PHYSIQUE AND THE GRAMMAR SCHOOL ENTRANCE EXAMINATION

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To obtain standards for somatotyping children by physical anthropometry at the age of 11, 371 boys and 421 girls were measured by one of us (C. K. W.) as an additional part of the routine medical examination in the City of Oxford schools during the period January, 1953, to March, 1954. Following the discovery of significant relationships between physique and final honours class results among Oxford undergraduates (Parnell, 1954a), it was decided to compare children's physique with their marks in the grammar school entrance examination. This report covers our findings: it reveals those somatotypes who are most often successful in gaining grammar school places, showing a trend towards more frequent selection of less-muscular children; it also shows that significant relationships exist between physique and performance on intelligence tests, while significant physical trends also appear in the proportion of children with better than average achievement in English and arithmetic.

Somatotyping Children

The children's physiques were classified according to Sheldon and Tucker's (1940) somatotype method, with two important differences. First, since it was impossible to photograph the children, the estimates were based on physical measurements alone, whereas Sheldon uses mainly photoscopic methods. Secondly, since he has not yet published photographic standards for children, it seemed dangerous to adopt his terminology; therefore, while keeping to a classification with three components each on a scale of half points from 1 to 7, the components themselves are renamed. The first component, endomorphy, was called Fat (F), the second, mesomorphy, indicating bone and muscle development, was termed Muscularity (M), and Linearity (L), was substituted for the third component, ectomorphy.

The somatotype estimates can be plotted on Sheldon's (1954) chart with its centre 444 and extremes of 711, 171, and 117. The sectors have been named according to the primary and secondary dominance of the types falling within these sectors by capital and small type respectively. Thus an Mf child would be one who was predominantly muscular, but also fat (cf. endomorphic mesomorph). Occasionally the estimates could not be plotted directly on Sheldon's chart. In these cases, while retaining relative dominance between the components, each component was reduced or increased by one-half—for example, 336 plotted as $2\frac{1}{2}2\frac{1}{2}5\frac{1}{2}$, $3\frac{1}{2}33\frac{1}{2}$ as $43\frac{1}{2}4$.

To estimate children's somatotypes a "deviation chart" was drawn up similar in design to that employed when

typing undergraduates by physical anthropometry (Parnell, 1953, 1954b). The first step was to calculate means and standard deviations of all the measurements. Next the results for boys and girls were combined on the empirical grounds that the differences between them were, except in the case of the fat measurements, too small to make separate scales practicable. The central column of the deviation chart (see Fig. 1) contains the mean value of each measurement. Values of these measurements at half standard deviation intervals are arranged on each side of the centre. There are six columns on each side, so that the outside columns correspond to measurements three standard deviations above and below the mean. In the case of fat measurements, logarithmic scales are employed to relieve skewness in the distribution.

A "profile" was drawn for each child by ringing the appropriate value for every measurement. This gave a general impression of the physique (see Figs. 1-4). Numerical estimates for each component were obtained as follows:

Fat (Endomorphy)

The total of the three fat measurements taken was plotted on a logarithmic scale (based on the mean total fat), and "F" estimates were given according to Table I.

Muscularity (Mesomorphy)

I. First Estimate.—For children of average height a "bone and muscle" point was found corresponding to the average standard score of the humerus, femur, and muscle girth measurements. A rating was given according to the number of columns (half-units) the "B.M." point lay from the central column of mean values, which was rated 4. Children *not of average height* presented a problem, because bone and muscle measurements are determined by size as well as by body shape. This was dealt with by calculating somatotype 444 bone and muscle measurements for each half-unit of height assuming a linear relation between height and bone muscle measurements—that is, by multiplying the mean bone and muscle measurements by actual height. From these 444 somatotype measurements a corresponding 444 "B.M." point was found for each height. Fig. 5 shows a section of the deviation chart with lines linking the 444 somatotype measurements with each unit of height. The muscularity rating was allotted according to the number of columns an individual's "B.M." point lay from the 444 point for his height. Thus a child of height 61.5 in. and with humerus 6.7 cm., femur 9.1 cm., biceps 20.5 cm., and calf 30.2 cm. would have a "B.M." point at the position of the cross (x), which is one column, or a half standard deviation, from the 444 point (marked 4); he would receive a provisional rating of 4 minus $\frac{1}{2}$, or $3\frac{1}{2}$, in muscularity.

