

when searching for me, or when exceeding joyous or high-spirited. It is a kind of "crowing," and quite distinct from purring. Darwin, in his "Expression of the Emotions," does not mention it. Is it exceptional? J. L. Driffield.

### EDUCATION IN AMERICA.<sup>1</sup>

IN the Report of the American Commissioner of Education it is shown that the stimulating influence of the educational exhibits and conferences that formed a feature of the New Orleans Exposition is manifest in almost every department of education. A special Circular of Information respecting the Exposition is in preparation by General Eaton, who is at the head of this wide system. His successive Reports are mines of educational wealth; they have aroused and stimulated educational workers everywhere.

In the collection of essays included in Parts II. and III. of "Educational Exhibits and Conventions," many educational subjects are dealt with by specialists. It is claimed on behalf of Massachusetts that it published the first periodical in the English language devoted to the advancement of education, viz. the *American Journal of Education*, started January 1, 1826. The very broad views it set out with are still urged in the United States: that education should be regarded as the means of fitting man for the discharge of all his duties, and that it accordingly includes much that is generally left to home influence. The editor of the *New England Journal of Education* now carrying on the work there observes that "a history of educational journalism in New England culminates in *Barnard's Journal of Education*, full of instruction as to systems, institutions public and private, technical and special schools, history, biography, philosophy, &c., &c." The annual Reports of Horace Mann are "the very gospel of the new education, and are found in the libraries of every country," and the acts of this apostle form an interesting chapter here. It is to be observed that in this model State, where less than two-fifths of 1 per cent. of its native children belong to the illiterate class, no technical education is supplied in the State schools, the old aim of widening the scholar's mind being preferred to that of imparting information. A "noble showing," observes General Eaton, though this last Report records a very small falling off.

Massachusetts is, however, far ahead of some other States. With all the matter for congratulation which follows, and although education is so popular that in Texas the enforcement of it among the few who need compulsory measures may be placed in the hands of the police, surveyors have to own to an increase of even the *proportion* of ignorance in the United States, which is nearly as alarming as ever it was in England. Over 2,000,000 voters, one in every five, are unable to read the ballots which they cast. As an effort to meet this illiteracy, it was suggested in the Congress of Educators that some 65,000,000 dollars should be allowed to various States from national funds, and the proposition of Dr. T. W. Bicknell, of Boston, was that the money should be allotted in proportion to the number of illiterates in every State between the ages of ten and twenty years, diminishing from four dollars a head for the first three years, to one dollar the tenth, eleventh, and twelfth years, when all such illiteracy ought to be overcome.

The highest class of education does not seem to be gaining ground. Dr. Payne, of the Ohio Wesleyan University, urged the importance of increased College educa-

tion, and of the personal example and influence of high-class teachers, calling attention to the fact that not 15 per cent. of either doctors or lawyers in the United States are graduates of any University. He explains this unpopularity of College education by the great length of time which is given there to unpractical classics, which might easily be made familiar in a shorter way, more economical of time. He asserts that two years and a half might be made sufficient for the work done in a College in four years. Clever and painstaking pupils are yoked together with the idle and stupid; and the same energy and thrift of time by which the former would attain this result makes them reject a University education altogether. A similar reform is required with the object of economy in expenses.

This same "commercial spirit of the age," Prof. Garnett laments, has caused the number of pupils in the University of Virginia to fall off during the last twenty years. This institution is divided into nineteen distinct schools, and each pupil chooses from which he will make up his course of studies. Each school gives a certificate of proficiency or a diploma of graduation, and the University gives the various titles of Bachelor or Doctor of Letters or of Science, of Philosophy or of Arts; also of Bachelor of Law or of Scientific Agriculture; of Doctor of Medicine; of Civil Engineer and of Mining Engineer. With the same desire for higher results, also, Colonel W. P. Johnston, President of the University endowed by "that princely benefactor of education in Louisiana, Paul Tulane," under the roof of which the papers were read, urged the need of a University doing what it could, if it could not do what it would. Much work, he pleaded, was required in a Louisiana University that a German University would reject.

