The outstanding point is seen under the heading "myocardial degeneration," the great majority of the cases falling into the fatal category. The five cases in group 2 were Nos. 3, 6, 9, 15, and 17, Nos. 15 and 17 only just coming into the category of low-voltage curves. On the other hand, all the fourteen cases in group 1 easily fall below the standard accepted for low-voltage tracings.

It seems reasonable to assume that the prognosis in the case of a patient who has symptoms of myocardial degeneration, and also shows a low-voltage curve in all leads, should be extremely guarded, as the great majority of such patients live a few months only. On the other hand, the prognosis, although still doubtful, is better in those cases in which cardiovascular degeneration is not suspected to be present to any marked degree. On the whole, the lower the voltage of the tracings the worse the prognosis, the average for the two groups being:

(1) Fatal (Table IV)			(2) Non-fatal (Table V)		
Lead ... I	II	III	Lead ... I	II	III
Average ... 3	3.76	3.45	Average... 4.57	5.24	4.3

CONCLUSIONS

1. Low-voltage curves occurring in lead I only are found as commonly in electrocardiograms of normal hearts as of abnormal ones. It is obvious, therefore, that no especial significance can be placed on its occurrence *per se*. When, however, the electrocardiogram is abnormal in other respects its presence may have some slight significance, as it is a fact that a large percentage of such cases showed evidence of fairly gross muscle damage.

2. With low-voltage changes occurring in lead II we may state that: (a) The first two groups, consisting of 251 cases, showed only one case coming into this category. Its presence, therefore, in an otherwise normal electrocardiogram would be unusual, and possibly suggestive of muscle damage. (b) It occurs relatively frequently in tracings showing left axis deviation. Here it cannot be considered either as abnormal or as having any special significance. (c) Associated with changes in the electrocardiogram other than left axis deviation it must be considered to be abnormal, and strongly to suggest myocardial damage.

3. Low-voltage curves occurring in lead III only were very commonly found, and cannot be regarded as having any especial significance.

4. Low-voltage changes occurring in all three leads were found in 1.75 per cent. of the total electrocardiograms examined. In cases showing evidence of cardiovascular degeneration the occurrence of such a tracing is significant, and justifies a bad prognosis. Exceptions do occur, but the great majority of these patients die in a comparatively short time.

Finally, it should be noted that low-voltage curves (in lead II only or in all three leads) are particularly likely to occur in cases of cardiovascular degeneration, and their presence usually indicates a poor prognosis. The significance of such curves is of no great import unless considered in conjunction with the other factors of the patient's case; if this is done their occurrence may prove of great value in giving an accurate prognosis.

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EFFECT OF CERTAIN PHYSICAL FACTORS ON THE MENTAL CAPACITY OF SCHOOL CHILDREN*

SYNOPSIS OF PRELIMINARY REPORT

BY

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The children in this investigation were those attending the schools in the burghs of Falkirk and Stirling; the population is mostly industrial, as shown by the classification of parents' occupation—manual 85.8 per cent., sedentary 11.1 per cent., professional 3.1 per cent. Two groups that were medically examined during 1931 were taken. The first comprised 479 boys and 476 girls of approximately 9 years, and the second 346 boys and 337 girls of approximately 13 years of age. Each group was subdivided according to the mental capacity of its members—and by mental capacity is meant the sum of intelligence and ability to acquire knowledge—into four: advanced, normal, retarded, and very retarded.

In ascertaining to which division a child belonged two factors were taken into consideration: first, the child's fitness to do the work of its school class, and secondly, the correct age for that class. The first was estimated by the teachers and head masters, and in regard to the second there was a nominal age of entry for each class, and an allowance of six months was made on either side of this as the limit of normality. The percentage numbers resulting in each division approximated closely to the figures found by the Royal Commission on Physical Training (Scotland). A study of the figures shows that there is a tendency for the girls to find their way into relatively more advanced classes than the boys.

Each division was then compared as regards attendance at school, nutrition (judged by height and weight), employment out of school hours, home environment (judged by size of house, persons per room, occupation of parent, cleanliness, and clothing of child), and physical abnormalities.

