

any great value. The water should be boiled and used as hot as the patient can bear with comfort. In all the deeper abscesses the patient should be kept in bed or on a couch until the abscess has almost healed. As granulation proceeds, irregular healing should be prevented by sponging the surface of the wound with a small piece of cotton twisted on the end of a grooved director. This breaks down any bridging and is an important detail in the prevention of fistula formation.

THE ENERGY REQUIREMENTS OF GIRLS FROM 12 TO 17 YEARS OF AGE.

BY FRANCIS G. BENEDICT AND MARY F. HENDRY, BOSTON.

[From the Nutrition Laboratory of the Carnegie Institution of Washington, Boston, Massachusetts.]

(Continued from page 262.)

Comparison of Weight for Age. On the basis of body weight alone it can be seen that all of our groups, with one almost insignificant exception, had higher weights than the weights for similar ages represented by Wood's material. In the group aged 14 years, 1 month, the average weight of our girls was 44.2 kgs., as against an average weight of 44.5 kgs.

for the Wood data. On the other hand, the weights of our girls exceed the weights for the Benedict and Talbot private school girls in only two age groups and are somewhat inferior in six groups. The particular age group of 14 years, 1 month is 7.1 kgs. lower (44.2 kgs. as against 51.3 kgs.) than the Benedict and Talbot group, but this fact cannot properly be taken as an index of distinct abnormality, since the average weight of this group is only 0.3 kg. lower than the average weight noted on the Wood curve. From an examination of the detailed data in Table III, showing the individual ages, weights and heights, it can be seen that this group included five girls under 41 kgs. in weight, offset in part, it is true, by the unusual weight of subject No. 39, *i.e.*, 62.2 kgs. It is, however, a point worthy of special note, that while we may not consider the girls in this group as physiologically inferior to a normal series of girls, such as that of Wood, they still are characterized by being perceptibly lower in the scale of comparison, *i.e.*, age-weight, with the Benedict and Talbot private school girls than any other of our groups.

Comparison of Height for Age. The average heights of our groups of girls are in all cases above the average heights drawn from the Wood curve. When compared with the Benedict and Talbot private school girls, our first group only is up to this standard. All the other groups are somewhat shorter, the greatest difference being observed in the group aged 14 years, 1 month, where the height is 7 cms. shorter than that for the private school girls. Attention should be called to the fact that the group aged 13 years, 4 months, is 6 cms. shorter than the corresponding private school group. In connection with the difference in height shown by the group aged 14 years, 1 month, it should be recalled that this particular group also showed the greatest weight difference when compared with the private school girls.

Comparison of Weight and Height as an Index of Normality. In spite of the popular use of the weight-age ratio, the weight-height ratio is physiologically much sounder. In the final consideration of our girls with a view to establishing their normality, therefore, it is necessary to study the relationships between weight and height and compare them with other standard series. For this purpose we will use the same series, namely, those of Wood and of Bene-

TABLE IV.—COMPARISON OF THE AVERAGE WEIGHTS AND HEIGHTS OF THE GROUPS OF GIRLS STUDIED WITH THE STANDARDS OF WOOD¹ AND OF BENEDICT AND TALBOT¹ (PRIVATE SCHOOLS) FOR GIRLS OF THE SAME AGES.

Average age	Weight (without clothing)			Height	
	Girl Scouts	Wood standard	Benedict-Talbot (private schools) standard	Girl Scouts	Benedict-Talbot (private schools) standard
Yrs. mos.	kgs.	kgs.	kgs.	cms.	cms.
17 0	58.1	51.3	59.4	163	163
17 10	53.6	49.9	54.8	157	164
14 10	49.9	47.1	54.7	160	162
14 1	44.2	44.5	51.3	155	162
14 0	51.7	44.2	50.8	161	162
13 8	50.0	41.8	49.2	159	161
13 4	43.7	40.0	47.5	153	159
12 10	41.0	37.3	44.9	152	156
12 2	39.5	35.2	41.9	150	153

