_\_\_\_\_\_ <u>POSSESSION OF GARDEN</u> - Maximum 5 points \_\_\_\_\_\_

FAMILY RATINGS ON BASIS OF HOME

CHILD'S HOME CARE

Case Number:

Sleeping Arrangements:

Hours of Sleep at Home:

Time of Arising in Morning:

Hours of Rest at Home:

Number of Windows in Child's Bedroom:

Number of Windows Open When Child Sleeps:

Number of Times Child Is Bathed a Week:

Comments on Child's Clothing:

Self-Help in Dressing, Washing, Toileting:

Child's Diet at Home:

Cod-liver Oil or Other Rich Sources of Vitamin D:

CLASSES OF FOODS INCLUDED IN CHILD'S HOME DIET

Family Consumption of Types of Food Per Week

Case Number:

Flour, meal, and other cereals:

#### Petatoes:

Dried peas, beans, and muts: Tomatoes and citrus fruits: Leaf, green, and yellow vegetables: Dried Fruits: Other vegetables and fruits: Fats: Sugars: Lean meat, poultry, and fish: Eggs: Milk: COMMENTS:

# RATING OF FAMILIES AND HOMES

# Family Rating on Basis of Income

An arbitrary rating scale of income levels, devised jointly by A. Pauline Sanders and Portia Brieker Harvey for human nutrition studies of their own which were begun at The Pennsylvania State College before the first of the nursery school series was reported, was used in this work. This scale is as follows:

Class A - 1 -- \$10,000 or above A - 2 -- 7,500 to 10,000 A - 3 -- 5,000 to 7,500 Class B - 1 -- 4,000 to 5,000 B - 2 -- 3,000 to 4,000 B - 3 -- 2,500 to 3,000 Class C - 1 -- 2,000 to 2,500 C - 2 -- 1,500 to 2,000 C - 3 -- 1,000 to 1,500 Class D -- Income of below \$1,000, exclusive of families on

direct relief.

Class E -- Income of families on direct relief alone.

## Family Rating on Basis of Education of Parents

The families of the various children included in this study were rated as follows on the basis of the education of their parents:

Class A --- Both parents college graduates;

Class B -- One parent a college graduate;

Class C -- Both parents high school graduates;

Class D - One parent a high school graduate; and

7.

Class E -- Neither parent a high school graduate.

# Family Rating on Basis of Physical Home

The rating scheme used to evaluate the physical homes of the children is that given in the questionnaire presented above. This rating scheme was devised by Providentia Urgell for use in the first of the studies of this series. The scheme was planned to include those points about the physical home which were believed to have a direct bearing on the well-being of a young child.

In evaluating homes by means of the point system just mentioned, the following arbitrary classes were set up:

Class A -- 100 to 86 points; Class B -- 85 to 71 points; Class C --- 70 to 51 points; Class D --- 50 to 26 points; and Class E --- 25 points or below.

#### MEASUREMENT TO DETERMINE

#### NUTRITIONAL STATUS

The following measurements were made three times on the group of children included in this report:

Weights: anthropometric observations; X-rays of hand, foot, elbow, knee, shoulder, and femur; percentage of haemoglobin (grams per 100 c. c.) in the blood; capillary wall strength; and footprints.

### Anthropometric Studies

The following anthropometric instruments, purchased from the Anatomical Shop at Western Reserve University, and recommended by 8.

Dr. Wingate Todd, were used:

(1) An anthropometer, used either as a stadiometer or as a large-

size sliding caliper;

(2) Small sliding calipers;

(3) Spreading calipers;

(4) Flower's craniometer; and

(5) Reserve head-spanner.

Twenty-six body measurements were taken with these instruments as follows:

(1) Weight

(2) Standing Height

(3) Horizontal Height

(4) Sitting Height

- (5) Stem End
- (6) Suprasternal Height
- (7) Tip of Acromion Height
- (8) Cristal Height
- (9) Anterior Iliac Spine Height
- (10) Knee Height
- (11) Tibial Length
  - Elexed Tibial Length

9.

- (12) Acromial Breadth
- (13) Cristal Breadth
- (14) Trochanteric Breadth
- (15) Transverse Chest
- (16) Entire Arm Length
- (17) Upper Arm Length
- (18) Forearm Length
- (19) Hand Length
- (20) Chest Girth
- (21) Head Length
- (22) Head Breadth
- (23) Head Height
- (24) Interpupillary Distance
- (25) Suprasternum to Head Top
- (26) Head Circumference
  - Headline
  - Hairline

#### Roentgenographie Appraisement of Skeletal Status

The same method of making and evaluating roentgenograms was used as that of Malley (2), and of O'Brien (3). The description given below is quoted from these sources:

"The following roentgemguam negatives were made of each child by the use of a General Electric Model F portable shock-proof X-ray unit. The anterior-posterior and lateral aspects of the hand, foot, elbow, and knee were taken, as well as the anterior-posterior position of the shoulder and the femur. Films (8 X 10 inches) enveloped in cardboard holders, were used for making the first four negatives, while the last two were made by the use of films placed in 14 X 17 inch Rayspeed casettes, these being lined with high-speed luminescent screens. The exposure times were selected according to previous trials which showed the time required to give a standard density of the blacks, greys, and whites of the films, as shown by the use of an aluminum density gauge number 20, prepared under the supervision of Todd at Western Reserve University. This was calibrated to show a density ladder identical with that on roentgenogram number 8592 in the Western Reserve files.

"In making the anterior-posterior hand picture, the child was seated at a convenient height facing the X-ray table, it having been found by various trials that a seated position for the first film tended to dispel fear from the mind of the person being studied. The hand was then placed, palm downward, on one-half of the film holder, the other half of the film being covered with a lead plate. In the lateral aspect of the hand, the ulnar border was made to rest on the film holder, with the palm inclined toward the envelope. The hand pictures were made with the long axis of the hand extending the longer dimension of the film, thus enabling the lower end of the radius and the ulna to be included in the picture. 11.

"The child was next seated on the X-ray table, with the sole of the foot placed on one-half of the cardboard film holder, the long axis of the foot being in the longer dimension of the 8 X 10 film. In the lateral roentgenogram of the foot, the dorsiflexed foot was so placed that its fibular side lay directly on the plate. Whereas the calcaneum is not visible in the anterior-posterior view, it is plain in the lateral aspect.

"In progressing from the elbow to the knee, the child's position was adjusted slightly, while he was still on his back, so that the lateral aspect of the flexed knee was placed on about two-thirds of the film in the transverse direction, the film being centered just

above the tibial tubercle. The child was then rolled over onto the stomach so that the patella could be placed directly in contact with the film holder for the anterior-posterior picture. A typical knee roentgenogram is shown in Figure 1.

"As mentioned above, a 14 X 17 inch casette was used instead of cardboard holders for the shoulder and femur, in order to shorten exposure time, the film being divided between these two pictures. In taking the shoulder, the child was placed prone with the left shoulder on the casette and the face turned away from this shoulder, with the arm parallel with the body, and palm downward. The femur was taken with the child lying on his back on the casette, with the patella upward. The iliac creat was completely included in this roentgenogram. "The roentgenograms were evaluated for the following purposes:



- (1) to determine the bone age of the child on the basis of ossific centers or epiphyses;
- (2) to determine bene age from bene penetration, by comparison with standards;
- (3) to note the presence and positions of scorings and scars.

"Study of Ossific Centers. The ossific centers were located and recorded in order to find out the child's bony developmental stage as far as this factor is concerned. As a result of an intensive study of rcentgenograms of normal children covering a period of many years, Tedd and his co-workers have determined the time of appearance in young white American males and females of the more important ossific centers. In each case, the presence or absence of the centers ordinarily present in a child of the age in question was noted and recorded. The ossific centers which were considered in the study were as follows:

13.

Hand

(Hamate			)					
(Capitate			)					
(Lunate			)					
(Triquetrum			) -				carp	als
(Navicular			)					
(Multangular Ma	aju	8	)					
13)-(Multangular M:	inu	8	)					
(Metacarpals	1,	2,	з,	4,	5	)		
(1st phalanges	1,	2,	3,	4,	5	)		
(2nd phalanges	1,	2,	з,	4,	5	)	-	fingers
(3rd phalanges	1,	2,	з,	4,	5	)		
(Distal radius								
(Distal ulna								

## (Talus

(Calcaneous

(Navicular

(Cuboid

(Medial cuneiform

(Middle cuneiform

Foot

(13) --- (Lateral cuneiform (Metatarsals 1, 2, 3, 4, 5) (1st phalanges 1, 2, 3, 4, 5 ) (2nd phalanges 1, 2, 3, 4, 5) (3rd phalanges 1, 2, 3, 4, 5) (Distal fibula (Distal tibia

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14.

		(Capitulum
Elbow	(3)	(Medial epicondyle
		(Proximal radius
		(Patella
Knee	(3)	(Proximal tibia
		(Proximal fibula
Hip	(2)	(Head of the femur
(femur)		(greater tuberosity of the femur
Shoulder	(2)	(Head of the humerus
		(Greater tuberosity of the humerus
"Below	is a copy	y of Todd's chart called 'Time of Appearance of

Ossification Centers,' which served as the key to the various epiphyseal

ratings reported below. It will be noted that males and females differ in order of appearance of center of ossification according to this chart.

#### TIME OF APPEARANCE OF OSSIFICATION CENTERS

Brush Foundation, Inc.

September, 1934

(Dr. T. Wingate Todd)

Male - White

#### Birth

(6) 1. calcaneous
2. talus
3. femur, distal
4. tibia, prox.
5. humerus, head
6. cuboid

#### 2 mos.

(3) 7. capitate 8. hamate 11. lat. cuneiform 12 mos.
(3) 19. 2 F. - 1 phal.
 18. 4 F. - 1 phal.
 20. 1 F. - 2 phal.

13 mos.
(3) 22. 3 T. - 1 phal.
 30. 2 metacarpal
 40. medial cuneiform

14 mos.

(3) 23. 4 T. - 1 phal.

-

3 mos.

(3) 13. femur, head
12. capitulum
9. tibia, distal

6 mos.

(1) 10. fibula, distal

7 mos.

(2) 14. gt. tuber. humerus 15. radius, distal

10 mos.

(1) 16. triquetrum

11 mos.

(2) 17. 3 F. - 1 phal. 21. 1 T. - 2 phal. 24. 2 T. - 1 phal. 25. 3 T. - 2 phal.
15 mos.
(3) 28. 3 metacarpal 45. 2 T. - 2 phal. 27. 5 F. - 1 phal.
16 mos.
(2) 26. 4 T. - 2 phal. 29. 4 metacarpal
18 mos.
(4) 44. 2 F. - 2 phal. 32. 3 F. - 2 phal. 33. 4 F. - 2 phal. 31. 5 metacarpal

#### 20 mos.

(2) 46. 1 T. - 1 phal.
41. middle cuneiform

#### 21 mos.

(4) 35. 3 F. - 3 phal.
36. 4 F. - 3 phal.
42. navicular of foot
34. 5 T. - 1 phal.

#### 22 mos.

(2) 43. 1 metacarpal 39. 1 metacarpal

#### 23 mos.

(1) 37. 1 F. - 1 phal.

#### 2 yrs.

- (2) 51. 5 F. 2 phal. 52. lunate
- 2 yrs. 2 mos.

- 3 yrs. 4 mos. (1) 53. 5 T. - 3 phal. 3 yrs. - 7 mos. (2) 57. 3 T. - 3 phal. 58. 4 T. - 3 phal. 3 yrs. - 8 mos. (2) 60. 5 metatarsal 55. 2 T. 3 phal. 3 yrs.-10 mos. (1) 62. radius, prox. 4 yrs. - 2 mos. (1) 56. mult. majus 4 yrs. - 4 mos. (1) 64. navic., hand
- 4 yrs. 8 mos.

(1) 38. 2 metatarsal
<u>2 yrs. - 5 mos.</u>
(2) 49. 2 F. - 3 phal.
50. 5 F. - 3 phal.
<u>2 yrs. - 11 mos.</u>
(2) 54. 3 metatarsal
47. fibula, prox.

### 3 yrs. - 1 mo.

- (2) 63. gt. trochanter femur 48. patella
- 3 yrs. 3 mos.
- (1) 59. 4 metatarsal

(1) 65. mult. minus

### <u>5 yrs</u>.

(3) 66. med. epicondyle humerus
67. ulna, distal
61. 5 T. - 2 phal.

#### TIME OF APPEARANCE OF OSSIFICATION OF CENTERS

Frush Foundations, Inc.

September, 1934

(Dr. T. Wingate Todd)

Female - White

#### Birth

- (6) 1. calcaneous
   2. talus
   3. remur, distal
   4. tibia, prox.
   5. humerus, head
   6. cuboid
   2 mos.
- (3) 7. capitate 8. hamate 11. lat. cunsiform

#### 3 mos.

(3) 13. femur head 12. capitulum

- 9 mos.
- (3) 25. 3 T 2 phal. 23. 4 T - 1 phal. 40. medical cunsiform

#### 12 mos.

(2) 33. 4 F - 2 phal. 32. 3 F - 2 phal.

#### 13 mos.

(2) 31. 5 metacarpal 44. 2 F - 2 phal.

#### 14 mos.

(8) 43. 1 metacarpal 46. 1 T - 1 phal.

9. tibia, distal
4 mos.
(1) 14. gt. tut. humerus
6 mos.
(2) 10. fibula, distal 15. radius, distal 15. radius, distal
7 mos.
(3) 21. 1 T - 2 phal. 17. 3 F - 2 phal. 18. 4 F - 1 phal. 18. 4 F - 1 phal.
8 mos.
(3) 19. 2 F - 1 phal. 20. 1 F - 2 phal. 22. 3 T - 1 phal.

34. 5 T - 1 phal.
35. 3 F - 3 phal.
36. 4 F - 3 phal.
42. navicular of foot
41. middle cuneiform
39. 1 metatarsal

#### 15 mos.

(2) 37. 1 F - 1 phal. 51. 5 F - 2 phal.

#### 17 mos.

(2) 49. 2 F - 3 phal. 50. 5 F - 3 phal.

### 19 mos.

(1) 38. 2 metatarsal

#### 21 mos.

(1) 53. 5 T - 3 phal.

#### 22 mos.

(1) 54. 3 metatarsal

#### 23 mos.

(1) 48. patella

#### 2 yrs.

- (5) 52. lunate
  57. 3 T 3 phal.
  58. 4 T 3 phal.
  47. fibula, prox.
  63. gt. trochanter femur
- 2 yrs. 2 mos.
- (2) 55. 2 T 3 phal. 59. 4 metatarsal
- 2 yrs. 5 mos.
- (1) 60. 5 metatarsal

- 2 yrs. 8 mos. (1) 56. mult.majus
- 2 yrs. 9 mos.
- (1) 66. med. epicondyle humerus

#### 3 yrs.

- (2) 62. radius, prox. 65. mult. minus
- <u>3 yrs. 2 mos.</u> (1) 64. navic., hand <u>4 yrs. - 6 mos.</u> (1) 67. ulna, distal <u>5 yrs</u>. (1) 61. 5 T - 2 phal.

"A Study of Bone Penetration. A set of 40 standards for hand (male), 35 for hand (female), 38 for knee (male), and 35 for knee (female) were purchased from the Anatomical Laboratory at Western Reserve University for purposes of assaying the ages of the children in the study on the basis of bony penetration. In preparing these sets of standards, Todd and his co-workers have selected from a large group of normal children roentgenograms for various ages of white American males and females, these believed to represent the standard degree of progress for the age in question.

"Standards for hand and knee were selected at three month intervals through one year and three months, then at six-month intervals through to sixteen years and 3 months for female (hand and knee); male (knee) through 17 years and 9 months and male (hand) through 18 years and 9 months.

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"The hand and knee of each child in the study were evaluated as to bone age based on penetration, by comparison with the Todd Standards. When standards for elbow, foot, shoulder, and hip later become available, the roentgenograms of these members will then be evaluated on this basis also.

"In assaying an X-ray negative for bony penetration by the Todd technique, such points as the following are considered in comparing the case films with standards; contours of the bone ends and epiphyses, the length and breadth of bones, and cartilagenous interosseous intervals.

"In studying the hand, the shafts and epiphyses of the long bones, the bony maturation of the carpals, and the appearance of the distal

end of the radius are among the points considered in matching the films under consideration with the standards.

"In the knee, one depends to a considerable extent upon studying the bony differentiation of the epiphyses of the femur and upon the contours of the ends of the femur and tibia, and to a lesser degree upon the ossification of the patella.

"Aside from comparing the hand and knee with the standard series of films, the radius and ulna were studied for change in bone ends. A concave bone end was taken to indicate that the bone was not growing, a healthy growing bone being convex in contour. Billowing was assumed to show that the bone was taking on beginning convexity. A dense band at the end of the bone denoted growth interference. "Scars and Scorings. An attack of disease, a severe, gastreintestinal upset, colds, fevers, and other disturbing influences may produce temporary cessations of bone growth, calcium being deposited more thickly at the ends of the bones at these times than normally. When normal growth is resumed, the thickened mineral deposit remains for a time as a scar or a scoring. These two marks of nutritional disaster differ from each other in that the term "scar" is generally applied to a dense marking which extends entirely across the bone, and is more particularly observable on the larger bones. The term, "scoring" on the other hand is applied to bands, somewhat less dense, these being the relics of minor nutritional disturbances . Scorings are less pronounced than scars usually not extending across the full width of a bone. 20.

"Since the tibia and radius normally grow at about the rate of 10

millimeters, and the femur at the rate of 15 millimeters a year, it was found to be possible to determine the approximate time when disturbances in bone growth had occured, by studying roentgenograms of representative parts of the bony skeleton."

The X-ray of knee reproduced in Figure 1 shows typical scars and scorings.

#### Haemoglobin in the Blood

The smount of haemoglobin in the blood was determined by the Newcomer method in terms of grams of haemoglobin per 100 c.c. of blood. In this method, slightly more than 0.05 c.c. of blood was obtained by pricking the finger with a sharp spring blood lancet. Exactly 0.05 c.c. of this was measured by means of a calibrated micropipette into 10 c.c. of approximately 0.1 N hydrochloric acid. The blood was rinsed out of the pipette thoroughly by sucking up the acid and blowing it out several times. The combination of blood and hydrochloric acid was allowed to stand for 25 minutes, at the end of which time it was matched in a colorimeter of the Duboscq type against a standard Newcomer plate with a factor of 0.252. The following formula was used in computing the grams of haemoglobin per 100 c.c. of blood:

Percentage of haemoglobin  $\frac{0.252}{\text{Reading}}$  X 501 (dilution factor) (Grams per 100 c.c.) of unknown

#### Measuring Capillary Wall Strength

A Dalldorf Capillary Resistometer was used on the skin of the inner part of the upper arm, in order to determine capillary wall strength. This was found by establishing the least negative pressure needed to

give a standard red color which the operator learned through experience to recognize.

Vaseline was rubbed onto the area of the arm to which the vacuum cup of the instrument was applied. A vacuum of 35 centimeters as registered on the gauge was used for the initial trial, the vacuum being increased by gradual stages until the standard break was obtained. A skin area about midway between the forward part of the erm pit and the anterior part of the elbow joint was used. Adjoining areas on the skin were subjected to the test until an end-point was reached.

# Evaluating Muscle Tone by Footprints

Footprints were used to secure an arbitrary rating for muscle tone by comparing sitting and standing prints with standards. Four arbitrary standards were used for evaluating these footprints. Standard number A is classed as good, B as medium, C as poor, and D as very poor. These were numbered 1, 2, 3, and 4 in the order named:

The following footprint solution was used in making these footprints:

 22.



#### METHOD OF CALCULATING IRON CONTENT OF DIET

The iron content of the food eaten by each child while in the nursery school was estimated in the following manner. The recipes used by the distitian were calculated in terms of iron grams. The iron figures for milk and egg were taken from Rose's Laboratory Manual; those for meat and fish from Sherman's Chemistry of Food and Nutrition. The iron content of the vegetables EP was computed from the percentages given in the U. S. D. A. circular No. 205 on "Iron Content of Vegetables and Fruits" (1951); the AP values were computed by using the percentage of refuse as given for each item in U. S. D. A. circulars No. 50 and 146. Exceptions to the latter were peas and spinach, which were calculated from Rose's Laboratory Manual. The cereal products were taken from

Sherman's Food Products.

The dietary intake of the children was tabulated in the following classes: milk, meat, egg, fish, vegetables, and fruits and cereals. The total iron intake of each child for the week was determined. The servings of food eaten were weighed and the percentage of total food prepared which each child ate was calculated. The iron value of the portions was then summarized for each child.

During the period for which iron is reported in numerical terms, namely - for the three-month period just previous to the June, 1937, nutritional measurements - the author was present at the nursery school while the meal was being prepared, and weighed the foods which were prepared, and served.

#### PRESENTATION OF DATA

The data secured during the interviews and by means of the laboratory tests on nutritional status are given in tabular form, as follows:

TABLE I RATINGS OF FAMILIES ON BASIS OF FAMILY INCOME, PHYSICAL HOME, AND EDUCATION OF PARENTS;

- TABLE II ANTHROPOMETRIC MEASUREMENTS;
- TABLE III SUMMARY OF OSSIFIC CENTER STATUS;
- TABLE IV SUMMARY OF BONE PENETRATION STATUS;

#### TABLE V EVALUATION OF ROENTGENOGRAMS;

A - for X-rays taken in November, 1936

- B for X-rays taken in February, 1937
- C for X-rays taken in June, 1937
- TABLE VI HAEMOGLOBIN STATUS OF CHILDREN;
- TABLE VII CAPILLARY WALL MEASUREMENTS; and
- TABLE VIII FOOTPRINT EVALUATIONS.