Attendance.—Loss of attendance during any part of the school career was counted, and three classes of children were included: (a) those going to school late; (b) those changing school during their "primary" career; (c) "irregular attenders," in the commonly accepted sense. In the third class it was found impossible to fix any definite standard which would imply irregularity, and reliance was placed on the teacher's estimate. It is, of course, accepted that the greatest amount of irregularity is bound to occur during the early years of the school career, and the figures for the 9 years group show that the position of the child in school suffers materially during that period. By the time the child is 13 there has been an opportunity to make up the lost ground, and the irregular attenders are more evenly spread over the four divisions, although the "normal" children still show the smallest percentage of irregularity. The striking factors are that there is greater irregularity among children from very small houses and from large houses, and that there is a larger percentage of irregular attenders among girls than among boys, especially in the 9 years group. Children of professional people are more irregular in attendance than those of manual workers, and the children of sedentary workers are the best attenders. It is evident, therefore, that a child's position in school cannot be taken *alone* as a reliable index of its mental capacity, especially in the earlier years. In order to avoid this fallacy a separate study of the regular attenders was made.

Nutrition.—The factors dealt with here—namely, height and weight—have to be judged in relation to the age and sex of the children concerned. With the exception of the 13 years "advanced" girls there was a steady decline in both height and weight from the "advanced" to the "very retarded."

* Read in the Section of Public Health at the Centenary Meeting of the British Medical Association, London, 1932.

Employment out of School Hours.—This included employment either before or after school hours, or both. The number of 9-year-old children (twenty-three) was so small that no reliable conclusions could be drawn. In the case of the 13 years group there was a bigger percentage of employed children in the lower divisions than in that group as a whole. Taking the figures for boys alone the difference was not quite so marked, so that very little stress can be laid on this result. With the exception of the "advanced" children, the average height and weight of employed boys were below the corresponding figures of all boys of similar age.

HOME ENVIRONMENT

A tendency was evident for an increased percentage of children from the smaller houses to fall into the "very retarded" division; this gradation was most marked in the 13 years group. There was also a steady increase in height and weight with increase in the number of apartments. Comparing the children from one-apartment houses with children from four-apartment houses the average increase amounted in the case of the 13 years group to no less than 3.8 inches and 16 lb. in boys, and 4.1 inches and 16.4 lb. in girls. These figures are very striking.

In order to discover if overcrowding of the home had any effect on mental capacity, the children were divided into two categories—those from houses with more than two persons per apartment, and those from houses with two or less; children of 14 or under were counted as 0.5. The percentage number of children in the "advanced" division from the first category was less than the number from the second, but increased steadily with each descending mental capacity division. In the case of regular attenders the gradation was more marked, and with the 13 years group, where the time factor has been allowed full operation, the gradation was very striking.

The heights and weights of children in these two categories were also compared, and again regular attenders were dealt with separately. With the exception of the 9 years group boys' "advanced" division, the children from houses with more than two persons per apartment were both smaller and lighter than children from houses with two or less persons per apartment. Also children both from houses with more than two and with two or less persons per apartment showed the same decline in height and weight from "advanced" to "very retarded." It would appear that the much bigger percentage of children from houses with more than two persons per apartment in the lower divisions was due to overcrowding rather than to poorer nutrition.

With irregular attenders excluded the fall in height and weight difference from "advanced" to "very retarded" became more noticeable in the case of boys, but the increased percentages of children from houses with more than two persons per apartment in the lower divisions could not be thus explained in the case of girls. While it is manifest that poor nutrition has undoubtedly an effect on mental capacity, overcrowding also would appear to have a lowering influence, especially in the case of girls.

Occupation of Parent.—We found a larger percentage of manual workers' children in the lower divisions, that the children of sedentary workers formed the bulk of "advanced" pupils, and that the children of professional workers clustered round the "normal" and "retarded" divisions. When only regular attenders were dealt with, there was a closer approximation between the three types of children, but the numbers here were smaller, being exceedingly small in the case of professional workers' children in the 13 years group. The effect of the different amount of irregularity of attendance in the three divisions must, however, be kept in mind. The average ages, heights, and weights of boys and girls in the three divisions were compared, and it was found that children of sedentary workers were taller and heavier than the children of manual workers, but smaller and lighter than the children of professional workers.