II. Correction for Fat.—There is the further complication that measurements of bone and muscle girth are affected by the amount of fat present, bone slightly but girth rather more; unless allowance is made for this, fat people would be overestimated in muscularity, thin people underestimated. Corrections were made for fat according to the lower part of Table I. This was based on the assumption that there is a linear relation between the amount of fat and its effect on bone and muscle measurements. Since the F scale was based on logarithmic increases of fat, corrections for fat to the muscularity scale increase in the same way and have been rounded off for convenience.

TABLE I.—For Estimating F Rating, and Appropriate Correction for Fat to Estimate M for Muscularity

Total fat (mm.): Midpoint Limits	12 <12	14 13-15	17 16-18	20 19-22	24 23-26	29 27-31	35 32-38	42 39-46	50 47-55	60 56-66	72 67-79	87 80-95	104 96+
F rating	1	$1\frac{1}{2}$	2	$2\frac{1}{2}$	3	$3\frac{1}{2}$	4	$4\frac{1}{2}$	5	$5\frac{1}{2}$	6	$6\frac{1}{2}$	7
Correction to M rating ..	$+\frac{1}{2}$	$+\frac{1}{2}$	$+\frac{1}{2}$	$+\frac{1}{2}$	0	0	$-\frac{1}{2}$	$-\frac{1}{2}$	-1	$-1\frac{1}{2}$	-2	$-2\frac{1}{2}$	-3

Linearity (Ectomorphy)

The ponderal index (height over the cube root of weight) was used as the basis for rating linearity as shown in Table II. The somatotype distributions of boys and girls may be compared in Figs. 6 and 7.

TABLE II.—For Estimating Linearity (L) From the Ponderal Index

Height ÷ ∛Weight Linearity	—	12.1	12.4	12.7	13.0	13.2	13.4	13.6	13.8	14.0	14.2	14.4	14.6
	12.0	12.3	12.6	12.9	13.1	13.3	13.5	13.7	13.9	14.1	14.3	14.5	+
	1	1½	2	2½	3	3½	4	4½	5	5½	6	6½	7

Standard Scale	1	1½	2	2½	3	3½	MEAN	4½	5	5½	6	6½	7
Height (ins.)	47.8	49.2	50.6	52.0	53.4	54.7	56.0	57.4	58.7	60.1	61.5	62.9	64.3
Weight (lbs.)	36.0	43.0	50.0	57.0	64.0	71.0	78.0	85.0	92.0	99.0	106.0	113.0	120.0
Bone: Humerus (cms.)	5.0	5.2	5.5	5.7	6.0	6.2	6.5	6.7	7.0	7.2	7.5	7.7	8.0
Femur (cms.)	7.0	7.2	7.5	7.7	8.0	8.2	8.5	8.7	9.0	9.2	9.5	9.7	10.0
Muscle: Biceps (cms.)	13.9	15.0	16.1	17.2	18.3	19.4	20.5	21.6	22.7	23.8	24.9	26.0	27.1
Calf (cms.)	20.6	21.8	23.0	24.2	25.4	26.6	27.8	29.0	30.2	31.4	32.6	33.8	35.0
Fat: Back (mm.)	3	4	5	6	7	8	9	10	11	13	16	20	25+
Abdomen (mm.)	4	5	6	7	8	9	11	13	16	19	23	28	34+
Over triceps (mm.)	6	7	8	9	10	12	14	16	18	21	25	30	36+
TOTAL FAT	12	14	17	20	24	29	35	42	50	60	72	87	104

FIG. 1.—A linear physique—sector Lf, type 21½7.