However, General Eaton remarks that 1884-85 was characterized by great activity in all departments of College and University work, and by full and earnest discussion of important questions pertaining to the conduct and development of these institutions, and especially as to the separate functions of Colleges and Universities. Apparently many enthusiasts have convinced themselves that the teacher now stands, not only in the place of the parent, but also of the State and of all guiding influences. Other writers here, besides General Eaton, Canadian as well as those of the United States, describe education as if the school-master would soon have the entire bringing up of the young, starting from the kindergarten school, superintending their games as well as their studies, and maintaining a hold over them till the technical school, seen already to be very near by General Eaton, has turned them out self-supporting citizens. Doubtless the wonderful division of labour and of knowledge into special departments makes it possible for teachers to bring up children with more science than formerly; but surely the human race cannot afford to release parents from the duties which fall so naturally to them, and to waste the zeal and enthusiasm with which mothers especially enter upon these duties. General Eaton has much to say about the responsibilities of teachers. Dr. Mayo cautioned them that the United States were determined to have the best of everything. As the old coaches had been superseded by the Pullman cars, so inferior teachers must make way for superior. But to read these enthusiastic educationalists' views of the duties of teachers, "the burden laid upon them seems greater than they can bear."

None urge the almost boundless importance and dignity of the office of teacher of the young with such fervour and consistency as Brothers Maurelian, Justin, and Noah, of the Christian School. All that they say is quite true except the idea that the ordinary assistant is able to judge of and then to guide the character of every child under his care. It is more than "fond" parents can do for their own children even; and happy must the child be who finds a teacher more devoted than its own parents!

<sup>1</sup> "Educational Exhibits and Conventions at the World's Industrial and Cotton Centennial Exposition, New Orleans, 1884-85." Part II. Proceedings of the International Congress of Educators. Part III. Proceedings of the Department of Superintendence of the National Education Association, and Addresses delivered on Education Days. (Washington: Government Printing Office, 1886.)

<sup>2</sup> "Report of the Commissioner of Education for the Year 1884-85." (Washington: Government Printing Office, 1886.)

Nowhere is the importance of high-class teachers better understood than among the Japanese. A short address given here by their Commissioner describes their eager search after European knowledge for several generations before the present reformed Government came into power, and now the rule is that all employed in instruction—normal teachers at the end of seven years, ordinary teachers at the end of five—must be re-examined to ascertain whether they are keeping up with the progress of the age. But great efforts are made to render the profession in every way attractive. Teachers are exempt from military conscription. Titles, quasi-offices, and ranks are given to them, so that the profession may not be treated as a low or unimportant one. For a similar encouragement of learning, University men are also freed from military service; and even the students of the middle-class schools are exempt from conscription for six years. One speaker, who had been resident in Japan, but had travelled through Europe, claimed for Tokio also the best Froebel kindergarten that he had ever seen. It would not be surprising if the great experiment referred to above were really tried in Japan—such a system of school work as that described by Prof. Hailmann, competent to supersede home teaching altogether. He rather naïvely remarks that his mother was a natural kindergarten. The kindergarten work is a system of technical instruction in which the scientific teacher undertakes to inculcate systematically what parents have hitherto taught as amateurs. Little science and little system are shown in most homes; in fact the kindergartners complain of home influences thwarting their teaching, and urge that young women should attend their schools to learn how to bring up their own families; and one cannot read the principles laid down for a kindergarten school without feeling how appropriate they are for home rule. In the case therefore of those who can afford such a training, this seems the most efficient and desirable way of carrying the work out; where, on the other hand, a mother has been debarred from such a training, the school may really supersede her home work with advantage. Kindergarten schools accordingly, from every State, were represented at the New Orleans Exposition. The system can hardly, however, become universal, for each child is to be taught in some different way, according to its character, and it is urged by Mrs. Ogden, "if we must crowd, let us crowd the big children, and not the little ones."

As illustrating the principles of kindergarten schools, Prof. Spring, of the Chautauqua School of Sculpture and Modelling, showed, in an experimental address, how much of science could be illustrated by moulding a lump of clay; affirming that a young child caught at the character of various shapes as quickly as an adult. The Commissioner in his Report remarks a large increase in these schools in 1884-85—28 in Pennsylvania alone, 33 in the south and west. Few are supported at public expense, yet the system has had a marked effect in improving the methods of teaching employed.

Prof. W. Hudson, of Texas, lays it down that the interest which a lad can be induced to take in his lessons is a measure of the extent to which his perception, reason, and judgment will be drawn out. More life and reality can be put into a lesson in natural history or botany, and they are therefore more valuable school subjects, and far more useful, than classics. Such pursuits are interesting in leisure hours also, and will keep him out of the mischief to which unemployed energy is so prone. Many experiments in different schools are reported by General Eaton, but so far the only exercises of this kind that it has been found practicable to bring within the reach of the entire school populations are drawing, clay-modelling, and sewing.

