

books than with them; and there are some cases already so obvious that I wonder why it is that teachers always resort to books when they would teach some new branch in their schools.

When we teach music, we do not learn it by rote, we do not commit it to memory, but we take an instrument and learn to play upon it. When we would study natural history, instead of books let us take specimens—stones, minerals, crystals. When we would study plants, let us go to the plants themselves, and not to the books describing them. When we would study animals, let us observe animals; and when we would study geography, let us not resort to maps and text-books, but take a class of children and go into the fields, and look over the hills and valleys, the lakes and rivers, and learn that a knowledge of the earth consists in knowing what mountains and hills there are, what rivers flow, what are the accumulations of water and the expanse of land. And then, having shown them that land, let us show them a representation of what they know, that they may compare it with what they have before them, and tell them that is the way in which the things they have seen may be represented, and then the maps will have a meaning for them. Then you can go to maps and books, but not before you have given them some hints as to what these things mean, and what east, west, north and south are; not merely by representing them by the letters E., W., N. and S. upon a square piece of paper, with all sorts of dots upon it, one representing Spain, the other the United States, which in their estimation have about the size of the piece of paper on which they have learned it.

I well remember that when I was a teacher at Neufchatel, I objected to the mode of teaching geography in our schools. I was satisfied it could be done otherwise, and I asked that I might have a class of the youngest children, who were admitted to the school, and teach them in another way. The Board of Education would not grant me leave, and I resorted to another means. I took my own children, my oldest, a boy of six, my girls, children of four and a half and two and a half years, one hardly capable of walking, and invited the children of my neighbors. Some came upon the arms of their mothers, others were able to walk by themselves. I took these young children upon a hill above the city, and there showed them the magnificent crescent of the Alps standing before them, their peaks piercing the clouds, and told them how far away they were, then pointed to the hills between these, and the lake at our feet; and when they had become very familiar with all these, and enjoyed the beautiful scenery, I took from my portfolio a raised map, in which the natural features of the country are attempted to be imitated in pasteboard, and turning them away from the scene, I showed them everything represented on a small scale, and they recognized the very peaks they saw before them; they saw the lake which was spreading before them as a blue spot upon that map; and so they learned the meaning of maps, and afterwards could appreciate the map which was not even raised, but only with black and white marks representing the same features. From that day geography became no longer a dry study, but a desirable part of their education.

I have undertaken to address you upon the desirableness of introducing the study of natural history into our schools, and of using that instruction as a means of developing the faculties of children and leading them to a knowledge of the Creator. Natural History, I have already said, should be taught from objects and not from books, and you see at once that this requires teachers who can read and say whether a lesson has been committed faithfully to memory; but they must know these objects before they can teach them, and they should bring these objects into the school, and not only exhibit them to the scholars, but place them in the hands of each scholar.

Some years ago I was requested by the Secretary of the Board of Education to give some lectures on Natural History to the teachers in different parts of the State, in those interesting meetings which are known as Teachers' Institutes. I had been asked to give some instructions upon insects, that the teachers might be prepared to show what insects are injurious to vegetation and what are not, and be the means of imparting that information to all.

I thought the best way of answering the call was, to place at once an object of this kind into their own hands, for I knew that no verbal instruction could be transformed into actual knowledge; that whatever I might say would be carried away as words, and not as the impression of things—and what was needed was the impression of things. Therefore I went out shortly before the exercises commenced, and collected several hundred grasshoppers and brought them into the room, and having first etherized them, so that they should not jump about, I put one of them into the hands of each teacher. It appeared ridiculous to all. But, I have the satisfaction of saying that the examination of these objects had not been carried on long

before every one became interested, and instead of looking at me, they looked at the thing.

At first, I pointed to things which could not be easily seen. They said, 'These things are too small to be seen.' I replied, 'Look again, and learn to look, for I can see things ten times smaller than those to which I have called your attention; it is only want of practice which sets such narrow limits to its powers.'

Having examined one object, take another which has some similarity to it, and analyze its parts, and point out the differences between that and the object examined before, and you are at once upon that track, so important in all education, which consists in comparison. It is by comparison that we ascertain the general features of things; and it is by comparison that we reach general propositions. In fact, comparisons are at the bottom of all philosophy, and without comparisons, we never get beyond the knowledge of isolated, disconnected facts.

Now, do you not see what importance there must be in such training—how it will awaken the faculties and develop them—how it will be suggestive of further inquiries and further comparisons? And as soon as one has begun that sort of study, there is no longer a limit to it. In this way, we can become better acquainted with ourselves, we can more fully understand our own nature and our own relations to the world at large. We can learn how we are related to the whole animal kingdom, if we once begin that comparison. At first it might seem difficult to find any resemblance between man and a quadruped, or between the quadruped and birds, or between birds and reptiles, or between reptiles and fishes; and if we were to attempt to compare a fish with man, the very idea would seem preposterous; and yet, the two are constructed upon the same plan; the same elements of structure which we may trace in the fish are presented again in man, only in a more elevated combination; and it may be shown, in the simplest way, that there is a plain gradation leading up from the fish to the noble stature of man. And these comparisons are the best means of developing all our faculties, because they call out not only the powers of observation, but also the ability of the mind to generalize and at the same time discriminate. They call out, in fact, all those abilities which distinguish one man from another, which give men power over other men—the ability of discriminating judiciously and of combining properly—the ability of ascertaining the differences as well as the resemblances. The one constitutes the art of observing; the other constitutes the art of philosophy, the art of thinking.

The difficult art of thinking can be better fostered by this method, than in any other way. When we study logic, or mental philosophy, in the text books, which we commit to memory, it is not mind which we cultivate, it is memory alone. The mind may come in, but if it does, it is only in an accessory way. But if we learn to think by unfolding thoughts ourselves, from an examination of objects brought before us, then we actually learn to think, and to apply this ability to think to the realities of life.

It is only by the ability of observing for ourselves that we can free ourselves from the burthen of authority. As long as we have not learned to settle questions for ourselves, we go by authority, or we take the opinion of our neighbor;—that is, we remain tools in his hands, if he chooses to use us up in that way, or we declare our inability to have an opinion of our own. And how shall we form opinions of our own otherwise than by examining the facts in the case? And where can we learn to examine facts more readily than by taking at first those facts which are forever unchangeable, those facts over which man, with all his pride, can have no control? Man cannot cause the sun to move in space, or change the relations of the members of the solar system to each other, or make the seed to sprout out of its season, or make the oak produce apples. Man must take the phenomena of nature as they are; and in learning this, he learns, truth and humility. He learns that what exists in nature is true, and to value truth, and that he must bow to what is,—to what he cannot change in the nature of things. But, at the same time, he learns how to ascertain what things are; and how they came to be; and while he learns that, he acquires a power which can never be lessened, but which is ever increasing in proportion as his opportunity for further observation is increased.

It is only by the development of all his faculties that we can make man what he may be; it is only in giving to his mind the food which will nourish all his faculties, that we accomplish this end. If we only cultivate the imagination, the taste, the memory, the culture of the senses is neglected, the ability of observing is neglected, and all those abilities which man may acquire by the culture of his senses, by the art of observing, are left untrained.

The reason why we so frequently see scholars who do not do well in school is because their abilities lie in another direction from