General Cleanliness and State of Clothing.—In judging cleanliness and state of clothing both the teacher's and

the medical officer's opinions were considered. Relatively few children had insufficient clothing, most of the defects being due to lack of care and to general uncleanness. Children who were clean and had good clothing predominated in the "advanced" division, while dirty, poorly clad children were in marked excess in the "retarded" divisions. With regular attenders the same gradation was observed.

PHYSICAL DEFECTS

Slight Defect of Vision.—All cases with vision 6/12 or 6/9 were placed in this group. Comparing the group category percentage with the group percentage there was a slight decrease in the 9 years "advanced" division and a slight increase in the "retarded" division. In the 13 years group this increase had moved on to the "very retarded" division, showing that the child with slight visual defect falls gradually further behind in school. Irregular attendance made little difference here, unless with the 13 years group "very retarded" pupils, where there was a somewhat smaller percentage of regular attenders.

Marked Defect of Vision.—This included cases with vision 6/18 or worse in one or both eyes, and we observed the same group variations as with slight defect of vision, except that a much larger percentage of children were found in the "very retarded" division and from an earlier age.

Defective Hearing.—Here again we had a decreased percentage number of cases in the "advanced" and an increased percentage number in the "very retarded" divisions from an early stage. In the 13 years group the percentage number of "very retarded" cases was greatly increased. Irregular attendance did not affect the result.

Defective Speech.—Similar observations were made as in the case of defective hearing, although a number of bright children were apparently able to succeed despite this handicap, since there was an increased number in the 13 years "advanced" division.

Pulmonary Defect.—Children with any abnormal physical signs in the lungs were included here. There appeared to be a slight retardation, which only became noticeable in the later years at school. When only regular attenders were dealt with the result was the same, so that it was not absence from school—which is expected with pulmonary defect—but the condition itself which was associated with the retardation.

Organic Cardiac Defect.—In the 9 years group, children with organic cardiac defect were, if anything, in advance of their fellows, but in the 13 years group the reverse was the case. With irregular attenders excluded the results were the same.

Minor Defects.—Enlarged tonsils, adenoids, otorrhoea, functional cardiac disease, anaemia, and other minor maladies appeared in themselves to have very little, if any, effect on mental capacity.

INTELLIGENCE AND MENTAL CAPACITY

A further investigation was undertaken in order to ascertain the relation between mental capacity and intelligence. A number of children, chosen at random from each division in each school, were tested by means of the Stanford modification of the Binet-Simon mental tests, the number of boys and girls thus tested being approximately equal. A number of irregular attenders were included owing to the random selection. There was found to be a steady decline in the average intelligence quotient for the regular attenders of each division from "advanced" down to "very retarded." It would appear, therefore, that, with regular attenders, grouping according to intelligence is the same as grouping according to mental capacity.

CONCLUSIONS

1. The distribution of the children in the various mental capacity divisions is just.
2. Irregular attendance is a potent factor in altering the child's place in school, particularly during the earlier years, and the result of this is specially marked in the case of children of professional workers.

3. There is a tendency for a larger proportion of girls than boys to be above the normal.
4. There is a larger percentage of dull children among manual workers' children and of advanced pupils among sedentary workers' children.
5. There is a steady decline in nutrition, as judged by height and weight, from clever children to very dull children.
6. The majority of very dull children come from houses with only one or two apartments.
7. The majority of dull children, and, especially of backward girls, come from houses with more than two persons per apartment.
8. As a rule, children of good mental capacity are cleanly, while children of poor mental capacity are dirty and ill cared for.
9. The height and weight of children employed out of school hours and their hours of sleep per night are less than in the case of school children of similar age not so employed.
10. Defects in vision, speech, and hearing and organic cardiac defects cause retardation.
11. Minor defects do not cause retardation.
12. Intelligence and mental capacity figures can be substituted one for the other in the case of regular attenders.

I must express sincere thanks to Dr. Adam, medical officer of health for the County of Stirling, for the facilities he has given me in this investigation, and to his assistants, my colleagues, Dr. Rutherford and Dr. Learmonth, for their help in carrying through the mental tests in many of the children.