Standard Scale	1	1½	2	2½	3	3½	MEAN	4½	5	5½	6	6½	7
Height (ins.)	47.8	49.2	50.6	52.0	53.4	54.7	56.0	57.4	58.7	60.1	61.5	62.9	64.3
Weight (lbs.)	36.0	43.0	50.0	57.0	64.0	71.0	78.0	85.0	92.0	99.0	106.0	113.0	120.0
Bone: Humerus (cms.)	5.0	5.2	5.5	5.7	6.0	6.2	6.5	6.7	7.0	7.2	7.5	7.7	8.0
Femur (cms.)	7.0	7.2	7.5	7.7	8.0	8.2	8.5	8.7	9.0	9.2	9.5	9.7	10.0
Muscle: Biceps (cms.)	13.9	15.0	16.1	17.2	18.3	19.4	20.5	21.6	22.7	23.8	24.9	26.0	27.1
Calf (cms.)	20.6	21.8	23.0	24.2	25.4	26.6	27.8	29.0	30.2	31.4	32.6	33.8	35.0
Fat: Back (mm.)	3	4	5	6	7	8	9	10	11	13	16	20	25+
Abdomen (mm.)	4	5	6	7	8	9	11	13	16	19	23	28	34+
Over triceps (mm.)	6	7	8	9	10	12	14	16	18	21	25	30	36+
TOTAL FAT	12	14	17	20	24	29	35	42	50	60	72	87	104

FIG. 2.—A fat physique—sector Fm, type 731.

Standard Scale	1	1½	2	2½	3	3½	MEAN	4½	5	5½	6	6½	7
Height (ins.)	47.8	49.2	50.6	52.0	53.4	54.7	56.0	57.4	58.7	60.1	61.5	62.9	64.3
Weight (lbs.)	36.0	43.0	50.0	57.0	64.0	71.0	78.0	85.0	92.0	99.0	106.0	113.0	120.0
Bone: Humerus (cms.)	5.0	5.2	5.5	5.7	6.0	6.2	6.5	6.7	7.0	7.2	7.5	7.7	8.0
Femur (cms.)	7.0	7.2	7.5	7.7	8.0	8.2	8.5	8.7	9.0	9.2	9.5	9.7	10.0
Muscle: Biceps (cms.)	13.9	15.0	16.1	17.2	18.3	19.4	20.5	21.6	22.7	23.8	24.9	26.0	27.1
Calf (cms.)	20.6	21.8	23.0	24.2	25.4	26.6	27.8	29.0	30.2	31.4	32.6	33.8	35.0
Fat: Back (mm.)	3	4	5	6	7	8	9	10	11	13	16	20	25+
Abdomen (mm.)	4	5	6	7	8	9	11	13	16	19	23	28	34+
Over triceps (mm.)	6	7	8	9	10	12	14	16	18	21	25	30	36+
TOTAL FAT	12	14	17	20	24	29	35	42	50	60	72	87	104

FIG. 3.—A muscular physique—sector M/=type 25½2.

Standard Scale	1	1½	2	2½	3	3½	MEAN	4½	5	5½	6	6½	7
Height (ins.)	47.8	49.2	50.6	52.0	53.4	54.7	56.0	57.4	58.7	60.1	61.5	62.9	64.3
Weight (lbs.)	36.0	43.0	50.0	57.0	64.0	71.0	78.0	85.0	92.0	99.0	106.0	113.0	120.0
Bone: Humerus (cms.)	5.0	5.2	5.5	5.7	6.0	6.2	6.5	6.7	7.0	7.2	7.5	7.7	8.0
Femur (cms.)	7.0	7.2	7.5	7.7	8.0	8.2	8.5	8.7	9.0	9.2	9.5	9.7	10.0
Muscle: Biceps (cms.)	13.9	15.0	16.1	17.2	18.3	19.4	20.5	21.6	22.7	23.8	24.9	26.0	27.1
Calf (cms.)	20.6	21.8	23.0	24.2	25.4	26.6	27.8	29.0	30.2	31.4	32.6	33.8	35.0
Fat: Back (mm.)	3	4	5	6	7	8	9	10	11	13	16	20	25+
Abdomen (mm.)	4	5	6	7	8	9	11	13	16	19	23	28	34+
Over triceps (mm.)	6	7	8	9	10	12	14	16	18	21	25	30	36+
TOTAL FAT	12	14	17	20	24	29	35	42	50	60	72	87	104

FIG. 4.—Physique with relatively little muscle—sector Fl, type 51½44.

