EXTRINSIC and INTRINSIC CONDITIONS AFFECTING SCHOOL CHILDREN:

A STUDY of SOME SCHOOLS and SCHOOL CHILDREN in GLASGOW.

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In the following paper, it is intended to offer some considerations based on the observation of Schools and School Children in Glasgow and District. The observations were made by the writer when demonstrating to Teachers in training the actual conditions described and also from special visits made on other occasions. It is hoped that the record here given will be useful as illustrating the conditions of school life in cities and under Boards which have an elastic school board rate.

School Hygiene and the Medical Inspection of School Children are at present being treated as matters of the first importance; after having been treated as of minor importance for a generation. The change of attitude is due to many causes but more immediately to the discovery by a Royal Commission, that if marked deterioration in the manhood and womanhood of the nation is to be avoided, measures will have to be taken, chief among which is the care of the child when under state control, i.e., during school life.

The necessity for the work of medical supervision and inspection of school children and school buildings has grown since the introduction of compulsory education. In the preceding times when compulsion was not, education was only sought for by the few and the School House usually consisted of the teachers dwelling. The question of over-crowding rarely arose and all questions of such a nature were met as a rule by the application of what knowledge was common property at the time. The teacher was an autocrat and could make his hours and intervals at his own pleasure without the terror of a School Board or inspecting official in the back ground. On the whole the system worked fairly well so far as the health of the child was concerned and if any child was not thriving, the parents exercised their own discretion in keeping them from school. Even where the parents were not sufficiently alive to notice such a matter, the pressure of their neighbour's opinions often must have brought it home to them and suggested some such action.

But with compulsion, all this was changed. The question of expense entered, inasmuch as the large numbers to be taught, necessitated much building accommodation and a numerous teaching staff. At first makeshift measures were taken, but gradually the opinions on the subject were crystallised into stone and lime and remain today as a witness to their form. In the schools which were taken over from the Churches, the Established and Free, one large hall under the charge of a master and one or two assistants, usually was made to accommodate all the classes, the total number of pupils varying.

In some the infants were detached and placed in another room where their instruction could be carried on in the sing song manner without disturbing the whole school. Such arrangements did not allow much room for expansion and when the population increased, overcrowding followed. The herding of such a mass of children in a common room for periods averaging two hours on end, produced dangers to the well-being of teacher and taught, some of which are only now being publicly acknowledged and dealt with. Chief among these dangers, were those arising from imperfect ventilation, which with the actual contact increased the danger of infection, specially of the specific fevers: and out-of-doors, the dangers arising from absence of, or insufficient latrine accommodation, common use of sinks and towels, and imperfect water supply. Of less obvious dangers but still important from many points of view were those of bad seating and lighting, and heating.

With the advent of the School Board type of school, many of these difficulties were tackled. Thus heating, lighting and seating tended to be more efficient, while ventilation and accommodation were not unattended to.

The large classes, however, entrusted to each teacher and which he had to instruct with the aid of young pupil-assistants, together with the cast-iron codes and the adherence thereto of H.M.Inspectors, made the teacher's task a far from enviable one. Little or no allowance was made for bad sight, bad hearing, poor physique and mental dulness or backwardness, so that these poor unfortunate children were pressed on against nature by the fear of, or exhibition of, corporal punishment. In our present mood, it is difficult to realise that such conditions are so little removed from our time and that the study of the child's powers of acquiring knowledge, preceding the imparting of it, should be such a commonplace today and so anathema yesterday. How trite is it, that the truism of today is the aspiration of yesterday.

With these preliminary remarks we shall consider the subject of the paper under the following heads:-

I. THE SCHOOL:

General Construction.

The Schoolroom:

Seating: size: shape: accommodation: lighting and equipment.

Ventilation and Heating.

Cloakrooms, wash-basins, lavatories.

Playgrounds, drill halls, gymnasia

laboratories, workshops.

Baths.

2. THE CHILD:

School Hours: Sleep: Play and Work.

Physique: height and weight, etc.

Clothing.

Deformities.

Vision, hearing, speech,

Teeth Throat, glands

Skin and hair.

Defectives: (physical
(mental.

3. THE TEACHER.

GENERAL CONSTRUCTION -

In the construction of schools, certain axioms are well established and yet are seldom given effect to. The first of these is that as far as possible all the rooms should be on the ground level. In the country this is usually the case, because land is comparatively cheap and great accommodation is seldom needed. But in towns where, and especially of recent years, the decision of the School Board to acquire a site raises the price enormously it is not easy to get a sufficiency of land for all the schools even when the buildings are of the three storey type. The result is that in towns, the single storey school is a rarity. This is unfortunate because the addition of other flats introduces winding stairs and problems of lighting and ventilation which are not always easy of solution. The single storey school can be made to face the S.W. and so secure for all parts of the school the best lighting and warmest exposure. The ventilation by free perflation or other measures also presents no special difficulties as two sides of the school are exposed to the outside air and exit channels to the roof are easily arranged.

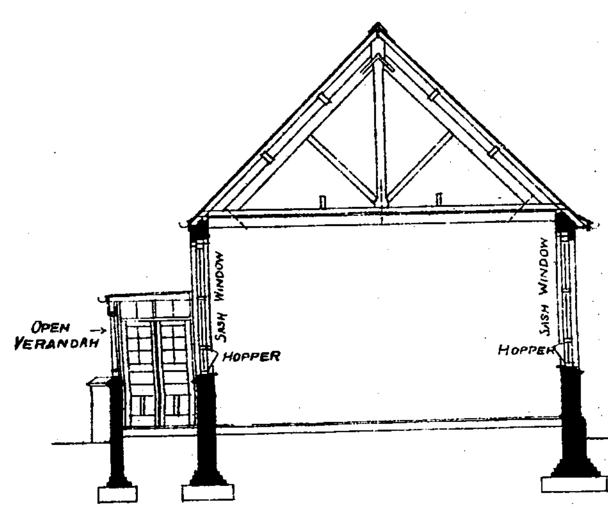
Such a type of school has been built in Staffordshire on the proposal of Dr Reid and by his favour I am enabled

THE STAFFORDSHIRE TYPE OF ELEMENTARY SCHOOL.

NOTES:—

Warming by low-pressure water circuit and ventilating radiators.

Hopper openings in windows, 5 feet from floor level, and sash openings above.



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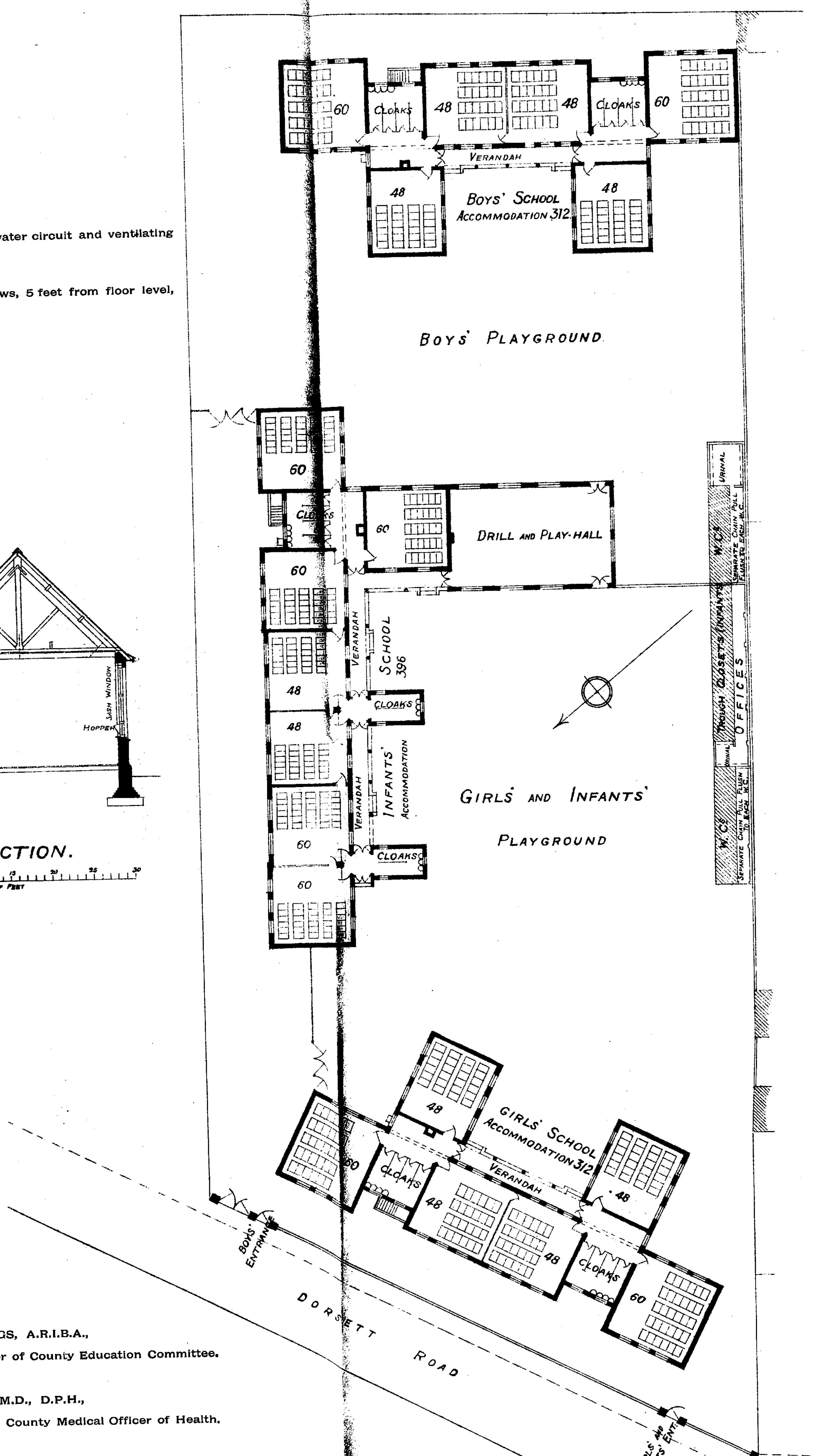

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GROUND PLAN OF DORSETT ROAD SCHOOL.
DARLASTON.

to present a ground plan of such a school. The class rooms are connected at the back by corridors and off these cloak rooms are built. A semi-detached drill hall serves for the whole school. Cross window ventilation is secured by hopper openings, and the heating is by low pressure ventilating radiators, each room having a distinct circuit. This promotes security against breakdown in individual rooms. Seventeen to twenty lineal feet of piping is allowed per 1000 c.ft of air space. Such a school likewise is economical in construction and works out at about £10 per head exclusive of site, as against £15 per head in the type of school next to be considered - the Central Hall type.

