

further into the culture medium. Frequently individual epithelial cells included some of the blood serum in vacuoles situated near the nucleus. The periphery of such cells showed repeatedly a distinct radiating striation. Occasionally such cells became even detached from the main mass of cells, they assumed a round shape, but showed even then the characteristic striation and included the blood serum near their nucleus.

There were almost no leucocytes visible at this period and over considerable areas the epithelium was not accompanied by connective tissue. Nevertheless, several mitoses could be seen in the epithelium and always in cells directly in contact or near the blood serum, just as in the ordinary epithelium the mitoses are found near the connective tissue.

The cells and nuclei were usually drawn out as if traction had taken place on the protoplasm of many cells. The cells were not massed together as it would have been expected in case the mitotic division and the pressure resulting from the increased number of cells were the only cause of the ingrowth of the epithelium. It is therefore probable that there are other protoplasmic movements at play besides that connected with the mitotic division of the cells.

In conclusion, it might be stated that during its growth the epithelium forms a mass of cells, all layers of which are equally able to grow in different directions. A distinct differentiation between different rows of these cell masses does not exist. Later on the epithelium which comes into contact with connective tissue well supplied with blood vessels forms again regular epithelium, the lowest rows producing new cells, which now undergo the changes leading to the formation of normal keratohyalin and keratin. We see that these growing cell masses do not need connections with either resting or growing connective tissue; although under the usual conditions found during the growth of epithelium, the epithelial cells are found accompanied by connective tissue. The possibility of separating the growing epithelium from other tissues might be used to subject an isolated tissue like epithelium to certain experimental conditions, as for instance, to the influence of different chemical substances and thus study the reaction of isolated tissues, other than connective tissue and leucocytes to different stimuli.

#### SOME CONSIDERATIONS REGARDING THE HYGIENE OF EARLY SCHOOL LIFE.\*

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The medical man's point of view regarding the hygiene and physical regimen of school life often gives rise to misunderstanding and not infrequently to the most unreasonable opposition from the pedagogue. The physician, says the pedagogue, is too materialistic, is too much occupied with the pathologic side of the child and not infrequently is biased, catering to the hysteric dilettante for the mere sake of humoring the misguided parents.

Under the head of "Mental Fatigue in School" appears, among other propositions of a similar character, the following translation, from a paper by Prof. Albert Spitzner, Leipzig:

\* Read at the Fifty-second Annual Meeting of the American Medical Association, in the Section on Diseases of Children, and approved for publication by the Executive Committee of the Section: Drs. H. E. Tuley, Edwin Rosenthal and Samuel W. Kelley.  
1. Report of Commissioner of Education, 1895-6, p. 1191.

"The propositions generally advanced, that present methods of public education imperil the health of children, is not only applied to certain evils for which individual teachers or schools are called to account, but directly attack the normal foundation of a school. The censure of physicians does not refer to the harming of already sick or nervously inclined pupils, but to injury done to mentally and physically normal children, by methods and practices considered normal." Dr. Pellmann, tersely expressing himself, says, "Children work too soon, too much and badly; that is to say, under unfavorable hygienic conditions." In interpreting his meaning we are reminded of the long list of studies, the rushing through of courses, the long duration of hourly, daily, and weekly lessons of useless studies, the method of teaching, unscientific in its disregard of the laws of physiology and purely in favor of psychology, the evil of home tasks which rob children of their short periods of recreation, etc. We receive also the practical suggestion of omitting home lessons, instructing by means of observation lessons, instituting a beneficial interchange of physical and mental occupation, etc.

Further on the paper continues: "It may be truthfully said that the judgment of the medical profession on these matters is not based on an actual, exact, and technical examination of the methods employed, but on inference from facts connected with nervous diseases of children." Psychologic pedagogy must protest against such arguments.

Again, this same report says: "In view of what has been said, the doctrinary foundation upon which the medical profession bases its opinion of psychic and in part physiologic conditions and processes, can not be accepted by teachers who must protect their profession against medicine and its encroachments; that is to say, must place psychologic pathology and pedagogic hygiene and therapeutics in so clear a light that the facts connected with the intellect and the development of children be studied in a manner consistent with their real meaning and pedagogical observation."

This represents briefly the case of the routine pedagogue versus the physician, as regards the school curriculum and its influence upon the development of the child. We may, by reason of our purely materialistic tendencies, have some difficulty in grasping the exact meaning of pedagogic therapeutics and hygiene, as well as psychologic pathology, but otherwise there is certainly no ambiguity in stating the case.