# TABLE I

RATINGS OF FAMILIES ON BASIS OF FAMILY INCOME	RATINGS	OF	FAMILIES	ON	BASIS	OF	FAMILY	INCOME
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# PHYSICAL HOME, AND EDUCATION OF PARENTS

hild's Number	Family Income Rating	Rating of Physical Home	Rating of Education of Parents
2	D	D	E
3	C-3	D	E
4	D	D	E
5	D	E	E
6	D	E	E
7	D	E	E
8	D	E	Е
9	D	D	E
10	C-3	С	E
11	C-3	D	D
13	C-3	C	E
14	C-3	C	E
15	D	C	E
16	D	C	E
17	D	C	E
18	D	C	Е
19	C-2	В	E
20	D	D	E

Child's Number	Family Income Rating	Rating of Physical Home	Rating of Education of Parents
21	D	с	E
C26	D	E	E
C28	D	E	E
C30	D	D	E
C34	D	C	E
C35	D	C	E
C36	D	C	E
C37	D	C	E
C39	E	D	E
C40	C-3	E	E
C41	C-3	C	E
001	D	C	E
002	D	C	E
003	D	D	E
004	D	C	E
005	D	C	D
006	D	C	E
007	D	C	D
009	D	D	E
0012	D	С	E
0013	D	С	E
0014	D	С	E
0015	D	C	D

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hild's Mumber	Family Income Rating	Rating of Physical Home	Rating of Education of Parents
0016	C-2	В	D
0018	D	C	E
0019	D	C	E
0020	C-3	C	C
<b>W</b> 3	D	C	E
W4	D	C	D
<b>W</b> 5	D	C	E
W6	D	D	E
W7	D	C	E
W8	D	C	E
<b>W9</b>	D	D	E
Wll	D	D	E
W12	C-3	С	C
W14	D	D	E
W16	B-3	A	A
W17	D	A	A
W18	D	D	E
Wl9	D	D	С
22	C3	D	E
23	C-3	С	D
C38	D	С	E
0011 Wl	D C-3	D D	E E

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# TABLEII

ANTHROPOMETRIC MEASUREMENTS

NURSERY SCHOOL CHILDREN, (PART A), NOVEMBER, 1936

Case No.	Stand- ing Height	Hori- zontal Height	Sitting Height	Stem End	Supras- ternal Height	Tip of Acro- mion Height	Cristal Height	Anterior Iliac Spine Height	Knee Height	Tibial Length Flexed
6 18 15 9 037 17 2 13 038 004 21 003 19 11 002	98.5 98.8 84.0 92.6 93.0 97.2 93.0 90.5 88.2 86.6 93.4 87.0 89.8 97.4 92.4	101.5 102.6 90.2 96.6 97.2 101.6 99.1 93.5 91.8 89.7 97.8 92.0 93.5 99.6 94.6	54.5 57.3 47.6 51.3 53.9 54.7 54.7 52.6 51.8 49.2 55.3 49.2 55.3 49.7 54.1 53.4 55.3	57.9 62.1 53.0 54.3 57.4 60.8 59.6 57.5 55.7 54.0 59.9 53.7 57.6 56.2 58.3	76.5 76.4 67.2 73.0 70.2 75.6 70.7 69.0 68.9 66.2 71.9 66.1 69.0 74.7 69.3	77.5 76.5 65.9 73.0 69.9 75.1 72.3 67.2 66.3 66.1 71.8 64.1 68.0 73.6 71.4	54.5 57.9 50.2 55.0 54.8 57.7 53.8 57.3 49.8 48.5 53.5 50.0 49.9 54.9 54.9 52.3	52.2 52.8 48.8 52.0 47.0 52.9 48.5 44.5 44.5 44.2 46.2 47.1 45.1 45.1 45.1 43.8 59.1 42.0	28.5 23.4 21.5 24.6 22.3 26.2 24.2 22.5 21.9 24.1 22.3 23.6 28.8 25.0	20.4 20.7 20.3 19.1 17.5 20.5 17.7 17.9 17.9 17.8 20.0 19.5 18.2 21.2 19.7 21.8

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# $\frac{T A B L E I}{(Continued)}$

NURSERY SCHOOL CHILDREN, (PART B), NOVEMBER, 1936

	Tibial Length	Acro- mial Breadth	Cristal Breadth	Trochan- teric Breadth	Trans- verse Chest	Entire Arm Length	Arm	Forearm Length	Hand Length	Chest Girth	Head Length
6 18 15 9 037 17 2 13 004 21 003 19 11 002	20.2 20.4 19.6 19.0 17.4 20.0 17.2 17.0 17.0 17.0 19.2 19.1 18.2 20.8 19.5 21.4	25.7 26.2 21.6 21.8 24.0 23.4 24.3 24.9 23.0 23.6 26.2 22.3 25.5 20.7 21.9	16.3 $17.6$ $15.2$ $16.0$ $16.0$ $17.0$ $16.5$ $16.2$ $16.2$ $15.9$ $18.7$ $15.4$ $17.4$ $15.5$ $16.1$	18.7 18.6 16.6 17.7 17.9 18.2 15.8 18.2 17.0 17.0 17.0 17.0 19.1 16.5 18.5 18.5 18.5 18.5 17.9	$14.8 \\ 15.9 \\ 12.5 \\ 15.5 \\ 13.5 \\ 14.5 \\ 13.7 \\ 13.2 \\ 14.3 \\ 13.2 \\ 14.3 \\ 13.2 \\ 15.6 \\ 13.3 \\ 13.1 \\ $	45.8 42.1 38.4 39.1 37.9 40.8 42.0 37.5 36.8 35.8 35.8 35.8 38.4 35.7 38.4 42.2 38.4	19.8 $15.9$ $15.2$ $14.2$ $14.9$ $15.6$ $16.3$ $14.0$ $13.7$ $13.9$ $14.0$ $15.6$ $17.0$ $16.4$	14.6 14.6 12.7 13.7 13.3 15.6 14.9 13.6 13.5 12.9 12.9 14.0 12.8 12.9 14.0 12.8 13.5 14.5 13.2	11.5 $12.0$ $10.7$ $11.4$ $9.8$ $10.4$ $10.8$ $10.5$ $9.5$ $9.7$ $10.5$ $9.7$ $10.7$ $10.1$ $10.3$ $11.1$ $10.2$	58.1 47.8 48.5 55.8 56.9 60.3 55.5 57.4 56.9 54.6 60.3 55.7 59.1 51.0 54.0	$14.1 \\ 14.8 \\ 11.1 \\ 14.3 \\ 15.3 \\ 14.4 \\ 13.9 \\ 13.7 \\ 14.2 \\ 12.7 \\ 14.2 \\ 12.7 \\ 14.4 \\ 13.0 \\ 15.0 \\ 15.0 \\ 16.7 \\ 16.6 \\ 16.6 \\ 16.6 \\ 100 \\ 10$

# $\frac{T A B L E I}{(Continued)}$

NURSERY SCHOOL CHILDREN (PART C), NOVEMBER, 1936

Case No.	Head Breadth	Head Height	Interpu- pillary Distance	Surpra- sternum to head top	Head Cin Head Line	rcumference Hair Line	Weight	Comments on Weight
<u>6</u> 18	9.8 10.9	7.9 7.6	5.a 5.1	26.7 23.1	50.8 49.8	48.8 49.8	34.25 37.50	Satisfactory
15 9	9.6 10.4	7.9 8.4	5.3	20.5	48.0	47,8	25.50	satisfactory Satisfactory
C37	10.4	7.8	5.6	21.0 23.0	49.8 52.3	49.0 51.4	33.00 31.75	Satisfactory Satisfactory
17	11.4	7.2	5.2	23.5	52.7	52.0 49.5	34.50	Satisfactory
13	10.1	8.0	5.6	20.4	48.3	49.5	31.25	Satisfactory Satisfactory
C38 004	10.0	8.1	5.8 5.3	19.4	49.5	48.2	29.75 28.00	Satisfactory Satisfactory
21	12.0	8.4	5.1	20.6	51.4	51.4	37.00	Satisfactory
19	10.3	10.1 8.1	5.2	20.2	49.5 52.7	47.6	27.75 33.50	Satisfactory Satisfactory
11 002	10.6	7.95	5.3	21.3	50.0	49.0	34.50	Satisfactory
	TAPZ	7.4	5.0	22.5	49.6	49.0	38.50	15.7 percent over weight

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TABLE II (Continued)

CONTROLS (PART A), NOVEMBER, 1936

Case No.	Standing Height	Hori- zontal Height	Sitting height	Stem End	Supra- sternal Height	Tip of Acromion Height	Cristal Height	Anterior Ilian Height	Knee Height	Tibial Length Flexed
4	103.4	105.6	58.9	59.6	79.0	80.5	59.5	53.0	26.1	20.7
0012	108.3	109.0	55.6	58.5	83.6	82.7	62.2	60.4	30.2	25.8
14	97.9	100.0	54.0	58.9	74.9	73.8	55.8	48.6	25.3	21.3
23	103.1	104.2	57.0	60.0	80.5	79.0	62.0	54.3	27.0	24.0
0013	96.6	99.0	53.1	57.0	57.4	72.3	-55.4	54.3	26.5	20.3
10	93.6	96.8	52.8	58.0	72.2	69.0	53.0	47.9	20.4	22.1
C39	93.2	97.5	53.6	54.9	71.2	71.6	53.1	47.9	24.8	17.5
0018	98.8	100.2	55.2	58.1	77.7	76.0	59.6	52.1	27.5	19.2
005	92.3	94.7	54.4	56.2	71.2	70.9	53.0	46.2	24.7	18.5
Wl	83.6	-8671	50.7	64.2	62.7	63.8	48.6	41.6	19.8	17.0
0019	89.9	90.6	50.1	60.7	70.2	71.4	55.3	47.7	22.7	17.4
5	87.3	90.2	53.2	57.1	66.4	68.4	46.4	41.4	23.4	16.1
0014	88.3	91.5	58.1	56.1	65.2	66.9	50.5	45.0	22.2	16.5
0020	89.4	90.1	53.8	64.4	69.2	69.0	48.8	44.2	22.9	14.8
0016	91.2	93.9	52.7	53.3	69.0	68.9	49.6	49.4	29.9	14.6
007	94.9	97.5	54.5	58.6	72.9	71.2	52.4	50.0	23.4	21.0
0015	81.8	86.3	48.9	61.9	60.9	60.3	43.7	38.6	18.2	14.1
C26	83.0	84.3	53.2	53.9	63.3	63.0	41.0	38.4	21.3	18.5
W3	86.7	90.3	54.1	58.2	65.2	65.6	47.6	43.2	21.8	15.8

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# TABLE II (Continued)

CONTROLS (PART B), NOVEMBER, 1936

Case No.	fibial Length	Acro- mial Breadth	Cristal Breadth		verse	Entire Arm Length	Upper Arm Length	Fore- arm Length	Hand Length	Chest Girth	Head Length
4	20.2	25.3	18.1	20.1	16.3	45.1	17.3	15.2	12.0	59.7	16.0
0012	24.2	24.1	16.3	18.7	12.3	45.4	19.1	15.3	11.5	55.8	14.6
14	20.9	23.3	17.3	20.0	15.0	40.6	15.1	14.8	10.8	54.4	14.0
23	23.1	26.0	17.5	17.7	13.9	43.0	16.0	15.0	12.0	55.8	15.0
0013	20.0	22.2	16.2	16.7	14.0	41.0	14.4	16.5	11.0	53.3	15.8
10	18.2	23.1	16.1	17.2	14.4	38.6	13.4	15.0	10.6	23.0	58.4
-C39	17.4	23.8	16.1	16.9	12.1	40.4	16.5	12.9	10.1	55.8	15.7
0018	18.9	22.6	13.4	17.0	13.2	39.4	15.8	14.3	10.6	54.6	13.4
005	18.0	22.0	16.3	20.2	13.8	38.1	16.3	12.9	10.6	53.3	13.9
Wl	16.2	21.6	40.9	15.8	11.5	34.5	12.6	12.5	9.4	48.2	15.4
0019	16.8	20.8	14.4	15.8	12.3	35.3	13.0	11.7	8.6	53.3	13.0
5	15.7	21.0	14.5	17.4	13.9	36.4	14.2	12.9	10.6	50.0	16.1
0014	15.3	21.5	15.7	16.0	13.2	36.5	12.7	14.0	9.4	55.8	14.6
	13.8	22.7	15.4	16.9	13.9		14.5	12.3	9.6	55.8	13.6
0016	13.7	22.4	15.0	16.0	12.8	36.0	14.2	12.5	10.1	55.8	13.9
-007	20.8	22.4	16.1	17.4	12.6	38.2	15.3	12.2	11.2	55.8	15.5
0015	13.3	20.0	14.6	15.3	11.7	30.8	12.7	11.5	9.7	55.3	12.8
C26	17.5	18.0	14.1	16.2	12.2	35.2	13.0	12.9	10.0	48.0	14.5
W3	15.5	18.8	12.9	15.5	13.1	34.1	13.0	12.6	10.6	51.5	16.9

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# $\frac{TABLE II}{(Continued)}$

CONTROLS (PART C), NOVEMBER, 1936

			Interpu-	Supra- sternum	Head Cir	cumference		
Case No.	Head Breadth		pillary Distance	To head Top	Head Line	Hair Line	Weight	Comments on Weight
4	11.3	8.1	5.7	23.5	53.6	53.6	37.5	Satisfactory
0012	10.3	9.1	5.0	23.6	53.3	50.6	33.0	Satisfactory
14	11.2	8.9	5.3	20.7	52.8	51.9	39.0	Satisfactory
23	14.3	8.5	5.2	22.0	49.3	48.6	36.0	Satisfactory
013	9.9	7.6	5.0	20.7	54.6	50.8	31.0	Satisfactory
10	11.0	8.1	5.1	22.0	50.8	49.8	35.0	Satisfactory
-C39	9.8	9.1	5.6	20.3	50.0	48.6	32.5	Satisfactory
0018	10.2	8.35	5.4	21.8	49.5	49.0	32.5	Satisfactory
005	10.9	8.4	5.4	22.7	48.2	47.9	31.0	Satisfactory
Wl	10.5	8.7	5.2	18.9	48.2	47.6	26.0	Satisfactory
019	10.0	8.8	5.3	19.2	49.5	49.0	27.0	Satisfactory
5	10.0	9.5	4.9	21.8	49.0	48.0	29.5	Satisfactory
0014	10.3	715	4.9	22.0	49.5	48.2	27.5	Satisfactory
020	10.3	.8.6	5.5	20.4	49.7	49.5	30.0	Satisfactory
0016	11.0	7.4	5.0	22.7	49.8	49.8	29.0	10.7 percent
-007	10.6	7.5	5.7	22.2	54.6	50.8	34.0	underweight
0015	9.5	8.2	5.1	20.8	47.6	45.7	22.0	Satisfactory 10.8 percent
C26	10.4	8.7	4.2	20.5	46.8	45.5	OZ NE	underweight
<b>W</b> 3	10.0	6.7	5.1	21.3	49.3	49.0	23.75	Satisfactory Satisfactory

# TABLE II (Continued)

NURSERY SCHOOL CHILDREN (PART A), FEBRUARY, 1937

Case No.	ing	Heri- zental Height		Stem End	Supra- sternal Height	Tip of Acromion Height	Cristal Height	Anterior Ilian Spine	Knee Height	Tibial Length Flexed
9	96.0	99.1	53.7	57.0	76.8	76.6	55.5	52.5	28.1	24.1
C37	95.9	97.2	53.2	58.8	72.2	71.9	51.2	48.9	24.4	19.1
15	89.1	92.2	48.9	55.4	68.2	69.0	51.4	47.9	23.9	20.8
2	96.6	99.6	55.5	59.6	73.9	74.8	58.2		28.2	22.3
13	93.7	95.3	53.6	59.4	71.9	71.4	52.4	47.9	25.1	23.1
17	100.1	102.8	58.0	61.3	77.1	76.8	57.8	53.0	28.2	25.2
0018		103.9	57.7	61.1	78.9	80.7	59.4		28.6	26.4
0019	91.9	94.4	50.9	53.6	70.4	70.2	53.3	49.5	26.4	24.1
<b>C38</b>	89.8	92.1	52.0	57.0	67.7	68.3	48.9		23.9	19.1
004	88.4	90.9	51.5	54.1	67.4	68.7	49.2		21.9	20.0
21	95.2	99.3	54.6	60.9	72.6	73.3	50.9	47.5	24.5	20.4
0020	92.4	94.5	52.7	53.1	69.6	70.6	51.6	55.4	23.8	20.3
002	94.5	96.5	55.6	58.6	71.7	72.2	51.7		23.9	22.3
003	90.1	92.5	50.7	54.7	69.0	68.7	52.0	47.7	24.2	21.3
0015	83.9	86.6	49.9	53.4	63.4	64.2	45.1		21.5	19.9
19	94.4	96.7	55.1	59.0	72.9	72.6	51.8		24.6	22.4
<b>W</b> 3	88.5	91.9	56.1	59,1	67.3	66.0	49.7		22.4	17.1
007	94.9	97.5	54.5	58.0	72.9	71.2	52.4		23.4	21.0

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# $\frac{T A B L E I}{(Continued)}$

NURSERY SCHOOL CHILDREN (PART B), FEBRUARY, 1937

Case NO.		Acromia Breadth	Cristal Breadth		Trans- verse Chest	Arm	Upper Arm Length	Fore- arm Length	Hand Length	Chest Girth	Hand Length
9	23.3	20.7	13.3	18.1	14.1	40.1	14.3	14.4	11.4	22.5	16.3
C37	19.1	20.2	14.2	17.7	14.1	39.7	15.2	19.9	19.3	17.2	12.4
15	20.6	20.0	14.8	17.5	13.3	39.1	15.1	13.9	10.9	49.5	11.2
2	21.4	19.3	13.9	16.6	14.2	41.9	16.4	14.7	10.9	59.3	16.0
13.	22.5	19.2	12.6	17.9	12.5	41.0	16.3	14.2	10.7	54.6	10.9
17	24.8	22.9	16.8	19.8	13.6	43.7	19.0	13.9	11.6	55.9	16.5
0018	25.6	21.9	15.6	19.1	13.8	42.4	17.9	14.7	10.7	55.9	17.0
0019	23.4	25.0	14.8	17.2	11.7	36.6	13.4	13.3	9.8	54.6	15.8
<b>C3</b> 8	18.7	18.7	14.7	17.7	14.4	37.2	14.1	13.3	10.7	22.0	15.2
004	19.4	22.2	14.4	18.0	12.1	37.4	14.9	12.8	10,0	50.2	14.8
21	20.2	19.0	16.3	18.3	14.4	38.9	14.6	13.3	10.4	55.9	15.5
0020	19.3	20.0	15.9	18.6	14.7	38.4	14.2	14.4	10.8	57.2	15.1
002	22.0	20.1	14.2	18.1	13.1	39.5	14.8	14.8	10.6	55.9	16.8
003	21.2	20.5	14.3	17.9	12.0	39.6	15.7	14.0		50.1	16.3
0015	19.4	18.6	12.5	15.4	11.5	32.7	12.2	10.9	9.9	52.7	14.2
19	21.3	23.8	17.1	18.1	14.2	41.2	16.8	14.1	11.7	53.3	15.5
W3	17.0	19.0	13.1	15.5	12.7	35.0	13.4	12.5	10.5	54.6	16.7
007	20.8	22.4	16.2	19.3	12.6	43.7	18.1	14.6	11.3	53.3	16.8

# $\frac{T A B L E II}{(Continued)}$

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			Interpu-	Supra- sternum	Head Cin	cumference		
Case No.	Head Breadth	Head Height	pillary Distance	Te head Tep	Head Line	Hair Line	Weight	comments on Weight
- 9	9.9	8.1	5.1	19.2	50.8	48.3	33.50	Satisfactory
C37	10.4	7.4	5.2	21.9	52.1	51.5	34.00	Satisfactory
15	10.1	8.0	5.3	20.6	50.1	48.2	36.75	26.7 percent overweight
2	10.2	6.6	5.0	22.1	50.2	49.2	33.50	Satisfactory
13	10.2	7.4	4.9	21.0	48.9	47.6	36.00	16.1 percent overweight
-17	11.6	7.4	5.2	22.8	51.5	51.2	36.00	Satisfactory
0018	10.1	6.9	5.3	21.5	50.2	49.5	24.50	36.5 percent underweight
0019	10.0	6.8	5.1	21.1	49.5	48.9	28.50	Satisfactory
<b>C3</b> 8	10.5	7.9	4.8	20.1	48.9	48.3	31.00	Satisfactory
004	10.1	8.4	4.5	20.0	46.9	45.7	27.75	Satisfactory
21	10.7	6.4	5.1	20.3	51.5	50.8	37.50	Satisfactory
00020	11.0	7.6	5.2	21.3	50.8	50.2	34.25	Satisfactory
002	10.6	7.2	5.3	22.8	50.8	50.25	34.00	Satisfactory
003	10.1	7.6	4.9	22.8	49.5	46.9	39.00	Satisfactory
0015	9.0	7.1	4.9	18.6	54.1	52.0	23.50	Satisfactory
19	9.7	7.55	5.1	21.8	51.5	50.2	35.00	Satisfactory
<b>W</b> 3	9.2	6.1	5.0	20.4	50.8	49.5	28.50	Satisfactory
007	10.4	7.6	5.4	22.4	53.3	49.5	33.00	Satisfactory

NURSERY SCHOOL CHILDREN (PART C), FEBRUARY, 1937

# $\frac{T A B L E II}{(Continued)}$

CONTROLS (PART A), FEBRUARY, 1937

Case NO.	Stand- ing Height	Hori- zontal Height	Sit- ting Height	Stem End		Top of Acromion Height	Cristal Height	Anterior Iliac Spine Height	Knee Height	Tibial Length Flexed
7	114.8	117.7	59.8	66.0	91.4	91.7	70.5	64.6	33.8	29.3
4	103.4	105.6	58.9	59.6	79.0	80.5	59.5	53.0	26.1	20.7
0012	108.3	100.0	55.6	58.5	83.6	82.7	62.2	60.4	30.2	25.8
38	108.4	111.3	61.1	64.9	84.8	85.7	63.4	59.2	31.3	26.6
W7	99.4	102.7	57.2	58.1	77,1	76.9	59.4	53.4	27.4	23.9
18	100.1	104.3	58.4	62.1	77.7	77.2	57.4	51.7	25.3	23.5
6	101.6	103.7	56.0	59.3	79.7	79.6	58.2	52.3	29.8	25.0
14	99.5	102.9	55.2	59.0	77.5	75.3	56.7	53.7	26.3	22.7
0013	99.5	100.5	53.2	59.0	76.6	76.1	57.4	55.5	26.6	24.25
10	96.4	98.5	55.2	58.0	75.5	75.2	55.9	52.4	27.3	24.2
C39	97.2	99.1	55.0	58.8	74.7	73.1	55.0	49.2	25.7	24.1
W8	91.4	94.2	52.6	56.0	70.5	69.2	52.3	44.6	26.5	21.9
W6	95.9	99.7	54,7	60.5	74.9	75.0	56.4	49.5	24.5	21.8
005	95.8	97.5	53.3	56.0	73.5	74.9	55.4	47.8	26.6	25.0
5	88.8	92.1	52.8	56.9	67.8	69.7	46.2	42.8	24.8	20.8
0014	92.2	94.6	54.2	57.2	69.6	69.5	50.7	45.4	23.2	22.0
C26	85.2	87.5	50.7	53.9	65.4	65.9	47.8	44.0	23.4	19.8
<b>W</b> 4	86.9	88.6	50.5	56.1	64.7	63.9	47.9	43.9	22.9	18.9
<b>W</b> 5	86.2	89.2	49.4	54.6	66.0	64.4	45.0	41.0	21.2	18.7
<b>W9</b>	85.0	89.2	50.0	53.7	65.4	66.4	46.2	44.1	23.8	22.6

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# $\frac{T A B L E I}{(Continued)}$

# CONTROLS (PART B), FEBRUARY, 1937

Case Tibi No. Leng	al Acromial th Breadth	Cristal Breadth		verse		Arm	Fore- arm Length	Hand Length	Chest Girth	Head Length
7       29.1         4       20.2         012       24.5         012       24.5         012       24.5         013       25.9         W7       23.9         18       23.1         6       24.6         14       22.5         013       23.4         10       23.5         W8       21.6         005       24.3         5       20.7         014       21.1         226       19.0         W4       18.5         W5       18.4         W9       21.8	22.3 24.1 22.5 23.6 22.4	16.9 18.1 16.3 15.9 15.7 17.0 15.9 15.7 16.3 17.2 16.3 17.2 16.8 14.2 14.8 16.4 16.1 15.8 13.5 13.5 13.5 13.5	21.2 20.1 18.7 19.8 19.8 19.0 18.4 19.3 17.3 18.8 18.6 17.7 19.6 18.0 17.7 19.6 18.0 17.5 17.1 16.2 14.9 17.1 17.3	13.6 16.3 12.3 14.8 14.5 13.3 15.1 13.6 14.6 14.0 12.4 13.2 14.4 12.3 12.4 13.2 12.4 13.2 12.4 13.2 12.4 13.2 12.4 13.2 12.4 13.2 12.4	52.6 45.1 45.4 45.4 46.6 43.7 42.6 46.8 44.7 42.1 41.3 39.2 39.6 39.6 39.6 39.6 39.6 39.6 39.6 39.6 39.6 39.6 39.6 39.6 39.6 39.6 39.6 36.7 36.5 36.1 36.5	22.8 17.3 19.1 17.5 16.9 16.6 20.0 17.8 17.6 17.6 15.7 15.4 15.7 14.6 17.6 13.1 15.3 13.8 13.8	17.9 15.2 15.2 16.0 16.5 16.5 14.5 14.5 14.4 14.4 14.4 14.4 14.4 14.4 14.4 14.4 14.5 14.2 14.5 13.6 13.0 13.4 13.2 13.1 13.8	13.7 $12.0$ $11.5$ $12.2$ $11.3$ $10.4$ $11.8$ $11.2$ $11.4$ $11.8$ $11.2$ $10.1$ $9.7$ $9.6$ $10.1$ $9.7$ $9.6$ $10.4$ $10.7$ $9.8$ $10.2$ $9.9$ $9.0$	61.0 59.7 55.8 57.2 54.6 55.9 58.4 50.8 52.1 52.2 52.1 50.8 57.2 54.0 52.7 54.0 52.7 54.0 52.7	16.9 $16.0$ $14.6$ $17.5$ $15.8$ $13.5$ $16.5$ $16.0$ $17.4$ $15.7$ $14.0$ $15.2$ $16.6$ $17.1$ $15.7$ $16.1$ $15.7$ $16.1$ $16.0$ $14.4$ $16.2$

