Science Bulletin

Volume 4 | Number 2 Article 7

10-1931

Vitalizing Science Teaching

E. J. Cable
Iowa State Teachers College

ance. The ultimate effects are quite similar to those of morphine except that there is seldom as great a moral degeneration. Opium users may be petty thieves but rarely are they great crooks. The opium taker is very susceptible to spirits, and will often abandon the drug and become an alcoholic. He seldom turns to morphine because the opium smoker dreads the use of the needle.

Cocaine, an alkaloid of the cocoa plant, is one of the most subtle and dangerous intoxicants. The cheapening of the drug has increased its use and popularized it in prescriptions where pain and irritation are to be overcome. The victim of the cocaine habit seems always to be possessed of the delusion that there is a safe use of the drug, and that he can quit whenever he wishes. Cocaine may properly be listed as a stimulating narcotic. Its immediate effects are excitation and exaltation. The user is seldom combative but is likely to be talkative and boisterous. Later it brings a quiet dreamy satisfaction. To the sensitive individual it brings soothing relief, to the stupid brain it brings fascination and comfort, to the fatigued person it gives temporary, fictitious strength, and to the sufferer it brings calm and peace. Incidentally it also brings a serious impairment of sight, hearing, taste, smell, and other sensations, and if continued, will provide its user with a home in the asylum for maniacs. Recovery is possible but not probable, and often the user turns to other drugs or alcohol.

Chloralism is another form of drug addiction more common among women than men. The drug produces a profound sleep followed by no especially unpleasant experience. Chloral does not so seriously effect the mind, but its physical effects are pronounced.

Narcotics are not restricted to any class of society. The business man stimulates himself with cocaine, the hobo dazzles himself with heroin, and the Chinese coolie puts himself to sleep with opium. Society women play with the fires of morphine or chloral. None of them intend to form a habit which will soon lead them to insanity or the grave. The only kind thing we can say for them is that they are ignorant.

H. E. Rath

VITALIZING SCIENCE TEACHING

Scientific problems are not generally discovered by those who sit and idly dream of ease and pleasure, but are found by those who walk through nature with eyes open and all the senses awake to the myriad question marks that are encountered at every turn of the road.

Every boy and girl may acquire the scientific turn of mind without the use of a laboratory fitted with expensive apparatus, although all great scientists do their most valuable research in such laboratories. What the science teacher of our public schools needs to do is to direct young life to be always on the alert for the problems which are to be met at every turn. It is the sacred duty of every teacher to arouse the enthusiasm of his pupils that they may become interested in solving the problems, presented by nature, by the scientific method of careful, accurate observation and experimentation. No one can ever hope to become a scientist by chance nor can everyone become a world-famed scientist, but everyone may add greatly to his knowledge and enjoyment by learning early in life to cultivate right habits of scientific observation and scientific experimentation.

It is the business of every teacher of science, therefore, to encourage children to form correct habits of looking for problems through the eye, the ear, and the nose. Some of the problems may readily be solved; others will require much observation and experimentation before right conclusions are reached. Children should never be permitted to grow up in ignorance and superstition. No scientist is ever superstitious; he knows that nothing happens without there being a cause for it. He is never excited by the mysterious about him, for he recognizes that there are certain natural causes working to produce changes, and he has been instructed to look for the facts which are responsible for the changes. Science is advanced only by those willing to make careful, deliberate measurements. To develop this scientific attitude in boys and girls should be the chief goal and

ambition of every true science teacher, it makes no difference what science is taught. Start early this school year to guide and direct the seeing, reasoning and imaginative powers of the pupils entrusted to your care through the introduction of problems of all kinds. Check frequently to see if your pupils are advancing in their observing and reasoning skills. Encourage constantly the inquisitive habit, the observing habit, the experimenting habit, and you may be the one instrumental in helping to produce an Agassiz, a Pasteur, a Humboldt, a Faraday, an Osborn, or a Noguchi.