It is perhaps true that the physician is often too radical, and that occasionally when in doubt, liable to err on the side of physical well being. Occasionally he may also be guilty of humoring the wishes of an hysterical parent. Errors of this sort are a necessary concomitant of the imperfections and shortcomings of human reason and human nature. When, however, we study the basis of such criticisms as have been offered by Hasse, Pellmann, Nathan Oppenheim, Francis Warner, Bowditch, J. M. Rice and others, whose reasons are not based upon inference, but upon the data—possibly yet too meager—furnished by physiologic and anthropometric observations. From data already at our disposal, it is clearly evident, 1, that mental and physical abnormalities exist in school children and, 2, that these abnormalities are always aggravated, if indeed they are not actually produced by pedantic, pseudo-educational methods.

As a matter of fact, the physician's capability and wisdom in educational matters has always been acknowl-

edged in the most difficult department of education, that of the mentally and physically defective, i. e., idiots, imbeciles, the feeble-minded and the defective classes. When, indeed, reason becomes deranged he is called upon to restore it to its normal balance, which he often succeeds in doing, not by the administration of medicine, but by the adaptation of wise training and the judicious application of the laws of physical and mental hygiene. It appears, therefore, eminently proper for the physician to interfere in matters relating to school hygiene, even though this may involve the criticism of the curriculum and also some of the more absurd conclusions of psychologic pedagogy.

Very briefly and imperfectly epitomized, the general import of the medical protests against the prevailing public educational methods may be summarized as follows:

1. We insist that there is no evidence by which educational values can be determined, except through the study of material manifestations transmitted through the nervous system. Thought and mind are immaterial, but we have no way of measuring, or estimating the value or extent of their action, except through the evidences of material production. For this reason we are forced to study the physical and physiologic changes produced in the body as the result of psychologic activity.

2. Education produces nothing new in the child; it simply unfolds and brings into intelligible activity the latent forces of the nervous system. Most of us agree with Prof. H. H. Donaldson,<sup>2</sup> who says, "Education consists in the modification of the central nervous system."

3. One of the most important and essential prerequisites necessary for a good education is good nutrition. Psychologically, mind is immaterial, but physiologically, we are forced to the conclusion that sane thought and vigorous intellectual activity is possible only through the medium of brain cells that are well nourished and physiologically active. It appears, therefore, entirely reasonable and logical to conclude that all educational methods which ignore the physiologic evolution of the child, are faulty and open to criticism, from the physiologic and hygienic standpoint. As a matter of fact, we not only ignore the most obvious requirement of practical hygiene in our school curriculum, but we insist upon a uniformity of educational training which is physiologically as absurd as it is impossible of practical application. "In fact," says Dr. Nathan Oppenheim,<sup>3</sup> "I know of no harder experience, no more trying ordeals than what a child at this time undergoes. His experiences in the school environment are designed to encourage irritation and waste of nerve and muscle tissue; the circumstance of instruction are useful for deadening, instead of encouraging, a normal standard of intellectual development."

When we consider how variable is the inherent mental capacity of children, in fact so variable and so difficult to determine that we find it almost impossible to draw a line of demarcation between the normal and the abnormal child; when we consider that this constant variability to respond to educational stimuli, so manifest at all the different stages of development, it becomes evidently absurd to attempt to lay out a uniform system of mental training applicable to all alike, exclusive of

pronounced idiots and imbeciles. That this method does injury to a great many children is not only the testimony of physicians, but also of a great many progressive educators and thinkers as well.

Regarding the influence of school life upon normal, healthy children, Dr. Francis Warner, London, says:

"I do not think that the boy or girl at the older ages of school life, who is free from developmental defects of any kind and shows no abnormal nerve signs or indications of delicacy, i. e., the normal child, is very likely to fall into ill health or a nervous condition if a wisely conducted training at school is continued. Of the 100,000 children that I have examined at schools, 80 per cent. of the boys and 84.10 per cent. of the girls were normal and not reported as dull mentally. It is, however, far otherwise with the children who have some defect; anemia, nervous disturbances or hysteria may become manifest as adolescence approaches, especially in girls. When such becomes established, particularly if anemia and nerve disturbance occur together, a long period of ill health may result."<sup>4</sup>

His table of statistics shows, of all cases with developmental defects at all ages, 38.4 per cent. of the girls, and 49.9 per cent. of the boys were mentally dull. Of all dull children, at all ages, 57.6 per cent. boys and 52.6 per cent. girls also presented abnormal nerve signs. This appears to indicate that about 18 per cent. of the children examined have some developmental defect, and that of these defectives 44 per cent. are mentally dull.