Standard Scale	1	1½	2	2½	3	3½	MEAN	4½	5	5½	6	6½	7
Height (ins.)	47.8	49.2	50.6	52.0	53.4	54.7	56.0	57.4	58.7	60.1	61.5	62.9	64.3
Weight (lbs.)	36.0	43.0	50.0	57.0	64.0	71.0	78.0	85.0	92.0	99.0	106.0	113.0	120.0
Bone: Humerus (cms.)	5.0	5.2	5.5	5.7	6.0	6.2	6.5	6.7	7.0	7.2	7.5	7.7	8.0
Femur (cms.)	7.0	7.2	7.5	7.7	8.0	8.2	8.5	8.7	9.0	9.2	9.5	9.7	10.0
B. M. Point													
Muscle: Biceps (cms.)	13.9	15.0	16.1	17.2	18.3	19.4	20.5	21.6	22.7	23.8	24.9	26.0	27.1
Calf (cms.)	20.6	21.8	23.0	24.2	25.4	26.6	27.8	29.0	30.2	31.4	32.6	33.8	35.0

FIG. 5.—Somatotype 444 measurements according to height.

For the purpose of the present analysis, sector Mf includes types 343, 252, etc.; Ml includes 344, 244, etc.; in other words, viewed from the central 444, each sector includes its right-hand margin.

Findings

The "11-plus" examination consisted in 1953 of three papers—an intelligence test, English, and arithmetic—to which the Peel test of practical ability was added in 1954.

Complete results were not available for two groups of children—those who scored less than 70 in the intelligence test and those absent from one or more papers. The former were automatically excluded by their low mark from taking any further papers, and therefore cannot figure in this sample; their physique distribution will, however, be analysed in the intelligence test section of the boys' part, since all these very low scorers were boys. Those who were absent will also be removed from the sample after discussion of their somatotype distribution.

Absence

Five per cent. of the girls and 6.2% of the boys were absent at one or more papers. Physique seemed to play a part here; among the girls with a fat rating of 6 or more (the body-build associated with an easy-going comfort-loving temperament), 16.2% were absent as against 3.9% in the remainder of the sample (Difference = 2.0)*.

Analysis of the boy absentees yielded a similar result, but with a different emphasis: this time it was the linear boys (in sectors Lm, Lf, and Fl) who were noticeably present, with only 1.9% absent for one or more papers, as against 7.9% in the other sectors (Difference = 2.8).

Girls' Results

The children's results were analysed in terms of those scoring above and below the mean for each subject. In the girls' results the most outstanding feature was

*If two proportions differ by more than twice the standard error of the difference (S.E. Diff.), the difference is said to be "significant"—that is, such a difference would arise by chance, roughly, once in 20 times.

that the less muscular sectors (in particular Lf), consistently in all the tests, contained a greater proportion of girls scoring above the mean than the rest. The muscular-linear girls (Lm and Ml) varied in performance, while the muscular-fat ones (Mf and Fm) always had a lower percentage of high scorers than the whole sample. The results are given in detail in Table III.

FIG. 6.—Somatotype distribution of 371 boys aged 11 years. (A schematic two-dimensional projection of the theoretical spatial relationships among the known somatotypes.)

FIG. 7.—Somatotype distribution of 421 girls aged 11 years. (A schematic two-dimensional projection of the theoretical spatial relationships among the known somatotypes.)

The less muscular girls gained the most grammar and technical school places, not surprisingly considering their performance in the individual tests (Lf 35% compared with 18.5% of the rest; $\frac{\text{Diff.}}{\text{S.E. Diff.}} = 2.5$) (see Table IV). The fat-muscular girls received significantly few places (15.1% compared with 24.9%: $\frac{\text{Diff.}}{\text{S.E. Diff.}} = 2.4$).

In the intelligence test 66.9% of the Lf and Fl girls scored above the mean compared with 39.7% of the rest ($\frac{\text{Diff.}}{\text{S.E. Diff.}} = 5.3$). Histograms contrasting distribution of

TABLE III.—Proportion of Children with Above Average Scores, According to Physique