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# TABLE II (Continued)

CONTROLS (PART C), FEBRUARY, 1937

<b>R</b>	TT 7		Interpu-	Supra- sternal	Head Circ	cumference		
Case No.	Head Breadth	Head Height	pillary Distance	To head Top	Head Line	Mair Line	Weight	Comments on Weight
7 4 0012 W8 W7 18 6 14 0013 10 C39 W8 W6 005 5 0014 C26 W4 W5 W9	$   \begin{array}{c}     10.30 \\     11.34 \\     10.30 \\     9.90 \\     10.30 \\     10.50 \\     9.70 \\     10.90 \\     11.30 \\     11.50 \\     10.90 \\     11.50 \\     10.40 \\     9.20 \\     10.20 \\     10.20 \\     10.20 \\     10.20 \\     10.20 \\     10.30 \\$	7.4 8.1 9.1 7.7 6.9 7.2 8.3 6.7 7.4 7.1 8.2 7.1 8.2 7.3 7.7 7.7 8.4 7.3 9.6 7.2 8.2 7.2	5.4 5.7 5.0 5.1 5.1 5.2 5.6 5.3 5.25 5.4 5.0 5.1 5.5 5.0 4.9 5.4 4.9 5.4 4.9 5.4 4.3 5.2 5.2 5.4 5.1 5.5 5.0 4.9 5.4 5.1 5.5 5.0 5.1 5.5 5.0 5.1 5.5 5.0 4.9 5.4 5.2 5.1 5.5 5.0 4.9 5.4 4.3 5.2 5.1 5.5 5.1 5.5 5.0 4.9 5.1 5.5 5.0 4.9 5.4 4.3 5.2 5.1	24.1 $23.5$ $23.9$ $22.6$ $22.0$ $22.4$ $23.1$ $21.3$ $21.3$ $21.5$ $21.7$ $21.9$ $21.0$ $21.7$ $21.9$ $21.0$ $21.7$ $21.9$ $21.0$ $21.7$ $21.9$ $21.0$ $21.6$	50.2 53.6 53.3 50.8 51.2 50.2 50.8 52.1 54.0 54.0 54.6 48.9 48.5 49.5 49.5 50.8 49.5 50.8 48.3 49.5 50.8 48.3	50.0 53.6 50.8 49.5 50.2 49.5 50.2 49.5 53.3 50.2 48.3 48.3 48.3 48.3 48.3 48.9 46.9 46.9 48.3 49.5 46.9 50.2 47.6 47.6	$ \begin{array}{r} 44.00\\37.50\\37.50\\33.00\\40.00\\38.00\\38.00\\37.00\\34.50\\39.00\\32.00\\32.00\\32.00\\36.0$	Satisfactory Satisfactory

# $\frac{T A B L E II}{(Continued)}$

## NURSERY SCHOOL CHILDREN (PART A), JUNE, 1937

Case No.	Stand- ing Height	Hori- zontal Height	Sit- ting Height	Stem End	Supra- sternal Height	Tip of Acromion Height	Cristal Height	Anterior Ilian Spine Height	Knee Height	Tibial Length Flexed
C37	97.3	98.0	56:4	57.1	75.8	75.0	56.3	54.0	27.0	23.5
<b>W</b> 6	99.5	101.6	54.6	59.4	76.3	76.7	56.2	53.5	27.0	22.9
15	92.9	95.2	50.1	53.2	72.4	72.0	54.0	51.8	25.6	22.4
2	98.2	100.2	57.7	58.7	74.8	75.2	56.1	53.4	25.0	23.8
13	96.6	97.8	54.6	57.7	75.9	75.1	54.6	50.5	26.1	22.9
0018	104.5	104.9	59.3	58.3	81.7	81.5	60.5	56.6	28.3	25.6
0019	95.3	96.3	52.4	53.3	74.7	74.1	54.0	51.6	27.2	23.3
<b>C3</b> 8	92.6	95.6	55.9	57.7	70.8	71.7	52.2	48.4	25.3	22.5
21	99.0	101.0	57.3	59.3	76.0	76.4	56.5	45.8	25.9	20.9
004	90.6	92.8	49.1	55.3	69.4	69.1	51.8	48.0	24.6	22.1
0020	95.5	96.9	55.1	58.6	74.2	74.6	54.2	48.2	26.1	22.1
003	92.7	94.2	51.8	54.8	72.5	73.8	54.6	50.9	25.0	21.8
<b>W</b> 9	87.0	88.1	49.9	52.9	67.7	67.2	48.8	47.4	23.6	20.5
₩5	89.1	91.6	52.5	54.9	67.5	67.8	51.3	46.8	23.7	20.8
007	96.7	97.5	53.8	56.0	74.7	73.9	56.0	53.9	26.0	23.5
W4	90.0	90.6	53.2	56.7	68.5	68.7	48.7	45.9	22.3	20.3

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# $\frac{T A B L E II}{(Continued)}$

	Case No.	Tibial Length		Cristal Breadth	Trochan- teric Breadth	Trans- verse Chest	Entire Arm Length	Upper Arm Length	Fore- arm Length	Hand Length	Chest Girth	Head Length
0	C37 W6 15 2 13 018 019 C38 21 004 020 003 W9 W5 007 W4	23.1 22.7 21.8 22.9 22.9 22.9 22.9 22.1 20.1 20.1 20.5 21.5 21.5 21.6 19.9 19.6 23.1 19.5	21.7 $21.6$ $20.3$ $22.4$ $23.1$ $22.0$ $20.7$ $21.1$ $23.2$ $19.8$ $22.4$ $22.1$ $20.5$ $20.3$ $22.5$ $15.7$	16.3 $14.1$ $14.4$ $15.2$ $16.0$ $14.9$ $14.5$ $16.1$ $17.7$ $14.4$ $15.8$ $14.3$ $14.5$ $15.9$ $16.0$ $13.3$	19.2 12.5 17.2 18.1 20.5 18.3 17.3 18.4 19.9 18.0 19.7 17.9 16.9 17.3 18.4 16.7	13.5 $18.8$ $12.0$ $12.5$ $13.0$ $12.9$ $12.6$ $13.8$ $13.3$ $12.1$ $13.6$ $12.0$ $13.0$ $12.0$ $13.0$ $11.9$ $12.3$ $12.1$	42.7 41.4 42.3 40.0 43.1 39.0 39.0 39.4 41.3 37.4 40.0 39.6 38.3 34.0 42.5	19.2 16.3 15.4 17.0 15.6 17.2 16.5 15.6 16.3 14.9 16.5 15.7 15.3 15.7 15.3 15.0 15.8 15.2	14.0 14.8 14.0 14.6 14.0 14.8 14.1 13.8 14.1 13.8 14.3 12.8 12.9 14.0 12.6 12.5 15.8 13.4	10.7 10.9 11.9	54.6 57.8 45.7 50.8 57.2 52.1 49.5 52.7 55.9 50.2 54.6 50.1 50.2 54.6 50.1 50.2 54.6 50.1 50.2 54.6 50.1 50.2 54.0 52.7 53.3	16.7 16.2 15.5 16.4 15.7 15.8 16.5 16.2 14.1 14.8 15.9 16.3 16.2 16.3 16.2 14.9 17.2 17.3

## NURSERY SCHOOL CHILDREN (PART B), JUNE, 1937

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# $\frac{T A B L E I}{(Continued)}$

## NURSERY SCHOOL CHILDREN (PART C), JUNE, 1937

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			Interpu-	Supra- sternum	Head Ci	rcumference		
Case No.	Head Breadth	Head Height	pillary Distance	To head Top	Head Line	Hair Line	Weight	Comments on Weight
C37	11.0	7.3	5.4	23.0	51.5	50.8	35.50	Satisfactory
₩6	9.5	7.8	5.0	20.5	49.5	48.9	39.00	23.8 percent overweight
15	11.0	8.3	5.1	20.7	49.5	48.3	27.00	Satisfactory
2	10.3	7.7	5.4	22.1	48.9	46.9	33.00	Satisfactory
13	10.5	7.6	5.0	21.0	48.3	46.9	39.00	Satisfactory
0018	11.5	7.6	4.9	23.5	50.2	48.9	33.75	Satisfactory
0019	10.1	7.6	4.8	21.5			29.75	Satisfactory
<b>C3</b> 8	10.2	7.3	5.1	21.0	49.5	47.6	32.00	Satisfactory
21	15.2	7.4	5.7	22.3	50.2	49.5	40.50	Satisfactory
004	10.1	8.4	4.5	20.1	46.9	45.7	30.00	Satisfactory
0020	10.5	7.5	5.0	21.8	50.2	48.9	32.00	Satisfactory
003	10.1	7.6	4.9	22.8	49.5	46.9	30.50	Satisfactory
<b>W</b> 9	10.1	8.2	5.1	19.9	49.5	48.3	28.50	Satisfactory
<b>W</b> 5	10.1	8.3	4.6	20.7	48.3	47.6	28.50	Satisfactory
007	10.2	6.8	4.9	22.6	52.1	49.5	36.00	Satisfactory
W4	9.1	7.9	5.1	21.4	50.8	49.5	30.00	Satisfactory

 $\frac{T A B L E II}{(Continued)}$ 

CONTROLS (PART A), JUNE, 1937

Case No.	Standing Height	Hori- zontal Height	Sit- ting Height	Stem End					Knee	Tibial Length
7	116.8	116.5	60.9	65.4	92.4	91.9	Height 70.0	Height	Height	Flexed
4.	107.5	108.9	55.6	59.2	82.7	80.4		69.1	33.4	29.7
012	110.9	111.7	56.0	61.1	87.1	88.9	62.8	60.1	29.0	26.6
5	92.1	93.3	53.1	57.7	69.5	69.7	69.3	65.3	35.1	26.7
6	103.4	103.3	56.3	59.4	80.7	81.2	54.8	46.0	23.2	21.0
23	105.9	109.7	57.5	60.7	84.7	83.4	61.1	58.5	31.2	26.2
14	102.2	103.9	56.9	59.6	79.1	79.3	64.6 50.2	58.5	30.9	27.8
0013	102.6	103.1	54.4	57.5	80.0	79.6	59.2	56.0	28.3	24.7
9	98.8	100.7	51.5	57.1	77.6	77.1	61.1	57.7	28.6	25.1
10	99.5	100.5	54.1	57.6	77.7	77.2	58.0	55.6	30.2	23.9
C39	96.9	107.0	55.0	57.2	75.2	74.3	60.1 57.1	52.2	27.2	22.2
005	98.6	101.2	54.7	54.2	75.7	77.1		52.6	26,5	23.4
8	109.1	113.1	61.6	65.9	88.3	87.5	58.7	52.0	26.9	24.6
014	95.6	97.1	56.1	57.5	71.5	71.0	66.5 52 7	62.9	31.5	25.3
W18	88.4	89.7	50.1	52.4	66.8	67.1	52.3	49.3	24.0	21.8
W11	89.3	92.3	51.7	55.4	68.6	67.2	49.4	45.0	23.9	21.6
C26	88.1	91.0	51.2	51.3	68.4	67.8	49.6	44.6	24.0	21.8
W15	94.0	95.8	55.5	58.9	70.1	69.2	47.8	46.4	23.0	21.0
W17	85.0	87.7	52.0	53.0	65.6	64.4	52.0	46.5	25.6	21.5
<b>W16</b>	87.9	88.1	50.0	52.7	67.4	67.1	47.0	40.7	20.7	19.1
W14	89.7	92.7	53.9	56.2	69.3	68.9	47.4	42.9	23.1	20.8
W12	82.5	85.5	49.4	53.9	62.4	61.9	47.5	45.0	24.0	20.7
W19	81.2	83.1	48.5	50.0	62.2	62.3	45.7	42.4	21.0	18.3
-					0202	02.0	46.5	42.9	20.7	18.9

# TABLE II (Continued)

CONTROLS (PART B), JUNE, 1937

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Case No.	Tibial Length	Acromial Breadth			Trans- verse Chest	Arm	Upper Arm Length	Fore- arm Length	Hand Length	Chest Girth	
¥.	29.3	25.1	15.8	20.5	14.1	and the second s	21.6	17.8	14.3	59.7	16.6
4	26.3	23.6	17.3	20.0	13.6	46.4	18.1	15.2	12.6	55.9	16.9
0012	26.6	21.2	13.1	18.5	12.4	47.4	20.1	15.8	12.1	54.6	16.8
5	20.1	22.1	15.2	15.8	11.8	40.8	17.2	14.0	10.5	48.3	17.0
6	25.8	24.6	15.8	18.5	13.6	46.7	18.6	16.5	12.2	53.3	16.0
23	27.2	23.5	15.6	19.3	12.6	45.0	16.7	15.4	12.3	54.6	16.6
14	23.7	23.2	15.4	20.1	12.8	42.7	16.6	15.8	10.7	55.9	17.3
0013	24.9	18.6	11.1	16.7	12.7	44.0	17.7	14.5	11.6	53.3	17.5
9	23.9	22.9	14.7	19.5	12.5	43.0	17.1	15.9	10.9	54.6	16.6
10	21.4	23.2	14.0	18.1	13.2	41.7	15.9	14.7	10.6	54.6	17.2
C39	22.5	21.5	16.8	18.6	12.4	39.2	15.4	13.6	11.2	52.1	14.0
005	22.6	17.9	13.5	17.9	9.5	41.3	17.7	14.5	10.4	54.0	16.3
J8	25.0	21.1	14.3	18.3	13.0	47.5	20.9	13.8	12.8	54.6	17.5
0014	20.5	17.1	14.3	17.5	12.5	39.2	15.1	13.9	10.7	55.9	16.4
W18	21.0	20.6	14.8	16.5	13.0	35.9	14.2	13.0	9.5	50.8	16.2
W11	21.1	20.3	14.9	18.4	12.7	37.7	15.4	12.7	11.1	52.1	14.8
C26	20.5	20.5	14.1	16.7	12.0	39.0	15.0	12.7	10.6	46.9	15.8
W15	20.5	22.0	14.4	17.8	12.8	40.0	15.8	14.4	10.4	54.4	17.5
W17	18.0	21.0	15.3	17.0	11.0	35.1	13.8	11.7	8.8	54.0	16.7
W16	20.3	22.0	11.4	16.5	11.4	37.6	15.5	13.0	10.2	48.3	15.4
W14	20.5	22.1	16.3	17.7	13.6	38.5	14.9	13.5	10.7	52.1	15.5
W12	17.9	20.7	15.3	17.7	12.9	34.4	12.9	11.7	9.5	57.5	14.7
W19	18.3	20.6	13.2	16.8	11.4	33.5	13.6	12.0	:9.1	47.6	15.3

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# $\frac{T A B L E I}{(Continued)}$

CONTROLS (PART C), JUNE, 1937

Case No.	Head Breadth	Head	Interpu- pillary Distance	Supra- sternum to head Tep	Head Cir Head Line	cumference Hair Line	Weight	Comments on Weight
7	10.2	7.6	5.6	23.5	50.2	48.3	44.25	11.5 percent
•	1000							underweight
4	10.5	8.1	5.6	23.3	51.5	49.5	39.0	Satisfactory
2100	9.4	7.7	4.7	22.3	49.5	49.0	35.00	10.2 percent
								underweight
5	10.5	7.6	4.7	20.9	49.5	48.3	30.00	Satisfactory
6	9.4	8.0	5.0	21.9	49.5	46.9	34.50	Satisfactory
23	10.2	8.6	5.0	22.1	49.5	48.9	39.00	Satisfactory
14	10.2	7.1	5.2	21.9	52.1	50.2	40.00	Satisfactory
0013	9.5	7.5	5.5	21.5	52.1	49.5	34,00	Satisfactory
9	9.6	8.2	4.8	21.2	50.2	49.5	35.00	Satisfactory
10	11.8	7.5	5.4	20.7	50.8	50.2	36.00	Satisfactory
C39	10.4	8.2	5.0	21.7	48.9	48.3	34.00	Satisfactory
005	8.5	7.2	4.7	21.7	49.5	49,5	31.00	Satisfactory
<b>U8</b>	9.0	8.15	5.0	22.0	51.5	51.2	40.00	Satisfactory
0014	9.2	7.6	5.4	22.5	49.5	48.3	28.50	18 percent
								underweight
W18	10.1	8.3	4.6	20.4	49.5	47.8	28.00	Satisfactory
W11	10.2	8.6	4.8	21.0	46.6	46.4	30.50	Satisfactory
<b>C</b> 26	9.5	8.4	4.3	20.4	47.6	45.7	25.75	Satisfactory
W15	10.5	7.3	4.9	22.5	52.7	50.8	33.25	Satisfactory
W17	9.6	7.5	4.4	19.3	50.2	47.6	30.00	Satisfactory
W16	10.6	8.2	4.9	19.8	45.7	45.7	28.00	Satisfactory
W14	10.9	7.7	5.5	21.5	48.3	46.9	31.00	Satisfactory
W12	11.2	8.6	4.7	19.1	48.3	47.6	29.00	Satisfactory
W19	9.7	9.2	4.5	18.8	45.7	45.7	23.00	Satisfactory

45

KEY TO TABLE III

- A. -- Nursery School Children
- B. -- Control Children
- C. -- Control Children Dropped from Nursery School, but Continued in the Study
- D. -- Control Children Who Never Attended Nursery School



### SUMMARY OF OSSIFIC CENTER STATUS

	March 1936	May 1936	August 1936	November 1936	Februar 1957
		 Bone Age Co nters.	ompared with C	hronological .	Age Based
	$\downarrow$	J	$\checkmark$		$\downarrow$
A	-7.31	+4.75	-8.42	- 6.0	- 7.44
B		-17.28	-5.43	-11.08	-10.6
C				-13.0	-13.37
D		-17.28	-6.02	- 9.66	- 9.87
	Average ]	Number of Os	sific Centers	Missing for (	Ossific C
A	7.54	10.75	6.63	7.80	7.47
B		7.28	5.83	3.33	3.75
C			8.0	2.2	3.0
D		7.28	5.73	4.0	3.12
	Average 1	Number of O	ssific Center	s Missing for	Chronolo
A	10.0	9.75	10.2	12.84	11.92
B		14.0	9.7	9.34	8.15
С			8.00	7.2	7.56
D		14.0	9.2	6.33	6.37

\*

- Indicates retardation of growth

+ Indicates advancement of growth

47.

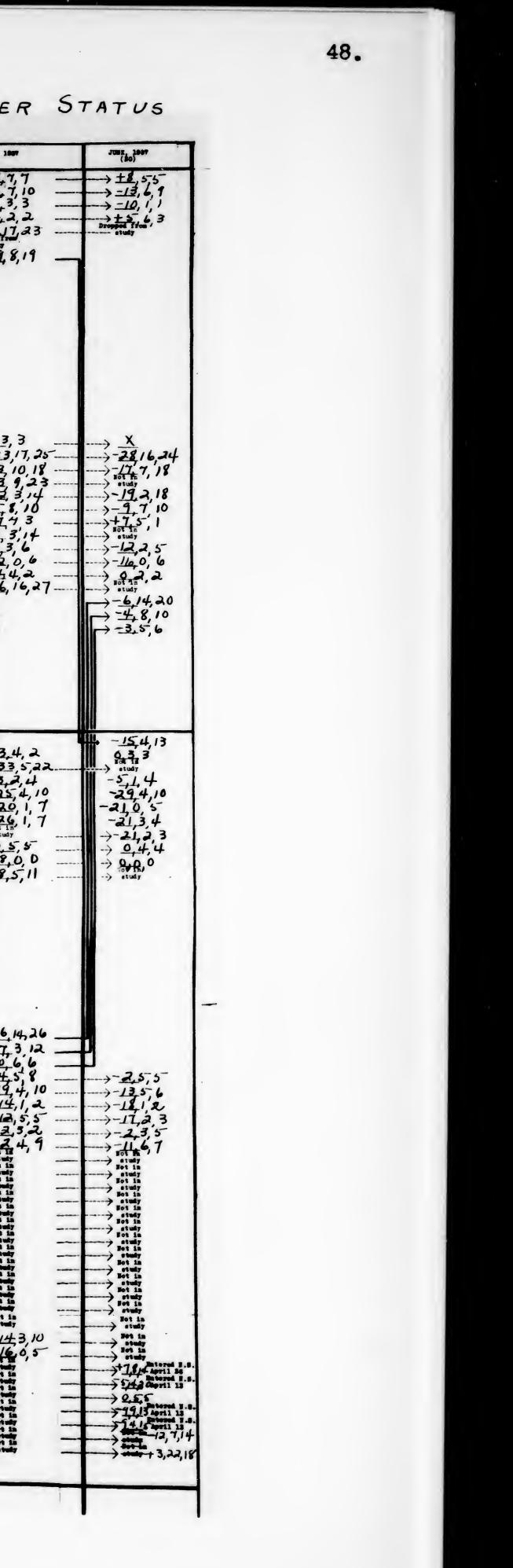
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HAT LOLOOL 9	far inge	ADDINET, 1938	1000 1000 (00)	FIDRUARY, 1897 (30)
-57,8 $-7,10,13$ $+3,12,11$ $-13,6,26$ $-5,5,4$ $-15,10,20$ $+14,12,8$ $-22,10,25$ $0,8,18$ $-31,3,18$ $-11,7,12$ $-15,6,11$ $0,13,13$ $-3,0,0$ $-13,2,3$ $0,5,5$ $-6,2,4$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$ $1$		$ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} 0, 10 \\ \hline \\ -12, 6, 13 \\ \hline \\ 24, 7, 8 \\ \hline \\ 72, 7, 8 \\ \hline \\ 73, 11, 10 \\ \hline \\ -10, 17, 21 \\ \hline \\ \hline \\ -10, 17, 21 \\ \hline \\ \hline \\ -10, 17, 21 \\ \hline \\ -10, 7, 4 \\ \hline \\ -23, 3 \\ \hline \\ -24, 10, 24 \\ \hline \\ -23, 3 \\ \hline \\ -24, 10, 24 \\ \hline \\ -7, 0, 1 \\ \hline \\ -7, 0, 2 \\ \hline$	$ \begin{array}{c} \begin{array}{c} \begin{array}{c} \begin{array}{c} 15 \\ 10,10 \\ 15 \\ 10,10 \\ 15 \\ 10,10 \\ 15 \\ 10,10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\$	
C H I L D R X H X X X X X X X X X X X X X		x x x x x x x x x x x x x x		

June 1937 lary sed on Ossific - 7.31 4 - 9.09 -12.44 57 - 6.76 Center Age 6.15 5.55 2.33 7.0 logical Age 9.2 7.52 5.12 9.76