It is impossible, by reason of insufficient data, to form a reasonable, accurate estimate of the existing number of defective children which imperatively demand special school training. In Germany and England, where special classes are maintained for defective children, they average about 1 per cent. of the school population. Dr. Charles F. Folsom<sup>5</sup> gives the number of pronounced intellectual idiots and imbeciles as 1 to 650 of population. That we have in our public schools a very large percentage of mentally abnormal and physically defective children who require segregation and special training is evident from the physiologic and anthropometric examinations made in many of our cities.

I have briefly referred to this subject of the dull, the backward and the defective child, to emphasize the practical value of regular, periodic, physiologic examination of school children. Such examinations would disclose incipient cases, classified by teachers as dull, stupid, backward, disorderly or incorrigible, when in reality the child is the subject of some developmental abnormality, which makes ordinary school work intolerable to him. The early discovery of these cases and their segregation for special training is one of the important problems of public school life. Pupils of this character are a drag and a danger to the normal child. I am fully aware of the practical difficulties to be met in a solution of this question; but that these are not insurmountable has been shown by the experience in some of the European countries.

The study of the defective, i. e., the idiot, the feeble-minded, and persons afflicted with sensory aphasia resulting from an injury to the central sensory nerve cells, has made it possible for us to understand in a measure how ideas are built up during the developmental period. The fact that these observations are

2. *Growth of the Brain*, p. 338.

3. *Development of the Child*.

4. "The Study of Children," Francis Warner, MacMillan & Co., p. 190.

5. Pepper: *System of Med.*, vol. v, p. 140.

based upon changes that may be termed pathologic does not diminish their practical value.

The mentally defective represents arrested brain nutrition, partial or total, at an early period of development. It was early shown by Dr. Sequin and others that a partial restoration of the dormant nerve cells of the idiotic brain could be effected by the application of judicious training along the lines of primitive development. The recognition of this principle has done wonders for the idiot, so that he has not only been improved, but even educated and cured. These well-known facts are referred to because they clearly indicate that the early school training of the child is largely a problem of localization of stimuli at different points in the nerve centers. This stimulation, if it is not prolonged to such an extent as to produce fatigue, promotes nutrition and tends to the reproduction of the action after a period of rest.

That we have vastly overrated the intellectual value of this formal training to the child there can be no doubt. That we have carried it to unreasonable extremes and burdened it with artificial, psychologic, and other incomprehensible nonsense is undeniable.

Returning again to the normal child, it is a mere truism, often enough reiterated, to state that our schools should have the benefit of good hygiene, good light, proper heating, ventilation and seating. Regarding these matters there is general agreement so that improvements in these departments are simply a matter of financial and mechanical detail. When, however, we come to the more vital and difficult problem of the school curriculum and the general methods of training to be adopted in early school life, viz., the number of hours that should be given each day to purely mental tasks, and the age at which school life should begin, there is very general disagreement between the physician and the routine pedagogue.

When we insist upon the fact that well-known physiologic studies show that the child is an exceedingly immature and delicate animal, undergoing important developmental changes having no analogues in the adult; that his plastic tissues and delicate nerve cells are easily warped and injured by long-continued mental or physical efforts; when we report that children have actually been injured by injudicious school work, and that for this and other reasons, we favor shorter hours, more attention to the physical side of the child, more nature study out of doors in contact with actual natural objects, less of text-books and less of the exhaustive rote drill, which simply burdens the memory; when we insist upon these things as a natural outcome of the observations of the laws of development, we are told that these are questions of psychologic pedagogy, which must be settled by the pedagogues themselves. While it is true that the practical details must be left to the teachers, it does not follow that they are to control absolutely the principles upon which we desire to have our children educated. This would be equivalent to saying that we, as physicians, should have absolute control over the treatment of our patients, irrespective of the consent of the patient and his family. The absurdity of such a proposition is still more apparent when we consider the fact that the pedagogues disagree on both diagnosis and treatment.