Sector	No. in Sector	Intelligence %	Arithmetic %	English %	Peel Test, 1954	
					No. in Sector	%
Girls						
Mf ..	38	36.8	36.8	44.7	26	42.3
MI ..	24	62.5	45.8	58.3	17	35.3
Lm ..	79	41.8	51.9	46.8	45	51.1
Lf ..	60	71.6	65.0	71.7	34	73.5
Fl ..	70	62.9	61.4	61.4	51	58.8
Fm ..	121	33.9	34.7	41.3	90	33.3
Central 444	8	50.0	50.0	62.5	4	50.0
Total ..	400	48.5	48.5	52.2	267	47.6
Boys						
Mf ..	83	38.6	47.0	50.6	70	42.9
MI ..	87	50.6	50.6	48.3	61	52.4
Lm ..	83	48.2	38.6	39.8	53	58.5
Lf ..	13	69.2	69.2	76.9	10	80.0
Fl ..	5	20.0	0.0	40.0	4	25.0
Fm ..	58	51.7	60.3	62.1	45	55.5
Central 444	7	14.3	28.6	14.3	3	100.0
Total ..	336	46.7	47.9	49.4	246	52.8

TABLE IV.—Proportion of Children Gaining Grammar and Technical School Places According to Physique

Sector	Girls		Boys	
	No. in Sector	% G. and T.P.	No. in Sector	% G. and T.P.
Mf ..	38	10.5	83	22.9
Ml ..	24	20.8	87	25.3
Lm ..	79	19.0	83	24.1
Lf ..	60	35.0	13	46.1
Fl ..	70	25.7	5	0.0
Fm ..	121	16.5	58	34.4
Central 444	8	12.5	7	0.0
Total ..	400	21.0	336	25.9

TABLE V.—Difference in Proportion of Less Muscular and Other Girls with Above Average Test Scores

Test	Sectors Lf and Fl	Remainder	Diff. S.E. Diff.
Intelligence test (Moray House) ..	66.9	39.7	5.3
Arithmetic ..	63.0	41.5	4.1
English ..	66.9	45.6	4.0
Peel practical ability test ..	64.6	39.6	4.2

I.Q.s between the better somatotype sectors and the others are shown in Fig. 8. There was a significantly large proportion of high scorers in the same less muscular sectors (Lf and Fl) in both the arithmetic and English tests (see Table V). A similar result was also found among those girls who took the Peel practical ability test.

In all these tests stocky and tubby girls in sectors Fm and Mf did significantly poorly compared with the others. It is interesting that many lean girls (Lm) did well in the intelligence and English tests, but few did so in arithmetic and the practical ability test. The slightly more muscular and less linear girls of sector Ml, on the

FIG. 8.—Histogram contrasting distribution of girls' I.Q.s in sectors Fl and Lf.

other hand, performed *well* at arithmetic and in practical ability, but *poorly* on English and the intelligence tests.

Boys' Results

The boys' results were not as highly significant as the girls'. This is almost unavoidable with samples of 13 and 5 in the two less muscular sectors. There was, however, a consistent trend throughout all the results. The fattest boys (Fm) were the most successful of the larger samples, and the muscular ones with secondary fat dominance the least successful. In the case of the two small groups, the Lf were outstandingly good (as among the girls), but out of the five boys in Fl none achieved a place at grammar or technical school, see Table IV. The neighbouring sectors were noticeably but not significantly successful in achieving places.

In the intelligence test 12 boys did not take the other papers because of intelligence quotients of less than 70. Of these, 7 were in the Mf sector, representing 7.8% of its population, compared with 1.9% of the rest of the boys ($\frac{\text{Diff.}}{\text{S.E. Diff.}} = 2.0$). Considering all the boys with I.Q. above the mean, again the Mf sector did comparatively badly with only 35.5% falling into this category, compared with 48.5% among the other physiques ($\frac{\text{Diff.}}{\text{S.E. Diff.}} = 2.2$)*.

In both the English and arithmetic test results, the fat and less muscular boys taken together (Lf, Fl, and Fm) contained more with marks above the mean than the rest of the sample. In arithmetic the proportions were 60% to 46.7% ($\frac{\text{Diff.}}{\text{S.E. Diff.}} = 2.0$), in English 63.1% to 45.3% ($\frac{\text{Diff.}}{\text{S.E. Diff.}} = 2.8$).

In the Peel test of practical ability (which was taken only in 1954) the most remarkable feature was the poor performance once again of "north-western" muscular boys with secondary fat (42.9% in Mf compared with 56.8% of the rest).