A paper was read by Mr. E. M. Hance, Clerk to the Liverpool School Board, on the experimental science

instruction first introduced into English elementary schools by that Board. Colonel W. P. Johnston tried to show that technical education is the most beneficial that can be given to the black population. In, we fear, a rather too hopeful simile he compares these latter to the chosen people educated in all the wisdom of the Egyptians before their return to independence. He trusts that one of their great destinies is to re-people with a civilised race their old continent of Africa. Prof. W. J. Thom also urges a technical education for the Negro—not a high-school education, but a farm-labourer's and domestic servant's training. "Unless they know how to work and how to do work, their destruction seems a natural consequence." He, however, looks forward to the black population reaching ten times its actual number, and its present far more rapid increase than that of the white race renders this probable enough. Presidents Fairchild and Long, on the other hand, think that uniform education will heal the breach between the races: the former predicting that twenty-five years of mixed schools would set coloured men on a full equality with the most eminent whites, and hardly leave a vestige of the present "constitutional ineradicable antipathy," which latter epithet we are inclined to judge from the past history of races gives the truer view. He thinks it is a relic of slavery, and asserts that the objection to mixed schools is, not that the antipathy will injure the schools, but that the schools will annihilate the antipathy and bring about an undesired social equality. Strongly pointing against the above hopeful opinions is General Eaton's reference to a tendency among some trade-unions to exclude coloured citizens from industrial training and employment. He accordingly urges that all parties should promote this industrial training by every means, both on the above account and also as the best preparation of Negroes for new and remunerative occupations which must spring up round them. The religious education of the Negro is becoming a special difficulty, and Prof. Thom fears the spread of Mormonism among a race which has neither tradition, habits and customs, nor reverence for law and religion. One matter to which he calls attention may perhaps be a sign that there are influences telling against the blending of the races, viz. that already there is a divergence of Negro dialect from the standard of the vernacular so great as partially to "destroy the uplifting idealism contained in the English tongue."

A most interesting paper, to an English reader especially, bearing on this matter is an account of the present condition of the Negroes in Jamaica after fifty years of freedom. They have nearly doubled their number in the time, and are in more comfortable circumstances. Their dwellings compare favourably with those of Ireland or Scotland. Improvements are recorded of the island generally, exactly answering to the improvements in an English town during the same time, and all done voluntarily and with far less labour than in the old slave times. If they do not love work, still as much voluntary labour was forthcoming as was required to make a railway, without any difficulty on the part of the contractors. Cambridge Local Examinations are held in the island, and some high honours have been taken. Such a sketch must be set against the dark pictures usually drawn. General Eaton, too, in his Report, we are glad to see, thoroughly endorses the accounts of energetic improvement in education still taking place.

A striking feature of the wide views of their duties and responsibilities which are now making their way among educationalists is well brought out in this compilation. There are careful and interesting papers upon all the physical aspects of education; and much is laid down about bodily exercises and training which, though excellent in itself, seems hardly yet to belong to the department of the schoolmaster. The Commissioner urges in his Report that a gymnasium should be attached to

every city system of schools, and quotes Germany's example, followed by Austria after Sadowa. Credit is given also to the Germans for leading the way in ventilating school-rooms scientifically. In 1858 Pettenkoffer's method of testing the impurity of the air in a room came into use, and a description is here given of a different simple apparatus for the same purpose. The conclusion is drawn that organic matter in "bad air" is more frequently the dangerous part of it than superabundant carbonic acid. England, while at the higher schools formally ignoring this branch of education, nevertheless really recognises it in the games which make themselves of so much importance at the Universities and the great schools that feed them. Physical training was despised and repressed by the monks of old, who founded these schools, and taught that the body was at enmity with the soul, and that the more the former was weakened the more the latter was strengthened and purified; and if with Mr. Galton we regret that all the softening elements of human nature were eliminated by monastic celibacy, we may also console ourselves that, but for it, many injured constitutions must have been handed down as the result of such tenets. Schoolmasters now know that the difficulties of teaching are immensely increased by any physical disorder, and that an absolute incapacity to learn follows some bodily ailments. Imperceptibly increasing from the sleepiness which follows upon a good dinner comes the dullness caused by the bad air of ill-ventilated rooms. There is a long and full paper on this latter subject prepared for independent publication by the Bureau of Education, of great value but too general in its teaching to be epitomised here.