¹ Benedict and Talbot, Carnegie Inst. Wash. Pub. No. 302, 1921, pp. 43 and 44. See, also, Gray and Gray, BOSTON MEDICAL AND SURGICAL JOURNAL, 1917, Vol. cxxvii, p. 894.

diet and Talbot for private schools. The data are shown in Table V herewith. In the first part of the table the actual average heights of our girls are compared with the heights obtained for girls in the Wood series and the Benedict-Talbot series at similar average weights. In the second part of the table the actual average weights of our girls are compared on the height basis with the weights for the two standard series. The unavoidable variations in weight and height of the girls in our several Girl Scout groups make such a comparison, at best, open to severe criticism, and yet as a whole it is not without significance in indicating normality.

TABLE V.—RELATIONSHIPS BETWEEN HEIGHT AND WEIGHT FOR THE GROUPS OF GIRLS STUDIED, AS COMPARED WITH THOSE IN THE STANDARD SERIES OF WOOD¹ AND OF BENEDICT AND TALBOT² (PRIVATE SCHOOLS) FOR GIRLS.

Average weight (without clothing)	Height			Average height	Weight (without clothing)		
	Girl Scouts	Wood standard	Benedict-Talbot (private schools) standard		Girl Scouts	Wood standard	Benedict-Talbot (private schools) standard
kgs.	cms.	cms.	cms.	cms.	kgs.	kgs.	kgs.
58.1	163	---	166	163	58.1	52.9	53.7
53.6	163	164	163	163	53.6	52.6	53.0
49.9	160	159	161	161	51.7	51.0	49.4
44.2	155	152	157	160	49.9	51.0	47.0
51.7	161	161	162	159	50.0	50.0	47.0
50.0	169	159	161	155	44.2	47.8	42.5
43.7	153	151	156	153	43.7	46.0	40.6
41.0	152	149	154	152	41.0	44.4	39.1
39.5	150	148	152	150	39.5	42.0	37.3

¹ Gray and Gray, BOSTON MEDICAL AND SURGICAL JOURNAL, 1917, Vol. clxxvii, p. 894.

² The data here given for the Benedict-Talbot standard have not hitherto been published. They were obtained from the extension of the curve shown in figure 8, Carnegie Inst. Wash. Pub. No. 302, 1921, p. 46.

Considering, first, the height for weight comparison, it can be seen that the Girl Scouts at a given weight were shorter than the Benedict and Talbot series in all but one group, but, on the other hand, were in the majority of instances taller than the girls in the Wood series. In other words, in this comparison they lie, roughly speaking, half way between the two standard series, and consequently must be ad-

judged normal. Although a series of girls who are shorter for a given weight than another standard series would obviously be heavier for a given height, it is of interest to note the exact mathematical relationships when weights for heights are compared, as has been done in the second half of Table V. On the weight for height basis our Girl Scouts at a given height are heavier in every instance than the Benedict-Talbot private school girls, but lighter in five cases out of nine than the Wood standard.

It is quite clear that on the basis of the weight-height comparisons shown in this table our girls may be considered as coming well within normal limits, measuring on the whole somewhat above the Wood standard, when comparing heights for weights, and somewhat less than the Benedict-Talbot private school girls, who, we have reason to believe, are somewhat exceptional in their superior development. As was pointed out in an earlier treatment,¹⁶ however, while the Benedict-Talbot private school girls are heavier and taller for a given age, they are not as well developed for a given height, and consequently may be considered as being slightly thin for a given height.