Athletic Ability

Ratings of athletic ability were obtained through the kindness of head teachers on 285 boys and 306 girls. There were thus several observers, and the proportion of children said to possess athletic ability varied widely from school to school. Only rough conclusions may therefore be drawn, but it was found that for the sample as a whole there was a higher proportion of children (both boys and girls) considered to be good at games among place winners than among the remainder.

Discussion

The finding that low-level performance of both boys and girls was specially associated with a fat-muscular (Mf) type of physique is in striking contrast to the high-level performance associated with fat-linear (Lf) types. Further subdivision of each sector into central and peripheral types showed the average score of central types in these sectors to be higher than those more peripheral. While the establishment of normal variation in intelligence scores according to finer shades of physical classification must await larger samples, it is interesting to note that central Lf boys had a mean I.Q. of 111.9, and 37 girls of similar physique a mean value of 105.6. The lower average scores for peripheral Mf children were: boys 99.3 (n=38) and girls 99.7 (n=16). That central Lf children did best is interesting because in an older group of undergraduates (Parnell, 1954a) the outstandingly good performers in final honours class examinations were endomorphic ectomorphs, whose physique was similar when determined by the appropriate deviation chart for their age. It cannot, of course, be

*Both proportions are below 50% owing to slight skewness in the distribution.

assumed that children typed at 11 would necessarily have the same type allotted to them at the age of 21 even when a comparable method is used: any attempt to compare the prevalence of this physique in school and university population in an exact way is likely to be unreliable; nevertheless, the impression has been gained that men of this physique are relatively much more common in the university population, a situation which could be brought about by progressive academic test selection. The trend is important because the high disposition to psychological difficulty and breakdown shown by men with this particular physique is now well established, whereas it is also known that student endomorphic mesomorphs at Oxford, whose physique is most comparable to that of Mf children, show little disposition to breakdown (Parnell, 1955).

Summary and Conclusion

Groups of 371 boys and 421 girls were measured at the age of 11 to obtain standards for somatotyping children by the deviation chart method.

The technique of this objective method of assessing physique in terms of fat, muscularity, and linearity is described, bringing out the points of similarity to and difference from Sheldon's method of somatotyping.

The grammar school entrance marks of 336 boys and 400 girls are compared according to their body build. The slightly smaller sample is accounted for by examination absentees and those who, having scored less than 70 in the intelligence test, did not complete the other papers.

The following conclusions are reached:

1. Absence from the examination was significantly greater among girls with a high fat rating; it was significantly uncommon in boys of linear build.
2. Less muscular girls, and especially those in sector Lf who were linear too, showed significantly high proportions with above-average scores. Their results were consistent for all tests—arithmetic, English, intelligence, and the Peel test of practical ability.
3. A similar trend was found among the boys, although the results were not so highly significant.

Among 12 boys with intelligence scores below 70, there were 7 in the Mf sector, and the lowest proportion of boys scoring above the mean was found in the same area. The same was true of the Peel practical ability test.

Fat and linear non-muscular boys (Lf, Fl, and Fm) did significantly better than the remainder in English and arithmetic.

4. In spite of the tendency to select less muscular children, there was evidence that a higher proportion of those selected, both boys and girls, were considered good at games compared with children failing to obtain places.

5. Certain points of similarity exist between test results at the age of 11 and those discovered in a group of Oxford undergraduates taking their final honours class examination. At both ages linear subjects with more than average fat for their weight were best at examinations. Undergraduates with this type of physique are known to possess comparatively high disposition to psychological breakdown; thus it is not altogether surprising to find high prevalence rates for psychological upset as an associated consequence of intensive academic selection.

We wish to thank Mr. C. F. L. Piggott, Chief Education Officer, City of Oxford, for allowing us access, for the purpose of statistical analysis, to the examination marks, which are otherwise confidential. Dr. J. F. Warin, Medical Officer of Health and

Principal School Medical Officer, City of Oxford, gave us valuable help and advice. Our thanks are also due to the head teachers, without whose kind co-operation the inquiry could not have proceeded so effectively. Miss W. Hunt, of the School Health Department, and Mr. A. D. Hewitt, of the Education Department, also assisted us greatly with practical details. Mrs. G. A. Rainbird kindly drew the diagrams. It formed one part of the research programme at the Warneford Hospital, Oxford, to study methods of physical assessment and the relationship between physique and behaviour, both normal and abnormal.