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TABLE III SUMMARY OF OSSIFIC CENTER STATUS





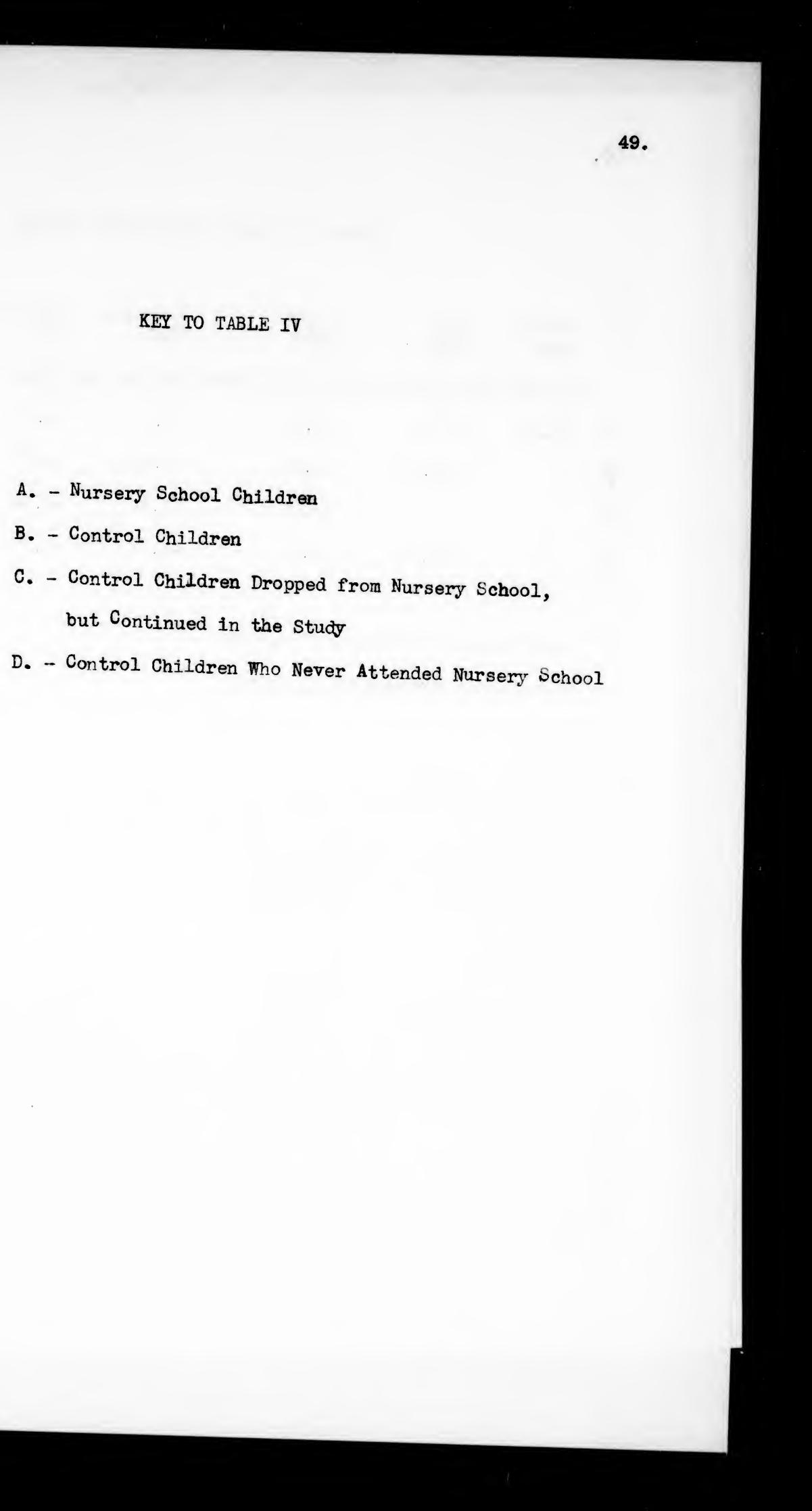
## KEY TO TABLE IV

- A. Nursery School Children
- B. Control Children

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- C. Control Children Dropped from Nursery School, but Continued in the Study



## SUMMARY OF BONE PENETRATION STATUS

	March 1936	May 1936	August 1936	November 1936	Februar 1937
	*Average	Bone Age	Compared with	Chronological	Age Based $\downarrow$
A	-3.44	+ 2.5	-2.55	-2.1	-1.81
B		-12.71	-5.16	-4.12	-4.77
C			-3.0	-3.5	-4.94
D		-12.71	-5.0	-4.58	-5.5

\* - Indicates retardation of Growth

+ Indicates advancement of Growth

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TABLE IV

FRALERT ROROGL CRILDREP

SUMMARY OF BONE PENETRATION STATUS

9

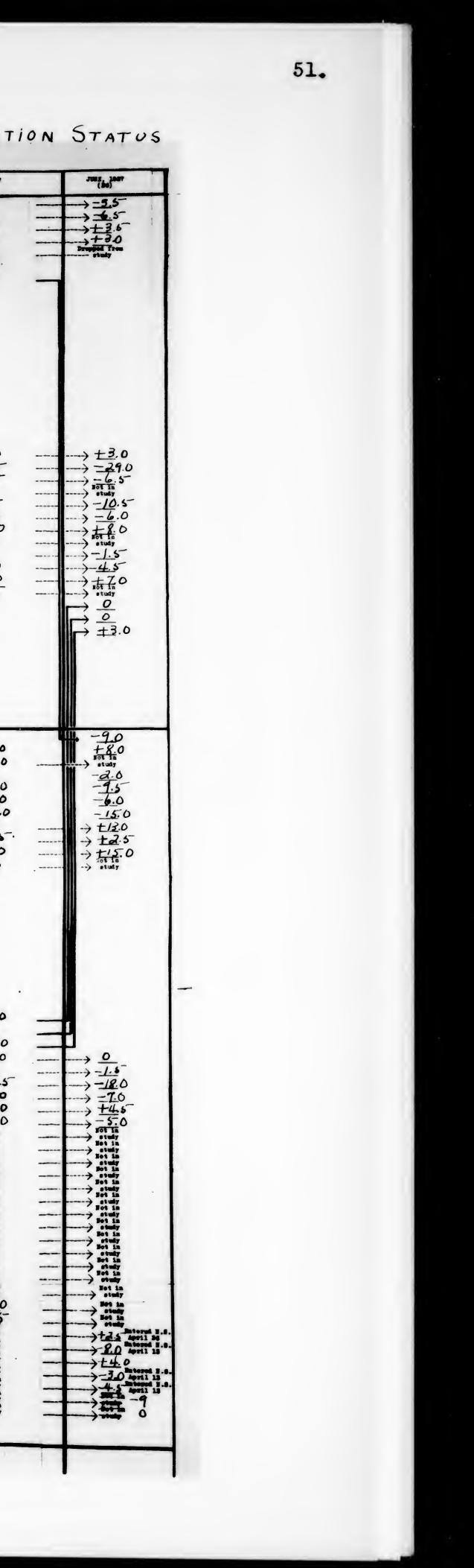
MARON, 1936 (URDELL)	NAY, 1000 (UnderLL)	ADDENT 1836 (MALLET)		PEDRUART LOUP
$\begin{array}{c} 2 & -1.0 \\ -4.0 \\ 13 & -4.0 \\ 15 & -1.0 \\ 10 & 10 \\ 11 & 12.0 \\ 9 & -8.0 \\ 8 & -1.0 \\ 8 & -14.0 \\ 18 & -14.0 \\ 18 & -13.0 \\ 18 & -13.0 \\ 10 & -6.0 \end{array}$		$ \begin{array}{c} & & & & \\ & & & & \\ & & & & \\ & & & & $		
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$		$-\frac{5.0}{+10.0}$ $+\frac{10.0}{+5.0}$	Dropped free study Dropped free 	$\begin{array}{c} + 110 \\ - 135 \\ - 135 \\ - 235 \\$
X X X X X X X X X X X X X X X X X X X	I I I I I I I I I I I I I I I I I I I	$ \begin{array}{c} x \\ x \\ x \\ x \\ x \\ x \\ y \\ y$	I $I$ $I$ $I$ $I$ $I$ $I$ $I$ $I$ $I$	111 +6.0 -12.0 0 -18.0 -7.0 -7.0 -7.0 -7.0 -7.0 -7.0 +1.0 +1.0 +1.0
study Not in study Not in study				