Another cause of what to thoughtless teachers seems irritating stupidity is partial deafness. Interesting observations upon the varieties of this infirmity among school children have been made by Dr. Sexton, of New York. Careful estimates show that only 5 per cent. of the entire population of the United States have normal hearing. Ten per cent. of pupils have such defective hearing as to make special placing and such like care for them in schools necessary. If a teacher has not made himself fully acquainted with the amount of this deafness, a very slightly deaf pupil will either be liable to be sent to the deaf-and-dumb school, or he will leave the ordinary school in disgust at the teacher's harsh and unfair reprimands. Prof. Graham Bell's audiometer is found to answer well in the work of classifying defective hearers. On behalf of the deaf-mute school Mr. Dobyms boasted that theirs was the only universal language: when he met an educated deaf-mute not only from America but from France, Germany, England, or Japan, he could hold communication with him.

From an examination of about forty thousand cases, a Committee on the subject draws the important conclusion that, while very few pupils indeed are short-sighted when they first enter school, "the number afflicted, and the degree or intensity of the disease, gradually but surely increase through the entire school life, from class to class, from year to year, until, when the Colleges and Universities are reached, in many cases more than half the students are near-sighted." This Committee strongly recommends increased use of the black-board and less use of books. This practice has been found to reduce the amount of myopia to one-half. A Report of a second Committee on the causes of it recommends that the head should not be bent forward too much over a desk. Near-sightedness has increased in Alsace since German letters have been used there. There is a special danger of its being brought on at about fifteen years old, the age of puberty.

While these deficiencies are to be found in so large a proportion of children, however, Mr. Jepsen, teacher of music in New Haven, limits the number of children who have really what is called "no ear" for music to less

than 4 per cent., and he urges that it may profitably be taught in a thoroughly scientific way to be familiarly read. The Commissioner has felt the importance of this matter so much that through the co-operation of a Music Teachers' Association the heavily burdened Bureau has been already able to draw up and issue a Circular of Information on the study of music in public schools. It is remarked that singing seems to be despised as a school pursuit in the United States, and to be less popular and more neglected than in England. It is taught that mental culture comes chiefly through the eye; moral culture through the ear and voice. Sounds can be taught to children much more easily than numbers. To read music, again, is as great a superiority over singing it by ear as being able to read is better than having learnt a few pieces by heart.

Bearing upon the same question of classifying children according to their powers is a short paper read by Mr. E. Chadwick, of educational celebrity in England, who urges the economy of dividing the bright children from the dull, so as to educate them in less time—a most desirable arrangement for all parties, where it is practicable.

Two papers, one of them also by Mr. Chadwick, take up the subject of rewards and punishments. Mr. Chadwick protests against the use of the stick, while Prof. Barbour urges first the needlessness, and then the danger, of giving prizes, which may breed a sordid character, supply unworthy and therefore unstable motives. They are, he thinks, of no value at all to any but a very few in each class. But in each case it is necessary to supply a motive which the very young can fully appreciate; some terror must be held over the young transgressor's head, and so long as terror is the motive power, the stick is as fair as any other, with the advantage that each culprit is an example to all who see his discomfort, and the influence upon them is nearly equal to that of being caned themselves. The refined torture of solitary confinement, which is considered less degrading, has not this advantage. In like manner, everything in this world is done for a prize, even if that prize be a "high calling," and school-boys require some outward and visible sign of successful labour, books, marks, or class-places. The grosser methods of marking it might well be dropped as the children get older. But rewards we all strive for, and it is untrue that no higher and wider valuation of knowledge replaces the ambition to take home a prize which first led to a laborious pursuit of it.

W. ODELL.

#### ABSTRACT OF THE RESULTS OF THE INVESTIGATION OF THE CHARLESTON EARTHQUAKE.<sup>1</sup>

##### II.

LET us suppose an elastic wave to originate at a point C (Fig. 1) situated at the depth  $q$ , below the surface. Let the intensity of the shock (amount of energy per unit of wave-front) at the distance unity from C, be denoted by  $a$ . Since the intensity is inversely proportional to the square of the distance, the intensity at the epicentrum would be  $\frac{a}{q^2}$ . Take any other point on the surface of the earth at the distance  $x$  from the epicentre, and connect it with C by the line  $Cx = r$ . The intensity at any such point will obviously be equal to  $\frac{a}{r^2}$ . If we denote the intensity by  $y$ , we shall then have the equation—

$$y = \frac{a}{r^2} = \frac{a}{q^2 + x^2}$$

This equation expresses a curve which will serve as a

<sup>1</sup> Paper read before the National Academy of Sciences at Washington, on April 19, 1887, by C. E. Dutton, U.S.A., and Everett Hayden, U.S.N., U.S. Geological Survey. Continued from p. 273.