General Conclusions with Regard to Normality. From Table IV it can be seen that our girls, both as regards height and weight for age, measure up very satisfactorily with one of the best known standards, namely, the Wood standard. In a number of instances they are, however, somewhat inferior to the selected group measured by Benedict and Talbot in private schools. No group, therefore, may be asserted to be abnormal either with regard to weight or to height. Of special significance in our study is the fact that one group, namely, that aged 14 years, 1 month, is characterized by having a much smaller weight and height when compared to the private school girls than any of the other age groups, and consequently we must assert that this group, on the age basis, should be looked upon as somewhat inferior anthropometrically. At this point it should be emphasized, however, that since all our girls were selected on the basis that they were presumably in good health, this fact is not *a priori* evidence that we are dealing with a group of young girls pronouncedly abnormal physically.

It hardly seems justifiable to enter into a further discussion of the physical relationships

existing in these groups, especially that between height and weight and the computed body surface area. (The data for the average body surface area of our groups of girls may be found in Table X.) We believe the evidence is sufficient to show that our groups of girls are in all cases of a type fairly representative of normal young girls, that among the various groups the group aged 14 years, 1 month, exhibits greater defections from the superstandard, such as the private schools, than any of the others, and hence, on the private school basis, and considering age-weight and age-height relationships may be looked upon as being somewhat inferior physically to our other age groups. Upon direct comparison of height for weight, however, a comparison that we believe is physiologically sounder than that of weight for age or height for age, it can be seen that all of our groups lie, for the most part, midway between the two standard series, and the seeming anthropometric inferiority previously noted with the group aged 14 years, 1 month (44.2 kgs.) disappears on this more logical basis.

PULSE RATE.

An examination of the earlier literature shows little of positive value with regard to the normal pulse rate of young girls lying quietly at rest. Most of the studies of the pulse rate of children have been made either in the hospital ward or in the physician's office, and in these instances the pulse rate might easily have been influenced by the factor of previous illness or by psychical disturbances. The difficulties of securing accurate records of pulse rate with young children have been pointed out in an earlier publication.¹⁷ Bearing in mind all of the objections and difficulties there raised, we attempted to measure the pulse rate of these groups of girls. Since the measurements could be made in the morning, about 7 o'clock, upon twelve normal girls who had been lying quietly for several hours before, who had become accustomed to the environment, and were not unduly excited or agitated, we felt that pulse records obtained under these conditions would more nearly approximate the physiological normal. The difference in pulse rate when the child is awake and asleep is also a factor to be considered, but in practically all of our observations the girls were awake. In the evening

prior to retiring the girls were cautioned to lie quietly in the morning until the pulse was counted. While this requirement was not strictly adhered to in every instance, in the large majority of cases it was fulfilled most satisfactorily.

Before discussing the group results, the influence of repeated experiences in the respiration chamber upon the basal pulse rate is worth recording. Seven of the girls were present in two or more tests, and for these girls we have given in Table VI the pulse rates noted in each of these tests. Since the pulse rate was counted

TABLE VI.—PULSE RATES OF GIRLS STUDIED ON TWO OR MORE NIGHTS.

Subject number	Jan. 24		Feb. 14		March 20		April 10	
	First count	Second count	First count	Second count	First count	Second count	First count	Second count
1	872	902	913	925	---	---	---	---
35	88	82	80	76	---	---	76	78
36	84	81	74	74	---	---	---	---
39	80	77	70	---	70	74	73	78
38	86	82	---	79	71	---	---	---
46	82	85	---	---	76	70	---	94
44	96	87	---	---	---	---	98	---

¹ Subject numbers underlined represent girls who have not reached puberty; ² Obtained January 3; ³ Obtained January 10.

by two different observers, a period of approximately five or six minutes intervening between the first and the second count, the table shows both these counts. In five of the seven cases the lowest pulse rate was *not* found on the first day, thus speaking for a slightly greater psychical disturbance on the first day. Since most of our subjects participated in only one test, this would mean that in all probability our values for pulse rates, as recorded on the first day, are a little higher than they would have been, had the girls been more accustomed to the entire routine. The possibilities of rather rapid, inexplicable changes in pulse are shown with subject No. 44, whose pulse rate on April

10 was nearly 20 beats higher than on March 20. At the time of taking the pulse no particular explanation could be given for this. It seemed inadvisable to cause possible apprehension and disturbance by taking the temperature or making special comment on it, but we have no reason to suspect a febrile state.