Unfortunately in towns this has come to be looked upon as ideal. This has arisen from limitations of space giving rise to many storied buildings, at first not unlike tenements in construction with enclosed stairways and the rooms opening off these. Later the stairways were made open, but the two sets (boys and girls) so entwined as to occupy all the space and darken each other. Gradually the stairways were separated and a clear space, at first small, left between. Thus originated the central hall which at length became of imposing size and having the stairways quite apart. The stages are well illustrated in surveying the Glasgow schools. In Tureen Street, the stairways are enclosed and run up the building just as in an ordinary tenement (1875). The oldest part of Kennedy Street shows a building with the class rooms, arranged right and left of a partially enclosed stairway. This was built in 1875 and is of two storeys. The middle portion built in 1889 is a square building with a central rectangular well of narrow width almost entirely occupied by the boys and girls stairs which darken each other, so that artificial lighting is often required. A similar construction is seen in Dobbie's Loan School which was built in 1887. 3 (?)

The fault in both of these schools lies in attempting to utilise all the space for rooms. The central strip from front to back would give a light stairway at each end and a central air space. But, instead, we have central stairs darkening each other by intertwining, and teachers' and other rooms at each end. By degrees the idea of the central hall or space gained favour and was used in various ways. In some (Dennistoun, Townhead) the stairs occupied the ground floor level and led to the upper storey. But the increase of drill in the junior classes, necessitated some place therefor, and so the stairs were kept to the sides and a clear space left for musical drill and physical exercises. This space, in some schools small, in others is very ample. In Provanside (built 1901) the hall is very spacious and finely proportioned. There are three sets of stairs, one at the end of the hall and a pair outside the other end and entering from an outside passage. This school is notable for its fine proportions, ample stairways, correct lighting and efficient ventilation. Later examples of the central hall type are Canning Place, Strathclyde, Cuthbertson, etc. In these the stairways are completely detached from the central hall and rise from the connecting passages. The stairs are now made wide and spacious and well lighted.

THE SCHOOLROOM:

Seating, size,shape,accommodation, lighting, and equipment. All these are factors which have likewise been the subjects of much change. In the early days, the population was not so much massed and so large schools were rarer. Still from the records we find that the accommodation for a certain size of building has not much declined.

The notions in regard to floor space per pupil were certainly much less defined than now, but the shape of desk used, precluded from its bulkiness the overcrowding of the rooms. Thus a desk now condemned from certain points of view, was of great service in a negative way. The desk referred to is what now is known as the Glasgow pattern, and was and is still widely used. It consists of a long desk with sloping table and a seat fixed at a variable distance from it, generally 4" back. Behind the seat a clear space of about 12 inches was left in front of the next desk. It is this space which saved the massing of the class together and ensured a good air space around each pupil. Since the seats were not movable the space behind was required to step out from the desks and for progression out of and into them. It was also found to be very useful from a pedagogic point of view as the teacher could walk along it himself and supervise the writing and other tasks of the pupils without disturbing them to any marked extent. The difference of floor space per pupil with and without this stepping out space, is shown from actual measurements in Kennedy Street. With the spaces as at present in use the floor space around each pupil was 4.5 to 5 sq.ft (648-720 sq.in.) with the spaces deducted it was 3 to 3½ sq.ft.

In the latter case the result resembled a collection of dual desks brought alongside each other.

And the resemblance is not a casual one but is an expression of actual fact. The dual desk gives room for standing, by folding up the seat and half the desk. It thus economises the stepping-out space as each dual desk in the commonly used pattern has the seat dependent from the next desk and no corresponding gap occurs. The result is that, in spite of the gangways being more numerous, the children are more massed together and breathe in a more confined space. The distance between two dual desks averages 27" and the desk allowance is 18"-21" per pupil. This gives 3.375 - 3.937 sq.ft (486-567 sq.in.) per pupil as against 4.5-5 sq.ft 648-720 sq.in. in the Glasgow pattern; or, put another way, each child in a Glasgow pattern desk is set in the midst of a circle of floor space of a diameter of 28-30 inches and in the dual desks of a diameter of 24"-27". When the actual classroom is taken and the gangways included the results do not differ much from those given. Thus in a room with Glasgow pattern desks, set for 72 with two files of desks containing 6 each and 6 desks in each file and two gangways, one central 31 in. and one side 18", the total area occupied by the desks and gangways was 23' x 19.75 = 454.25 sq.ft and this divided by 72 gave 6.31 sq.ft (908.6 sq.in.) per pupil or a circle of diameter 34 ins. In another room with dual desks set in five files with four gangways 15" each and 6 desks in each file, the total area occupied was 20.5 x 14.5 = 297.25 sq.ft - 60 = 4.59 sq.ft (660.9 sq.in.) per pupil or equal to a circle diameter 29 inches. If the gangways be made 18" then 21.5 x 14.5 = 311.75 sq.ft - 60 = 5.12 sq.ft (738.5 sq.in) per pupil or equal to a circle of diameter 30.6 inches. Thus although the gangways in the two cases with the dual desks contribute respectively 72.5 and 87 sq.ft to the floor space as against 80.6 sq.ft for the Glasgow pattern the floor space per pupil is notably less.

	Floor Space		Circle
	sq.ft	sq.in.	Diam.
Glasgow pattern	6.31	908.6	34.0
Dual 15" gangways	4.59	660.9	29.0
" 18" "	5.129	738.5	30.6

It is thus seen that the dual desk has not increased the floor space around the scholar, but has diminished it. It has moreover brought the scholars closer together from before backwards. Thus the actual distance between the heads of the scholars from before back in the Glasgow pattern averages 36": in the dual desk 27". It does not admit of question that this is a serious disadvantage increasing as it does the pollution of the air between the scholars and making the direct impact of one scholar's breath on the head of another in front more likely. This is the direct result of the crowding of the scholars together from before back and is further borne witness to by the teacher's criticism that dual desks admit too easily of copying from the scholar in front.

We have thus seen that the Glasgow pattern desk is superior to the dual desk in its greater air space and separation of the scholars and from pedagogic reasons. It has also the proper slope of desk to wit about 15°. On the other hand it has the following disadvantages: (1) The desk and seat are of fixed height and distance apart and cannot be adjusted. (2) There is no back to the seat. (3) The usual make has a "distance" of 3 to 4 inches which with the sloping desk is quite suitable for writing, and (4) it cannot be folded up for free hand drawing (such desks are now supplied.) The dual desk on the other hand -

(1) can have the seat raised and lowered;

(2) provides a back rest;

(3) has the ledge divided so that it can be turned up for reading and drawing purposes.

Nevertheless it has also these disadvantages:

(1) The ledge is in most instances horizontal;

this is bad for writing.

(2) Though the seat is adjustable as to height, it is rarely adjusted, as this requires a mechanic. The height of the ledge is fixed.

(3) The seats are ordered to an average size for age and the pupils are not arranged in order of size but in order of merit.

(4) While the average desk space per scholar is equal to and often a few inches more than, that given in the Glasgow pattern desk (namely 18 inches,) the scholars are either sitting very closely or are over the ends of the seat. When writing, however, the case is worse. The scholar who first appropriates the desk for his copy-book monopolises two thirds of it and the other scholar has to do as best he may. In fact for writing or drawing they really should be reduced to single desks.

These faults have all been noted in schools visited. In Washington Street School which is fitted throughout with dual desks the most glaring examples of misfit of desks were seen in Standard III. The average age was 9 years and the height of seat provided 13". Very few of the scholars measured this amount from the sole of the boot to fold of knee. In one instance a boy was seen crowded into the desk and having a difficulty in folding his legs below the desk while his neighbour was a very little chap whose toes touched the ground. The big boy measured 17" to the fold of knee with the leg flexed to a right angle and his neighbour 11",while the seat was 13". There were other seats somewhat higher, even up to 15" but the children were not assorted accordingly as is self-evident when two such were occupying the same dual desk. The order of merit prevails and not the order of size. The height of the desk likewise is often at fault from the same reasons. The sitting height of children varies so that the level of the elbow in two children of the same total height may be different. Girls have a greater sitting height than boys of the same stature and this cannot be adjusted simply by moving the seat.

To meet the need for different distances between the seat and desk, for the various operations of reading, writing and standing several types of desks have been devised. These are now being classified as follows, on the basis of the relation of the back edge of the desk ledge to the vertical plane passing through the front edge of the seat:

1. The "plus" desk. In this form the vertical plane is behind the back edge of desk, and the "distance" varies.

In the Glasgow type it is 3 to 6 inches, and in the dual desk usually 1" and maybe 3".

(2) The "zero" desk; where the vertical plane passes through the rear edge of desk and there is thus no "distance" between them. Many dual desks are thus fitted.

(3) The "minus" desk, where the vertical plane passes through the desk so that the latter overlaps the seat and the "distance" is thus measured in a different direction from that in a plus desk. The word distance has become specialised in this sense so that the"distance" of a desk is spoken of as plus or minus so many inches or zero.

For writing, the minus position is the one naturally adopted by most adults when sitting on a movable chair. The advantages over the plus position are these: (a) a more erect posture is easily maintained and so the crowding together of the ribs and abdominal organs is avoided; (b) the weight of the body is over the centre of gravity and is maintained in position by balance, (c) the head is more easily kept erect and congestion of the face and eyes avoided.

For sitting the minus desk is not comfortable, unless specially adjusted for each pupil. It has been introduced in Canning Place School (opened 1907) for the higher infants. The varying bulkiness of children from before back makes one child fit it, while his neighbour feels it impinging rather much on his breast. In these desks the overlap is 3" and the seats are 10" broad. In the infant class some of the children could not sit comfortably on a 10" seat as the edge of the latter caught their calves when they were sitting well back, with the result that they slid forward and only rested their shoulders on the back support.

The desks have also in some cases to serve for young men and women in continuation classes and under such circumstances the old Glasgow pattern was more easily put up with than the closed-in dual desks. It is not easy to get a desk to serve all these purposes. Various forms of single desk have been devised, adjustable by the teacher or scholar, and many difficulties would be solved by their adoption. The increased floor space which is eminently desirable as also the reduced size of class which could be accommodated, would come naturally by its introduction. But each of these results means the increase of school provision and of school staff and the expense of these and of the desks themselves are at present in the way. They are, however, in use for defective classes. In such classes, the teacher is not allowed to have more than twenty scholars and in an average sized room with single desks, the space is easily obtained. In Dobbie's Loan School the single desks used allow 22" desk space and 28" from before back equal to 616 sq.in floor space or 4.28 sq.ft. In five rows six desks deep with four intermediate gangways 18" each, the single desk gives a floor space of 1037.376 sq.in or 7.204 sq.ft per pupil. The pupils are thus in a larger floor space but are still with their heads only 28" apart.

Another device is to use the long desk of the Glasgow pattern with no long seat but separate chairs which can be moved about and can also be easily raised or lowered. This is the "Sheffield" type of desk and provided the height of the ledge is suitable solves many of the problems we have mentioned.

There is no doubt that, waiving the question of expense, the single desk is the type to be aimed at. Each child is isolated and so the danger of corporeal infection is minimised. A larger floor space is a concomitant and a very desirable advantage. And to the teacher, the separation of the class members diminishes the numbers able to be accommodated in the usual space, improves the discipline, and makes the supervision less irksome. It is in fact another step towards the individual tuition which is now becoming more and more the aim of the educationist.

The size, shape, lighting and accommodation of a schoolroom are factors which react on each other and so are conveniently studied together.