ary June 1937 |d on Penetration  $\downarrow$ -2.53 -2.18 -33

-3.46

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PALL



## TABLEV, A

## EVALUATION OF ROENTGENOGRAMS

	_		N	OVEMB	eu 12:	0						
				_	EPIPH		R	ATING		BONE	AGE	
							NUMBE		ON BASIS CF PE	NETRATION		
Nursery-School November		•		CAL			OSSIF TERS	MISSING	IIAND	AGE B	ASED	COMPARISON WITH
Mader     Mathematical       R     Ritth       R	3-7 grs.		yrs. yrs.		E BASED ON	COMPARISON WITH	$(\alpha)$				ST.WITCH	CHRONOLOGICAL AGE
	0 0			BCNO	SIFIC CENTERS	CHRONOLOGICAL AGE	fic Conto	Chrono-EON Han logicald> so Lo	404			
			- 65 66	НЭ 4-6-6	5-04 www	Advanced 6 mos.	Age	Res of			5-3	Advanced 8 mos.
	57 60 6 58 55	2 58 54	- 00 00	4-6-0		Retarded 2 yrs-7 mo	1	23 5	D yra6 mos. 2 yrs-11 mos.	5 yrs-Omos. 3 yrs- 9 mos.	3-4	Retarded 1 yr.2 mes.
• M X X X - X X - 16 X X X 25 X 26 - X - 41 42 X 52 X 49 - 54 - 54 - 58 55	57 60 58 55											
C37 F X X X X X X 20 25 26X X31 42 37 - 49 - X - 53 54 48 58 55 60 56 66 - 65 - 64 -		-+-+-	+++-+	3-9-12		Retarded 1 yr.7 mos Retarded 1 yr.9mos.		<u>19</u> 7	3 yre- 0 mos.	3 угн- 6 mos. 2 угн- 6 mos.	3-3	Retarded 6 mos. Retarded 1 yr, 10,5 -
35 47					<u>e 71 .</u>	Astarded 1 yroseou				2 975- 0 205.	1-10.5	AUCE/000 1 9192010 -
15 7 X X X X X X Z 25 2dX X X X X X - X - X - X X X 57 55 60 56 X - X 64				3-5-29	3 Yrs.	Retarded 5 mes.	7	8 4	3 yrs- 6 mos.	3 yrs- 6 mos.	3-6	Advanced 1 mo.
17 M X X X - X X 16CO X 25 45 26 - 44 - 46 35 43 37 51 X 4964 - 63 - 59 33 41 36 39 52 50 - 64 48 - 65 - 59				3-3-23	2 778- 11 86	Retarded 4 mos.	22	25 4	2 yrs- 5 mos.	4 yrs- 3 mos.	3-4	Advanded 1 me.
2 y X X X X X X X 25 45X X X X X - X - X - 334 X 57 53 - 56 X - 65 - 64	┝┼╸┾╴	╌╆╌┢╸				Advanced 1 yr.	10	10 6	2 yrs- 6 mos.	4 yrs- 0 mos.	33	Satisfactory
13 F X X X X X X 25 26X X X X X - X - X - 55 X 48 57 55 60 56 66 - 62 - 64 -	┝╌╎╌┽╸	╍┼╍╆╍	++		0	3 mon. Retarded 1 yr.	6	14 4	3 yrs- 0 mos.	2 yrs- 6 mos.	2-8	Retarded 7 mos.
	┝╌┼╌	-+-+-	++	3=3=20	2 yrs.	3 208.				- jie		
C38 X X X - X X 16X X X 25 X 26 - 31 - 46 35 43 37 52 38 49 - 44 41 36 39 51 50 -				2-7-27	18 mos.	Retarded i yr.	5	19 8	2 yrs- 2 mos.	2 yrs- 7 mos.	2-4.5	Retarded 2.5 mos.
004 F X X X X X X X X X X X X X X X X X X	┨╌┨╌┤╴	-++	++-+			<u>1 mo.</u>						
				2-7-24	1 yr.	Retarded 1 yr.	2	14 1	2 yrs- 0 mos.	2 yrs- 2 mos.	- 2-1	Retarded 6 mos.
21 M X X X X X X X X X X X X X - 44 - 46 42 X 37 51 X X -	┡╌┠╌┠╸	-++	++-+	2-7-1	7 mos. 2 yrs.	Retarded 2 mos.	8	8 13	3 yrs- 0 mos.	2 yrs- 6 moe.	2-8	Advanced 1 me.
003 P X X X X X X X X X X 16K X X 2 X - X - X - X - X 54 48 58 55	╋╌╅╼╼╋	-+	++		5 mos.	Defended 4 mer	7	9 6	2 yrs- 0 mos.	2 yrs- 1 mo.	2 yrs	Retarded 4 moe.
	┝┼┼		++-+	2-4-20	2 yrs.	Retarded 4 mos.	2		2 yrs- 0 mos.		15 das. 2-8.5	Advanced 4.5 mos.
19 M X X X - X X X X X X X X 26 - K + X 42 X X X X X	┝╌┝╌┝	-+-+-	++-+	2-3-12	5 mos.	Advanced 3 mos.	0	<b>a b</b>	3 yrs- 0 mos.	4 yrs- 0 mos.	3 yrs.	Advanced 1 yr.
11 P X X X X X X X X X X X X X X X X X X	┫╼╂╌╶┼╴	-+-+-	+++-+		5 208.						5 mos.	2 20.
				2-0-27	18 mos.	Retarded 6 mos.	11	22 First X-	1 yr- 7 mos.	2 yrs- 3 mos.	1 yr. 10 mos.	Retarded 2 mos.
Total number of Epiphyseal Centers Missing for Ossific Center Age 117	* * * -		d		Average Bo	ne Age Compared wit	h Chro	nological	Average Bons Ag	e Compared with (		al
Assess number of Enishward Contain Mandas for Antific Contain to P. C.												
Average number of Epiphyseal Centere Missing for Ossific Center Age 7.8					Age Based	on Ossifie Centers.			Age Based on Pe	enetration.		
Average number of Epiphyseal Centers Missing for Chronological Age 203						on Ossifie Centers. etardation 7.06 men	the		Age Based on Pe Retardation			
							ths					
Total Number of Epiphyseal Centers Missing for Chronological Age 203							ths					
Total Number of Epiphyseal Centers Missing for Chronological Age 203 Average Number of Epiphyseal Centers Missing for Chronological Age 13.5 Total Number of Previously missing Ossific Centers Appearing since last X-ray 77 Average Number of Previously Missing Ossific Centers Appearing since last X-ray 5.6 Contro							ths					
Total Number of Epiphyseal Centers Missing for Chronological Age 203 Average Number of Epiphyseal Centers Missing for Chronological Age 13.5 Total Number of Previously missing Ossific Centers Appearing since last X-ray 97 Average Number of Previously Missing Ossific Centers Appearing since last X-ray 5.6 Contro Novem	<b>53 57 E</b>	5 -] 5e  8	4] 6 <b>3</b> - 60 - 1		Bone Age I	etardation 7.06 mon			Retardation	2,3 months		
Total Number of Epiphyseal Centers Missing for Chronological Age 203 Average Number of Epiphyseal Centers Missing for Chronological Age 13.5 Total Number of Previously missing Ossific Centers Appearing since last X-ray 97 Average Number of Previously Missing Ossific Centers Appearing since last X-ray 5.6 Contro Notes 4 MX A X - X X X X X X X X X X X X X - X	58 5	5	4 - 65 60 67 61	<b>3-9-</b> 26	Bone Age I	Retarded 2 yrs. 7 mos.	2	14 4	Retardation	2,3 months 5 yrs, 6 mos.	4-6	Retarded 1 yr. 2 moe.
Total Number of Epiphyseal Centers Missing for Chronological Age 203 Average Number of Epiphyseal Centers Missing for Chronological Age 13.5 Total Number of Previously missing Ossific Centers Appearing since last X-ray 77 Average Number of Previously Missing Ossific Centers Appearing since last X-ray 5.6 Contre Noves 4 N X A X - A X - A X X X X X X X X X X X X	58 5	5			Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yrs.	Retarded 2 yrs. 7 mos. Retarded 11 mos. Retarded 1 yr.		3 2	Retardation 3 yre= 6 mos. 4 yrs= 1 mos	2,3 months 5 yrs, 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos.	4-3,5	2 moe. Retarded 1 y, 1.5 m Retarded 8 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 203 Average Number of Epiphyseal Centers Missing for Chronological Age 13.5 Total Number of Previously missing Ossific Centers Appearing since last X-ray 77 Average Number of Previously Missing Ossific Centers Appearing since last X-ray 5.6 Contre Nover 4 M X A X - A X X X X 22 X 26 - X - X X X X X X X - 50 Contre Nover 4 M X A X X X X X X X X X X - X - X - 53 X X 557 X 56 X - X - X - 14 P X X X X X X X X X X X X X X X - X - X	58 53		61		Bone Age 1 3 yrs. 1 mo. 4 y- Cm. 2 yrs. 5 mos.	Retarded 2 yrs. 7 mos. Retarded 1 mos.	2	3 2	Retardation	2,5 months 5 yrs, 6 mos. 4 yrs, 6 mos.		2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 203 Average Number of Epiphyseal Centers Missing for Chronological Age 13.5 Total Mumber of Previously missing Ossific Centers Appearing since last X-ray 77 Average Number of Previously Missing Ossific Centers Appearing since last X-ray 5.6 Contre Moven 4 $M \times A \times X \times X$	58 5		61	5-5-17 4-4-23 4-0-20	Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yre. 5 mose. 3 yre.	Retarded 2 yrs. 7 mos. Retarded 1 mos. Retarded 1 yrs. 11.mos.	2	3 2 8 3 1 3	Retardation 3 yre= 6 mos. 4 yrs= 1 mo. 3 yrs= 6 mos.	2,3 months 5 yrs, 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos.	4-3,5	2 moe. Retarded 1 y, 1.5 m Retarded 8 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 203 Average Number of Epiphyseal Centers Missing for Chronological Age 13.5 Total Number of Previously missing Ossific Centers Appearing since last X-ray $77$ Average Number of Previously Missing Ossific Centers Appearing since last X-ray $5.6$ Contro Novem 4 M X A X - A X X X X 25 X 26 - X - X X X X X X X X X - 59 Movem 4 M X A X - A X X X X X X X X - X - X -	58 5		61	5-5-17 4-4-23 4-0-20	Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 9 3 yre. 2 yrs.	Retarded 2 yrs. 7 mos. Retarded 11 mos. Retarded 11 yr. 11.mos. Advanced 10 mos. Retarded 11 mos. Retarded 1 yr.	2 2 3 1	3 2 8 3 1 3	Retardation 3 yre= 6 mos. 4 yrs= 1 mo. 3 yrs= 6 mos. 4 yrs= 9 mos.	2,3 months 5 yrs, 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 0 mos. 4 yrs-11 mos.	4-3,5 3-8 4-10	2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 203 Average Number of Epiphyseal Centers Missing for Chronological Age 13.5 Total Number of Previously missing Ossific Centers Appearing since last X-ray 77 Average Number of Previously Missing Ossific Centers Appearing since last X-ray 77 Average Number of Previously Missing Ossific Centers Appearing since last X-ray 77 Average Number of Previously Missing Ossific Centers Appearing since last X-ray 5.6 Contre Nover $4 \frac{M}{X} \frac{A}{X} - \frac{A}{X} - \frac{A}{X} \frac{X}{X} \frac$	58 5		61	5-5-17 4-4-23 4-0-20 5-11-29	Bone Age 7 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 9 3 yre.	Retarded 2 yrs. 7 mos. Retarded 11 mos. Advanced 11 mos. Retarded 11 mos.	2 2 3 1 5 5	3     2       8     3       1     8       6     1       11     4	Retardation 3 yre= 6 mos. 4 yrs= 1 mo. 3 yrs= 6 mos. 4 yre= 9 mos. 3 yrs= 0 mos.	2,5 months 5 yrs, 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 1 mos. 3 yrs. 0 mos.	4-3,5 3-8 4-10 3-0	2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos. Retarded 11 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 203 Average Number of Epiphyseal Centers Missing for Chronological Age 13.5 Total Number of Previously missing Ossific Centers Appearing since last X-ray ff Average Number of Previously Missing Ossific Centers Appearing since last X-ray ff Average Number of Previously Missing Ossific Centers Appearing since last X-ray ff Average Number of Previously Missing Ossific Centers Appearing since last X-ray 5.6 Contre Novem $4 \frac{1}{2} \times \frac{1}{2} \times$	58 5		61	<u>5-5-17</u> <u>4-4-23</u> <u>4-0-20</u> <u>5-11-24</u> <u>3-6-23</u>	Bone Age 1 3 yrs. 1 mo. 4 y- Cm. 2 yrs. 3 yrs. 2 mos. 9 3 yrs. 2 pros. 2 yrs. 2 yrs. 2 yrs. 2 yrs. 2 yrs.	Retarded 2 yrs. 7 mos. Retarded 1 mos. Retarded 1 mos. Retarded 1 yr. Advanced (e mos. Retarded 1 yr. 4 mos. Retarded 1 yr.	2 2 3 1 5 5	3     2       8     3       1     3       6     1       11     4       10     3	Retardation 3 yree 6 mos. 4 yrs- 1 mo. 3 yrs- 6 mos. 4 yre- 9 mos. 3 yrs- 0 mos. 3 yrs- 0 mos.	2,3 months 5 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 1 mos. 3 yrs. 0 mos. 3 yrs. 3 mos.	4-3,5 3-8 4-10 3-0 3-1.5	2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos. Retarded 11 mos. Retarded 4.5 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 203 Average Number of Epiphyseal Centers Missing for Chronological Age 13.5 Total Number of Previoualy missing Ossific Centers Appearing since last X-ray 77 Average Number of Previoualy Missing Ossific Centers Appearing since last X-ray 5.6 Contr: More: 4 M X A X - A X - X X X 22 X 26 - X - X X X X X X X X - 55 6022 p X X X X X X X X X X X X X X - X - X -	58 5		61	5-5-17           4-4-23           4-0-20           5-11-29           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-25	Bone Age 1 3 yrs. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yrs. 2 mos. 9 3 yrs. 2 mos. 2 yrs. 2 mos. 2 yrs. 2 mos. 2 yrs. 5 mos.	Retarded 2 yrs. 7 mos. Retarded 2 yrs. 7 mos. Retarded 11 mos. Retarded 1 yr. 11 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 mos. Retarded 1 mos. Retarded 1 mos.	2 2 3 1 5 5	3     2       8     3       1     3       6     1       11     4       10     3       12     1	Retardation 3 yre= 6 mos. 4 yrs= 1 mo. 3 yrs= 6 mos. 4 yre= 9 mos. 3 yrs= 0 mos. 3 yrs= 0 mos. 2 yrs= 6 mos.	2.5 months 5 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 1 mos. 3 yrs. 0 mos. 3 yrs. 3 mos. 3 yrs. 6 mos.	4-3,5 3-8 4-10 3-0 3-1.5 3-0	2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos. Retarded 11 mos. Retarded 4.5 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 10 mos. Advanced 4 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 203         Average Number of Epiphyseal Centers Missing Costfic Centers Appearing since last X-ray 77         Average Number of Previously Missing Ossific Centers Appearing since last X-ray 5.6         Contrological Age 13.5         Model Street	58 5		61	5-5-17           4-4-23           4-0-20           3-11-20           3-6-23           3-6-20           3-6-21           3-6-21           3-6-21           3-6-21           3-6-21           3-6-21           3-6-21           3-6-21           3-6-21           3-6-21           3-6-21           3-6-21           3-6-21           3-6-21           3-6-21           3-7           3-7           3-7           3-7           3-7           3-7           3-7	Bone Age 7 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 9 3 yre. 2 yre.	Retarded 2 yrs. 7 mos. Retarded 2 yrs. 7 mos. Retarded 11 mos. Retarded 1 yr. 11.mos. Advanced 10 mos. Retarded 11 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 5 mos. Retarded 11 mos. Retarded 11 mos. Retarded 11 mos. Retarded 3 mos.	2 2 3 1 5 5	3     2       8     3       1     3       6     1       11     4       10     3       12     1       10     First X-ray	Retardation 3 yree 6 mos. 4 yrs- 1 mo. 3 yrs- 6 mos. 4 yre- 9 mos. 3 yrs- 0 mos. 3 yrs- 0 mos. 2 yrs- 6 mos. 2 yrs- 6 mos. 3 yrs- 0 mos. 2 yrs- 3 mos. 2 yrs- 3 mos.	2,3 months 5 yrs, 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 7 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 7 mos. 2 yrs. 9 mos. 2 yrs. 9 mos. 2 yrs. 5 mos.	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 3-6 2-4	2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos. Retarded 11 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 10 mos. Advanced 4 mos. Retarded 6 mes.
Total Number of Epiphyseal Centers Missing for Chronological Age 13.5         Average Number of Epiphyseal Centers Missing Conters Appearing since last X-ray TT         Average Number of Epiphyseal Centers Missing Centers Appearing since last X-ray TT         Average Number of Previously Missing Centers Appearing since last X-ray 5.6         Contr       Previously Missing Centers Missing Centers Appearing since last X-ray 5.6         Contr       Previously Missing Centers Appearing since last X-ray 5.6         Contr       Previously Missing Centers Appearing since last X-ray 5.6         Contr       Previously Missing Centers Appearing since last X-ray 5.6         Contr       Previously Missing Centers Appearing since last X = A = X = X = X = X = X = X = X = X =	58 5		61	5-5-17           4-4-23           4-0-20           5-11-29           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-23           3-6-25	Bone Age 7 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 9 3 yre. 2 yre. 2 mos. 2 yre. 2 yre. 2 yre. 2 yre. 2 yre. 2 yre. 2 yre. 2 yre. 2 yre. 2 yre.	Retarded 2 yrs. 7 mos. Retarded 2 yrs. 7 mos. Retarded 11 mos. Retarded 1 yr. 11 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 mos. Retarded 1 mos. Retarded 1 mos.	2 2 3 1 5 5	3     2       8     3       1     3       6     1       11     4       10     3       12     1       10     First X-ray	Retardation 3 yre= 6 mos. 4 yrs= 1 mo. 3 yrs= 6 mos. 3 yrs= 6 mos. 3 yrs= 0 mos. 3 yrs= 0 mos. 2 yrs= 6 mos. 2 yrs= 6 mos. 3 yrs= 3 mos. 3 yrs= 3 mos.	2.5 months 5 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 0 mos. 4 yrs. 1 mos. 3 yrs. 0 mos. 3 yrs. 3 mos. 3 yrs. 2 mos. 2 yrs. 9 mos. 3 yrs. 9 mos.	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 3-6	2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos. Retarded 11 mos. Retarded 4.5 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 10 mos. Advanced 4 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 203         Average Number of Epiphyseal Centers Missing Ossific Centers Appearing since last X-ray 77         Average Number of Previously Missing Ossific Centers Appearing since last X-ray 77         Average Number of Previously Missing Ossific Centers Appearing since last X-ray 77         Average Number of Previously Missing Ossific Centers Appearing since last X-ray 56         6002       F x x x x x x x x x x x x x x x x x x x	58 5		61	$     \begin{array}{r}                                     $	Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 9 3 yre. 2 yrs. 2 yrs. 2 mos. 2 yrs. 2 yrs. 2 mos. 2 yrs. 2 yrs. 2 mos. 2 yrs. 2 yrs. 2 mos. 2 yrs. 2 mos. 2 yrs. 2 mos. 2 yrs. 2 mos. 2 yrs. 3 mos. 2 yrs. 2 mos. 2 yrs. 3 mos. 2 yrs. 2 mos. 2 mos. 2 mos. 2 yrs. 3 mos. 2 yrs. 2 mos. 2 mos.	Retarded 2 yrs. 7 mos. Retarded 2 yrs. 7 mos. Retarded 11 mos. Retarded 1 yr. 11.mos. Advanced 10 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 mos. Retarded 11 mos. Retarded 3 mos. Retarded 3 mos.	2 2 3 1 5 5 4 7 5 3 0 2	3       2         8       3         1       3         6       1         11       4         10       3         12       1         10       First         X-ray       6         6       10         7       7         8       10         9       First         2       3         6       10         6       10         6       First	Retardation 3 yre= 6 mos. 4 yrs= 1 mo. 3 yrs= 6 mos. 4 yrs= 1 mo. 3 yrs= 6 mos. 3 yrs= 0 mos. 3 yrs= 0 mos. 2 yrs= 6 mos. 2 yrs= 3 mos. 2 yrs= 3 mos. 2 yrs= 3 mos. 2 yrs= 6 mos. 3 yrs= 0 mos.	2,5 months 5 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 3 mos. 3 yrs. 7 mos. 2 yrs. 9 mos. 3 yrs. 5 mos. 2 yrs. 6 mos.	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 3-6 2-4 2-6	2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos. Retarded 11 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 10 mos. Advanced 4 mos. Retarded 6 mos. Retarded 6 mos. Retarded 1 mos.
Intel Number of Epiphyseal Centers Missing for Chronological Age 13.5         Average Number of Epiphyseal Centers Missing Coeffic Centers Appearing since last X-ray 77         Average Number of Previously Missing Coeffic Centers Appearing since last X-ray 77         Average Number of Previously Missing Coeffic Centers Appearing since last X-ray 5.6         Contr         Average Number of Previously Missing Coeffic Centers Appearing since last X-ray 5.6         Contr         Average Number of Previously Missing Coeffic Centers Appearing since last X-ray 5.6         Contr         Average Number of X x x x x x x x x x x x x x x x x x x	58 5		61	$   \begin{array}{r}     5-5-17 \\     4-4-23 \\     4-6-20 \\     5-11-24 \\     3-6-23 \\     3-6-23 \\     3-6-23 \\     3-6-2 \\     3-4-9 \\     3-2-5 \\     2-10-10 \\     2-9 \\     2-2-20 \\     2-6-5 \\     2-5-6 \\   \end{array} $	Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 2 yre. 2 mos. 2 yre. 2 yre. 3 yre. 3 yre. 2 yre. 2 mos. 2 yre. 2 mos. 2 yre. 2 mos.	Retarded 2 yrs. 7 mos. Retarded 1 mos. Retarded 1 yr. 11.mos. Retarded 1 yr. Advanced 10 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 mos. Retarded 1 mos. Retarded 3 mos. Retarded 3 mos. Retarded 5 mos. Retarded 7 mos. Retarded 7 mos.	2 2 3 1 5 5 4 7 5 4 7 5 3 0 2 4 10	3       2         8       3         1       3         6       1         11       4         10       3         12       1         10       First         X-ray       6         2       8         6       10         6       First         X-ray       10         6       First         X-ray       16         First       First	Retardation 3 yre- 6 mos. 4 yrs- 1 mo. 3 yrs- 6 mos. 4 yrs- 1 mos. 3 yrs- 6 mos. 3 yrs- 0 mos. 3 yrs- 0 mos. 2 yrs- 6 mos. 2 yrs- 3 mos. 2 yrs- 3 mos. 2 yrs- 6 mos. 2 yrs- 7 mos. 2 yrs- 11 mos. 1 yr- 9 mos.	2,5 months 5 yrs, 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 7 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 7 mos. 2 yrs. 9 mos. 2 yrs. 5 mos. 2 yrs. 11 mos 2 yrs. 5 mos.	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 3-6 2-4 2-6 2-9 2-11 2-0	2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos. Retarded 10 mos. Retarded 4.5 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 10 mos. Advanced 4 mos. Retarded 5 mos. Retarded 5 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 13.5         Average Number of Epiphyseal Centers Missing Centers Appearing since last X-ray 77         Average Number of Previously Missing Centers Appearing since last X-ray 77         Average Number of Previously Missing Centers Appearing since last X-ray 5.6         Contrological Age 13.5         Of Previously Missing Centers Appearing since last X-ray 5.6         Contrological Age 13.5         Of Previously Missing Centers Appearing since last X-ray 5.6         Contrological Age 13.5         Of Previously Missing Centers Appearing since last X-ray 5.6         Contrological Age 13.5         Of Previously Missing Centers Appearing since last X-ray 5.6         Contrological Age 13.5         Of Previously Missing Centers Appearing since last X-ray 5.6         Of X X X X X X X X X X X X X X X X X X X	58 5		61	$   \begin{array}{r}     5-5-17 \\     4-4-23 \\     4-6-20 \\     5-11-24 \\     3-6-23 \\     3-6-23 \\     3-6-23 \\     3-6-2 \\     3-4-9 \\     3-2-5 \\     2-10-10 \\     2-9 \\     2-2-20 \\     2-6-5 \\     2-5-6 \\   \end{array} $	Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 2 yre. 2 mos. 2 yre. 2 yre. 3 yre. 3 yre. 2 yre. 2 mos. 2 yre. 2 mos. 2 yre. 2 mos.	Retarded 2 yrs. 7 mos. Retarded 2 yrs. 7 mos. Retarded 11 mos. Retarded 1 yr. 11.mos. Advanced 10 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 5 mos. Retarded 1 mos. Retarded 1 mos. Retarded 3 mos. Retarded 5 mos. Retarded 7 mos. Advanced 7 mos.	2 2 3 1 5 5 4 7 5 3 0 2 4 10 5	3       2         8       3         1       3         6       1         11       4         10       3         12       1         10       First         X-ray       6         6       10         6       First         X-ray       2         8       6         6       First         X-ray       16         First       X-ray         16       First         5       First         X-ray       16	Retardation 3 yre- 6 mos. 4 yrs- 1 mo. 3 yrs- 6 mos. 3 yrs- 6 mos. 3 yrs- 0 mos. 3 yrs- 0 mos. 2 yrs- 6 mos. 2 yrs- 6 mos. 2 yrs- 3 mos. 3 yrs- 3 mos. 2 yrs- 5 mos. 2 yrs- 6 mos. 2 yrs- 7 mos. 2 yrs- 7 mos. 3 yrs- 0 mos. 2 yrs- 1 mos.	2,5 months 5 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 0 mos. 4 yrs. 11 mos. 3 yrs. 3 mos. 3 yrs. 3 mos. 3 yrs. 9 mos. 2 yrs. 5 mos. 2 yrs. 6 mos. 2 yrs. 6 mos. 2 yrs. 11 mos	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 3-6 2-4 2-8 2-11 2-0 2-8	2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos. Retarded 11 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 6 mos. Retarded 6 mos. Retarded 6 mos. Retarded 6 mos. Retarded 1 mos. Advanced 5 mos. Retarded 5 mos. Retarded 5 mos. Advanced 4 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 13.5         Total Number of Epiphyseal Centers Missing for Chronological Age 13.5         Total Number of Epiphyseal Centers Missing Control Centers Appearing since last X-ray Ff         Average Number of Previously Missing Cosific Centers Appearing since last X-ray Ff         Average Number of Previously Missing Cosific Centers Appearing since last X-ray Ff         Average Number of Previously Missing Cosific Centers Appearing since last X-ray Ff         Average Number of X X X X X X X X X X X X X X X X X X	58 5		61	$   \begin{array}{r}     5-5-17 \\     4-4-23 \\     4-6-20 \\     5-11-24 \\     3-6-23 \\     3-6-23 \\     3-6-23 \\     3-6-2 \\     3-4-9 \\     3-2-5 \\     2-10-10 \\     2-9 \\     2-2-20 \\     2-6-5 \\     2-5-6 \\   \end{array} $	Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 9 3 yre. 2 yrs. 2 mos. 2 yrs. 2 yrs. 2 mos. 2 yrs. 2 yrs. 2 mos. 2 yrs. 2 yrs. 2 mos. 2 yrs. 2 mos. 2 yrs. 2 mos. 2 yrs. 2 mos. 2 yrs. 2 mos. 2 yrs. 2 yrs. 2 mos. 2 yrs. 2 yrs. 2 mos. 2 yrs. 2 yrs. 3 yr. 3 yr. 4 yr. 3	Retarded 2 yrs. 7 mos. Retarded 1 mos. Retarded 1 yr. 11.mos. Retarded 1 yr. Advanced 10 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 mos. Retarded 1 mos. Retarded 3 mos. Retarded 3 mos. Retarded 5 mos. Retarded 7 mos. Retarded 7 mos.	2 2 3 1 5 5 4 7 5 3 0 2 4 10 5	3       2         8       3         1       3         6       1         11       4         10       3         12       1         10       First         X-ray       6         6       10         6       First         2       -8         6       10         6       First         X-ray       10         6       First         X-ray       10         6       First         X-ray       10	Retardation 3 yre- 6 mos. 4 yrs- 1 mo. 3 yrs- 6 mos. 4 yrs- 1 mos. 3 yrs- 6 mos. 3 yrs- 0 mos. 3 yrs- 0 mos. 2 yrs- 6 mos. 2 yrs- 3 mos. 2 yrs- 3 mos. 2 yrs- 6 mos. 2 yrs- 7 mos. 2 yrs- 11 mos. 1 yr- 9 mos.	2,5 months 5 yrs, 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 7 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 7 mos. 2 yrs. 9 mos. 2 yrs. 5 mos. 2 yrs. 11 mos 2 yrs. 5 mos.	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 3-6 2-4 2-6 2-9 2-11 2-0	2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos. Retarded 10 mos. Retarded 4.5 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 10 mos. Advanced 4 mos. Retarded 5 mos. Retarded 5 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 13.5         Total Number of Epiphyseal Centers Missing for Chronological Age 13.5         Total Number of Previously Missing Costific Centers Appearing since last X-ray 77         Average Number of Previously Missing Costific Centers Appearing since last X-ray 5.6         Contrest Appearing since last X-ray 5.6         Contrest XX X X X X X X X X X X X X X X X X X	58 5		61	$   \begin{array}{r}     5-5-17 \\     4-4-23 \\     4-6-20 \\     5-11-20 \\     5-11-20 \\     3-6-23 \\     3-6-23 \\     3-6-23 \\     3-6-2 \\      3-6-2 \\      3-6-$	Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 9 3 yre. 2 yrs. 2 mos. 2 yrs. 2 yrs. 2 mos. 2 yrs. 2 yrs. 3 yre. 2 yrs. 2 mos. 2 yrs. 2 yrs. 2 yrs. 2 yrs. 2 yrs. 2 yrs. 2 mos. 2 yrs. 2 yrs. 3 yrs.	Retarded 2 yrs. 7 mos. Retarded 2 yrs. 7 mos. Retarded 11 mos. Retarded 1 yr. 11.mos. Advanced 10 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 5 mos. Retarded 1 mos. Retarded 1 mos. Retarded 3 mos. Retarded 3 mos. Retarded 3 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos.	2 2 3 1 5 5 4 7 5 3 0 2 4 10 5	3       2         8       3         1       3         6       1         11       4         10       3         12       1         10       First         X-ray       6         6       First         X-ray       2         6       First         7       First         8       6         10       First         X-ray       2         16       First         X-ray       16         7       First         X-ray       13         First       X-ray	Retardation 3 yre= 6 mos. 4 yrs= 1 mo. 3 yrs= 6 mos. 4 yrs= 0 mos. 3 yrs= 0 mos. 3 yrs= 0 mos. 2 yrs= 6 mos. 2 yrs= 6 mos. 2 yrs= 7 mos. 2 yrs= 3 mos. 2 yrs= 3 mos. 2 yrs= 0 mos. 2 yrs= 0 mos. 2 yrs= 11 mos. 1 yr= 1 mo.	2,5 months 5 yrs, 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 7 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 7 mos. 2 yrs. 7 mos. 2 yrs. 6 mos. 2 yrs. 6 mos. 2 yrs. 6 mos. 2 yrs. 6 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 5 mos.	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 3-6 2-4 2-8 2-11 2-0 2-8	2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos. Retarded 11 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 6 mos. Retarded 6 mos. Retarded 6 mos. Retarded 6 mos. Retarded 1 mos. Advanced 5 mos. Retarded 5 mos. Retarded 5 mos. Advanced 4 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 23.3         Arcrace Number of Epiphyseal Centers Missing Conters Appearing since last X-ray Tf         Arcrace Number of Previously Missing Contific Centers Appearing since last X-ray 5.6         Contr       ************************************	58 5		61	$   \begin{array}{r}     5-5-17 \\     4-4-23 \\     4-6-20 \\     5-11-20 \\     5-11-20 \\     3-6-23 \\     3-6-23 \\     3-6-23 \\     3-6-2 \\      3-6-2 \\      3-6-$	Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 9 3 yre. 2 yrs. 2 mos. 2 mos.	Retarded 2 yrs. 7 mos. Retarded 2 yrs. 7 mos. Retarded 11 mos. Retarded 1 yr. 11.mos. Advanced 10 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 5 mos. Retarded 1 mos. Retarded 1 mos. Retarded 3 mos. Retarded 3 mos. Retarded 3 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos.	2 2 3 1 5 5 4 7 5 3 0 2 4 10 5	3       2         8       3         1       3         6       1         11       4         10       3         12       1         10       First         X-ray       6         6       First         X-ray       2         8       6         6       First         X-ray       16         First       X-ray         16       First         X-ray       13         13       First         X-ray       13	Retardation 3 yre= 6 mos. 4 yrs= 1 mo. 3 yrs= 6 mos. 4 yrs= 0 mos. 3 yrs= 0 mos. 3 yrs= 0 mos. 2 yrs= 6 mos. 2 yrs= 6 mos. 2 yrs= 7 mos. 2 yrs= 3 mos. 2 yrs= 3 mos. 2 yrs= 0 mos. 2 yrs= 0 mos. 2 yrs= 11 mos. 1 yr= 1 mo.	2,5 months 5 yrs, 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 7 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 7 mos. 2 yrs. 7 mos. 2 yrs. 6 mos. 2 yrs. 6 mos. 2 yrs. 6 mos. 2 yrs. 6 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 5 mos.	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 3-6 2-4 2-8 2-11 2-0 2-8	2 mos. Retarded 1 y, 1.5 m Retarded 8 mos. Advanced 10 mos. Retarded 11 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 6 mos. Retarded 6 mos. Retarded 6 mos. Retarded 6 mos. Retarded 1 mos. Advanced 5 mos. Retarded 5 mos. Retarded 5 mos. Advanced 4 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 23.3         Arcrace Number of Epiphyseal Centers Missing Conters Appearing since last X-ray Tf         Arcrace Number of Previously Missing Contific Centers Appearing since last X-ray 5.6         Contr       ************************************	58 5		61	$   \begin{array}{r}     5-5-17 \\     4-4-23 \\     4-6-20 \\     5-11-24 \\     3-6-23 \\     3-6-23 \\     3-6-23 \\     3-6-2 \\     3-4-9 \\     3-2-5 \\     2-10-10 \\     2-6-2 \\     2-6-2 \\     2-6-2 \\     2-5-6 \\     2-4-23 \\     2-2-17 \\     2-1-13 \\   \end{array} $	Bone Age 7 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 9 3 yre. 2 yrs. 2 mos. 2 yrs. 2 yrs.	Retarded 2 yrs. 7 mos. Retarded 2 yrs. 7 mos. Retarded 1 yr. 11.mos. Advanced 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 5 mos. Retarded 1 mos. Retarded 1 mos. Retarded 3 mos. Retarded 3 mos. Retarded 5 mos. Retarded 7 mos. Advanced 7 mos. Advanced 1 mo. Retarded 6 mos. Retarded 6 mos. Retarded 2 mos.	2 2 3 1 5 5 4 7 5 3 0 2 4 10 5 3 4	3       2         8       3         1       3         6       1         11       4         10       3         12       1         10       First         X-ray       6         6       First         X-ray       2         8       6         6       First         X-ray       16         First       X-ray         16       First         X-ray       13         13       First         X-ray       11         11       4	Retardation 3 yre= 6 mos. 4 yrs= 1 mo. 3 yrs= 6 mos. 4 yrs= 0 mos. 3 yrs= 0 mos. 3 yrs= 0 mos. 2 yrs= 6 mos. 2 yrs= 6 mos. 2 yrs= 7 mos. 2 yrs= 3 mos. 2 yrs= 0 mos. 2 yrs= 0 mos. 2 yrs= 11 mos. 1 yr= 9 mos. 2 yrs= 1 mo.	2,5 months 5 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 0 mos. 4 yrs. 1 mos. 3 yrs. 0 mos. 3 yrs. 3 mos. 3 yrs. 7 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 1 mos.	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 2-6 2-4 2-8 2-9 2-11 2-0 2-8 1-10 2 yrs. .5 mos.	2 mos. Retarded I y, 1.5 m Retarded I y, 1.5 m Retarded 8 mos. Advanced 10 mos. Retarded 11 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 6 mos. Retarded 10 mos. Advanced 4 mos. Retarded 5 mos. Advanced 5 mos. Retarded 5 mos. Retarded 5 mos. Advanced 4 mos. Retarded 4 mos. Retarded 4 mos.
Intel Number of Epiphyseal Centers Missing for Chronological Age 203         Arcruss Number of Epiphyseal Centers Missing Con Chronological Age 13.5         Intel Number of Previously missing Ossific Centers Appearing since last X-ray Tf.         Arcruss Number of Previously Missing Ossific Centers Appearing since last X-ray Tf.         Arcruss Number of Previously Missing Ossific Centers Appearing since last X-ray 5.6         Ontri         None         4       X <td< td=""><td>58 5</td><td></td><td>61</td><td><math display="block">   \begin{array}{r}     5-5-17 \\     4-4-23 \\     4-6-20 \\     5-11-29 \\     3-6-23 \\     3-6-23 \\     3-6-23 \\     3-6-23 \\     3-2-5 \\     2-10-10 \\     2-9 \\     2-2-20 \\     2-6-20 \\     2-6-20 \\     2-6-5 \\     2-5-6 \\     2-4-23 \\     2-2-17 \\   \end{array} </math></td><td>Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 2 yrs. 2 mos. 2 yrs. 2 mos. 2 yrs. 5 mos. 2 yrs. 2 yrs. 2 yrs. 2 yrs. 2 yrs. 2 yrs. 2 yrs. 2 yrs. 2 yrs. 2 mos. 3 y. 1 ms. 22 mos. 1 yr.</td><td>Retarded 2 yrs. 7 mos. Retarded 11 mos. Retarded 11 mos. Retarded 1 yr. 11.mos. Advanced 10 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 mos. Retarded 1 mos. Retarded 3 mos. Retarded 3 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos. Retarded 6 mos. Retarded 6 mos. Retarded 2 mos. Retarded 2 mos. Retarded 2 mos.</td><td>2 2 3 1 5 5 4 7 5 3 0 2 4 10 5 3 4 5</td><td>3       2         8       3         1       3         6       1         11       4         10       3         12       1         10       First         X-ray       6         7       First         X-ray       2         8       6         10       First         X-ray       2         8       First         X-ray       13         13       First         X-ray       13         11       4         28       First         X-ray</td><td>Retardation 3 yre- 6 mos. 4 yrs- 1 mo. 3 yrs- 6 mos. 4 yrs- 9 mos. 3 yrs- 0 mos. 3 yrs- 0 mos. 3 yrs- 0 mos. 2 yrs- 6 mos. 2 yrs- 6 mos. 2 yrs- 3 mos. 3 yrs- 3 mos. 2 yrs- 6 mos. 2 yrs- 6 mos. 3 yrs- 1 mos. 1 yr- 9 mos. 2 yrs- 1 mos. 1 yr- 9 mos. 2 yrs- 1 mos. 1 yr- 7 mos.</td><td>2,5 months 5 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 7 mos. 2 yrs. 9 mos. 2 yrs. 7 mos. 2 yrs. 6 mos. 2 yrs. 6 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 1 mos. 2 yrs. 1 mos. 1 yr. 4 mos.</td><td>4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 2-6 2-4 2-6 2-9 2-11 2-0 2-11 2-0 2-8 1-10 2 yrs. .5 mos. 1-5.5</td><td>2 mos. 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Retarded 3 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos. Retarded 6 mos. Retarded 6 mos. Retarded 2 mos. Retarded 2 mos. Retarded 2 mos.	2 2 3 1 5 5 4 7 5 3 0 2 4 10 5 3 4 5	3       2         8       3         1       3         6       1         11       4         10       3         12       1         10       First         X-ray       6         7       First         X-ray       2         8       6         10       First         X-ray       2         8       First         X-ray       13         13       First         X-ray       13         11       4         28       First         X-ray	Retardation 3 yre- 6 mos. 4 yrs- 1 mo. 3 yrs- 6 mos. 4 yrs- 9 mos. 3 yrs- 0 mos. 3 yrs- 0 mos. 3 yrs- 0 mos. 2 yrs- 6 mos. 2 yrs- 6 mos. 2 yrs- 3 mos. 3 yrs- 3 mos. 2 yrs- 6 mos. 2 yrs- 6 mos. 3 yrs- 1 mos. 1 yr- 9 mos. 2 yrs- 1 mos. 1 yr- 9 mos. 2 yrs- 1 mos. 1 yr- 7 mos.	2,5 months 5 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 7 mos. 2 yrs. 9 mos. 2 yrs. 7 mos. 2 yrs. 6 mos. 2 yrs. 6 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 1 mos. 2 yrs. 1 mos. 1 yr. 4 mos.	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 2-6 2-4 2-6 2-9 2-11 2-0 2-11 2-0 2-8 1-10 2 yrs. .5 mos. 1-5.5	2 mos. Retarded 1 y, 1.5 m Retarded 1 mos. Advanced 10 mos. Retarded 10 mos. Retarded 4.5 mos. Retarded 4.5 mos. Retarded 10 mos. Advanced 4 mos. Retarded 6 mes. Retarded 6 mes. Retarded 5 mos. Advanced 5 mos. Advanced 4 mos. Retarded 4 mos. Retarded 4 mos. Retarded 4 mos. Retarded 4 mos.
Total Number of Epiphyseal Centers Missing for Chronological Age 203         Arcrare Number of Epiphyseal Centers Missing for Chronological Age 13.5         Total Number of Previously Missing Centers Appearing since last X-ray 5.6         Ontri         ************************************				$   \begin{array}{r}     5-5-17 \\     4-4-23 \\     4-6-20 \\     5-11-24 \\     3-6-23 \\     3-6-23 \\     3-6-23 \\     3-6-2 \\     3-4-9 \\     3-2-5 \\     2-10-10 \\     2-6-2 \\     2-6-2 \\     2-6-2 \\     2-5-6 \\     2-4-23 \\     2-2-17 \\     2-1-13 \\   \end{array} $	Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 9 3 yre. 2 yrs. 2 mos. 2 yrs. 2 yrs.	Retarded 2 yrs. 7 mos. Retarded 2 yrs. 7 mos. Retarded 1 mos. Retarded 1 yr. 11.mos. Advanced 10 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 mos. Retarded 1 mos. Retarded 3 mos. Retarded 3 mos. Retarded 3 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos. Retarded 6 mos. Retarded 6 mos. Retarded 2 mos. Retarded 10 mos. Retarded 10 mos. Retarded 10 mos.	2 2 3 1 5 5 5 4 7 5 3 0 2 4 10 5 3 4 10 5 3 4 4 5 Chronu	3       2         8       3         1       8         6       1         11       4         10       3         12       1         10       First         X-ray       6         6       First         X-ray       2         8       6         6       First         X-ray       16         First       X-ray         16       First         X-ray       13         13       First         X-ray       13         11       4         28       First         X-ray       11         28       First         X-ray       10         11       4	Retardation 3 yre= 6 mos. 4 yrs= 1 mo. 3 yrs= 6 mos. 4 yrs= 0 mos. 3 yrs= 0 mos. 3 yrs= 0 mos. 2 yrs= 0 mos. 2 yrs= 0 mos. 2 yrs= 0 mos. 2 yrs= 3 mos. 2 yrs= 0 mos. 2 yrs= 0 mos. 2 yrs= 0 mos. 2 yrs= 11 mos. 1 yr= 9 mos. 1 yr= 1 mo. 1 yr= 7 mos. Average Bone A Are Based on P	2,5 months 5 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 0 mos. 4 yrs. 1 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 2 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 1 mos. 3 yrs. 1 mos. 4 yrs. 1 mos. 3 yrs. 1 mos. 4 yrs. 1 mos. 4 yrs. 1 mos. 4 yrs. 1 mos. 5 mos. 4 yrs. 1 mos. 5 mos.	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 2-4 2-4 2-4 2-4 2-4 2-4 2-4 2-4 2-11 2-0 2-11 2-0 2-11 2-0 2-11 2-0 2-11 2-0 2-11 2-0 2-8 1-10	2 mos. Retarded 1 y, 1.5 m Retarded 1 mos. Advanced 10 mos. Retarded 11 mos. Retarded 4.5 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 10 mos. Advanced 4 mos. Retarded 6 mos. Retarded 6 mos. Retarded 5 mos. Advanced 5 mos. Advanced 5 mos. Retarded 4 mos. Retarded 4 mos. Satisfactory Retarded 4.5 mos. al
Intel Number of Épiphyseal Centers Missing for Chronological Age 283         Arcrare Menber of Epiphyseal Centers Missing for Chronological Age 13.5         Total Muster of Proviously Missing Cesific Centers Appearing since last X-ray 57         Arcrare Member of Epiphyseal Centers Missing Cesific Centers Appearing since last X-ray 56         Arcrare Member of Proviously Missing Cesific Centers Appearing since last X-ray 5.6         Arcrare Member of Proviously Missing Cesific Centers Appearing Since last X-ray 5.6         Arcrare Member of Proviously Missing Cesific Centers Appearing Since last X-ray 5.6         Arcrare Member of X 2000 Particular Since Last X-ray 5.6         Arcrare Member of X 2000 Particular Since Last X-ray 5.6         Arcrare Member of X 2000 Particular Since Last X-ray 5.6         Arcrare Member of X 2000 Particular Since Last X-ray 5.6         Arcrare Member of X 2000 Particular Since Last X-ray 5.6         Arcrare Member of X 2000 Particular Since Last X-ray 5.6         Arcrare Member of X 2000 Particular Since Last X-ray 5.6         Arcrare Member of X 2000 Particular Since Last X-ray 5.6         Arcrare Member of X 2000 Particular Since Last X-ray 5.6         Arcrare Member of X 2000 Particular Since Last X-ray 5.7         Arcrare Member of Epipheeal Centers sissing for Oasifio Center Age (not including chil	58 51 	f age) ( of sge of sge)	- X - 61 - 61 - 61 - 61 - 61 - 61 - 61 - 61	$     \begin{array}{r}                                     $	Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 9 3 yre. 2 yrs. 2 mos. 2 yrs. 2 yrs.	Retarded 2 yrs. 7 mos. Retarded 1 mos. Retarded 1 yr. 11.0000, Advanced 10 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 mos. Retarded 1 mos. Retarded 3 mos. Retarded 3 mos. Retarded 3 mos. Retarded 7 mos. Retarded 7 mos. Retarded 7 mos. Retarded 6 mos. Retarded 6 mos. Retarded 2 mos. Retarded 10 mos.	2 2 3 1 5 5 5 4 7 5 3 0 2 4 10 5 3 4 10 5 3 4 4 5 Chronu	3       2         8       3         1       8         6       1         11       4         10       3         12       1         10       First         X-ray       6         6       First         X-ray       2         8       6         6       First         X-ray       16         First       X-ray         16       First         X-ray       13         13       First         X-ray       13         11       4         28       First         X-ray       11         28       First         X-ray       10         11       4	Retardation 3 yree 6 mos. 4 yrs- 1 mo. 3 yrs- 6 mos. 4 yrs- 1 mo. 3 yrs- 6 mos. 3 yrs- 0 mos. 3 yrs- 0 mos. 3 yrs- 0 mos. 2 yrs- 3 mos. 2 yrs- 3 mos. 2 yrs- 3 mos. 2 yrs- 6 mos. 2 yrs- 3 mos. 2 yrs- 0 mos. 2 yrs- 1 mos. 1 yr- 9 mos. 2 yrs- 1 mo. 1 yr- 7 mos. Average Bons A	2,5 months 5 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 0 mos. 4 yrs. 1 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 2 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 1 mos. 3 yrs. 1 mos. 3 yrs. 1 mos. 3 yrs. 1 mos. 4 yrs. 1 mos. 5 mos. 2 yrs. 1 mos. 3 yrs. 1 mos. 4 yrs. 1 mos. 4 yrs. 1 mos. 5 mos. 4 yrs. 1 mos. 5	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 2-4 2-4 2-4 2-4 2-4 2-4 2-4 2-4 2-11 2-0 2-11 2-0 2-11 2-0 2-11 2-0 2-11 2-0 2-11 2-0 2-8 1-10	2 mos. Retarded 1 y, 1.5 m Retarded 1 mos. Advanced 10 mos. Retarded 11 mos. Retarded 4.5 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 10 mos. Advanced 4 mos. Retarded 6 mos. Retarded 6 mos. Retarded 5 mos. Advanced 5 mos. Advanced 5 mos. Retarded 4 mos. Retarded 4 mos. Satisfactory Retarded 4.5 mos. al
Total Number of Epiphyseal Centers Missing for Chronological Age 20.5         Arcraic Number of Epiphyseal Centers Missing for Chronological Age 13.5         Total Number of Proviously Missing Ossific Centers Appearing since last X-ray 5.6         Ontri         ************************************	58 51 	f age) of age of age of age	- X - 61 - 61 - 61 - 61 - 61 - 61 - 61 - 61	$   \begin{array}{r}                                     $	Bone Age 1 3 yre. 1 mo. 4 y- Cm. 2 yrs. 5 mos. 3 yre. 2 mos. 9 3 yre. 2 yrs. 2 mos. 2 yrs. 2 yrs.	Retarded 2 yrs. 7 mos. Retarded 2 yrs. 7 mos. Retarded 1 mos. Retarded 1 yr. 11.mos. Advanced 10 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 4 mos. Retarded 1 yr. 5 mos. Retarded 1 mos. Retarded 3 mos. Retarded 3 mos. Retarded 3 mos. Retarded 7 mos. Advanced 7 mos. Advanced 1 mos. Retarded 6 mos. Retarded 6 mos. Retarded 2 mos. Retarded 10 mos.	2 2 3 1 5 5 5 4 7 5 3 0 2 4 10 5 3 4 10 5 3 4 4 5 Chronu	3       2         8       3         1       8         6       1         11       4         10       3         12       1         10       First         X-ray       6         6       First         X-ray       2         8       6         6       First         X-ray       16         First       X-ray         16       First         X-ray       13         13       First         X-ray       13         11       4         28       First         X-ray       11         28       First         X-ray       10         11       4	Retardation 3 yre- 6 mos. 4 yrs- 1 mo. 3 yrs- 6 mos. 4 yrs- 1 mos. 3 yrs- 6 mos. 3 yrs- 0 mos. 3 yrs- 0 mos. 2 yrs- 6 mos. 2 yrs- 6 mos. 2 yrs- 7 mos. 1 yr- 9 mos. 1 yr- 9 mos. 1 yr- 7 mos. Average Bone A Age Based on P over 5 ysars o	2,5 months 5 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 6 mos. 4 yrs. 0 mos. 4 yrs. 1 mos. 3 yrs. 0 mos. 3 yrs. 0 mos. 3 yrs. 2 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 5 mos. 2 yrs. 1 mos. 3 yrs. 1 mos. 3 yrs. 1 mos. 3 yrs. 1 mos. 4 yrs. 1 mos. 5 mos. 2 yrs. 1 mos. 3 yrs. 1 mos. 4 yrs. 1 mos. 4 yrs. 1 mos. 5 mos. 4 yrs. 1 mos. 5	4-3,5 3-8 4-10 3-0 3-1.5 3-0 2-4 2-4 2-4 2-4 2-4 2-4 2-4 2-4 2-4 2-11 2-0 2-11 2-0 2-11 2-0 2-11 2-0 2-11 2-0 2-11 2-0 2-8 1-10	2 mos. Retarded 1 y, 1.5 m Retarded 1 mos. Advanced 10 mos. Retarded 11 mos. Retarded 4.5 mos. Retarded 4.5 mos. Retarded 6 mos. Retarded 10 mos. Advanced 4 mos. Retarded 6 mos. Retarded 6 mos. Retarded 5 mos. Advanced 5 mos. Advanced 5 mos. Retarded 4 mos. Retarded 4 mos. Satisfactory Retarded 4.5 mos. al