As regards the claim that physicians base their criticism upon inference, it can be very easily shown that this is not the fact. As an illustration, I submit the following case:

O. N. is aged nearly 10 years, at the opening of school, September, 1900. Stature, weight and development are normal. There are no physical defects, unless left-handedness can be so called. He has attended public school since 7 years of age. Mental faculties are good, except a little slow to learn to repeat texts from memory. The daily attendance at school from 9 a.m. to 12; and from 1:15 to 4 p.m. At the opening of the school year this boy is in good flesh, with nutrition, sleep, appetite and digestion good, presenting in every way the physical features of a normal, vigorous boy. After some months of school each year he gradually grows thinner, becomes restless, nervous, fidgety and shows dark lines under the eyes. Toward the end of the school year these symptoms increase, the nervousness increases, digestion and nutrition are disturbed. He talks in his sleep, gets out of bed at night, wandering about the room, talking about his examples and his examinations. During the summer vacation, which lasts about three months, the abnormal physical symptoms gradually disappear, physical vigor is restored, the nervousness disappears and sleep becomes quiet and peaceful. This result occurs without medical treatment or change in the environment, except the omission of school work.

Now, is it mere inference when I say that the abnormal physical disturbances in this case are due to the fatigue produced by faulty educational methods? I have at two different periods of three months each taken this boy out of school and placed him under private instruction, with the result that he would accomplish fully as much intellectually in two hours' instruction per day as he did in six hours at school.

That cases of this sort are of common occurrence is well known to every observant practitioner. That injury is done in these cases is undeniable. That these abnormal consequences of pseudo-educational methods can and must be prevented, without detriment or hindrance to the child's intellectual development, is unquestionable.

Granted that our diagnosis is correct, rational preventive treatment would appear to be along lines already indicated, namely, the shortening of hours of the primary school to, say, one hour in the forenoon and one hour in the afternoon. If more time is to be taken up at school, it should be devoted to Slöyd or manual training, together with the study of Nature and natural life and its activities, as it exists in the child's environment.

That this is practically possible, and that the results are exceedingly favorable, has been shown by the experience at Girard College and other similar institutions. The elementary school of the University of Chicago, under Professor John Dewey, is a most excellent demonstration along the same lines.

Regular periodic medical inspection, which should include physiologic and anthropometric examination of the school-children, should be a requirement in all public schools. These examinations would not only furnish valuable physiologic and anthropometric data, but would disclose cases of infections and other communicable diseases. They would also detect mental and physical defects—stigmata—not readily recognized by parents and teachers. These children with marked mental and physical abnormalities, developmental defects, or stigmata, should be segregated for special training. Every town with a school population of from 800 to 1000 will have a sufficient number of children of this sort to fill a room, which should be in charge of a per-

son having the exceptional qualifications necessary for success in this kind of work.

#### DISCUSSION OF PAPERS IN SYMPOSIUM ON SCHOOL HYGIENE.\*

DR. C. F. WAHRER, Fort Madison, Iowa.—The series of papers on backward children showed a difference of opinion as to where the line of demarcation is to be placed between backward and normal children, and again between backward and defective children. In one of the papers appears the suggestion that for these backward children special schools should be maintained. This would be placing upon these unfortunate children a stigma which they do not deserve. To take a child who is pronounced to be backward by a teacher who has not made a special effort to develop the latent mental powers of the child, and place it in such special school seems to me entirely wrong. The best talent of the teacher should be brought to this work of developing the mental powers. A child may be backward only when forced to go in a direction counter to his natural trend, and prove to be a genius when allowed to develop in his proper direction.

DR. SHELLEY, of Kansas.—It seems that where a child under 10 or 12 years of age in a country school is brought into contact with a child in a city school it is found that the country child surpasses the city child. If anyone else has made this observation I should like to know it.

DR. CLIFTON SCOTT, Des Moines.—I do not think that the observation made by the last speaker is correct. I observed in one school that the country boys easily became leaders in their classes but that many of the "town" boys did just as well. It was only the boys from the country who had a special ambition to get a good education, and who were earnest in their work that came to the school, and this in itself would explain the difference, as it is not fair to compare these select few from the country with the city boys as a whole. The reason that Austin Flint was the greatest physiologist in this country was because he had specially good opportunities in early life. Much depends upon these early advantages, though I would not have it understood that I believe in crowding studies upon young children. However, the disadvantages from the loss of good, early opportunities can never be overcome.

DR. EDWIN ROSENTHAL, Philadelphia.—In our city we have a wonderful institution, the Girard College. The plan adopted there is to teach the scholar aged from 6 years upward. Occasionally they meet with children who can not be taught, and all that they have been able to do with these is to make farmers of them.