At first the size was only limited by the number to be taught by one teacher and as this was often 120 and over the school rooms of those times were of large size. In spite of that, in buildings built for schools, the lighting was usually very good. Thus in Kennedy Street, what is now two rooms, formed one large class-room with the desks arranged so that efficient back lighting from the left was obtained,aided by right and lighting; the ratio of window area to floor area being 1 to 5. When smaller classes became the rule this room was divided. Of the two rooms so made; one was brightly lighted with a ratio of 1 to 3; and the other only lighted from the back and having a window area 1/10th of the floor space. In this way does one regulation defeat the object of another when applied to existing buildings. In schools designed to meet both requirements, however, very satisfactory results are obtained.

The size of class at present allowed is 60 pupils and a minimum of 10 sq.ft per pupil of floor space is required. This gives 600 sq.ft and the problem is how to shape the room. The direction of lighting which is most desirable is that from the left for then the shadow cast by the pen does not fall on the letter being written. Next best is lighting from the right side and in both cases some back lighting is useful at that end of the back wall away from the side windows. Lighting from the front is bad for the scholar's eyes: being dazzling. From the back, the teacher's eyes are fatigued, while the scholars' faces are darkened to him and they have dark shadows on the desk for reading or writing. Lighting from the roof except for special rooms such as gymnasium, art room, laundry, is not advisable and should even then only be additional to other lighting.

The height of the classroom has likewise been fixed and as this limits the height of the windows it reacts on the width of the room. If the area exceed 360sq.ft the height must be 13'; if 600, then 14'. Also the bottom of the window should be four feet from the floor level and the top should reach to within 6" of the roof. This allows a window 9 feet high and it is found that the light from the upper part will give sufficient intensity up to an angle of incidence on the desks of 30°.

From this we deduce the breadth of the room to be the height multiplied by the cotangent of 30^{o},

$$\text{or } 13 \times \frac{\sqrt{3}}{1} = 22.5 \text{ ft}$$

or if the height be 14 feet

$$14 \times \frac{\sqrt{3}}{1} = 24.2 \text{ ft.}$$

As a gangway is usually left next the wall another eighteen inches can be allowed so that the breadth should be 24-26 feet. The length of the room is then determinable by dividing the 600 sq ft of area by the breadth determined on and this would give 25 and 23 feet respectively. This gives almost a square room and many schools have their rooms of this shape. It is quite allowable, however, to lengthen the room and so make it more rectangular and at the same time increase the floor space and cubic space per pupil, which as we shall discuss later are too low. There are limits, however, to this lengthening process and these are fixed by the distance at which scholars with normal eyes can be expected to see the board, and at which the teacher's voice is still clearly heard. These limit the length to 30 feet. Such a room 25 x 30' gives 750 sq ft floor space $= \frac{750}{60} =$ 12.5 sq.feet per pupil and with height of roof 14 feet, gives 175.c.ft per scholar.

The size of the classroom thus established, the ratio of lighting area has to be considered. The present instruction is that it shall not be less than $\frac{1}{6}$ but $\frac{1}{5}$ or ¼ is better. Taking it at $\frac{1}{6}$ of 600 we get 100 sq ft of window and at 9 feet height of each, $11\frac{1}{9}$ ft of breadth is required. Three windows 4 ft wide would supply this and would give a well lighted room. In Provanside School the rooms are all 26 feet broad by 24 deep and with three windows 9' x 4' the ratio of 1 to 6 is obtained. On the north side of the school, however, it is found that the lighting is not so good and fortunately at the end rooms, a gable window gives aid in lighting.

The lighting, however, of many of the older and medium old type of schools is in some classrooms very bad. As in the case referred to in Kennedy Street, this is due to division of larger rooms, leading to one part being over lighted and the other not only under lighted but having the light coming in a totally wrong direction. In room 26 and that above, 37, the lighting is only $\frac{1}{10}$ of the floor area and except for a little borrowed light from the glass partition is wholly from the back. In the winter time artificial lighting is the rule and was observed at every visit made in December. Similar rooms in every respect were noted in schools of the same age and type, namely, Camlachie, Rumford Street, and Tureen St.

In all these cases the direction could be improved by arranging the desks at right angles to the windows. The illumination of the classroom can be increased, it is claimed, by 50% by the use of ribbed or prismatic glass on the top sash. The action of these is to deflect the rays impinging on the window at a small angle, so that they enter it. The use of oriel windows should likewise be considered. They undoubtedly give increased illumination and the side sashes can be used alternately for ventilation according to the direction of the wind. Window blinds should be provided rolling from below upwards, on the East, south, and west, sides of the school.

The question of galleries is one that is at present engaging attention and the tendency is to abolish them. With smaller classes and classrooms (graded desks and the larger pupils to the rear) they are not so necessary as formerly and are the occasion of much stumbling. They also render the cleansing less easy. Where present they vary from 2" to 6" in height. In Provanside in room 8, there were 5 steps from before back, respectively, 2", 3", 4", 5", and 6". This variation rendered the seats of the dual desks higher as one went back because the seat for each desk depends from the one behind, and as this was not noted at first caused a good deal of adjusting to be necessary.

Floors.

The floors should be of narrow planking laid tightly. In Provanside the floors are of 3" pitch pine boards and are closely packed.

The walls should be smooth and painted a light grey or grey green. They should be washable and wiped down every week. There should be no fixtures on the walls such as maps, charts, etc., as these harbour dust. The junctions of the floor with the walls and of the walls with ceiling should all be rounded. The walls are usually wood panelled to 4½ ft. The furnishings of the schoolroom besides the desks should be simple and dust proof.- A teacher's desk and chair and one or two cupboards to hold copy-books, etc. Cupboards set in the walls with or without sliding doors should be abolished.
The blackboards should be black, of slate or glass, and dull not shining. Besides the teacher's blackboard, there should be one round the room 4' wide, the height to suit the children in the room. This is of much use for free arm drawing and other tasks when the children have been sitting in the desks for some time and are requiring a change of position.

VENTILATION and HEATING.

The ventilation and heating of the school-room have been taken together because they are in many instances, and especially in artificial systems, associated.

It is not necessary to be an expert in ventilation to be painfully conscious of the need for it when people or children are massed together in an enclosed space. The rigour of our northern climate combined with the more indoor life led by many of our populace has resulted in a dread of the effects of cold air, night air, etc. The result is that people are more inclined to make their rooms stuffy than airy, and if they feel comfortably warm to ignore the quality of the air in the room. This probably is partly due to the dulling effect on the sense of smell and on the brain which the breathing of gradually vitiating air has. It is a common-place observation which is being repeated day by day for someone to enter a room and exclaim how stuffy, smelly, and hot it is, while the inmates in many cases with mild surprise ask is it so? They are not conscious to any marked degree of its foulness because of its insidious onset. It requires much courage to preach the doctrine of fresh air and cold air and say in public and print it later that children will remain healthier and physiologically better through the school day# if they are made to keep their bodies warm and to breath the cool fresh air. (Leslie Mackenzie - Health of the School Child p.8) Nevertheless there is a growing conviction on the part of the profession and of the public in favour of fresh air and a belief in the further statement that the air of this country is never too cold to breathe and if the children are well clad the temperature of the room does not so much matter.

In the course of our visits to the various schools it has often been a matter of note, how in some classrooms the air seemed to the intruder disagreeably hot, and smelling. In the worst instances the windows were found to be closed (Finnieston) reliance being placed on an inefficient inlet and outlet arrangement. In a majority of the schools, ventilation was by natural means only, that is, the heating of the rooms was by 4" hot water low pressure pipes and the air supply from open windows. Some had outlets in the roof; others had not. In none of the school-rooms visited was there an open fire.

The efficiency or otherwise of ventilation by this method depends on the production of currents from differences of temperature in masses of air in the room.

The chief source of heat which raises the temperature of masses of the air is the breathing of the occupants. Other sources are the hot pipes and gas lighting when in use. The inspired air, varying (in our own city) in temperature from 39° F in January to 65° F. in August, is, on expiration, almost at blood heat or 98° F. This considerable rise in temperature with consequent lessened density in conjunction with the motion imparted by its expulsion, supplies the energy, which is translated into motion. From all these causes acting in a similar direction, the expired air rises towards the ceiling and will escape by any suitably placed exit. To take its place fresh air will constantly be drawn into the room, by the open window, by special supplied openings, or failing these by the chinks and crevices about the windows and doorways.

Such in brief is the mode of action of natural ventilation and within limits it is quite efficient. But if too much is demanded of it, it will of course fail. The limits are imposed by the amount of heat energy imparted to the air by breathing. This is greater in winter and so such mode of ventilation will tend to be more efficient in winter than in summer. But in any case the amount of energy supplied can only do a certain amount of work in raising the air to a height and then discharging it. It has been calculated that the height to which such heated air can rise is 13-14 feet and so it is advised that rooms should not be higher in the ceiling. When such air has risen to 13 feet, it has become cool to a certain extent, but is able to move out of a suitable exit placed at this level. Such an exit is often the space left when the top sash of the window is lowered and when the window reaches to or within 6" of the ceiling. In other cases an exit is supplied in the centre of the roof and if this opens directly through a cowl or chimney to the open air, much of the heated air escapes. But it is often the case that it leads into a flue of varying length and of many directions. If the flue is vertical and not over long, the air may still have sufficient energy when compressed into it to rise to the outlet. But if the flue is horizontal and takes numerous bends then it is unlikely that it is of much service. On the other hand it is more likely to allow a reverse current, especially on a windy day, causing a down draught on the class-room. An example of this was seen in Kennedy Street where the outlet was in the centre of the roof and was a perforated grating 15" x 15" or 225 sq.in. possible area. From this 25 sq.in. would require to be deducted for the thick spars of the wooden grating and at 60 pupils this gave $(\frac{200}{60})$ 3.5 sq.in.

outlet area per pupil. But on investigation in the attic of the building it was found that the outlet was closed and when open led into a horizontal flue which took several bends ere it finally reached the outside air. When the flap was raised little time elapsed until complaint was made of uncomfortable down draughts of cold air into the class-room.

When a greater height than 13 feet is allowed and especially where the windows stop short two or three feet from the roof, the extra height is not only of no service but is actually harmful, acting as a cloud pall of hot, saturated air. It has then the same action as the heavy strata-nimbus clouds of a summer evening, obstructing evaporation and preventing deposition of moisture, by causing the air to become uncomfortably moist and warm.

In the summertime the difference in temperature is not so great between the warmed air of the room and the outside air and hence the conditions are less favourable on this point for thorough ventilation but on the other hand the windows can be more freely opened and so allow a greater diffusion to take place.

In the winter likewise the inrush of cold air is apt to be disagreeable. This is more noticeable in all seasons when there is any wind blowing towards the windows. Draughts and free perflation of air are caused and when this is cold, the sensation of discomfort is so great as to cause closure of the windows.