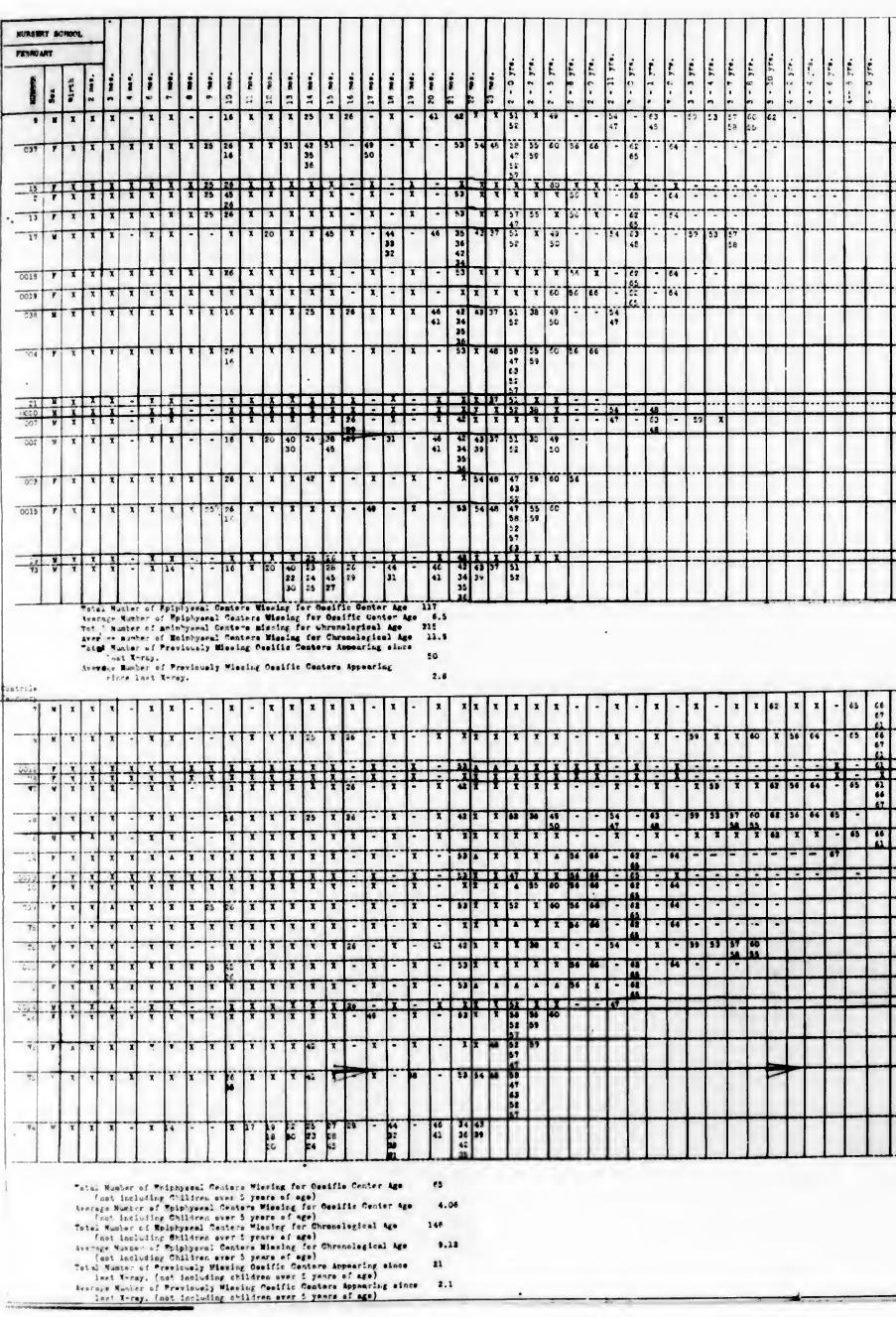
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### TABLE V, B

## EVALUATION OF ROENTGENOGRAMS - FEBRUARY, 1937



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-		PPIPHNEFA	τ.	RATING			1011	19.8	
20V TRUISCTONCHE	AGE BASED CH OSEIFIC CHNTPB	SOMPARISON TITH CHRONOLOOJOAL AGE	NUMBET SECTIME (1) CESJFIC CENTER AGE	OSSIFIC	NUMBER OF PREVICUSLY MISSING CSEIFIC CENTERS APTEARINO 8 INCZ. LAST X-RAY	CH BASES OF Find	RTRATION Kinne	AGE SASED ON PERETRATION	COMPARISON VITH CHRONOLOGICAL AGB
- 0-14	? yrs 5 mos.	Retarded 1 yr7 mos.	8	19	1	3 yrs 0 mes.	? yrs 9 mes.	3 - 4,5	Retarded 7.5 mes.
-11 - 7	2 yrs 0 mos.	Retarded 1 yr - 11 mes.	17	25	;	1 yrs 3 mos.	3 yrs 6 mes.	1 - 9.5	Petarded 2 yrs - 2.5 see
	3 yrs 2 mps. 4 yrs 6 mas.	Retarded 6 mes.			<u></u>	2 yrs 6 pes.	<u>3 378 6 888.</u> 4 yrs 0 868.	2 - 6	Notarioi 2 por.
				· · · · · · · · · · · · · · · · · · ·	1				Retarded 2 mos.
· 6-11	î yre 9 mor.	Retarded 9 mos.	9	10	4	3 yrs 0 mos.	3 yrs 6 mos.	3 - 3	Retarded I mes.
6-15	2 yrs 11 mos.	Retarded 7 mos.	17	23	5	2 770 6 800.	6 yrs 6 nes.	3 - 6	Setiefactory
5-17	2 yrs 9 200.	Petarde4 8 mos.	3	6		3 pro 0 me.	4 yrs 0 mes.	3 - 5	Betlefactory
2-10	2 yrs 2 .0s.	Retariei 1 yr	0	6	·····;	2 yrs 9 mes.	1 978 9 108.	2 - 3	Retarded 5 mes.
11- 6	57 200.	Retariet lyr 1 -e.	30	18	3	2 yrs 6 mos.	2 yrs 9 met.	? - 7.5	Batarded 3.5 mes.
10-15	98 may.	Metariad 1 yr	3	14	2	2 yrs 0 mes.	2 yrs 3 ms.	2 - 1.5	Rotarded 8.5 mea.
1-22	2	Astorded 1 mag.	?		6	3 yrs 0 mes.	3 779 6 899.	1-1-1	Advanced & see
1-17	2 YFR 5 500. 3 YFR 1 10.	Retarted 4 map.	4		2	2 779 9 300.	4 YTR 0	3 - 5	Advanced 8 mes.
9- 7	3 - 4	Airances 7 mas.	7	3		3 yrs 0 mes.	5 yrs 6 me.	3 - 3	Advanced 6 per.
7-25	16 mes.	Retarted 3 yr 1 mo.	2	°3	4	2 yrs 3 mes.	3 yrs 0 mes.	2 - 6.5	Batlefactory
7-16	7 yrs 2 mss.	Rotaried 5 mas.	8	10	2	2 yrs 0 mes.	2 yrs 6 mes.	1 - 1	Retarded 6 nos.
(-26	19 805.	Retarded 11 mas,	3	14	0	1 yrs 8 mss.	8 yrs 3 mss.	1 - 11	Rotardod 7 mos.
4.15	7 xrs 1 80s.	Batisfactory				3 TTR A BOG.	4 yrs 0 me.	1.1.1	Advanted 31 mm.
0-11	1 - 6	Retarded 6 nos.	16	27	2	1 yrs 3 mes.	1 yrs 6 mes.	1 - 4.5	Totarted 7.5 mo.

Confic Centers Pene Age Petariatian 7.4 months

Read on Pourtration Retardation . 2.5 months

6- 7-17	5 +	Satisfactory	5	5	•	6 yrs 0 mes.	5 yrs 9 mes.	5 - 30.5	Retarted 3.5 me.
-11-18	3 yrs 10 zus.	Metarded 2 yrs. 1 me.	-+	10	3	5 yrs 6 mes.	5 yrs 6 mes.	6 - 5	Retarded 1 yrs 6 mes.
	4 YF8 6 268.	Setarded 1 yr. 2 mes.		2		5 TE 1 886.	A 178 A 200.	4 - 3.5	Retarded 1 yrs 4.5 m
	5 yrs 6 + 1	Petarie: 5 205.	9	2	1	T	A YEA 9 BAL	5 - 9	Litransed 1 man.
20-26	3 yrs 0 mts.	Retarded 1 yr2 mes.	3	10	First X-ray	4 yrs 0 mes.	4 yrs 6 mes.	6 - 3	Notaried 7 mes.
- 1- 6	1 - 0	Potarioi : yrs 4 mas.	2	22	2	3 yrs 0 mes.	4 yrs 6 me.	3 - 9	Retarded 1 yrs.
9-28	5 yrs. 4	Advanced 3 mos.		:	1	5 yrs 6 ms.	5 yrs 0 mes.	5 - 3	Mynneed 6 mag.
. 7- 5	1-1.	Rotardad 2 yrs 2 mos.		*	2	3 yrs 3 use.	4 yrs 0 mes.	3 - 7.8	Retarded 1 yrs.
-	1-1	Belanied 1 m.	- 5	5	9	1. TTR 0. TOR.	4 778 0 100.	4 - 0	Betarded 2 men.
10- 2	2 yrs 2 ues.	Rotarded 3 yr 0 mes.	1	7	4	3 yrs 0 mes.	3 yrs 6 mes.	3 - 3	Rotarded 7 mos.
- 9-11	1 - 1	Retaried 1 yr 7 me.	•	10	0	2 yrs 6 mss.	3 yrs 6 mss.	3 - 0	Retarded 5 mes.
- 9- 6	2 yrs 5 mos.	Rotardod 1 yr 6 mos.	0	5	First 1-ray	2 778	3 yrs 6 mss.	2 - 12.5	Retarded 3.6 mes.
	3-1	Rotardod 8 mes.	5	11	First X-ray	yrs 6 mes.	4 778 6 888.	4 - 0	Advanced 1 mes.
	"2 yrs 5 mos.	Retarded 3 mes.	•	3	3	2 yrs 6 mes.	4 yrs 0 me.	3 - 3	Bobarded 6 mos.
	12 - 9	Retarded 3 mes.	2	4	1		1 yrs 0 res.	1-0	Batisfactory
T BH	1	Airpaged 2 mas					2 YFR 6 mes.	2 - 6	Mynned 2 men
4-3	1-0	Rosardod 4 mes.	3		•				
- 1-25	1-1	Batisfactory	-1	•	First X-ray	. 770 0 100.	2 yrs 6 mo.	2 - 6	Advanced 5 mee.
- 0-25	1 yr 5 mee.	Retarded 7 mes.	-	12	Pirot X-my		2 yrs 6 ms.	2 - 0	Batisfactory
-10- 1	1 - 4	Retarded 6 mes.	26	26	Piret I-ray		1 yrs 9 ms.	1 - 1	Petarded 5 mos.
		worago Bono Ago Compared wi Deolfis Contere (net in age) Hono Age Rotardation 13,3	th Ghrend sluding of months	iegieni Age i hiléren ever	hared on 3 years of		rage Basé Are Gespere Based as Posetratic over 5 years of ag- undation 3.0 menthe	m (net inel	

MURSERY SCHOOL 
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Average Number of Zpiphyseel Conter Missing for Chronosomaton of (not including children over 5 years of age) 9.05 Tetal Number of Proviously Missing Ossific Conters Annearing since lest X-ray (not including children over 5 years of age) 28 Average Number of Previously Missing Ossific Conters Annearing since lest X-ray ( not including children over 5 years of age) 2.8 last X-ray ( not including children over 5 years of age) 2.8