DR. JAMES WORK, Elkhart, Ind.—We have had papers presented this afternoon from so many different States that it is evident that the subject commands a very general interest. I infer from this that there must be a widespread defect in our school system, or else that we must be a degenerate race. I am of the opinion that the classification in our schools according to intellect is not carried out sufficiently, hence the studies are not well adapted to the individual needs of the pupils. I was much interested in what Dr. Darnall said about the ill effects of closely-fitting clothing, for, I believe it is a factor of considerable importance. In dressing children it is important to secure equal warmth and equal pressure when selecting their clothing. I am satisfied that physicians as a rule are not sufficiently emphatic in impressing upon parents, who have the greatest interest in our schools, the importance of the pupils attending to the organs of elimination. These organs are the bowel, skin, kidneys and lungs. One must expect a child to be dull if it goes to school daily without having had a proper evacuation of the bowel, or if baths are not had two or three times a week. Too, some of us do not understand the first principles of preparing food for children. The great need in most of our schools is that we have trained mothers at home.

DR. A. W. WILMARTH, Chippewa Falls, Wis.—Mention has been made of the establishment of schools for backward children. Such schools have been already established in Providence and in Philadelphia. It would be well if teachers could

give more time to individual pupils, but this is utterly impossible in the present state of our schools. Some provision must be made for these children.

DR. B. R. SHURLY, Detroit.—It seems to me that one remedy is to be found in giving medical advice to the school board. Every such board in our larger cities employs legal counsel, yet, so far as I know, medical advice and supervision in our schools are sadly neglected. Along this line we certainly have work to do which will prove of great advantage to children, and particularly to those who are backward.

DR. W. T. LEARNED, Fall River, Mass.—I have been interested in this subject since the rearing of my first-born child without his mother. I followed out the plan then in vogue of giving two waters and one milk, but finding that he did not do well I soon increased the proportion until the whole milk was given, and then the improvement was marked. I made the interval three hours, and the quantity that which the child could digest and be hungry by the time of the next feeding. This resulted in natural development. His school work began between the age of 11 and 12, at which time he weighed about 100 pounds. Field work was made a part of his education, and at the age of 18 he weighed 185 pounds. At the age of 21 he entered a university to study law, and passed with honor at the end of one, instead of two years. This picture is presented, not to show that there was anything unusual about the boy, but to emphasize what can be done by an entire freedom from cramming and the maintenance of good health. A moderate amount of brain work and the determination to do something constitute, in my opinion, the best education that we can give our boys and girls. I am totally opposed to the custom of putting a little one of 3 years in a kindergarten and keeping him in school until a diploma is presented as evidence of education. It seems to me that there is no greater defect than that of so drilling and perfecting children in tuition that they can get a living without work.

DR. J. NOER, Stoughton, Wis.—I wish to emphasize that cases like the one I reported are common. By taking a child out of school and placing him under a private tutor for two hours a day he can accomplish just as much as in six hours at school, while at the same time the nervous symptoms will disappear. I fully concur with Dr. Rosenthal that the method pursued in Girard College is an ideal one. An experiment along the same line is now going on in Chicago, in the Elementary School of the University of Chicago, in charge of Professor John Dewey. It seems to me that this opens up a great field for improvement in the education of young children. I have given this subject considerable attention as a physician and as a member of a school board, and I can not resist the conclusion that there is altogether too much pressure used in conjunction with the early education of the growing child. The physician has a duty to perform in this matter and he ought to use his influence for improvement. He should also be prepared to give an intelligent explanation of the physiologic side of this question to teachers and parents.

**Tuberculosis as a Professional Disease.**—The French law on industrial accidents is being revised, and one of the amendments proposed urges that tuberculosis be included in the list of professional affections, and that the latter should be regarded as industrial accidents and entail the same responsibility on the proprietor of the establishment. The *Progrès Médical* observes that if this amendment could be adopted the prophylaxis of tuberculosis in large cities would be immeasurably promoted. The victims of professional affections, it states, are more deserving of interest than the victims of industrial accidents, as the latter are frequently due to some imprudence on the part of the workman, while a professional affection is almost invariably the result of the negligence of the proprietor to provide sanitary conditions or to his insisting upon the use of a poisonous substance, because it is cheaper, when a harmless substitute is available. To include tuberculosis among the professional diseases, it adds, and to enforce the penalties, would do more for actual progress than twenty anti-tuberculosis congresses.

\* Papers by Drs. Baker, Wilmarth, Makuen and Wahrer published Oct. 12, 1901.