From these and other reasons, unless the teacher is an enthusiast for fresh air, the ventilation by such primitive methods of natural ventilation is seldom a success. One result has been the substitution of entirely mechanical measures such as the plenum system which we shall discuss later. But such a great step is scarcely needed. The provision and planning of suitable air inlets and outlets and of means to avoid draught on the same liberal scale as is done for mechanical systems of ventilation would result in a much greater efficiency thereof; and inasmuch as the person was living in the same atmosphere would render them less liable to feel the change to the outer air. The aim of all systems of ventilation should be to render the person or persons, proof to the outer air, which must be encountered in our journeyings to and fro. This cannot be done by cooping oneself up in an atmosphere, which is much warmer and less humid than the outer air. The one result is that the capillaries of the nose become dilated and the nasal mucus dried and on emergence a sudden stimulus of comparative cold is applied to them which results in a nasal catarrh. Such measures have been taken in the newest part of Kennedy Street, in Canning Place (though here the extraction is aided by vacuum producing fans), in Kelvinhaugh and elsewhere.

The windows are arranged to open widely at the foot but a Sheringham valve with movable glass frame is there placed which directs the air upwards and inwards. Tobin's tubes are also provided as adjuvants and there is an exit in the roof leading vertically to the open air. Hot water pipes are led round the room on two sides and serve to keep the temperature up. The cold air entering at the height of six feet mixes with warm air rising from the pipes and the children's breaths and forming a heavier mixture is precipitated towards them. The force of gravity is thus made to perform useful work and so the air is continually replenished. On windy days some adjustment of the openings has to be made. It has to be admitted that even thus the mixture supplied is not pure air. Neither is it so in the plenum system. In fact unless one lives in the open air, it is impossible to discharge the impurities of the breath and get a pure air supply unless by some such measures as are used to supply the diver to the sea bottom. The advantages of this fresh air system, however, over the plenum or other hot air system may be summed up thus.

1. The air delivered to the room is of the same humidity and density as the outer air. It has therefore no extra drying effect. The plenum air is heated and expanded and less humid than the outer air.
2. The air being unexpanded contains the same volume of oxygen in the tidal air as does the outer air (which it is). The plenum air being expanded delivers a less volume of oxygen in the same tidal air. Hence increased respiration is necessary.
3. The apparatus is entirely controlled within the class-room, namely, the air supply by the windows and the heat supply by radiators. It can therefore be adjusted to the local needs more readily than where not dry air is supplied.
4. Breakdown in the hot water supply is not common and does not make very much difference. In the plenum system a breakdown means that recourse has to be had to open windows in the old crude way.

The disadvantages are that the air is not filtered of dust and that street noises are disturbing through the open windows.

The plenum system to which we have been referring, consists in the supply to the class-rooms of washed air which is then heated, and delivered by special ducts under pressure. The inlet in the class-room is placed about 8 feet high and an outlet on the same wall on the floor level. The outlet leads at once into a vertical duct which discharges on the roof of the building. The windows and the door of the class-room must be kept closed to maintain the system in action.

The air delivered is drawn through a screen of horse hair or jute by the action of a fan or fans, and the screen is kept wet by a thin stream of water flowing over it. The opening for the indrawn air may be six feet from the playground level as at Provanside or three feet as at Church Street. Preferably it should be from a greater height to avoid dust and surface contamination. The air then passes through the wet screen where dust particles are removed in considerable amount and where it is likewise moistened. Passing on it is heated on coils of steam heated pipes and then or earlier passing through the fan which produces the motion in it, it is pressed along ducts from which vertical air shafts lead to the class-rooms. The amount of inlet into these can be regulated and at the foot of each shaft a radiator is placed which can be used for further heating of the air and in a breakdown of the fan as described later.

In the system as here detailed the air is first washed and then heated. The result is that a super-heated dry air is produced which is delivered to the class-rooms, where these characteristics of it are quite evident and very objectionable. This has led to its discontinuous use in numerous schools where the system was fitted in without the provision of spacious passages below. Such is the case in Dalmarnock, Calton, Queen Mary Street and doubtless other schools where the original cost of the building was much increased by the provision of this system of ventilation. The working of it proved at times so inefficient that the teachers preferred open windows. Even in Church Street, Partick, and Woodside, where special mechanics are alloted the duty of supervising the system, the air in the class-rooms has a disagreeably hot and burnt smell.

In Provanside, on the other hand, the conditions in the class-rooms were quite pleasant and the staff expressed their preference for the system over the ordinary open window method, which they occasionally experience when the belt working the fans, gives way. Nevertheless here also, the system at first gave great trouble and dissatisfaction, as it was put in by the contractors. That is,here,as elsewhere,the screen was put first and the heating second. With this arrangement it was found so difficult to get up the temperature of the air that a great excess of heating pipes were placed within the fan. After much negotiation, on the part of the headmaster and his science master, the system was altered so that the pipes in front of the screen,put in only to be used in frosty weather,were fitted to be used every day and the others provided with disconnection apparatus. When this was done it was found that the air, now heated first, and washed and moistened later, was much pleasanter in the class-room. After some experimentation it was observed that when (in winter) the thermometer in the passage inside the fan averaged 58^{o} F. the heating was sufficient and that one row of radiators in front of the screen was as effective in heating as three to four behind had previously been, while the air was in the one case, warm and pleasant, in the other hot and dry. The extra piping put in has since never been used, the heating of the air being easily maintained. This is due to the air,first warmed, picking up more moisture from the screen and then passing over the few coils now used,carrying off much more heat than formerly,because moist air has a greater carrying capacity for heat than dry air. There is thus great economy in fuel. This shows that the plenum system is not even given a fair chance by its advocates and constructors, for, Provanside is the only place where any heating of the air previous to its being moistened is attempted. At the new Glasgow & West of Scotland Technical College, the air is first washed and the heating is by the radiators at the foot of each shaft. As an attender at a class there during a winter session, I found the air somewhat dry. The Victoria Infirmary likewise is always uncomfortable and probably from the same reason alone as the screen is first. At Church Street, Partick, the air is uncomfortably dry and to remedy this a spray is used in one of the ducts but the regulation of this is inefficient. The inference to be drawn is obvious on first principles alone. The in-drawn air should be first heated and then exposed to the wet screen and delivered to the class-room, and not cold air, wetted,and then heated and rarefied. The probability is that the heated air is charged with moisture and contracted in volume in passing through the screen, whereas in the reverse process, the partially wetted cold or cool air, is expanded and rarefied. When the system is erected in an inefficient manner, it is not wonderful that its working in any manner should be still more inefficient when it is often entrusted to the janitor, who has probably no mechanical or physical training and has a thousand and one other duties to attend to. Usually also the system of ducts is very small and ungetatable, and that where the janitor has least knowledge of how to help matters. It is thus that the system gradually lapses into disuse and generally with no outspoken regret.

In Provanside the air is changed from 8 to 10 times per hour in the class-rooms without obvious draught. The proportion of CO_2 at 3.45 p.m. after the occupation of the room for 45 minutes was 10.5 per 10,000 (0.0105%) and the relative humidity 64% while the outside air gave 53%. The temperature in the playground was 54°.5. F. and in the class-room 58°.5 F. A similar estimation in Canning Place school (which adjoins Provanside) gave proportion of CO_2 at 3.45 p.m. 10.97 parts per 10,000 (.0109%) and the humidity 63% while the temperature (the sun was beating on the windows) 64°.5 F. and outside 56°F. The humidity of the outer air was 60%.

When the fans break down from failure of the gas engine or the belt or the electric motor the plenum system goes out of use and all windows have to be opened. Hot air is supplied by the shaft by heating the radiators at the foot and an extra opening into the outlet shaft near the roof is opened and serves as an outlet for the heated air rising to the ceiling. These measures are not very successful, however. In winter, the supply of heat is too little to ~~combat with~~ counteract the cooling draughts from the open windows, and the absence of hot pipes is felt. In summer, the radiators need not be used and open windows alone are sufficient.

The vacuum method of ventilation is sometimes used alone, or in combination with the plenum. In it, suitable inlets have to be provided and short circuiting avoided. In combination with open windows at Canning Place School it has so far worked well and the analysis of the air works out much the same as in Provanside with an efficient plenum system.

Where no special provision is made, open windows is the only mode, and in the summertime when there is not too much wind, is wonderfully efficient. Thus at Kelvinhaugh school at 11.20, twenty five minutes after an interval, the analysis gave 10.15 parts CO_2 per 10,000, a temperature of 58% and a relative humidity of 78 per cent

In Finnieston School on the other hand, where double windows have been put in on one side of the school and an inlet and outlet on the same wall and within two feet of each other, the conditions were much worse and pointed to the conclusion that no ventilation was taking place. At 12.15 p.m. after one hour and a quarter's occupation, the analysis gave 17.88 parts CO_2 per 10,000 and oxygen absorption 26.5 parts per million against average of 3-10 for ordinary air. The air was uncomfortably close and smelling but unfortunately the humidity was not observed. In the winter time such crude open window ventilation is apt to be too draughty from (a) windiness and (b) from too small an opening. If a certain volume of air has to be admitted it will come in more slowly the larger the opening. Therefore windows should be opened boldly and there would be less draught. On the other hand a windy day is troublesome unless the room has windows on two or more sides. In this case likewise an oriel window would admit of the opening of the sashes away from the wind. An important point in all kinds of ventilation is to have it in operation for say half an hour before the opening of the schools. This is often overlooked and where the windows and doors have been closed overnight, the first hour of the morning is thus spent in an impure atmosphere.

HEATING.

The question of heating is mixed up with that of ventilation in those systems which deliver warmed air. In all other cases heating is by open fires or stoves or hot water pipes. In Glasgow Schools, only hot water pipes and radiators have been seen. These are always the hot water low pressure system, and consist of 4" iron pipes led from a boiler onwards and upwards to the top of the school and then downwards. The return pipe enters the boiler low down and the outflow leaves high up. Overflow outlet has to be left at the summit of the circuit.

In the older systems this is all, and there is no controlling apparatus to shut off the circuit from one or more rooms or to increase it to others. In such a case the side of the school to which the pipes are first led gets the most heat while the other side is probably under heated. This actually occurs at Kennedy Street where in the cold weather they cannot quite heat the north side of the school the warm water being first distributed to the south end. This is one of the little ironies which are discovered after a scheme is completed.

In the later installations short circuiting is arranged for and additional heating if required by the presence of a radiator which can be switched into the circuit. The usual allowance is 12 lineal feet of 4" piping per 1000 cubic feet of air space in the room and this was the amount found alloted. But in cases where rooms had been divided as at Kennedy Street, the piping was, like the lighting, deficient, and in the same class-room was only along the back of the room and 19'3" in length, equal to 2.4 lineal feet per 1000 cubic feet of air space. The temperature of the water in the pipes is usually from 160-180° F. The pipes should be about 18" from the floor and a suitable space left between them and the desks.

CLOAKROOMS.

These were provided in some schools, occupying the well of the stairway and other spaces. They were well lighted and had the pegs well apart and at suitable heights. In some schools no such provision was found. In the older ones,pegs were found in the class-rooms, but in the newer ones, the omission was deliberate. In Finnieston School few of the children ever come to school with an overcoat and from the knowledge of this fact in similar districts no provision was made. When first made, this discovery is saddening but when one thinks of the amount of casual employment in such parts of the city, it is not surprising. Nevertheless it is a regrettable fact.

WASH BASINS.

The old type of swing basin, was not observed in any of the schools visited, having been ousted in favour of the trough system. This is a long basin with a lead pipe, having many perforations along its under surface, so that when the janitor screws on the water the basin rapidly fills along its whole length, and when full, overflows into a smaller trough lying alongside and having an outlet. There are little slabs for soap.