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## TABLE V, C

### EVALUATION OF ROENTGENOGRAMS - JUNE, 1937. 2 A

									-	RATIN	·		6		
			4 - 6 yrs.	4 - 8 yrs.	5 - 0 yrs	CHRONOLOGICAL	AGE EASED ON OSSIFIC JEATERS	HTTI INSTRATION ARA INCIDOJOKORHO	NUMBER OF CENTERS 1 (3) CSSIFIC CSIFIC CSIFIC AGE	COBSIFIC (ISSING FOR (2) CHRONO- LOGICAL AGE	NUMBER OF PREVIOUSLY VISSING OSSIFIC CERTERS APTEANDS SINCE LAST X-RAY	ON SASIS OF PE		ONE AGE AGE RASED ON PENETRATION	COMPARISON WITH CHRONOLOGICAL ACE
	-	-				4 - 4 - 21	2 - 0	Rotarded 2 yrs. 4 mes	16	24	1	1 yr. 4 mes.	2 yrs. 6 mes.	1 - 11	Rotarded 2 yrs. 5 mes.
	56					4 - 1 - 12	3 - 1	-Retarded 1 yr.	3	12					
	-	+				4 - 0 - 15	3 - 24			**	2	3 yrs. 8 mes.	5 yrs. 0 mes.	4 - 4	Advanced 3 mes.
Γ	-	•	X			3 - 10 - 20	4 - 6	Retarded 10 mes. Advanced 8 mes.	J	1	2	4 174. 9 844.	3 yrs. 10 mes.		
_	-+-	-							5	5	2	3 yrs. 1 ms.	4 yrs. 0 mes.	4 - 3.5	Advanced 3.5 mes. Retarded 3.5 mes.
-	+	-				3 - 10 - 19	2 - 9	Retarded 1 yr. 1 me.	6	9	1	3 yrs. 1 ms.	3 yrs. 6 mes.	3 - 3.5	Retarded 6.5 mes.
_						3 - 9 - 26	2 - 9	Retarded 1 yr.	2	5	1	3 yrs. 0 mes.	4 yrs. 3 mes.	3 - 7.5	Retarded 1.5 mes.
						3 - 6 - 6	2 - 2	Rotarded 1 yr. 5 mms.	0	E	0	3 yrs. 3 mes.	3 yrs. 0 mes.	3 - 1.5	Retarded 4.5 mes.
						3 - 3 - 6	1 - 10	Retarded 1 yr. 5 mme.		18		2 yrs. 7 mes.	3 yrs. 2 mes.	2 - 9.5	Retarded 6.5 mes.
_		+			-+-		_								
-		+			-	$\frac{3-2-4}{3-2-20}$	3 - 7	Advanced 5 men.	6	3	0	3 yrs. 9 mes.			
						3 - 2 - 20	1 - 7	Rotarioi 1 yr. 7 mos.	2	18	ŏ	7 yre. 1 me.	4 yrs. 0 mes. 2 yrs. 6 mes.	3 - 5 2 - 3.5	Advanced 3 mes. Retarded 10.5 mes.
_		+					3 - 1	Satisfactory	2						
-	-	-	-+		-+-	3 - 0 - 11	3 - 7	Advanted 7 see.	5	1 +		3 YFR. 6 808.	4 YER. 0 mes.	3 - 8	Advanced 7 men.
						2 - 11 - 14	2 - 2	Retarded 9 mes.	7	10	1	3 yrs. 6 mes. ? yrs. 0 mes.	4 YFR. 0 mos. 3 yrs. 0 mes.	3-8	Advanced 8 mes. Retarded 6 mes.
		Ι	1			2 - 5 - 15	2 - 2	Retarded 3 mes.	5	6	1	3 yrs. 0 mes.	2 yrs. 6 mes.	2 - 0	Advanced 3 men.
		T		Т	T	2 - 4 - 8	2 - 0	Retarded 4 mes.		10					
-		+-	-+	+	+	2 - 3 - 7	1 - 9	Rotarini 6 mas.			3	2 yrs. 1 me.	2 yrs. 7 mes.	2 - 4	Satisfactory
								overava o mes.	14	20	10	2 yrs. 1 ms.	2 yrs. 6 mes.	2 - 3.5	Batisfastery

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Average Bose Age Compared with Chronological Ats Basel on Ossifin Tantare. Bonn Are Retardation 8.07 meathe.

Average Bene Age Compared with Chronological Age Based on Penetration Retardation 2.0 months.

				1 5 - 04								
+	-	61	6 - 3 - 10			4	4	1	6 yrs. 10 mes.	6 yrs. 9 mes.	6 - 9.5	Mynacod 2.5 pes.
		56	0 - 3 - 14	3 - 104	Retariet 2 yrs. 5 mes.	4	10	0	5 yrs. 5 mes.	5 yrs. 6 mes.	5 - 5.5	Retarded 9.5 mes.
I	1.	61	6 - 6 - 20					•				
X	1-	Y	5 - 11 - 25		Retarded 1 yr. 6 men.	1	2	0	4 YER. 6 MER.	4		
	-	66	5 1 7	2 2 - 04	A REAL PROPERTY OF A REAL PROPER	0	0	0	7 778. 9 208.	4 YTR. 5 MR.	1-6	Betarted 1 Tr. 6 men.
-	-	61		34	Satésfactory	3	3.	1	6 yrs. 2 mes.	6 yrs. 9 mes. 5 yrs. 6 -ss.	9-2	Advanced 1-2 Advanced 6 mes.
7	1.		4-11-3	3 - 2+	Retarded 1 yr. 9 men	2	+					
7	÷.	+	4 - 11 - 7	2 - 2	Retarded 1 yr. 9 me.				6 YTE. O BOR.	6 YES. 0 100.	6-0	Advanced 1 yr. 1 m.
7	·	+	4 - 7 - 2	1-2	Retarded 1 yr. 5 mee 1	2	+-+		J yra & ma	A. HOR. Q 100.	3-9	Retarded 1 - 3 mes.
	i		4 - 4 - 6	3 - 1	Retarded 1 yr. 3 mes.	4	23		4 YER. O men.	A res. 0 ma.	4-0	-Retarded 7 man
-	<u>+</u>	+	4 - 2 - 1	2 . 5				•	3 "rs. 6 mas.	3 yrs. 9 mes.	3 - 7	Retarded 2 mes.
_		+			Retarded 1 yr 9 mms.	0	5	2	3 yrs. 6 mes.	4 yrs. 0 mes.	3 - 8	Rotarded 6 mus.
-	<u>.</u>	+	4 - 1 -10	3-0	Retarded 1 yr. 1 m.	5	6					
			3 - 11 - 2	3 - 0	Retaried 11 mes.	6	+		3 778. 3 70.	4 YER. Q MER.	3 - 11.5	Betarded 1 yr. 5 mes.
	•	1	3 - 2 -21	2 - 9	Retaried 5 mes.				3 yrs. 0 mes.	4 yrs. 0 mos.	3 - 6	Retarded 5 mes.
		+	3 - 1 -19			1	4	1	3 yrs. 0 mes.	3 yrs. 0 mes.	3 - 0	Retarded 2 mes.
				2 -114	Retarded 2 mos.	3	5	1	3 yrs. 5 mes.	3 yrs. 6 mes.	3 - 5.5	Retarded 4.5mos.
			3 - 0 -15	2 = 0	Retarded 1 yr.	7	14	+				metalling 4.5408.
-		+	2 - 8 - 6	1 -11				First X-ray	2 yrs. 0 mes.	2 yrs. 6 mes.	2 - 3	Retarded 9 mes.
					Rotardod 9 mes.	9	13	First X-rey	2 yrs. 4 mos.	2 yrs. 6 mos.	2 - 5	Retarded Smes.
-			2 - 7 -27	2 - 5	Retarded 2 mas.		5					
_						3	,	1	2 yrs. 6 mes.	2 yrs. 6 mos.	2 - 6	Satiafactory
			2 - 2 -25	1 - 9	Retarded 5 mes.	14	20	First X-ray	1 yr. 3 200.	1 yr. 9 mon.	1-6	Retarded 8 mes.
I			2 - 2 - 9	2 - 2	Satisfactory		5	First X-ray				
+			2 - 2 - 8				3	FIFET A-Pay	2 yrs. 6 100.	2 yrs. 6 mes.	2 - 6	Advanced 4 mes.
				1 - 9	Advanced 7 mos.	8	14	First X-ray	2 yrs. 3 mes.	2 yrs. 6 mes.	2 - 4.5	Advanced 2.5 mos.
+		++	2 - 0 -22	1								
			- 0 -22	1 - 3	Retarded 9 mes.		15	Firet X-ray	1 yr. f mos.			
1								aret array	a yr. c mos.	1 yr. 9 mes.	1 - 7.5	Retarded 4.5 pes.
+												
			- 11-20	2 - 2	Advanced 3 mes.	28	16					
							10	First X-ray	1 yr. 2 mon.	1 yr. Pros.	2 = 5.5	Seriefectory
		l			Ronn Age Compared with C an Opelfic Centers (ne	hreasleg	ical		Average Ber	n Arr Sommarod with	th Chronologic	0al Aze
				Ch114	n ever 5 years of are)	· THATAG	5.00 K		Saund on De	catenting land to		• •

Bone Are Reteriation 10.4 months.

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### KEY TO TABLE VI

A. -- Nursery School Children

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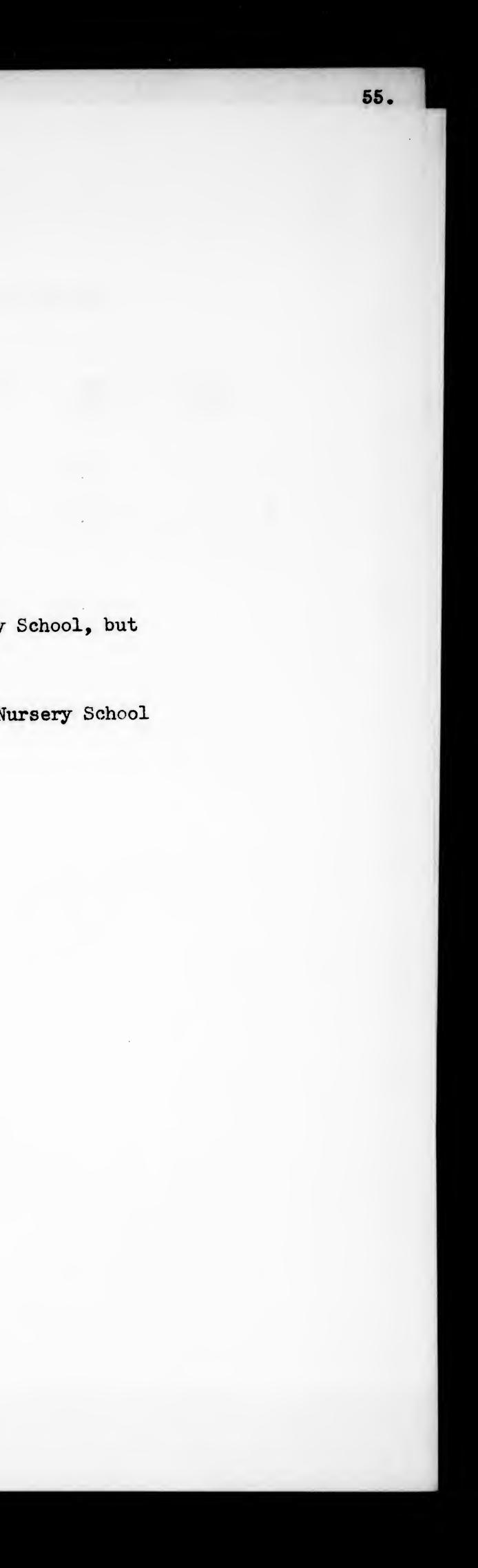
B. -- Control Children

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C. -- Control Children Dropped from Nursery School, but Continued in the Study

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D. -- Control Children Who Never Attended Nursery School



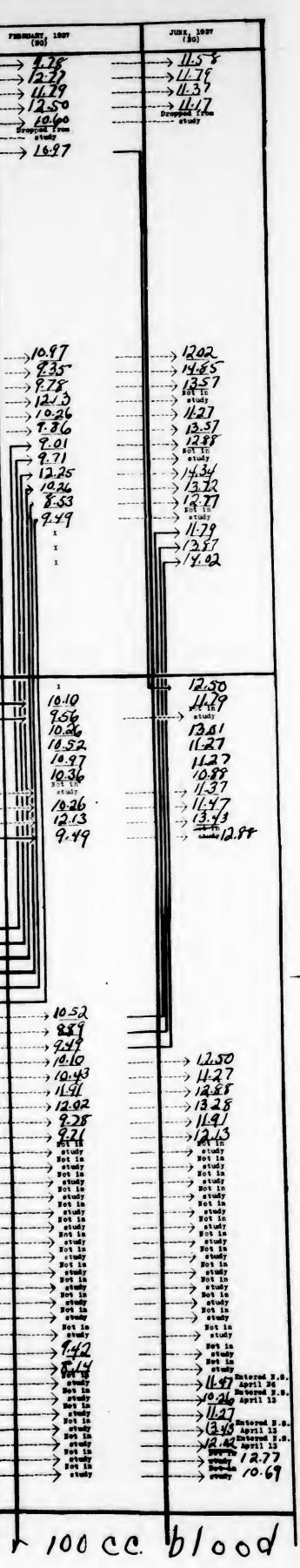
AVERAGE HAEMOGLOBIN STATUS OF CHILDREN

	March 1936	<b>May</b> 1936	August 1936	November 1936	February 1937	June 1937
A	-	13.46	11.04	10.85	10.55	12.78
B	-	11.30	10.49	9.35	10.20	11.98
C	_	-	10.97	10.94	10.41	11.98
D	-	11.30	10.49	11.16	10.03	11.68

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T	HANNE, 1936 (UNMELL)	T	HAT	$\boldsymbol{\mu}$ ·	(MALLET)		107111112R, 1936 (16)	
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D) <pd)< p=""> <pd< td=""><td>X <u>L CHILDRK</u> X X X X X X X X X X X X X</td><td><u>1</u></td><td>X X X X X X X X X X X X X X</td><td></td><td>x <math display="block">x</math> <math display="block">x</math></td><td>·</td><td>x x x 10.26 117 11.79 11.47 11</td><td></td></pd<></pd)<></pd)<></pd)<></pd)<></pd)<></pd)<></pd)<>	X <u>L CHILDRK</u> X X X X X X X X X X X X X	<u>1</u>	X X X X X X X X X X X X X X		x $x$ $x$ $x$ $x$ $x$ $x$ $x$ $x$ $x$	·	x x x 10.26 117 11.79 11.47 11	
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030 034 V1 V7 V8 V14 V15 V15 V15 V15 V15 V15 V15 V15 V15 V15	Jot in study Jot in study							

HAFMOGLOBIN STATUS OF CHILDREN



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KEY TO TABLE VII

A. -- Nursery School Children

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B. -- Control Children

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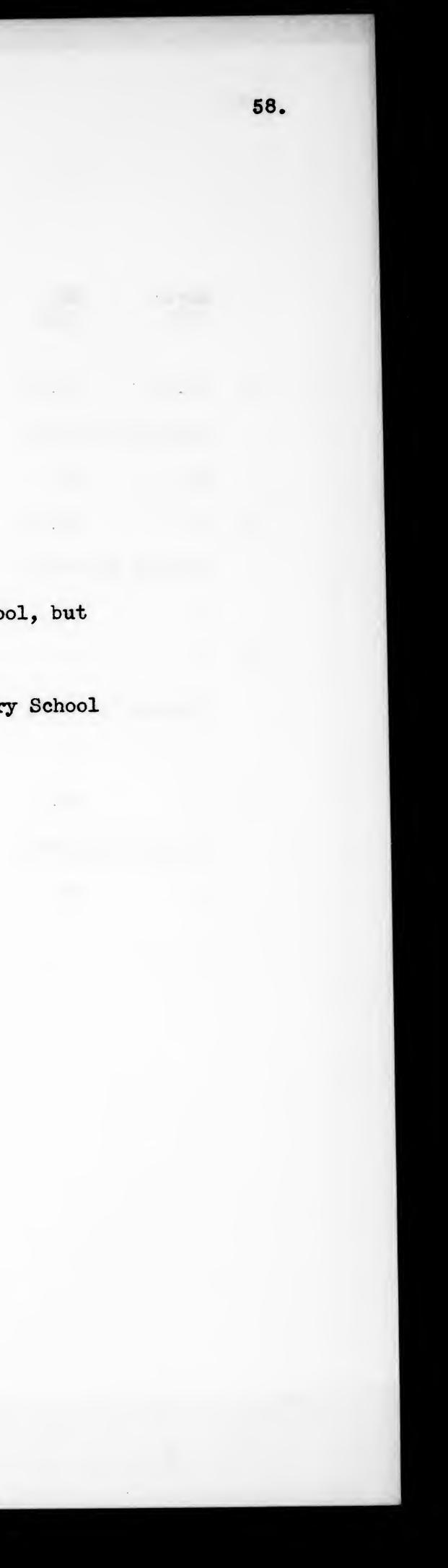
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- C. -- Control <sup>C</sup>hildren Dropped from Nursery School, but Continued in the Study
- D. -- Control Children Who Never Attended Nursery School

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			AVERAGES OF	CAPILLARY	WALL MEASUREMENT
	March 1936	May 1936	August 1936	November 1936	February 1937
A	29.85	41.47	53.47	58.66	56.94
	Average	Reaction			
	4+	4+	4+	0	0
B		26.54	56.95	55.38	58.75
	Average	Reaction			
		4+	4+	2+	1+
C			40	55	59.4
	Average	Reaction			,
			4+	0	1+
D		26.5	57.7	63.5	58.1
	Average	Reaction			
		4+	4+	1+	0

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CAPILLARY WALL MEASUREMENTS

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	<b>20</b> (4+1) 58 (4+1)		42 (4+) -		(4+)		(i+)	30	<u>s</u> (0) <u>o</u> (1+)		→ <u>55</u> (1+)	
	25 (4+)		<u>62</u> (4+) <u>30</u> (4+)	5		55 (	(1+)	51	0. (1+)			
	$\frac{30}{25}(4+)$		35 (4+) -		5 (4+)	60	(1+)		<b>_</b>			
	$\frac{30}{20}(4+) =$		35 (4+) 38 (4+) 32 (4+)		2 (4 + +		(1+)					
	28 (4+)		<u>60</u> (4+) - <u>35</u> (4+) -									
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	27(4+1) -		32(4+) -									
	$\frac{35}{25}(4+) =$				- (4+t) - 7 (4+t) -	Dropped fr Dropped fr Dropped fr Dropped fr Dropped fr Dropped fr Dropped fr Dropped fr Dropped fr Dropped fr						
	27(4+) -		· # (4+1) -			Dropped T study Dropped T	705					
	28 (4+) -		30 (4+)						55-(1+)		-> 55-(0)	
	<u>30</u> (4+) - esualy -		55 (4+) .		0(47)		(1+)	$ \rightarrow $	60 (0)		-> 55(1+)	
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	1		X.	x	· ·	105000	(o) - (1+) - (1+)		55 (0) 60 (1+)		-> 55(1+)	
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	X		x · ·			T III			55 (1+) 55 (1+)			
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	597.00(801 29.85(41	L)	41.47 (4	+)	53,47(4+							
	OL OHILDREE								x		55(1+	5
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	x		x		sudy		tudy		60 14	+)	-) <u>555</u> (0) -) study	,
	x		25 (4+)		et in teda							
	Rot in study Not in				<u>63(4+)</u> 64(4+)							
	etudy Not in study Not in				<u>64</u> (4-1)		•					
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	atudy				60 (4+) ( 50 (4+) ( 50 (4+) ( 60 (4+) (							
	study Jot in study Jot in study Jot in study Jot in								<u>"</u>			
	study Jot in study Jot in				tudy Fot 18 Study		5-5-(1+)		→ 55(1·	+)		
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	study 276 in		-> 11 (4+)	$\rightarrow$	50 (4+) 50 (4+)		study Lot in		-> steaty Boo Sa -> steaty Bot Sa		Bot in study study	
	study Jot in study Bot in			$\rightarrow$	43 (4+)		study Jot in study Det in	-+	Jos 3a		Bet 15 Bet 15	
	Staty Sot in study Sot in			$\rightarrow$	45 (4+)	$\rightarrow \rightarrow$	study Jot in study Jot in					
1	study Not in study Not in			$\rightarrow$	54 (4+) X		etudy Bet in					
	Bet 1a		-> 22 (4+)		60 (4+)	$\rightarrow$	study Bot in study Bot in		not in	·		
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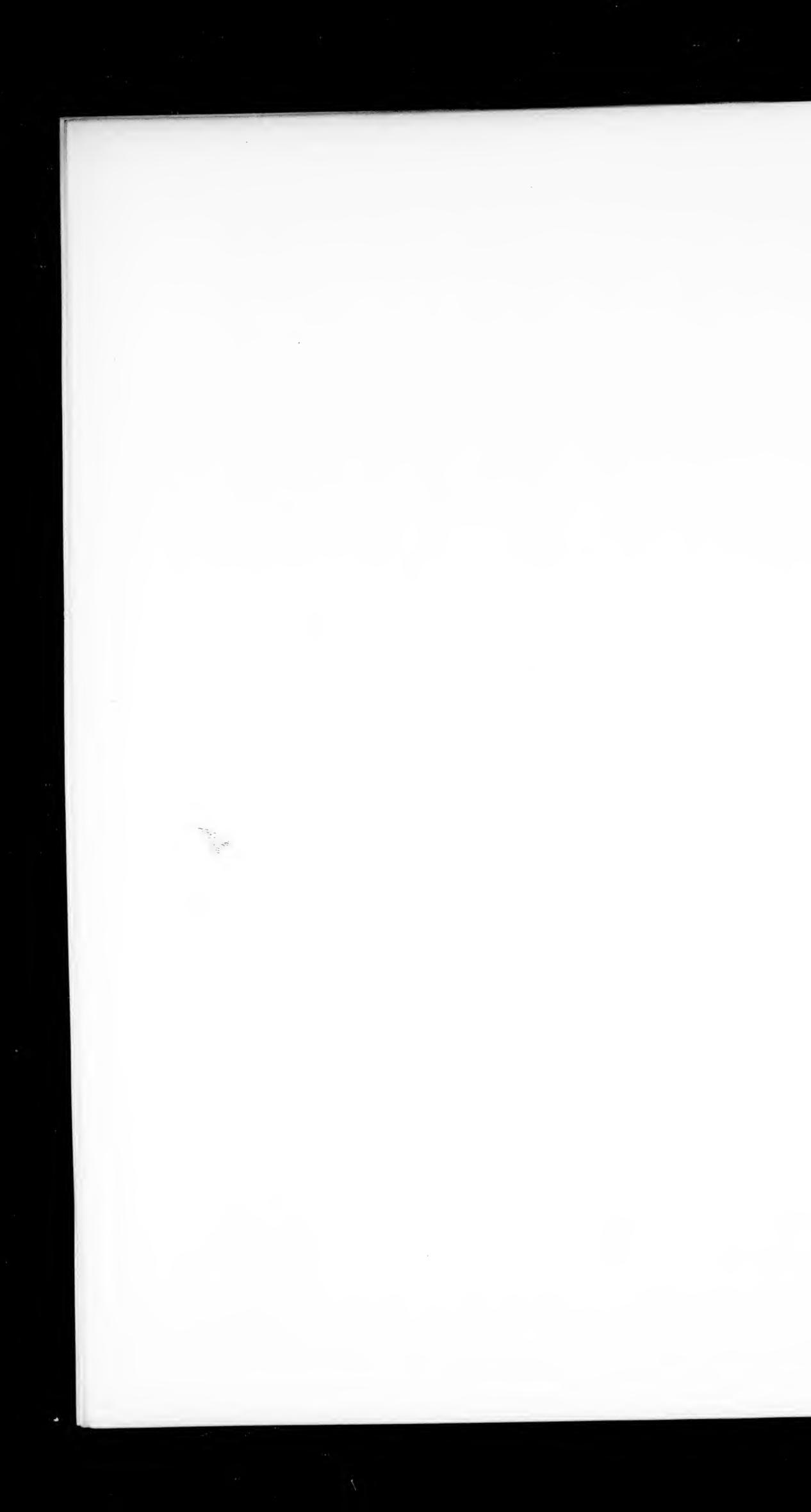
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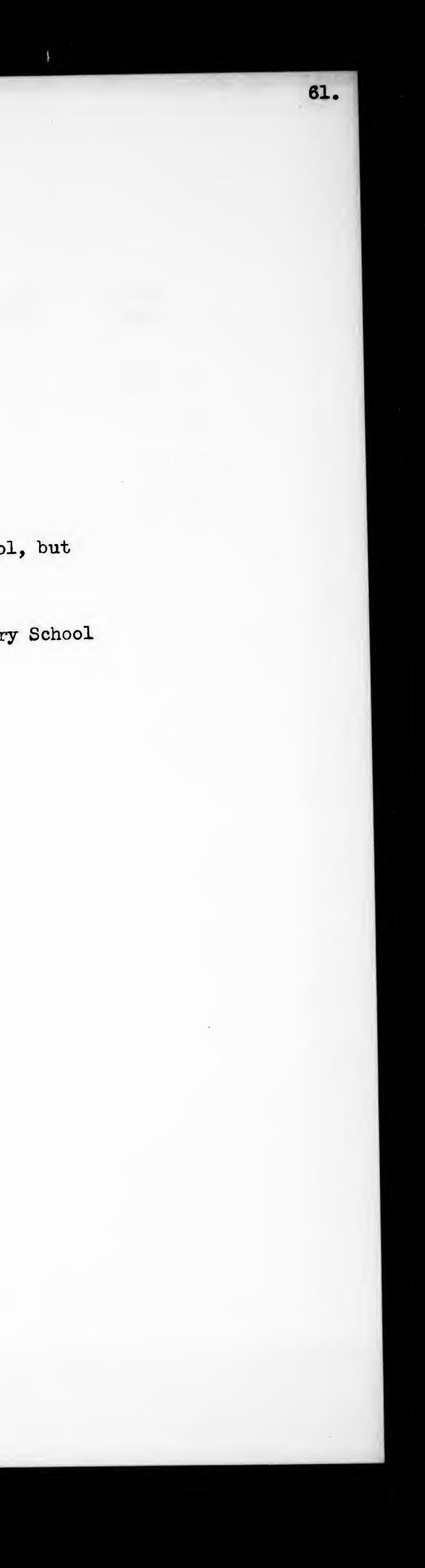
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## KEY TO TABLE VIII

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- A. -- Nursery School Children
- B. -- Control Children
- C.-- Control Children Dropped from Nursery School, but Continued in the Study
- D. -- Control Children Who Never Attended Nursery School



62.

