

out the fact that each of the senses has its own specific function which cannot be transferred to another, and should therefore receive appropriate culture. He says: "Different nerves are appropriated to the transmission of different kinds of molecular motion. The nerves of taste, for example, are not competent to transmit sonorous vibrations. For this latter a special nerve is necessary, which passes from the brain into one of the cavities of the ear, and there spreads out into a multitude of filaments. It is the motion imparted to this, the *auditory nerve*, which in the brain is translated into sound."

This statement contains enough—perhaps a little too much. It seems to accord one function to the brain which certainly does not belong to it. If it ascribes the mental act of translation to the brain it is a mistake. It is not the *brain* which translates the motion into sound, but the *mind*, to which the brain and the nerves are auxiliary. The senses give no knowledge any more than the living tissues of a plant possess that function. They are merely servants, reporters, to the mind, without which they are useless and destitute of all intelligence. They are related at the one end to the outer world, and at the other to the mind; and it makes all the difference imaginable what sort of mind is placed at the inner end of these nerves, and what sort of treatment or culture they have received. The brain of an ox or an ass may, and does, translate motion into sound in Tyndall's sense. The ear of the rabbit or the stag is far quicker than the ear of man; but it needs the *mind* of a man and of an accomplished musician related to the *auditory nerve* to translate the vibrations of a grand orchestra into all the thrilling effects of melody and harmony. Hence the necessity of training, of educating, this sense. And what is true of this is true of all the rest. It may seem strange to some—even after all that has been written in this direction—but it is nevertheless true, that boys and girls, men and women, literally require to be taught to see, and hear, and feel, and taste, and smell correctly. According to the Kindergarten system of education, founded by Frederick Froebel, this sort of culture of the senses is made to precede all other elementary training so as to prepare the child for higher forms of instruction. This is so far well. But I see no valid reason for limiting such culture to childhood. On the contrary, it should be extended by appropriate methods over the student's entire career, and beyond the time when he takes leave of his *alma mater* to the end of his life. Many weighty reasons might be urged in favor of this course. Suffice it to say, that the manipulations of the natural sciences as well as the refinements of literature and art demand this delicate and accurate culture of the senses. How otherwise, for example, can the beneficent marvels and triumphs of surgery be accomplished? It is only the man whose eye, and hand, and sense of touch have been most carefully and minutely educated for years that can be entrusted with operations involving the life, or the life-long happiness or misery of his fellow-creatures. And it seems superfluous to say that such training is fundamental to the fine arts,—that Architecture, Sculpture, Painting, Music and Poetry are impossible upon any other condition. It is vain to dream of genius taking its place. Men of the highest talent and genius cannot dispense with it. Their success is dependent upon it. Every observant student of Tennyson, for example, must have noticed to what an exquisite degree he has cultivated his ear. Hence the music of his lines from first to last—those that mean little and those that mean much—is perfect. This ear-culture has not made him a poet. *Poeta nascitur, non fit*; but his case shows with superlative force that the training of the senses, the teaching of the ear to hear and the eye to see, is fundamental—stands at the very threshold of the highest education; and that, as one of Tennyson's admirers has well remarked, "the intensest sense of natural beauty—whether of color, or

form, or sound, or imagery, or thought—needs culture, and the poet who neglects thus to train his ear is as unfair to his genius as a painter would be who did not study drawing and the harmony of colors."

(b) *The culture of our physical organs as mechanical instruments of the mind*—only a few words on this point. It is now well understood that in order to secure the health and growth and beauty of the human frame—and these are grand ends to aim at—we must supply the right sort and right measure of food and rest and exercise. It is not possible here to prescribe the form or manner in which this is to be done, or to lay out the work to be accomplished in this respect in our homes and school-rooms and shops. I merely affirm in a general way that just as each one of the senses requires separate culture, so the hand, the foot, and every organ of the body should be trained for its proper functions, and that physical exercises and activities in the school-room, the gymnasium, the play-ground, and workshop should be made to contribute to the attainment of firmness and strength and skill in the use of our organs, and this skill should be treasured up and rendered permanent as well as available at any moment in the form of settled mechanical habits.

Our system of education recognizes this doctrine and provides some facilities for carrying it out. Hence we have gymnastic exercises, calisthenics, and object lessons to a limited extent—but these are not enough. They afford but partial scope for the development of the senses and bodily organs. Our appliances and arrangements for physical training, generally speaking, are by no means complete. Its necessity and utility are very inadequately appreciated by many parents and even directors of schools. It is therefore neglected or treated with contempt. Hence incompetency in many instances for the duties of life, feebleness and deformity of the body, discomfort, disease, and death are frequently the issues. We need a vast extension and practical improvement upon the means and methods employed for the strengthening of the physique of our boys and girls, and men and women; and the morality of the land, let me say in passing, would be greatly improved by this means, for certain secret vices are checked and banished by the cultivation of manly physical vigour. But I am not despondent or despairing in this connection. I look with hope and gladness to the spirit of the age, which demands that theoretical knowledge, the speculations and abstractions of philosophers are no longer to reign supreme in education. The tangible, the visible, the products of men's hands are justly forcing themselves upon attention and gaining ready acceptance in our practical age; and we are destined to see far more of this in future. The training of the hand, of the whole frame, for the toils which it is to undergo in life will yet become much more closely related than at this moment to the work of the school-room. Children will be trained, not for genteel indolence, but for healthy and remunerative activity. The raw materials of the industrial arts may yet be put into the hands of pupils now deemed too delicate or refined to touch them, that they may learn their nature and history and be practically trained in the methods of preparing them for man's use. We are doing a little, and are destined to do far more in this direction, by our agricultural colleges, schools of applied science, schools of cookery and technology, with their workshops and other appliances attached to them. And when we have attained to the right standard of this sort of physical training—this culture which makes all the organs of the body skilful instruments in working out the grand purposes of the intellect and the heart, then the material resources of our country will speedily become available as inexhaustible storehouses of national wealth and prosperity—we shall be moving in the direction of a practical solution of the great ethical problems