FURTHER REPORT ON THE TUBERCULIN TREATMENT OF ASTHMA

BY

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The treatment of asthma by means of subcutaneous injections of old tuberculin has now been carried out in this country for more than five years, but, so far as I am aware, there has been no recent published record of the late results achieved by this method. Papers were published in 1928 by Ling,¹ in 1929 by Simpson and Stone,² and in 1930 by the present writer,³ all of whom recorded considerable improvement in the majority of the cases treated. In each of these series, however, the interval of time which had elapsed since the treatment was instituted was too short to permit any reliable conclusion to be drawn as to the permanence of the results. The primary object of this paper is to review the present position of the series published from the Royal Chest Hospital in 1930, which consisted of cases presenting themselves for treatment during the year 1928. The time interval is now therefore between three and a half and four and a half years, which should be sufficient to afford a fairly correct perspective, and should enable some definite conclusion to be drawn as to the ultimate value of the treatment. In addition, it is proposed to record the present state of the series of cases treated during 1929, 1930, and 1931, and to consider briefly the indications for the adoption of tuberculin in the treatment of asthma. In this period of four complete years the total number of cases accepted as suitable for treatment was 103, and this would seem to be sufficiently large to enable the objects stated above to be achieved.

Any attempt to consider the value of a particular method of treatment in asthma is rendered difficult at the outset by the nature of the disease, which is so variable and so apt to be influenced by extraneous factors that one

cannot be sure that improvement is necessarily the result of the particular line of treatment adopted. In addition, the term "asthma" is applied to a number of conditions characterized clinically by dyspnoea but aetiologically separable into distinct groups, not necessarily related to each other. In the previous report cases of spasmodic asthma were considered without reference to their aetiology; in the present paper the cases are separated into two groups—first, cases of true spasmodic asthma of the so-called "primary" type, presumably allergic in origin; and, secondly, cases in which the dyspnoea is spasmodic yet apparently secondary to some chronic infection of the respiratory tract. This has been done because it would have been expected that the former group would react more favourably to treatment than the latter, and a comparison of the results actually obtained is therefore of value in guiding the selection of cases.

TECHNIQUE

On the whole, the dosage described in the previous report has been found to yield the best results. Much larger doses were given in the year 1930 and much smaller doses during part of the year 1931, but in each case the results were found to compare unfavourably with those previously obtained; failure was particularly noticeable when the larger doses were given. The material used in all cases has been Koch's old tuberculin, which may be conveniently kept in decimal dilutions from 1 in 1,000 to 1 in 1,000,000. It is not necessary for the dilutions to be prepared immediately before use; they keep quite well under ordinary conditions for at least a month. The initial dose is gauged by the response of the patient to the Mantoux test. One-tenth of a cubic centimetre of the 1 in 1,000 dilution is injected intradermally and the result is read after two or three days, attention being paid only to the area of swelling, for erythema is apparently of no significance. If there is no swelling, then it is quite safe to begin the treatment with a subcutaneous injection of 1/10 c.cm. of the 1 in 1,000 dilution; if there be an area of swelling less than one centimetre in its long axis, the initial dose should be 1/10 c.cm. of 1 in 10,000; if the area be between one and two centimetres in its long axis the initial dose should be 1/10 c.cm. of 1 in 100,000; and in cases where the area of swelling exceeds two centimetres in diameter the initial dose should not be greater than 1/10 c.cm. of the 1 in 1,000,000 dilution.

In the early stages of treatment the interval between the injections should be two or three days, although, in the case of hospital out-patients, this is not always possible, and a weekly injection must suffice. The interval between injections may be gradually increased, but weekly injections should be given for at least six months, after which, in the majority of cases, the treatment may be given fortnightly for a further period of six months. The injections may then be suspended for three months, but a further course of weekly and fortnightly injections should be given to bring the total period of treatment up to a minimum of two years. It would appear that one of the commonest causes of failure has been an inadequate course of treatment—frequently the fault of the patient, who concludes prematurely from the absence of attacks that the condition is "cured." In some cases (especially in elderly people with chronic respiratory infections) it may be desirable to administer a course of tuberculin every year from October to May. The rate of increase in the dosage must be decided for each individual, but on the whole it has been found best to increase the dose by 1/10 c.cm. at each injection, although in some instances this rate of increase may be too rapid. The maximum tolerable dose is found to vary greatly, for some patients