The children thus get a fair volume of fresh water to begin with, but this soon gets soiled and remains so until the whole is emptied. The constant current, however, keeps up a certain amount of purification. In some schools this system has been replaced by the newest form of separate basin, in which each child has a basin fed from a small deep trough. The basin is simply moulded in the centre of a larger one and continually discharges by a small exit into the same, which has an outflow connection. When the hands are dipped into the water in the basin, owing to its shallowness and fulness, there is an overflow into the surrounding basin. By this means the water is constantly refreshed and does not get dirty nor soapy to any degree. So far as school children are concerned, it gives them separate basins and a fresh stream of water. The system is an admirable one, though costly. A separate tap is provided at one basin so that a child can be sent out to have his or her hands washed without turning on the whole series.

LAVATORIES.

These were found in every case at some distance from the school buildings, and completely detached. The provision of urinal space was in some cases scanty, and in a few only, was there automatic flushing. The levels were bad in one case, so that there was some travelling of the waste water towards the playground. The closet accommodation was in all cases of the water carriage system. In most, the type was the trough closet, consisting of a long trough with 9-12 divisions over it and about 6" of water in it. This was automatically flushed out every six hours by the discharge of 200 gallons of water from a large cistern at one end and six feet from the ground. In some cases the cistern was only discharged after each interval by the janitor pulling a plug. In spite of the great volume of water, the pipe was furred. There is no comparison between this system and the separate closet in an aesthetic way and also in its great wastefulness of water. The separate closet, consisting of a hopper closet with a strip of wood fixed on each side to receive the ischial tuberosities, a three gallon cistern and a chain pull in a guide frame, is gradually being installed by the school Board and in Kennedy Street and Woodside was in use. It has been found to work well and is much more easily kept clean than the trough closet.

PLAYGROUNDS.

The provision of these is in most cases ample. In the older schools, the smaller provision made at first has, where possible, been enlarged. In a few, the amount of building around the school prevented any such measures. In many schools the paving material is concrete, which is hard and dangerous for falling. In the most recent schools, some form of tar paving is being laid and gives a softer and less slippery surface.

DRILL/

<u>DRILL HALLS</u>: Gymnasia; Laboratories, Workshops and Baths.

The provision of these varies. The central **hall** is used for drill in some schools of that type, (Finnieston, Provanside) and in some a drill hall, in addition is provided in the basement (Finnieston, Washington Street and Grove Street). These underground halls are not to be commended and even the central halls do not give the best conditions. Drill or any kind of exercise should as far as possible take place in the open air, because, there is an excessive output of respiratory products with the increased respirations. If we have found the ventilation so deficient under conditions of rest, we can imagine that it will be much worse when the output of impurities is doubled. Therefore drill halls are only for inclement weather and should be airy.

The same remarks apply to gymnasia in a lesser degree, because fewer partake in the exercise as a rule and consequently the air pollution is less clamant. Nevertheless they should likewise be airy and spacious.

Laboratories and Workshops also should not be relegated to basements but should be well lighted and ventilated rooms with sufficient air space. At Tureen Street School, the workshop and gymnasium occupy a separate block and are very suitable for the purposes to which they are put.

Baths. The provision of baths for school children has not made much progress in Scotland. The Glasgow Board have arranged for instruction in swimming in the Corporation Public Baths and the Govan Board have built a bath for themselves in connection with Church Street School, but the actual washing of school children is as yet little practised. There is no doubt, however, from the experience gained at Wiesbaden and Nuremberg that such washing is quite feasible and at small cost. The method has been now adopted in some of the progressive School Boards of Yorkshire and Lancashire and ere long will be found in Glasgow too. It consists (as described by Dr Leslie Mackenzie, Health of the School Child page 17) of a room with a tiled floor. Pipes are carried round at a height of seven feet. To the pipes are attached rose showers - 6 or 8 in all. Each rose gives a shower sufficient to serve three to five boys. They stand under on a wooden board and wash themselves thoroughly with soap. The temperature of the water is regulated by the attendant by the help of a thermometer. To finish, a cool shower is given and the boys proceed to the drying room, where each has a towel and there are lockers for the clothes. Undressing, washing and redressing occupy about half an hour. The infant classes are exempted and any child whose parents so desire. The six upper classes have a washing shower once a week.

The shower bath is cheap and it is self cleansing; it can be controlled for a large number at one time and it can be done more rapidly than filling a bath. In Wiesbaden in one of the schools, 36% of the boys and 33% of the girls used the bath; in another 62% and 83% respectively.

Our visits to the schools has convinced us that in some at least, most of the children would be the better of a shower bath, and in such the parents would probably soon readily accede to the proposal.

2. THE CHILD

School hours; Sleep, Play and Work.

Physique; height and weight, etc.

Clothing

Deformities

Vision, hearing, speech

Teeth; Throat and Nose; Glands.

Skin and hair.

Defectives (Physical
(Mental

THE CHILD.

While it is necessary to see that the school building and its appointments are what they should be or at least as nearly so as we can make them, it is equally important that we should study the child. During the past generation the main emphasis in school work was laid on the production of definite results from the mass of the class. To do this the brighter students had to be kept back and the duller ones prodded up to the level of the average pupil. Little or no allowance was made for personal aptitude or predilection and the boy who seemed stupid in any subject was punished for his lack of advance. It is the old story of Linnaeus and Darwin both of whom were the despair of their teachers because they cared not for the things they had to give them. The writer has personal knowledge of a similar case in a fellow pupil to whom mathematics and physics were insufferable. Unfortunately his father was a director of a school where these were the chief objects of worship and which had a rule that "no Greek shall be taught in this School". After a fruitless course during which he seemed the stupid boy of the class; he went to the University, chose an Arts course, and in spite of his handicap, distinguished himself in Latin and Greek. No doubt the schoolmaster cannot predicate for his pupils what they should take, but it might be wise to take more stock of the pupil's bias and, where possible, direct it into the proper paths. On the other hand, this is often done at home and without consulting the schoolmaster.

Of late the tendency is to widen the curriculum and at first to lay as little stress as possible on any one subject, but later when the bent is shown to concentrate and specialise. This means more individual attention, and as a consequence, smaller classes and increased training on the part of the teacher.

Apart from pedagogic motives there is much need to take stock of the children and that from a wide standpoint. How are they housed at home and what sleep and play or work do they get? Are they preperly fed or are they hungry? Are they kept clean and well clad? Are they deformed in body or defective in sight, hearing or speech? Are their teeth good, and their tonsils normal, or have they adenoids or enlarged glands? or are they mouth breathers? Are their height and weight and chest measurement progressing as they ought to in healthy children? Are they mentally defective or needing special attention?

All these questions occur naturally to anyone studying the subject and the answer to them is extremely important to the child's well-being at home and school. We say home and school advisedly because they cannot be divorced. The teacher, however, well equipped and with the finest school buildings cannot make marked progress if the children are illslept, ill-kept and ill fed. He can be helped in other directions such as by the correction of visual defects, and throat mischief,but even here the co-operation of the parents or guardians is essential to secure that good shall follow. The tread of the argument therefore is that the child under state control at school must not be left to chance at home. That the further step must be taken of enforcing proper housing and feeding and keeping or of doing these for the child and charging the parent. Further, the teachers must be trained to a knowledge of all these matters, so that they will be able to assist in the selection of those with notable defects and also be able to make allowances in passing judgment on their pupils. And further, there must needs be medical inspection of school children. This, if simply devoted to the detection and school treatment of defects and maladies will not secure the valuable results to be desired, but will pause mid-way. No: the medical inspector must follow the child to the home when he discovers the need therefor, and when there, have power to insist on amendment. All this, means collision with vested interests, the freedom of the individual, the sanctity of the home, and the rights of the private practitioner of medicine. The first two interests are not serious, for it should not be difficult to get the majority of people to agree that no one is free to do ill, and that when they do so they forfeit their freedom. Likewise in such a case, there is little or no sanctity in the home to be dealt with, and so there can be little or no interference.

The last interest is a serious one, both for the profession of medicine and for the public at large. The state has interfered so largely with the private practitioner during the past generation, that any further step in this direction must be well weighed. The general measures taken to carry out the Public Health Legislation have resulted in a notable decrease of sickness and death rate among the population. This is especially seen in regard to the infectious maladies. Typhus is almost extinct: Smallpox is rarely epidemic: Enteric has dwindled to a pigmy: and Scarlet-fever is likewise much reduced in frequency. During the three years, 1898-1901, the average number of cases of Enteric Fever in Glasgow was 1000 per annum and of Scarlet Fever 4000 per annum. During the years, 1905-1906, the average prevalence has been reduced to, in Enteric Fever, 400 per annum, and in Scarlet Fever 1000 per annum. But this is not all. Whereas formerly the bulk of the cases were treated at home, now it is rare for any to be so treated, and especially in the working class districts where medical inspection carried to the home would most interfere with the private practitioner. In the report of the Medical Officer of Health of Glasgow for 1906, which is the last available, out of 388 cases of Enteric Fever,359 were treated in hospital,and of 1382 cases of Scarlet Fever, 1214 were so treated. Even Measles is becoming an hospital disease, and in 1906 almost 500 cases were treated in hospital, while in 1907 and so far in 1908 the numbers so treated have been much in excess of that figure. The private practitioner is therefore being beaten off his ground. On the one hand, the State exacts from him a prolonged and arduous curriculum, only to be entered on after a severe preliminary test, and on the other, it is continually restricting his field. There is but one fair solution. The State must take over the medical profession or such part of it as is willing, and re-organising all the State

medical services, the Post Office medical service, the Factory Surgeon, the Parish Doctor, and the now to be created School Medical Officer, fuse them into one man for each district and allot every man his sphere. Those who care can remain out and make a bid for special branches or for high class practice. But at any rate, the rank and file, would have a living wage year in, year out, without the worry of bad debts, dull times and competition.
"The best service is got from men on a salary" says John G. Kerr, LL.D., a noted educationist,and in his opinion, the medical profession would be no exception.

If this is not done, the profession will eventually drop to a lower level. Young men of promise will not be attracted as heretofore to an arduous student-ship with the prospect of becoming a candidate for private practice with an average income nowadays of £300 per annum, and with much increased expenses over the old days when the average income was double the figure given. Likewise the Medical Inspector will not have the same chance to know and treat the home conditions in the same way, as the local man, to whom they are daily exposed.

With these general remarks let us consider in detail the various headings set forth.

School Hours: Sleep: Play: Work.