## AVERAGE OF FOOTPRINTS

	March 1936	May 1936	August 1936	November 1936	February 1937	June 1937
A	2.25		2.19	2.53	2.27	2.75
В			2.16	2.33	1.90	1.91
C			1.0	2.20	1.88	1.60
D			2.13	2.42	1.10	2.15
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### DISCUSSION OF DATA

64.

### HOME AND FAMILY RATINGS

The ratings of the families of the children in the study on the basis of income, education of parents, and physical home may be summarized from the beginning of this series of studies as follows: <u>MARCH NURSERY SCHOOL CHILDREN</u>, 1936

Cash Income Level Rating

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Classes A-1 to C-2	- no families
Class C-3	- 6 families
Class D	- 14 families
Class E	- no families

### Physical Home Rating

Classes A and B	- no families
Class C	- 9 families
Class D	- 7 families
Class E	- 4 families
Rating on Basis of Edu	acation of Parents
Classes A to C	- no families
Class D	- 2 cases
Class E	- 18 cases

MARCH CONTROLS, 1936

None

## MAY NURSERY SCHOOL CHILDREN, 1936

Cash Income Level Rating

Classes A-1 to C-1	- no families
Class C-2	- 1 family
Class C-3	- 6 families
Class D	- 14 families
Physical Home Rating	
Class A	- no families
Class B	- 1 family
Class C	- 9 families
Class D	- 7 families
Class E	- 4 families

Rating on Basis of Education of Parents

65.

HULLE ON DADIS OF DUUCED	TOU	OI	Parents
Classes A to C	-	no	cases
Class D	-	2	cases
Class E	-	19	Cases
MAY CONTROL CHILDREN, 1936			
Cash Income Level Rating			
Classes A to C-2	-	no	families
Class C-3	-	2	families
Class D	-	8	families
Class E	-	1	family

Physical Home Rating	
Classes A to B	- no families
Class C	- 6 families
Class D	- 2 families
Class E	- 3 families
Rating on Basis of Edu	cation of Parents
Classes A to D	- no cases
Class E	- 11 cases
AUGUST NURSERY SCHOOL CHILDE	REN, 1936
Cash Income Rating	
Classes A-1 to C-1	- no families
Class C-2	- 1 family
Class C-3	- 6 families
Class D	- 14 families
Physical Home Rating	
Class A	- no families
Class B	- 1 family
Class C	- 11 families
Class D	- 6 families
Class E	- 3 families
Rating on Basis of Educa	tion of Parents
Classes A to C	- no cases
Class D	- 2 cases
Class E	- 19 cases

## AUGUST CONTROL CHILDREN, 1936

Cash Income Rating

Class	es A-1 to C-1	-	no	families	
Class	C-2	-	1	family	
Class	C-3	-	3	families	
Class	D	-	19	families	
Class	Е	-	1	family	
Physical	Home Rating				
Class	A	-	no	families	
Class	В	-	1	family	
Class	C	-	16	families	
Class	D	-	4	families	
Class	E	-	3	families	

Rating on Basis of Educ	ation o	f Adult Members
Classes A to B	- n	o cases
Class C	-	l case
Class D	-	4 cases
Class E	- 1	9 cases
NOVEMBER NURSERY SCHOOL CHIL	DREN, 1	936
Cash Income Level Ratin	g	
Classes A to C-1	- n	o families
Class C-2	- :	l family
Class C-3	- :	2 families
Class D	- 13	2 families

## Physical Home Rating

	Classes A to B	-	no	families	
	Class C	-	7	families	
	Class D	-	2	families	
	Class E	-	2	families	
1	ting on Basis of Educat	ion	of	Parents	

Rat tion of Parenus

Class	Classes	A	to	C	 no	families

Class D 1 family -

Class E - 10 families

## NOVEMBER CONTROL CHILDREN, 1936

Cash Income Level Rating

Classes A-1 to C-2 - no families

Class C-3	- 4 families
Class D	- 8 families
Class E	- 1 family
Physical Home Rating	
Classes A to B	- no families
Class C	- 8 families
Class D	- 3 families
Class E	- 2 families

Rating on Bas:	is of	Education	of	Parents
Classes A	to C	-	no	families
Class D		-	1	family
Class E		-	12	families

FEBRUARY NURSERY SCHOOL CHILDREN, 1937

Cash Income Level Rating

Classes	A-1 to C-1	-	no	families
Class C.	-2	-	l	family
Class C.	-3	-	2	families
Class D		-	15	families

Physical Home Rating

Class A

- no families

69.

- 415

Class B	- 1	family
Class C	- 14	families
Class D	- 3	families
Rating on Basis of	Education of	Parents
Classes A to B	- no	families
Class C	- 1	family
Class D	- 2	families
Class E	- 15	families

## FEBRUARY CONTROL CHILDREN, 1937

Cash Income Level Rating

Classes A to C-2	- no families
Class C-3	- 2 families
Class D	- 17 families
Class E	- 1 family
Physical Home Rating	
Classes A to B	- no families
Class C	- 10 families
Class D	- 5 families
Class E	- 5 families
Rating on Basis of Educa	ation of Parents
Classes A to C	- no families
Class D	- 2 families
Class E	- 18 families
JUNE NURSERY SCHOOL CHILDREN,	1937
Cash Income Level Rating	្មន
Classes A-1 to C-1	- no families
Class C-2	- 1 family
Class C-3	- 2 families
Class D	- 13 families
Physical Home Rating	
Class A	- no families
Class B	- 1 family
Class C	- 12 families
Class D	- 3 families

Rating on Basis of Educati	on						
Classes A to B	-	no	cases				
Class C	-	1	family				
Class D	-	2	families				
Class E	-	13	families				
JUNE CONTROL CHILDREN, 1937							
Cash Income Level Ratings							
Classes A to B-2	-	no	families				
Class B-3	-	l	family				
Class C-3	-	4	families				
Class D	-	16	families				
Class E	-	1	family				

Physical Home Rating

71,

Class A	- 2 families
Class B	- no families
Class C	- 8 families
Class D	- 7 families
Class E	- 5 families
Rating on Basis of	f Education of Parents
Class A	- 2 families
Class B	- no families
Class C	- 2 families
Class D	- 2 families
Class E	- 16 families

In order to have the ratings under discussion on a numerical basis for purposes of comparison of the nursery school group with the controls for each of the periods at which measurements were made, the letter ratings were translated into numerical ratings as follows:

### Income Level Ratings:

A-1 was changed to 1; A-2 to 2; A-3 to 3; B-1 to 4; B-2 to 5; B-3 to 6; C-1 to 7; C-2 to 8; C-3 to 9; D to 10; and E to 11.

### Physical Home Ratings:

A was changed to 1; B to 2; C to 3; D to 4; and E to 5.

### Educational Ratings:

A was changed to 1; B to 2; C to 3; D to 4; and E to 5.

When the numbers corresponding to the letter ratings were substituted, as mentioned the following averages for the nursery school

72.

and control groups were obtained:

	Average Income Ratings	Average Home Ratings	Average Rating on Parents' Education
MARCH, 1936			
Nursery School	9.7	3.7	4.9
No controls	X	X	X
MAY, 1936			
Nursery School	9.6	3.6	4.9
Controls	9.9	3.6	5.0
AUGUST, 1936			
Nursery School	9.6	3.5	4.9
Controls	9.8	3.3	4.7

	Average Income Ratings	Average Home Ratings	Average Rating on Parents' <u>Education</u>
NOVEMBER, 1936			
Nursery School	9.7	3.3	4.9
Controls	9.7	3.5	4.9
FEBRUARY, 1937			
Nursery School	9.7	3.1	4.7
Controls	9.9	3.7	4.9
JUNE, 1937			
Nursery School	9.7	3.1	4.7
Controls	9.6	3.5	4.3

The data just presented show that the nursery school groups and the corresponding control groups were well matched throughout with respect to cash income of the family, type of physical home, and education of parents.

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#### ANTHROPOMETRIC MEASUREMENTS

The anthropometric data for the series of nursery school studies of which this is a part are being recorded for the use of those who may continue in this work. At present, there are no norms for children of this age, and the best that can be done until more data are available is to eveluate the children as to whether they are over or under-weight on the basis of their age, height, and hip width. This was done by the use of Pryor Standards (4) which involves the use of the height and hip width to determine the proper weight of children of various ages. If a child was less than 10 per cent. over or under the Pryor weights, its weight was recorded as satisfactory. If it was 10 per cent. or more under or over these standards, the amount of

74.

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under or over-weight was recorded. (See Table II, Part C.)

A summary of the weight status of the children, including the data on this subject from the study of Malley (2) are summarized below. Standard anthropometric instruments were not available for the first study of this series (1).

### AUGUST, 1936

Nursery School Children

19 children (90.4 per cent. of the group) were satisfactory

in weight; and

2 children (9.5 per cent.) were underweight.

## Control Children

18 children (75 per cent. of the group) were satisfactory in

weight; and

6 children (25 per cent.) were under-weight.

### NOVEMBER, 1936

# Nursery School Children

14 children (93.3 per cent. of the group) were satisfactory

in weight; and

1 child (6.6 per cent. of the group) was over-weight.

## Control Children

17 children (89.4 per cent. of the group) were satisfactory

in weight; and

2 children (10.5 per cent.) were under-weight.

75.

## FEBRUARY, 1937

## Nursery School Children

15 children (83.3 per cent. of the group) were satisfactory in weight;

2 children (11.1 per cent.) were over-weight; and

1 child (5.5 per cent.) was under-weight.

# Control Children

20 children (100 per cent. of the group) were satisfactory

in weight.

JUNE, 1937

## Nursery School Children

15 children (93.7 per cent. of the group) were satisfactory in weight; and 1 child (6.2 per cent.) was over-weight.

Control Children

19 children (86.3 per cent. of the group) were satisfactory in weight; and

3 children (13.6 per cent.) were under-weight.

When the various measurements for nursery school and for control children were considered for August, 1936, November, 1936, February, 1937, and June, 1937, the following was found.

The nursery school children were under-weight in 4.2 per cent., over-weight in 5.6 per cent., and correct in weight 90.1 per cent. of the cases. The controls were under-weight 12.9 per cent., overweight in none, and correct in weight in 87 per cent. of the cases.

76.



#### EVALUATION OF ROENTGENOGRAMS

The work of Malley (2) showed the following concerning the skeletal status of the children in her study.

- (1) The federal emergency nursery school children were advanced in August, 1936, as compared with May of the same year, although not significantly, with respect to average number of centers missing for the ossific center age.
- (2) They were significantly improved during the three-month period from May to August, 1936, with respect to the average number of centers missing compared with the chronological age.
- (3) They were less retarded in ossific center age in August than in May, 1936, although not significantly so.
- (4) They were significantly improved with respect to the comparison

77.

of their bone penetration age (from the Todd standards) in August as compared with May, 1936.

An examination of Tables III and IV with their appended keys, will fail to show significant trends after August because the number of children entering and leaving nursery school had become so considerable by November, that a finer subdivision of cases seemed advisable to consider average changes in status from one period to the next, rather than gross averages. This has been done in Table IX.

# TABLE IX

# CHANGES IN SKELETAL STATUS OF CHILDREN IN STUDY

Groups	No. of Cases	Average Change Os- sific Cen- ter Age Compared with Chro- nological Age	Average Chan Number of Os <u>Centers Miss</u> (1) for ossific center age	sific		Pene-
All Chil- dren in Nu sery Schoo August, 19	r- 1,	-0.1 month	0.8	1.7	06 mon	th
All Con- trols, August, 19	6 36	-4.7 months	2.1	1.9	-0.5 mon	th
All Contro who had ne		-4.7 months	2.1	+2.0	-1.0 mon	th

78.

attended Nursery School previously, August, 1936

Controls who 1 had previous- ly attended Nursery School August, 1936	0	+2.0	+2.0	-3.0 months	
All Children 16 in Nursery School, No- vember, 1936	+0.9 month	0.4	+1.1	-1.0 month	
All Controls 16 November, 1936	-1.1. month	0.5	0.8	0.3 month	

# TABLE IX (Continued)

# CHANGES IN SKELETAL STATUS OF CHILDREN IN STUDY

Groups	of	Average Change Os- sific Cen- ter Age Compared with Chro- nological Age	Average Chang Number of Oss <u>Centers Missi</u> (1) for ossific center age	ific	
Controls who had neve attended Nur sery School previously, vember, 1936	er  No-	-1.5 month	0.8	0.6	0.3 month
Controls who had pre- viously atte Nursery Scho	ended	-0.4 month	2.2	1.8	0

79.

November, 1936

All chil- 19 dren in Nursery School February, 1937	0.0 month	+0.4	1.5	-1.7 month
All Con- 13 trols, February, 1937	-0.2 month	+0.6	+1.8	+0.3 month
All Con- 1 trols who had never attended Nursery School February, 1937	+0.6 month	0.3	0.3	+1.7 month
Controls 1 who had previous attended Nursery School Pebruary, 1937	•	1.5	+1.5	+0.3 month

1

# TABLE IX (Continued)

# CHANGES IN SKELETAL STATUS OF CHILDREN IN STUDY

Groups	No. of Cases	Average Change Os- sific Cen- ter Age Compared with Chro- nological Age	Average Chang Number of Oss <u>Centers Miss</u> (1) for ossific center age	sific	
All <sup>C</sup> hil- dren in Nursery Sc June, 1937		-0.8 month	+0.7	+0.6	-0.5 month
All Con- trols, June, 1937	15	-0.3 month	+0.6	1.0	-1.3 month
Controls		-2.6	0.6	1.0	2.0 months

0.0

80.

who had never attended Nursery School, June, 1937

Controls9 +2.0 months0.61.0who had pre-.........viously attended.........Nursery School.........

A study of the previous table will show the following: In general, the entire nursery school group is somewhat further advanced than the entire control group with respect to the ossific center age compared with the chronological age; for the six test periods under discussion.

Without exception, the part of the controls who had previously attended nursery school averaged higher than those who had never attended the school, with respect to ossific center age compared with chronological age.

Where any difference in ossific centers missing for ossific center age was found, this difference was in behalf of the nursery school children.

No significant differences appeared in the number of ossific centers

81.

12

for the chronological age, nor for bone penetration age compared with chronological age in the various groups studied.

The controls were found to be much further advanced in skeletal status in the author's study than was found by Malley, and it is believed that the visiting nurse who is a staff member at the federal emergency nursery school had encouraged the mothers through home visits in the neighborhood, to buy more milk, and to make other improvements in the diet.

## HAEMOGLOBIN TESTS

It was found by Urgell (1) that the children in the Lytle Addition Federal Emergency Nursery School in May, 1936, averaged 13.46 grams of haemoglobin per 100 c.c. of blood, with no child below 12.98. This average was significantly higher than that of a control group for the same period, which averaged 11.3 grams of haemoglobin per 100 c.c. of blood. The children had been fed a noon-day meal at the nursery school, with midmorning fruit juice, milk, and cod-liver oil, and midafternoon milk and toast, for a three-month period previous to the time of the measurements. The noon-day meal had consisted of a varied menu, including milk, bread, fresh or canned vegetables, and fruits, with meat three to four times a week.

At the end of the next three-month period (August, 1936), Malley (2)

82.

found that the average of the nursery school children had dropped to 11.0 grams of haemoglobin per 100 c.c. of blood, a highly significant decline when analyzed by the method of Love for comparing paired differences. The controls at the August period likewise fell significently to 10.49 grams of haemoglobin per 100 c.c. of blood, the latter value being significantly lower than the nursery school children for the same period. This was attributable either to a change in the home diet of the children (many of the control children coming from the same families as the nursery school children), or to a change in the menu at the nursery school, or to both causes. An analysis of the diet reported by the dietitian to Malley failed to reveal changes in the over-all weekly iron content of the diet through that period, although the diet as reported was made out in advance and was sometimes subject to lastminute changes because of market conditions or budget limitations.

During the period from August to November, 1936, the nursery school children suffered another drop in haemoglobin, coming to 10.85 grams of haemoglobin per 100 c.c. of blood, with the control group falling to 9.35 grams per ac. The dietitian had, because of finances eliminated meat from the diet of the federal emergency nursery school group except for once or possibly twice a week, and had given small attention to the iron content of the diet during this time.

At this point, the author and director of this study consulted the dietitian and planned with her to increase the iron content of the diet, especially serving meat or fish three to four times a week. The author went to the school each day during the period, and recorded the weights of raw food prepared for the mid-day meal, and recorded the amounts of food given to each child each day at meal-time, and at mid-morning and mid-afternoon. The analysis of the average iron given each week to the nursery school children, together with its food source is shown in Table X.

83.

As a result of the increase in iron in the diet at the school during this three-month period, the average haemoglobin of the nursery school group was 12.78 grams per 100 c.c. of blood, as compared with 11.98 for the control group. One reason which may account for the improvement in the haemoglobin status of the control group (although this is definitely lower than the nursery school average) was this. The visiting

# TABLE X.

# AVERAGE IRON PER CHILD PER WEEK

(for Period from March 22 to June 18, 1937)

Date	Milk	Meat	Egg	Fish	Vegetable and Fruit	Cereal
March 22-25	.00436	.00116	.00182	.00443	.00710	.00057
March 29- April 2	.00512	,00171	.00024	0	.01072	.00262
April 5-9	.00517	.00256	.00033	.00023	.00412	.00325
April 12-16	.00507	.00321	.00004	.00012	.00676	.00250
April 19-23	.00538	.00169	.00138	.00036	.00666	.00194
April 26-30	.00560	.01935	.00062	.00035	.00579	.00248
May 3-7	.00500	.00264	.00160	.00058	.00954	.00184
May 10-14	.00587	.00170	.00055	.00036	.01012	.00186
May 17-21	.00525	.00422	.00052	0	.00527	.00222
May 24-28	.00586	.00102	.00165	.00042	.00613	.00176
June 1-4	.00460	.00285	.00040	0	.00381	.00167
June 7-11	.00541	.00304	.00063	0	.00636	.00186
June 14-18	.00663	.00217	.00142	.00043	.00634	.00193

84.

Average for Period .00533 .00364 .00086 .00081 .00682 .00204 nurse carried to the mothers in the neighborhood the advice which had been given to the dietitian about increasing iron in the diet of the nursery school children, since she felt that this point was worthy of attention by the mothers.

#### CAPILLARY TESTS

The nursery school children, as will be seen in Table VII, improved in capillary wall strength from March, 1936, until November, 1936, at which time they gave an average negative break at the limit of vacuum of which the instrument was capable (55 to 60 mm. of mercury). The control children were inferior to the nursery school children up

until August, 1936, at which time they gave the same average response as the nursery school children. This may be accounted for by the garden foods available in most of the families during the summer months, or to the education on diet given by the visiting nurse, or both causes.

In November, 1936, and in February, 1937, the control group was slightly poorer than the nursery school children in the capillary test, but was equal to the nursery school group again in June. The fact that the controls were better during the winter of 1936-7 than during the winter of 1935-6 (although not quite so good as the nursery school group in either case) indicates that education on child diet which had come to the neighborhood from which these children were drawn as a result of this series of studies, had caused the controls to receive a better home diet than previously. The fact that, in June, 1937, both groups were the same in this regard appears to indicate that a combination of education of mothers and foods from early home gardens improved the control children in capillary wall strength until they were as good as the nursery school children in this regard.

(Note: The 4+, 1+, etc. mentioned in the Key to Table VII as the type of reaction denotes the severity of the capillary break, and has been defined by Logan (5).)

#### 86.

#### FOOTPRINTS

Investigators are not agreed as to the significance of footprint tests, although it has been shown in studies in this laboratory that there appears to be an association between the amount of the foot touching the floor in young children and their general nutritional status.

Without attempting to interpret the meaning of the findings, the data on footprints have been recorded in Table VIII. There appears to be little difference between the average of the footprint ratings of the nursery school and the control children.

#### SUMMARY

This is a report of a study of the nutritional status of a group of nursery school and a group of control children at approximate three-month intervals from November, 1936, to June, 1937. The findings have been given in detail, and they are briefly as follows:

Fewer under-weight children were found in the nursery school than in the control groups throughout this study and the two studies of the series which preceeded it.

In some respects there were no significant differences between the skeletal status of nursery school and control children. In others, notably in ossific center age and in the number of centers missing for the ossific center age, the nursery school children were superior to the control group.

87.

Haemoglobin status in the nursery school children became poorer when no particular attention was paid to the iron in the children's diet, and improved again when special care was given to this point.

The nursery school children were significantly higher than the controls in average haemoglobin at each measurement time except one, which followed a three-month period during which meat had been considerably reduced in the diet with no particular attention to other iron-containing foods (February, 1937). They became significantly higher than the controls again after a three-month period during which meat and other iron-containing foods were increased in the diet.

The average of the controls seemed at time to reflect the advice given to the mothers by a visiting nurse.

Capillary wall strength in the nursery school children improved from the opening of the school in February, 1936, until November, 1936, at which time the limit of the instrument to obtain positive breaks was exceeded. The nursery school children maintained this high average throughout the remainder of the study.

The control children were inferior to the nursery school children from the beginning of the study until August, 1936, at which time they had an average not significantly different from the nursery school group. They fell slightly during the winter months, but were not as

88.

low as during the previous winter. They rose to the average of the nursery school group again in June, 1937. It is believed that education of the parents in the neighborhood by a visiting nurse from the federal emergency nursery school, together with home gardens in summer are responsible for the improvement in the controls with respect to the capillary wall strength.

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