REFERENCES

- Parnell, R. W. (1953). *Trans. Ass. industr. Med. Offrs.*, 3, 209.
 — (1954a). *British Medical Journal*, 2, 491.
 — (1954b). *Amer. J. phys. Anthropol.*, 12, 209.
 — (1955). In *Modern Trends in Psychosomatic Medicine*, edited by D. O'Neill, p. 182. Butterworths, London.
 Sheldon, W. H. (1954). *Atlas of Men*. Harper Bros, New York and London.
 — and Tucker, W. B. (1940). *Varieties of Human Physique*. Harper Bros., New York and London.

FAVUS: A REPORT OF SEVEN RELATED CASES

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Favus, or tinea favosa, is a ringworm infection of the scalp, skin, and nails rarely seen in Britain, though it commonly occurs in Eastern and Central Europe, in the Mediterranean countries, and in the Near East. The majority of British infections have been sporadic and have occurred in widely scattered areas, but small outbreaks have been reported from urban districts. It has been stated that favus is becoming progressively more rare in this country (Whittle, 1947). Walker (1950) isolated the causative fungus, *Trichophyton schoenleini*, on 42 occasions among 2,473 ringworm cultures. These were grown from specimens received from various parts of Britain. We have been unable to trace any reports of this disease in the London area during the last ten years, and it was not diagnosed mycologically among 760 consecutive patients suffering from ringworm infections seen at the Institute of Dermatology in London (Partridge, 1952). Recently, the diagnosis of favus in a London infant led to the discovery of six unsuspected cases and enabled the source of infection to be traced to another town. This outbreak is reported in order to stress the ease with which the nature of the disease may be overlooked.

In an attempt to trace the source of the infection, attention was directed to a day nursery attended by the affected infant (Case 1). All available contacts were examined under Wood's light, with the result that a second case of scalp infection was discovered (Case 2). Finally, it was learnt that the original child had spent three months in the home of a relative in Kent, where, on inquiry, one adult (Case 3) and four children (Cases 4, 5, 6, and 7) in a single family were found to be suffering from favus. Hairs taken from all six of these patients contained fungous mycelium, and *T. schoenleini* was cultured from five of them.

Case Reports

Case 1.—A female child aged 14 months, living in London, was first brought to hospital in October, 1952. She had suffered from a scurfy condition of the scalp since birth, and on examination was shown to have a number of crusted lesions, but no broken hairs, alopecia, scarring, or scutula. A provisional diagnosis of ringworm was made after microscopy had revealed fungous mycelium in extracted hairs, though cultures were unsuccessful. Whitfield's ointment appeared to control the scalp condition, and after six months only two scaly erythematous patches approximately 1 in. (2.5 cm.) in diameter remained. Under Wood's light, however, a greenish fluorescence was observed along the entire length of many hairs distributed in groups over the whole scalp. These hairs were found to contain fungus, and on this occasion *T. schoenleini* was grown from them. While the condition was being re-investigated local treatment was discontinued, and this resulted in the appearance of typical scutula on the scalp (Fig. 1); there was also spread of the infection to one knee.

FIG. 1.—Case 1. Typical scutula on scalp.

Case 2.—This 1-year-old boy had a single small scaly patch $\frac{1}{4}$ in. (1.3 cm.) in diameter on the occipital region of his scalp. The lesion, which had been present for six months, was first observed two months after he had been attending the day nursery, where he was a close companion of Case 1. Though hairs growing from the affected area appeared normal, they fluoresced a dull green colour under Wood's light.

Case 3.—A woman aged 33, the aunt of Case 1, had suffered from scalp trouble since the age of 5, resulting in bald patches since she was 18. Various therapeutic measures had been tried without success. She had lived in Yorkshire, but had never resided outside Britain and was unable to explain the source of her infection. Examination showed a large scarred bald area—5 by 4 in. (12.5 by 10 cm.)—over the left parietal region with erythema, scaling, and

FIG. 2.—Case 3. Large scarred bald area, with erythema, scaling, and scutula at its periphery.