As a private practitioner, the question of school hours for some children has frequently cropped up. The mother says that she cannot get the child up in the morning and when up, the child is so excited from fear of being late, that it takes little or no breakfast. The kind doctor blames the school hours, and says schools should not begin until ten a.m. But the remedy lies deeper. From our modern tendency to urbanisation, we suffer in many ways, and in particular from turning night into day. What with brilliant house and street lighting, electric trams, numerous amusements, and political, social and religious meetings, there is every inducement to be out of doors and out of bed, until the evening is far advanced. With the adult thus about, the child is seldom put to bed at a reasonable time. How many people in working class districts put their children to bed at seven p.m., or 8 p.m., or 9 p.m., or even 10 p.m. And yet the statement is made and is well accredited that the child of

6	years	requires	at least	13	hours	sleep
7	"	"	"	12½	"	"
8	"	"	"	12	"	"
9	"	"	"	11½	"	"

10 years	requires	at least	11	hours	sleep
13 "	"	"	$10\frac{1}{2}$	"	"
15 "	"	"	10	"	"

Since the school hour is mostly 9 a.m. or 9.30 and in primary schools, the distance from the dwelling is not so great, 8 a.m. would be a suitable hour to awaken the child. This would mean that a child of 6 years of age should be put to bed,to sleep at 7 p.m., of 8 years at 8 p.m. and of 10 years at 9 p.m. and if earlier, so much the better. That such habits are not practised generally is very evident to anyone who visits at night. The small house room, and the late hour of tea in a working man's household, are impediments in many cases towards carrying out these desirable ends.

In addition to the hours of sleep, the atmosphere we sleep in is very important. In most small households this is very impure, and especially in the winter time. The assembling of the household in the kitchen, and the artificial lighting, raise the temperature so that an open window causes a disagreeable current of cold air. It is therefore closed by night even if open by day. Some ventilation goes on by the chinks and crevices, but the temperature and humidity rise to an uncomfortable pitch for anyone trying to sleep. And so the children put to bed in the kitchen are restless and wakeful. Moreover when all go to bed and the gas is put down or out and the fire goes down, the ventilation declines and the persons sleep in the already vitiated atmosphere until morning. Thus instead of laying in a store of oxygen and getting rid of excess of CO_2, the person is bereft of the first and retains too much of the second. He thus awakes, tired and unrefreshed; not bright and alert, but dull and inactive. The continuance of such conditions is a notable factor in the production of anaemia and phthisis. With such home treatment the child cannot receive the full advantage of the tuition bestowed on it.

The actual hours of school work are important and tend in most cases to be too long in the lower standards. Children are herded to school at 5 years of age, and kept there from 10-12 and from 1 to 3 p.m. According to Dr Dukes such a detention at school should not occur earlier than the tenth year. Nowadays, however, with the substitution of kindergarten work, plastic clay working, and such like, the time is not mis-spent, so long as the children are not kept sitting too long. Change of position every twenty to thirty minutes for infants and every 35-45 minutes for the older children, should be the rule.

Sitting varied with standing and then a walk out to the open air at the end of every session of 40-50 minutes, prevents the bodies of young children taking any definite set towards deformity. By such measures fewer cases of lateral curvature, flat chest, and round shoulders, would arise from school conditions.

The play hours, for the younger children especially, should likewise be regulated, and the children taught games and how to play them. All violent exercises, and exercises pushed to the point of fatigue, should be avoided.

Some children work before or after school hours, carrying milk, delivering papers, or going messages. Within reasonable limits, and so long as the child's sleep is not encroached upon, no great harm results. But this is seldom so, and the child is dull and sleepy at school. The raising of the age of compulsory school attendance to 14 years has increased the necessity, for some households, of exacting some remunerative employment from the children before or after school hours. In the older children some compromise might be made by allowing them to become half-timers, after having attained a certain proficiency.

Physique: Height and Weight; Chest and Head Measurements.

The children observed in our visits to the schools were selected,in some cases at random, and in others of set purpose. The physique noted varied from the degree marked poor, through that of fair, and good to very good. Most of them were fair, many good and a few poor and still fewer very good.

The conditions varied with locality. In Stow practising school, attached to the now called Stow College, or formerly Free Church Training College, the children are drawn from various localities, but there is still a sufficiency of well fed and well kept children to make the averages about that of the tables; whereas in Finnieston School the average is distinctly below that of the tables. The method of teaching was to weigh and measure the scholars according to age the first day, averaging the results and comparing with the tables; and on the second day taking a number of children nearly the same height and irrespective of age, measuring them first and then weighing them. The results were again averaged and compared with the tables giving weight for height. The observations made were useful to the teachers in training in many ways, and especially in showing that the tables are built up of a great variety of heights and weights, which are averaged. Therefore when a child does not conform to the tables, it is not legitimate to infer that he or she is abnormal, unless the deviation be marked. Thus in weighing and measuring boys of 10 years of age, the average of thirteen was 66.6 lbs and 52.2 inches, and of seven girls 73.8 lbs and 53.9 inches. Of the boys five weighed less than the weight for age, and 8 above it, the weights ranging from 57 lbs to 78 lbs, a margin of 23 lbs. Six boys,on the other hand, were below the table average of height for age, and seven above, the variation being from 50.25 inches to 55.5 inches, or 5.25 inches. The table averages for girls of 10 years is 62 lbs and 51.1 inches. Only one girl was below this average, and that for both weight and height. She weighed 53 lbs and measured 49.5 inches. The others ranged from 68 to 95 lbs and from 53.5 to 55 inches.

These limited observations tend towards the conclusion reached by Dr Bridge in his report issued this spring to the Dunfermline Carnegie Trust, that the town children and especially the female children exceed the average for height, while they are rather below it for weight.

The weight for height observations gave on the whole more uniform results.

Thus of six boys measuring 51 to 52.75 inches the weights varied from 63 to 69 lbs.

Another six boys measuring 51.7 to 52.8 inches varied in weight from 63 to 73 lbs, and a third lot of five boys, measuring 50 to 50.9 inches weighed from 55 to 68 lbs.

Of the girls, six measuring 52.125 to 54.5 inches weighed from 67 to 78.5 lbs.

Five girls measuring 55.5 to 57.6 inches, weighed from 75.5 to 86.5 lbs., and six girls, measuring 50.3 to 51.7 inches weighed from 53.5 to 63.5 lbs.

B O Y S

No.	Height	Weight
6	51. -52.75 inches	63 to 69 lbs
6	51.7-52.8 "	63 to 73 "
5	50. -50.9 "	55 to 68 "

G I R L S

No.	Height	Weight
6	52.1 - 54.5 inches	67 to 78.5 lbs
5	55.5 - 57.6 "	75.5 to 86.5 "
6	50.3 - 51.7 "	63.5 to 63.5 "

Two exceptionally heavy girls were met with, both quite healthy looking but stout.

No.1	S.M.	10 years,	height	55 ins,	weight	95 lbs.
No.2	C.S.	11½ "	"	57.7 "	"	110.5 "

The Chest measurement could not be taken on the bared chest and so were not very accurate. Until power is obtained, this measurement will only be taken with the parent's consent. When taken outside the clothing but inside the jacket in boys, in most it equalled half the height, so that the real measurement was less than this. The expansion was usually one to two inches.

The head afforded opportunity for some interesting measurements. According to Asbby (~~Hygiene of~~ Health in the Nursery) the circumference of the head which at birth is about 14 inches and at one year 18 inches, is at 10 years, 21 to 22 inches, and at 20 years 22 to 23 inches. As most of the children were above ten years, it was easily remembered what the circumference should be. Of 32 children, varying in age from 8 years to 13 years, the greatest circumference of the head varied from 20 inches to 22 inches. The length and breadth of the head were also taken and the ratio $\frac{\text{breadth}}{\text{length}} \times 100$, known as the cephalic index. The length was commonly from seven to eight inches and the breadth five to six. The index in one case was 81%, the lowest was 74%, the others running from 75 to 80%. That is,the mesocephalic type was the one chiefly found, with a few of the dolichocephalic type, and one only of the distinctly brachycephalic type.

One boy was distinctly prognathous and he was of the dolicocephalic type of head.

No child with a distinctly microcephalic head (circumference under 17" at 10 years), nor markedly hydrocephalic (circumference over 24" at 10 years) was met with, but our visits did not to this date, take us to any of the special classes for defective children.

Clothing.

The child's clothing was judged as to whether it was sufficient or insufficient, clean or dirty. A child may be sufficiently clad even though clumsily and wonderfully so, and it may be insufficiently clad even when its clothing is of the choicest materials. Likewise a well clad child may have dirty clothing and a poorly clad one be spotless. Nevertheless in our experience the clean, tidy child has usually been the well clad one, while the ill clad child has been usually very dirty. In some of the schools the clothing was dreadfully insufficient and dirty. When the pin holding the jacket together was undone, the chest often was found covered partly by a shirt without buttons. For a child of six to ten years of age and in January weather, this was very defective clothing, and if we add to this that the child was probably insufficiently fed, the wonder is that any schooling is possible. If such a case were rare, one might not stand aghast, but in some of the schools visited the number of such cases was considerable, even to 25 per cent of a class. Such conditions create problems difficult of solution. Confronted with such children it is not sufficient to lay the blame on the parents or on their social conditions. If nothing is done for them, these children grow up waifs and strays and help to swell the ranks of the ungovernable, the vicious, and the lawless. I venture to suggest, as a remedy, their confiscation to the State after enquiry held to prove that their parents are incapable of handling them. They could then be trained for service in the Navy or Army for a period of five to ten years. There would be then fewer corner boys, street hawkers, newsboys, all of whom tend to swell the criminal classes.

Deformities.

The chief cause of deformity is rickets, which, of course, is due to causes operating before the school age. The late Dr R.S.Thomson used to say that rickets was declining in Glasgow. When he first attended the Children's Hospital Dispensary, every second or third case was one of rickets. That was in the eighties. In the years 1890 onwards, the proportion fell, and when he made the remark in 1897, he appraised the relative frequency as one in six. While there is thus undoubtedly a fall in the number of cases reaching that dispensary, the disease may be as prevalent, and the cases going elsewhere for advice. At any rate in the schools visited and in the writer's experience in Bridgeton, rickets is still a very prevalent disease of childhood. In my opinion it will remain so as long as we have three and four storey tenements. Since having my attention directed to it by a brother practitioner, I have proved, to my own satisfaction, in numerous cases, the truth of the following statement. Two young people come to Glasgow from the country and after a time get married. The usual residence of such a young couple is three stairs up middle door. During the first part of their married life, the young wife gets out and about a good deal and even after her first baby she still can master the three stairs. But when she is carrying a second child she begins to be a house bird and from then on, is more or less a prisoner. When she has two children to look after she is not willing to tackle the stairs very often and so voluntarily stays in the house. And so on. The result is seen in this way, that whereas the first child is usually straight and strong, and the second may be so, the third and later members are often rickety. In one such instance known to me, out of six families of which I once took notes, the first two children are like the father, tall, while the next six children, are all under sized from very marked rickets. This result, of course, follows from gradual deterioration of the mother's health, leading to a weakly child, and to insufficient suckling or poor quality of the mother's milk. Other causes are operating at the same time, such as, increasing family needs on a stationary wage and such like, but the confinement of the mother and children to the house space is an important one.

The rickety deformities noted, comprised nearly all those described. There were numerous cases of knock knee and bow legs; anterior tibial curves, with, in a few, marked tibial spines; enlargement of the wrist joint and knee joint; and rachitic chest and rosary. Curving of the arm bones was seen in a few cases. The head was often square shaped but bossing was only once seen. The following are examples of marked undersize from rickety deformity and were seen in Dobbie's Loan School.

Mary Jack 5 years, height 32 inches (average 40.5") double knock knee and anterior curve of both tibiae.

