

## LUNG DEVELOPMENT IN THE CHILD.

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The prominence of affections of the lungs in various diseases, either as complications or primary elements, gives this organ perhaps a higher importance than any other organ in the body. The emphasis given to tuberculosis is not the result of a mere scare, nor is the fear of it to be characterized as a simple "phthisiophobia" without sufficient foundation. Statistics show the danger only too plainly and until specifics are obtained for the cure of the various diseases the human race must resort to prophylaxis as its chief means of rescue. Even when cure is accomplished the result is obtained by attention to the individual as well as to the causative germ or agent.

It is not the intention of this article to discuss the degree to which pulmonary diseases are infectious, contagious or communicable but, accepting the fact that the lungs are a fertile field for the cultivation and spread of infection, to note a few points in which we are lax in employing the ounce of prevention, relying too much upon the pound of cure, which, in many instances, is short in weight.

The individual is often forgotten in the eager pursuit of the respective causative germs. There are two elements to be considered in etiology and prophylaxis: the external agencies, and the individual himself. It is difficult to decide which is the more important. Pathological conditions always depend upon the relative strength of the infection and the infected. Were it not for the vital resistance of the human tissues against external invasion, our history would have been written long ago. Prophylaxis for all infectious diseases can be summed up in the one principle of weakening the invader and strengthening the invaded. Relatively too much strength is expended in weakening and destroying the invader, leaving the individual fearful and defenseless in the presence of his self-induced weakness. Civilization is thrusting upon us our coughs and colds, our contracted chests, enfeebled stomachs and weak limbs; and often the higher in the scale the weaker is the resistance. The veterinary hospital gets a majority of its inmates from the highly bred animals, not alone because of their higher value—hence the attempt at preservation—but also because of their lack of resistance. Dr. Forchheimer of Cincinnati recommends for infant-feeding, not the milk of the highly bred Jersey cow, but that of the common, long-horned, sturdy, resistant, mountain cow—for her power of resistance. All nature is aggressive and it merely becomes a question of what forces shall conquer. Why do so many infants die? Lack of resistance. Prophylaxis is of most value in infancy and old age where resistance is at a minimum. The larger the city in which the child has his habitat the less likelihood of his winning in the contest, not alone because the strength of invading agencies is increased, but perhaps even more because his own powers of resistance are minimized. In the schools of our large cities where brush, broom and dusting cloth effectually scatter any infection to all parts of the room and where children of all grades gather from all sorts of environment we often find an ideal culture medium for infection. The value of space has crowded a large proportion of our city urchins into tenements where sidewalks and courts serve for playgrounds, where breathing space is at a premium, where the outlook is often so limited that the weakest arm scarcely dares to cast a

pebble for fear of breaking windows, where echoing voices jostle each other in their struggle to reach the open air and where eyes accustom themselves to their narrow quarters and become near-sighted. Even where public parks exist the omnipresence of the "keep off the grass" and the stealthy encroachment of public buildings often rob the child of his natural gymnasium. His life is crowded with "don'ts" until spontaneity of life is lost. Autopsy can pronounce his lung "a city lung" by the accumulation of soot; osteology distinguishes the country maid from the society lass and pathology establishes her museum in the slums where moral, physical and mental development are under the handicap. How far governmental interference is admissible or possible is a debatable question but there is always one place where corrective and regulative measures are possible to a certain degree, viz., in the schools. Education should be more than a mental development of the child. The magnitude of the task of providing adequate facilities for gymnastics for the children is a serious obstacle and yet the results would justify the attempt. Above all, children must be good animals. The blessings of a gymnasium are only too plainly seen by a comparison of the lung capacity of children in private and public schools. The advantage of the former, so far as development of the lungs is concerned, is enormous. The effects of a general physical culture on the body as a whole need no comment. One of a series of tests<sup>1</sup> taken by the writer on the school children of New Haven was the determination of the lung capacity for the respective ages from 6 to 17 inclusive. The data are based upon 100 children for each age. These children were without the advantages of a gymnasium and regular training therein. The accompanying table and chart represent a comparison of these results with those taken by Dr. Wm. G. Anderson of the Yale Gymnasium from children in private schools near New York. His results represent an average of 600 children at each age from 6 to 15 inclusive:

COMPARATIVE LUNG CAPACITIES FOR PUBLIC AND PRIVATE SCHOOL CHILDREN.

Age.	Boys.		Girls.	
	Priv.*	Pub.	Priv.	Pub.
6 . . . . .	64	57.1	35	49.2
7 . . . . .	80	65.6	40	58.9
8 . . . . .	88	71.8	48	64.2
9 . . . . .	106	82.7	65	73.4
10 . . . . .	124	92.8	80	80.3
11 . . . . .	144	106.3	106	83.6
12 . . . . .	150	117.2	125	104.6
13 . . . . .	168	124.4	136	108.1
14 . . . . .	188	120.4	150	107.8
15 . . . . .	205	170.3	155	116.3
16 . . . . .		189.3		119.9
17 . . . . .		202.5		124.0

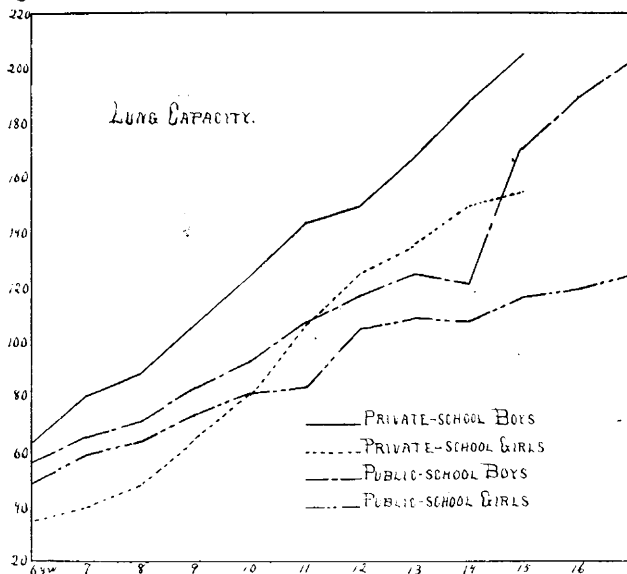
\* Priv.—Lung capacity of private school children in cubic inches.  
 Pub.—Lung capacity of public school children in cubic inches.