The detailed pulse records, first and second counts, for the entire series of observations are given in Table III, along with the data for the ages, weights, and heights for the several age groups. Average values for the first and second counts are likewise recorded. A general inspection of these data shows that the differences in pulse rate between the two counts are very pronounced in many instances, while in many others almost no differences are to be observed. It was impossible for us to attempt to correlate with these different readings any crude observations as to psychical state (degree of suppressed excitement, the influence of the novelty of the situation and of the observation of pulse countings upon other girls, etc.), but every effort was made to minimize these factors by previous, repeated instructions the evening before, when the girls were cautioned to lie quietly in the morning with no muscular movements. In spite of these instructions, it is obvious that some degree of interest obtained. Under these conditions one would normally expect to find that the second count was on the whole a little lower than the first, since the novelty of the first count would have helped somewhat in adding to the experience. An inspection of all the records shows that in 36 cases the pulse rate was lowest in the first count and in 60 cases lowest in the second count, while in nine cases no difference was observed between the two counts.

Of greatest importance, however, is the average pulse rate for the group. Whatever individual differences may occur, the average pulse rate should be not far from that to be expected with a group of young girls lying quietly in the morning. These average minimum pulse rates, together with the ranges in minimum pulse rate, have been summarized in Table VII. The average values were obtained from the pulse data in Table III, the lowest records, whether found in the first or second count, being averaged for the several girls in each group. Considering, first, the range in minimum pulse rate, it is clear that there are differences be-

tween the girls in the several groups approximating on the average nearly 30 beats. The absolute maximum difference is 39 beats, noted on March 13, and the minimum difference is 17 beats, noted on March 6. These ranges speak for the striking differences noticeable in young children. The average minimum pulse rate for the several groups is, however, of most interest to us. A reexamination of Table VII shows that the highest record was 83 beats per minute with the 15-year-old group, and the lowest record was 71 beats with the 16-year-old group. No special range or average value seems to be at all correlated with the age, although it would appear as if the high value for 15 years was somewhat unusual.

TABLE VII.—AVERAGE MINIMUM PULSE RATES OF GIRLS¹ 12 TO 17 YEARS OF AGE.
(Records obtained between 6.30 A.M. and 7.00 A.M.)

Date	Average age ²	Minimum pulse rate	
		Range	Average
1920	yrs.		
Jan. 3	17	58 to 89	74
Jan. 10	16	59 to 91	71
Jan. 17	15	60 to 96	83
Jan. 24	14	62 to 99	80
March 20	14	67 to 88	76
April 10	14	66 to 94	76
Feb. 14	13	56 to 94	79
March 13	13	53 to 92	74
March 6	12	73 to 90	81

¹ The pulse rates of eleven girls were studied on January 17, March 20, and April 10; 12 girls on all other dates.

² All girls in the 15, 16 and 17 year old groups had reached puberty; none of the girls studied on April 10 and March 13 had reached puberty; five girls on January 24, two on March 20, four on February 14, and 11 on March 6 had not reached puberty.

It will be noted that there are three dates when 14-year-old groups appear and two dates when 13-year-old groups appear. These were days on which tests were made with the special object of securing evidence with regard to the influence of the prepubertal and the pubertal state upon metabolism. While, with the fluctuations in pulse rate noted with individuals, a careful analysis of the influence of puberty is hardly possible with so few groups as this, it is of interest to compare the pulse data for the three groups of 14-year-old girls. Thus, with the group studied January 24 comprising seven girls who had begun to menstruate and five who had not, the pulse rate was actually a little higher than it was with the other two groups, namely, the group of March 20, comprising nine girls who had begun to menstruate and two who had not, and that of April 10, representing 11 girls, none of whom had reached puberty. With the two groups of March 20 and April 10 the pulse rates