Walter Steel 6 years, height 34 inches (average 44") double knock knee and anterior curve of tibiae; rachitic chest.

Duncan Guthrie, 8 years, height 36 inches (average 47") double knock knee and anterior tibial curves; rachitic chest.

Bella Allan, 7 years, height 40 inches (average 44.4") double knock knee.

Among those supplied for examination was the following girl who is an example of general undersize;

Maggie Wilson, 5 years, height 35 inches (average 40.5") no evidence of rickets and no deformity.

Other deformities were rare. There was one boy with defective right arm from a birth palsy; one case of infantile paralysis affecting the leg; a case of kyphosis in the dorsal region and a case of lameness from hip joint disease. Lateral curvature of the spine could not be studied as the children were not allowed to be stripped nor was there any proper provision for doing so.

One case of pigeon breast was discovered in a pupil of Stow College School and with his consent was demonstrated to the teachers. It was in the same boy who had the prognathous jaw. He also was a partial mouth breather and had probably had adenoids when younger. His age at present is 13 years.

Minor degrees of deformity were common, especially some flattening of the chest and rounding of the shoulders. Both of these,unlike all the other deformities mentioned (except lateral curvature of the spine), can be improved by suitable exercises and deep breathing. The child's skeleton is not yet fully grown and especially in regard to its chest and spine, can be moulded towards a proper shape.

<u>Vision; Hearing; Speech</u>.

In speaking to a schoolmaster recently about the old days, he said that the teacher was expected to make every pupil read and write to a certain standard, and no allowances were made. One wonders if there were no eye defects in those days. At any rate today, the eyesight is being tested under most School Boards, and some wonderful discoveries are made. The frequency of eye defect, requiring remedy, in Glasgow school children has been given by Dr Wright Thomson as 15-20% (quoted in Carstairs Douglas's "Laws of Health"). Likewise the amount of myopia was found to increase during the years of school attendance. At ages 7 to 9 years 1.9% of the children were myopic; at 10 to 11 years 6.9% and at 12 to 13 years 14.8%. These observations show an alarming rise in the amount of myopia due to the fineness of school work. To meet this danger, it is now proposed to abolish all fine work, such as reading small print, fine sewing, map drawing, and writing in the first three years of school life. By this means it is hoped to abate the increase of myopia, and to lessen strain and headache for those with hypermetropic eyes.

The mode of testing was the usual one, namely, Smellen's test types on an unglazed white card, hung on one side of the room where it was well illuminated. The child was made to stand 20 feet or 6 metres distant and each eye was tested separately. The eye not being tested was not closed nor pressed on, but its vision simply occluded by a piece of stiff paper. The child began with the top letter and read downwards, the last line read correctly being taken as the denominator with 6 as the numerator. The usual reading was $\frac{6}{9}$; that is the child standing at 6 metres distance from the card was able to read the line marked D = 9 metres. Some read $\frac{6}{6}$ but they were few. If given plenty of time others could also read the last or six line, so that the probability is that many children see the line but cannot read it as they do the lines with larger letters by their general form, and only when they take time and study the details. The introduction of the phonic system of teaching the alphabet has made the testing somewhat difficult to the younger children, some of whom do not know the letters by their usual names, or at all.

The results obtained were such as $\frac{6}{9}$, $\frac{6}{12}$ $\frac{6}{18}$ $\frac{6}{36}$ in both eyes and $\frac{6}{9}$ in one and $\frac{6}{36}$ or $\frac{6}{60}$ in the other. In the latter case, the child probably reads in class quite correctly but on testing it is found to be using the one eye only. Such cases are often associated with squint, which follows the non use of a defective eye or may cause an eye to become defective from inefficient use.

Astigmatism of course would complicate the readings obtained, but it was not possible to test the children for this directly. In such tests the description of what is seen is so important and the children are so lacking in precision and suitable ideas, that such testing is not very fruitful. Sufficient was made out to impress on the teachers in training that a child may have defective vision without any visible signs on his or her eyeballs or eye lids, and in one eye very defective vision with or without squint. Defective eyesight was also noted by inspection of a class at work, writing copy-books and reading. Several children were found to hold their head twisted so as to read with one eye or correct astigmatism. In others the eyes were too near the book. In nearly every case on enquiry, it was found that their eyes had been tested and glasses ordered, but their parents had failed to get them, or had objected to their children wearing glasses. A writer in the British Medical Journal of 25th April 1908, has called attention to the use of cobalt blue glass for the detection of myopia and hypermetropia. Such a glass, he says, transmits only blue and red rays when white light impinges on it. The blue rays being more refrangible than the red, focus more quickly and so in hypermetropia form a blue spot on the retina with a red haze around. In myopia the reverse occurs, the red rays focussing to a point with the already focussed and now divergent blue rays forming a blue haze around the red. In emmetropia the two colours are fused into a purple. This seems a simple test, but has not on trial yielded clear results and requires some further explanation as to method.

The tests for Hearing are not easily carried out with children. In testing with the loud ticking watch, the other ear being blocked, and the eyes closed, very various answers are given and great patience is required. The child's attention is easily tired and he is willing to give you any answer which he thinks will please you. In spite of this, it was determined that in those tested in Oakbank School, a large number were relatively deaf. In two instances this was quite easily seen to be due to wax, blocking the external auditory canal,which was removed in one case with improvement to hearing. In another boy the external auditory canal was blocked by a polypus which was easily seen, as was the wax in the other cases, by direct inspection. The polypus was due to old discharge.

Testing with the tuning fork was more satisfactory in the older children, who could understand what was expected of them. Weber's test, where the vibrating fork is placed end on at the root of the nose, serves to indicate what kind of mischief is present when only one ear is affected. If middle ear disease or blockage of the external auditory meatus by wax or polypus or foreign body is the condition, then all the sound is referred to the dull ear. If the deafness is due to nervous or cochlear mischief the note is heard best in the sound ear. Rinne's test is more easily followed by the child. The vibrating fork is put on the mastoid and when the child indicates that the sound is no longer heard the prongs are rapidly brought in front of the external auditory meatus. If hearing is normal, a quite audible note will be heard for a considerable time. This proves that the air conduction is better than the bone conduction which is as it should be from the design of the ear. If no sound is heard, then the test is repeated in reverse order, in front of ear first, then on the mastoid and if still heard, it shows that bone conduction is the better. This is usually due to obstructions in the canal or to middle ear mischief, and is spoken of as Rinne negative, the normal being Rinne positive.

Schwabach's test and Gelle's test are not suitable for school use.

Deafness can be roughly tested by low whispering to the child placed at the distance of eight yards. The ear being tested is towards the speaker and the other is occluded and the eyes shut. Certain words are whispered and the child instructed to repeat these. The kind of deafness may even be made out,as in nerve deafness the lowest tones are best heard and in middle ear and obstructive deafness the highest. The lowest toned consonant being, R, such words as forty five, robber, brother, rug, and rabbit, are heard best in nerve deafness. On the other hand S being the highest pitched consonant, words like six, sixty, sister, sailor, ship, house and mouse, are better heard in middle ear and obstructive deafness. In several tests on these lines, the S sounds were the better heard and this corresponds with the known facts that the common causes of deafness in children are wax and middle ear disease. Loud whispering can be heard up to 25 yards.

Speech is tested by a reading exercise. The mannerisms in children are extremely varied and only later are some of them toned down. But slurring and flat enunciation are notable in being due to remediable defects, namely, adenoids. To bring out this flatness in tone, words requiring nasal intonation are selected, as adenoids block the passage of the sound to the nasal sinuses. Dr Leslie Mackenzie in his report to the Secretary for Scotland issued in April 1907, commends the phonetic method of discovering the presence of adenoids, deafness and mouth breathing generally, and specially the method evolved by the collaboration of the Medical Lecturer of the United Free Church Training College and the Master of Method, Mr Hood. This consists in getting the children to repeat the following selection of words -

Man	nose	mass
May	gnat	singing
mug	nut	swimming
mat	name	ringing
know	mane	beginning

Numerous children were tested with these words, and in a fair proportion, it was easy to detect the false enunciation readily imitated in the words ending in ing, by dropping the g.

On the whole, few cases of adenoids were found, but notably enlarged tonsils were common. A few stammerers were encountered.

Teeth: Throat and Nose: and Glands.

The condition of the teeth was very bad in the schools in the poorest localities and demands some measure of treatment and less masterly inactivity. So far tooth-brush drill has not been attempted in any school we have visited.

Enlarged tonsils were common quite apart from adenoids. Some children were able to tell us that they had had their tonsils removed. There is no doubt that some of the tonsillitis resulting in chronic swelling is due to infection from the presence of bad teeth.

Nasal catarrh is likewise a common condition in Glasgow school children, producing "candles" or "drop at the nose", in those who have no handkerchief or are indifferent to the obstruction produced. A fair amount of nasal obstruction with its associated want of development of the nose and in some cases collapse of the alae, was noted. In a few, enlarged turbinals were visible.

The lymphatic glands at the angles of the jaw were as a rule palpable, and in many cases distinctly enlarged. This points to absorption from the tonsil being extremely common. In a few cases the submaxillary glands were swollen and those of the neck and back of head, but nearly always associated with some impetigo. A boy was found in an ordinary class-room with marked glandular enlargements about the neck, and on examination, the axillary and inguinal glands were likewise found to be swollen. He had a strumous looking condition of the eyes and his mother was advised to take him to the Western Infirmary. The physician to whom she was recommended took the boy into his wards and the diagnosis lay in the direction of Hodgkin's disease.

Skin: and Hair.

Affections of the skin are extremely common in certain schools. Many of the children are dirtily kept and readily take impetigo which generally spreads. Then there is pediculosis and scratching, and in a few, the itch. Eczema intertrigo behind the ears is extremely common and carelessly treated. Sore feet from the want of boots in the winter time, and sore heels from hard and badly fitting boots are often met with in the same class of school. Ringworm of the face and body was not encountered. A case of psoriasis in the declining stage was seen in a girl attending Oakbank School. Pediculosis of the head was met with in several instances in girls still attending school. There was usually crusting with enlargement of the suboccipital and posterior cervical glands. A few pediculi were commonly seen. Ringworm of the head was seen in Oakbank School alongside of a well marked case of alopecia areata, in which several areas were affected. The general inference from these observations is that it would be better in girls as well as in boys to keep the hair cropped short until the child is old enough to take proper care of it for herself.

Defectives, physicial and mental, are now being placed under special conditions. In several schools a room has been allotted for these classes and specially qualified teachers appointed to train them. The desks are single ones and the air space and lighting (is) are ample. The mental cases are under medical supervision, while in the cripple schools a trained nurse is in charge, and the children are brought to school and taken home again in an ambulance provided by the School Board. As I have made as yet no special study of these departments, I do not propose to offer any remarks on them.