The children from whom his data were taken underwent a daily training in the gymnasium, and while on an average his children at 6 years of age had a slightly smaller lung capacity than the public school children, the increase in development of the former was so rapid that the children of the public school were soon excelled. At the age of 15 private school boys had a lung capacity of 205 cubic inches; public school boys only 170.3 cubic inches, the former having the advantage of 35.3 cubic inches. The average private school boy at the age of 15 had a larger lung capacity than the public school boy at 17. In girls the difference is even more

1. Studies from the Yale Psychological Laboratory, vol. ii.

noticeable, for at 6 the girls of the private school have a smaller lung capacity than those of the public school, but they develop so rapidly that by the age of 10 the private school girls have a larger lung capacity; and thereafter the rapid development continues so that at the age of 15 they have attained 155 cubic inches, while public school girls show only 116.3 cubic inches, the former having the advantage by 38.7 cubic inches. The average private school girl at 15 has 31 cubic inches more lung capacity than the public school girl at 17. The chart shows an enormous difference in the development of the two classes of children. Had the lung capacity been larger at all ages in private school children it might be argued that the private schools received the children of the better classes and those who had athletic ambitions, but when it is remembered that at 6 years of age the average lung capacity of private school children is less than that of the public school children and that this relation is reversed within a year or two the argument in favor of the gymnasium in public school work would seem convincing.

The relatively slight increase in the lung capacity for girls subsequent to the age of 12 would seem to be a significant criticism of the prevalent fashion of lacing



rather than an indication that development of the lungs as such had in large measure completed itself previous to that time. Remembering the contracted breathing of the phthisical patient the above chart speaks loudly in favor of more attention to the physical in our schools. Mind and body are so intimately connected that neither may safely be neglected for the advantage (?) of the other. The value of deep inhalation is appreciated by insurance companies, for in all examinations they demand that the chest expansion be recorded; health resorts for the phthisical seek the places where the lungs can be thrown open, as it were, to the outside air; modern therapeutics in all lung diseases pleads for free ventilation and abundance of fresh air; every one knows that an organ in disease atrophies and yet we seem afraid of taking long breaths; seldom do we find the necessity of raising our voices above the loudness required to be heard across the reception room, and, to add to the handicap, fashion binds upon us its fiendish inventions calculated to restrict our natural freedom. We seem to have forgotten the truth that in order to be good men we must be good animals. As a rule the acute infectious diseases are acquired and not inherited and

a great majority of diseases of the respiratory system can be traced to insufficient consumption of fresh air. I repeat—nowhere is prophylaxis of more value than in the child. "As the twig is bent," etc. The place to attack the problem is not in the chest that has already surrendered but in our public schools where every child for a number of years is to a certain extent under public control. Gymnasia are a poor substitute for the ball field, swimming-hole and coasting hill, but let us arbitrate and compel the best terms possible from the civilization which refines to destruction.

## ROTARY LATERAL CURVATURE AND POTT'S DISEASE OF THE SPINE.

### DIFFERENTIAL DIAGNOSIS AND RATIONAL TREATMENT.\*

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From the time of Hippocrates, 500 B. C., until the present time the history of spinal surgery has been indissolubly linked with the general advancement of surgical knowledge. At no time, however, during all these centuries, so far as the writer can ascertain, has there been anything like an unanimity of opinion among medical men as to the proper treatment for these cases. In the time of Percival Pott all cases with kyphosis, even rapidly increasing, attended or unattended with abscess, were classed indiscriminately as Pott's disease. In this generation we have scarcely less erroneous statements from men who claim it is possible to cure cases of lateral curvature of the spine even after extensive bone changes have taken place. It is scarcely necessary for me to say here that these views are not now endorsed by representative surgeons. New ideas, however, even when sustained by unlimited pathologic and bacteriologic research and clinical experience, are often slow of adoption, and it is on this account that I purpose here to briefly differentiate, not only in the etiology and pathology, but also in the treatment of these two time-honored bugbears of the profession.

Not all cases supposed to be such are Pott's disease. Deformity, similar to that caused by tuberculosis of the spine, is seen following absorption from the Peyrierian patches of the intestines in typhoid fever. This condition would be readily discovered in connection with a history of other typhoid symptoms. Another rare affection of the spine, resulting in kyphosis, is caused by the inoculation of the germs of actinomycosis. We also recognize a condition closely simulating tuberculous infection in acute osteomyelitis. This, however, differs from the more common condition, by its rapid onset and virulent and destructive course, in marked contrast to the insidious approach of tuberculosis, sometimes covering months and months. The germs of osteomyelitis will do in a few days what tuberculosis, as a rule, will not accomplish in many months.

These four conditions, each distinct, yet resembling one another in a few general symptoms, are commonly classed together as "Pott's disease." The consideration of those conditions of chronic stiffness of the vertebral column, as Bechterew's hyphosis and Marie's spondylitis rhizomelia, I purposely omit in this connection.

\* The author of this paper died at Niagara Falls, N. Y., June 9, having been taken ill on the way to the Meeting of the Association. He had intended to read this before the Section on Diseases of Children.