are identical, and since none of the girls of April 10 had attained puberty, while the majority of the girls of March 20 had attained puberty, no influence of menstruation or development to the point where menstruation had begun can be said to hold with regard to the pulse rate. The value of 80 beats on January 24 is, to be sure, a little higher than the two values of 76 beats on March 20 and April 10, respectively, but obviously no specific influence of the pubertal state can be ascribed to this average. Of the two 13-year-old groups that of March 13 was composed only of immature girls, while that of February 14 included four girls who had not reached puberty. The average pulse is somewhat higher for the February 14 group, 79 as against 74. In consideration of the findings with the 14-year-old groups it seems quite impossible to ascribe the higher pulse rate on February 14 to the fact that eight of the 12 girls in the group had reached puberty. Little, if any, positive information can be drawn with regard to the influence of puberty upon the pulse rate from an examination of the values for the range.

To sum up, then, our data show the following average minimum pulse rates for resting girls. 74 beats at 17 years, 71 beats at 16 years, 83 beats at 15 years, 77 beats at 14 years, 77 beats at 13 years, and 81 beats at 12 years. The last value of 81 beats at 12 years may be compared with the average value of 75 beats for the three 12-year-old girls studied by Benedict and Talbot. (See Table II.)

The records in the earlier literature on the pulse rate of children are subject to all the difficulties attending pulse measurements that we have mentioned. Many writers do not even differentiate between girls and boys. Consequently a direct comparison of the earlier data with these new records obtained on our girls while quietly resting is questionable. Katzenberger,¹⁸ in 1913, collected practically all of the earlier literature on the pulse rate of children, and likewise included a large number of observations of his own. His own average values for girls at the ages in which we are particularly interested are as follows: 87 beats at 12 years, 82 beats at 13 years, and 86 beats at 14 years. These values are all considerably higher than ours, *i.e.*, 81, 77, and 77 beats, respectively.

(To be continued.)

Book Review.

A Physician's Anthology of English and American Poetry. Selected and arranged by CASEY A. WOOD, M.D., and FIELDING H. GARRISON, M.D. Oxford University Press. 1920.

Of the many tributes offered to Sir William Osler on his seventieth birthday, none could have procured him more intimate delight than this little volume, presented to him in manuscript form. The duty and the love that men bore him could hardly have been gathered into a garland of friendship, fresher, more choice than this. These radiant and triumphant songs in the English tongue form, in this new context, a "recordatio" or vivid remembering of him who, in the flesh, died at Oxford but in spirit remains, an ageless witness of the integrities that bind man to man, "the great humanist of modern medicine, the friend, inspirer, and encourager of youth, in whom the poet did not die young." Dr. Garrison's felicitous "Foreword" on Osler and the uses of the poetic spirit cannot fail to strike the liberal and gentle mind as consonant and supremely fitting. Throughout the compilation, a rare ear for music, for numerosity, and a fine gift of selection, is shown. Following a well-considered sequence from "Youth" through "Senectute" to "Divina Mors" man's hopes, needs, beliefs, loves are here in brief, expressed with all the majesty, high manner and charm of which he, as poet, is capable in his brightest and best moods. What more could be set within the narrow limits of a bibelot of this size? It was a happy thought on the part of the editors to issue the work through the Oxford University Press, for Dr. Osler had been, for some years before his death, one of the overseers of that press and was deeply interested in its past history and present operation.

The present collection is devoted neither to poetry by medical men nor to poems on medical subjects, as is stated in the Foreword. Selections range from Shakespeare and Ben Johnson to Yeats, Brooke and Sassoon.

We regret that in the issue of the JOURNAL for February 24, in a review of "Massage and Exercises Combined" the names "Brooks and Porter" were mentioned as the publishers instead of the author, Albrecht Jensen, Box 73, G. B. I., New York City.