3. THE TEACHER.

What shall we say of the teacher? With increasing demands on his scholarship, he is now asked to acquire an aptitude for detecting the physical failings and defects of his pupils. To this end the Teacher in Training is now compelled to take a course of forty lectures and twenty demonstrations on the Laws of Health and School Hygiene. By this means when he goes forth as a qualified teacher he will be able to take his place in the system of Medical Inspection of School Children, which is likely to come into force in the near future. In conclusion, it may be asked should not the Teacher be made a State servant also, with reasonable fixity of tenure, prospect of promotion, and finally a right to a pension? With such inducements, men and women of the most suitable class will be attracted to the profession, and the reproach of Roger Ascham in his "Scholemaster" will lose much of its weight, ".... it is a pity, that commonly more care is had, yea, and that amongst very wise men, to find out rather a cunning man for their horse than a cunning man for their children. They say nay, in word, but they do so, in deed. For, to the one, they will gladly give a stipend of 200 crowns by year, and are loth to offer to the other 200 shillings." Thus does mankind, at most times, recompense more liberally the provider of pleasure than the purveyor of knowledge.

David McKail.

AUTHORITIES QUOTED

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Health of the School Child: Leslie Mackenzie (Methuen)

Practical Hygiene: Harrington: (Kimpton)

Hygiene and Public Health: Whitelegge & Newman (Cassell's)

~~Hygiene in~~ Health in the Nursery: Ashby (Longmans)

Human Anatomy: Cleland & Mackay (Maclehose)

Laws of Health and School Hygiene: Carstairs Douglas (Blackie)

Health in the School: Elkington: (Blackie)

Diseases of the Ear: Todd: (Frowde)

Report to the Secretary for Scotland on the Teaching of School and Personal Hygiene to Students in Training 1907., Leslie Mackenzie.

Report to Dunfermline Carnegie Trust: Bridge: 1908.

List of Schools visited: (1) with Teachers in Training.

Provanside Public School	10 visits	
Kennedy St " "	10	"
Oakbank " "	20	"
Washington St " "	6	"
Thomson St " "	6	"
Stow College Practising School	30	"
Dobbies Loan Public School	20	"
Woodside " "	1	"
Kelvinhaugh " "	8	"
Finnieston " "	10	"
Church Street " "	2	"
Milton Street " "	6	"
Grove Street " "	6	"
Dundas Practising "	15	"

(2) Visited specially by myself.

Canning Place Public School	2 visits	
Camlachie " "	1	"
Dalmarnock " "	3	"
London Road " "	1	"
Rumford Street " "	1	"
Overnewton " "	1	"
Strathclyde " "	1	"
Tureen St. " "	1	"

HEIGHTS and WEIGHTS

A. PUPILS of STOW COLLEGE PRACTISING SCHOOL

1. Weight and Height for Age.

1. Boys

		Weight	Height	Chest
8 years:	Morris Barr (wooden leg)	59 lbs	46.75	24
	Richard Munn	57	46.75	24.75
	James Taylor	61	51.	25.5
	Totals	177	144.5	74.25
	Average	59	48	24.7
	Standard	55	47	
9 years:				
	Robert Duncan	70	50.25	26.5
	John Woods	58	47.	26.
	James Skilling	53	48.	25.5
	Totals	181	145.25	78.0
	Average	60.3	48.4	26.
	Standard	60.5	49.75	
10 years:				
	Neil Murdoch	71	52.75	26.5
	Dugald Buchan	58.5	50.25	25.
	John Dalgleish	79.5	54.75	30.
	Totals	209.0	157.75	81.5
	Average	69.6	52.5	27.1
	Standard	67.5	51.75	

11 years:

	Weight	Height	Chest
Laurence Farmer	57.5	48.5	24.
George McWilton	72.75	54.25	26.5
Fred Bristow	78.	56.25	28.
Totals	208.25	159.0	78.5
Average	69.4	53.0	26.1
Standard	72.	53.5	

II. <u>Girls</u>

10 years:

May Brough	76.75	57.	28.
Jane Cassels	53.	49.5	26.
Sarah Morrison	95.	55.	29.
Mina Deas	75.5	54.5	28.
Totals	300.25	216.0	111.
Average	75.0	54.0	27.75
Standard	62.	51.	

11 years:

Isa Smith	61.75	52.25	27.
Jessie Mulholland	65.	52.75	28.
Standard	68	53.	

12/

12 years:		Weight	Height	Chest
	Janet Murdoch	78.	55.	27.5
	Bessie Young	63.5	55.5	27.
	Isa Carson	68.	56.	27.5
	Jessie Hogg	64.	53.5	26
	Totals	273.5	220.0	108.0
	Average	68.3	55.	27.
	Standard	76.5	55.5	
13 years:				
	Jane Ross	75.25	55.25	28
	Lizzie Rodger	76.5	59.6	27.
	Standard	87.	57.75	

2. WEIGHT for HEIGHT

I. Boys

		Age	Height	Weight	Chest
Neil Murdoch		10	52.75	68.	25.5
Frank Nesbit		10	51.5	64.	26.
John Halley		10	51.5	69.	27.5
George Macarthur		9	51.75	63.	26.
Joseph Stewart		10	51.75	69.5	25.
Joseph Bristow		8	51.	64.	23
	Totals	57	397.5	310.25	153.0
	Average	9.5	66.2	51.7	25.5
	Standard		64.	50.	

II. Girls:

		Age	Height	Weight	Chest
Mina Deas		10	54.	78.5	27.5
Agnes Reid		10	53.5	74.	26.
Jeanie Kincade		11	56.	87.5	28.
Margaret Edgar		10	54.5	71.5	30.
Elsie Low		10	53.75	68.	28.
Katie Miller		11	52.75	67.	28
Lizzie Horner		11	52.125	67.	27.
	Totals	73	376.62	513.5	194.5
	Average	10.4	53.8	73.3	27.7
	Standard		52.	65.	

III. Boys:	Age	Height	Weight	Chest	Circe: of Head
John Dalglish	10 $\frac{6}{12}$	55.5	78.	28.	21.5
Fred Meldrum	13	55.5	78.	28.	20.5
Allan Howieson	11 $\frac{2}{12}$	54.5	64.5	25.5	21.
William Buchan	12 $\frac{11}{12}$	57.	81.	26.5	21.5
James Wilson	13 $\frac{2}{12}$	55.75	80.75	30.	21.
Totals	60 $\frac{9}{12}$	278.25	382.25	138.0	105.5
Average	12 $\frac{2}{12}$	55.6	76.4	27.6	21.1
Standard		55.3	76.75		21.

IV. Girls

	Age	Height	Weight	Chest	Circe: of Head
Janet Murdoch	12 $\frac{5}{12}$	55.5	76.75	28.	21.
Sarah McNaughton	12 $\frac{10}{12}$	56.5	86.5	29.	20.75
Mary Rough	11 $\frac{9}{12}$	56.	75.5	28.	21.
May Brough	10 $\frac{7}{12}$	57.625	76.5	29.	21.25
Christina Shaw	11 $\frac{7}{12}$	57.75	110.5	32.	21.5
Helen McNish	11 $\frac{2}{12}$	55.865	82.5	29.5	21.
Totals	70 $\frac{4}{12}$	339.240	508.25	175.5	126.50
Average	11 $\frac{8}{12}$	56.5	84.7	29.2	21.08
Standard		54.6	82.		21.

B. PUPILS of FINNIESTON PUBLIC SCHOOL

1. WEIGHT and HEIGHT for AGE

		Weight	Height	Chest	Circe: of Head.
10 years.					
	Edward Stormont	66.	52.4	25.5	21.5
	Frank Keating	57.75	51.3	26.	21.
	Torrance Mackie	63.75	52.2	26.	20.75
	Mark Clelland	57.	50.3	25.	21.
	Totals	244.5	206.2	102.5	84.25
	Average	61.1	51.5	25.6	21.06
	Standard	67.5	51.75		21.
11 years.					
	James Hynds	61.5	51.6	25.	21.
	Charles Cassels	63.5	52.5	27.	21.
	Edward Butler	62.	52.2	27.5	20.
	Hugh Bullion	65.5	52.6	25.	21.25
	Totals	252.5	208.9	104.5	83.25
	Average	63.1	52.2	26.1	20.8
	Standard	72.	53.5		21.
12 years.	Samuel Smith	71.75	52.2	27.	
	Robert Glencross	76.75	54.8	26.	
	Archd McLeod	68.75	52.2	27.5	
	Totals	217.25	159.2	80.5	
	Average	72.4	53.0	26.8	
	Standard	76.75	55.		

2. WEIGHT for HEIGHT.

Boys.

	Age	Height	Weight	Chest	Head
Edward Stormont	$10\frac{11}{12}$	52.3	66.5	28.	21.75
Torrance Mackie	$10\frac{3}{12}$	52.8	73.	26.5	20.75
Charles Cassels	11	52.4	67.75	26.5	21.
Robert Bruce	$10\frac{5}{12}$	52.7	64.	24.5	20.25
Edward Butler	$11\frac{6}{12}$	52.3	63.25	26.75	20.
James Hynds	$11\frac{5}{12}$	52.	63.	25.	21.
Totals	$65\frac{6}{12}$	314.5	397.5	157.25	124.75
Average	$10\frac{11}{12}$	52.4	66.2	26.2	20.8
Standard		53.3	71.5		21.

Boys.

	Age	Height	Weight	Chest	Head
Arch O'Brien	$9\frac{11}{12}$	50.9	68.5	28.	22.
Wm McCusker	$9\frac{4}{12}$	50.5	56.5	26.	21.5
David Ferguson	8	50.	55.25	25.5	20.5
Robert Stewart	$9\frac{7}{12}$	50.7	58.25	27.	21.
Tom Hogg	$9\frac{8}{12}$	50.9	58.25	28.	20.75
Totals	$46\frac{6}{12}$	253.0	296.75	134.5	105.75
Average	$9\frac{3}{12}$	50.6	59.35	26.9	21.15
Standard		50.25	62.25.		21.

Girls.

	Age	Height	Weight	Chest	Head
Nellie Findlay	11	51.7	63.5	29.	21.25
Margt Cunningham	11	51.2	63.25	25.5	21.5
Agnes Logan	$9\frac{11}{12}$	50.6	53.5	26.5	20.5
Katie McFadyen	$8\frac{9}{12}$	51.5	62.5	28.5	22.
Ina Banks	$9\frac{4}{12}$	50.3	54.5	27.	21
Totals	50	255.3	297.25	136.5	106.25
Average	10	51.0	59.4	27.3	21.2
Standard		51.	62.		21.

C. PUPILS of DUNDAS PRACTISING SCHOOL.

Abstract of revisal Sheets.

	Age	Height	Weight	Chest	Head Circe.	Head len.	Head brd.	Cephalic Index
Kenneth Black	13 3/12	53.6	72.	28.5	22.5	7 5/8	5 7/8	77%
Alex Sinclair	10 10/12	46.	50.	24.5	20.75	7 1/4	5 5/8	77.6
Wm Reston	12 7/12	58.5	89.	28.	21.	7 3/8	5 5/8	76.
George Hume	13 6/12	62.7	96.	33.	21.5	7 3/8	5 7/8	79.
John Rutherford	12 11/12	55.6	75.7	29.5	22.5	7 3/4	6 1/8	79.
Totals	63 1/12	276.4	382.7	143.5	108.25	37 3/8	29 1/8	
Average	12 7/12	55.2	76.5	28.7	21.6	7.4	5.8	77.9
Standard		56 +	79 +		21 +	7 +	5 +	