Many of our better high schools are building up good museums to aid science teaching. I know of no better way to encourage and stimulate boys and girls to become good observers. During the last five years the writer has visited thirty or forty schools and has helped to classify and arrange material that has been accumulated by pupils and patrons of the school. When properly arranged, such material is useful and helpful, not only to science teachers, but to teachers of history, geography, and English if they will but make use of it. Too often teachers are vague and abstract when all that would be necessary to make the topic concrete, to vitalize it, so to speak, would be to visit a museum, or go out of doors and secure simple illustrations of the things under discussion.

General Science, a subject taught in most of our Iowa high schools, is too frequently a mere textbook recitation of abstract facts. Students are permitted to believe that if they can make a good textbook recitation or remember enough abstract truth learned from the textbook to pass a satisfactory examination, they are learning general science. This is far from the truth. Poorly trained teachers of general science (and their number is great) are content with such standards of service, and as a result, the pupil loses not only his interest in science but has his sense of observation and experimentation dulled and his initiative destroyed. General science includes a broad knowledge of physics, chemistry, astronomy, physiography, meteorology, mineralogy, and biology. Each of the above named sciences is rich in possibilities for individual observation and investigation, and yet lost opportunities are numerous because of inadequate teacher training.

I wish I had the time and space to emphasize some of the rich possibilities along each of the above named sciences in which pupil interests might be aroused and guided. I chose only one along which I would like to give helpful suggestions.

As a boy, I well remember my many excursions across the fields and pastures of my father's farm. In one pasture, boulders were so numerous that I often crossed the entire pasture by jumping from one boulder to another. In the adjoining pasture, no such boyish feat was possible. My observation of this fact made me ask father why there were so many boulders in the one pasture and so few in the other. But father did not know, neither was he interested in my seemingly foolish question. Mother was next questioned; but mother, although interested in my query, could not give the desired information. As a last resort, the question was eagerly carried to the teacher of the small rural school; but here again I received a like answer with no encouragement to find out why. What a golden opportunity was lost for this teacher to interest and guide me to seek out and find the answer to one of nature's question marks! Not long after this experience, I was taken to a stone quarry to get some stone for building a foundation for the house in which I was to live. The question raised at the quarry was, why was this stone so different from the stone in the pasture? To this question likewise no help was forthcoming. Often I would fill my pockets with snakes, toads, frogs, and bugs, hoping that I might be able to secure some helpful information about them from my parents, but to all my questionings, mother responded with sound scoldings and father remonstrated with due warnings of danger if I continued doing such dreadful things. At other times, I accompanied some of my playmates to a brook to fish. Not interested in fishing, I occupied my time in gathering stones and pebbles and filling my

pockets with them. Father and mother were again asked to help solve the many questions concerning these rocks, but they could not answer my questions. Here I was losing a golden opportunity. No encouragement, no help to guide my observing eye and inquisitive mind. It is a wonder that I ever had a desire to know more of nature's wonders. This personal experience has been, no doubt, the experience of many boys and girls and has been cited for the express purpose of arousing in every teacher of science the great need for guiding and directing his pupils to see, to question and experiment.

The earth's surface is covered with minerals and rocks of all kinds. Why not encourage your pupils to collect, study and become familiar with the common minerals that man uses and which, when weathered, help to make our soil? In this article, I would like to call attention to one of the very common minerals and to give some of the simple tests that may be used to distinguish it.

One of the commonest minerals on the surface is quartz. It may be recognized by its luster; that is, its appearance in light. It is glassy in appearance, and very hard. An old knife can be used to test for hardness. Minerals range in hardness from one to ten, one being the softest, and ten the hardest. Minerals that may be scratched with a copper penny are said to be very soft. Those that can be scratched with a knife are said to be soft, and those that cannot be scratched with a knife are called very hard. Quartz cannot be scratched with a knife and is classed as a very hard mineral. If you attempt to break quartz with a hammer, you will discover that it breaks with a very rough or uneven surface; in other words, quartz does not have cleavage. Quartz is insoluble. Touch a drop of hydrochloric acid to a mineral and if it bubbles, it is soluble. Quartz is insoluble in acid. It cannot be distinguished by its color as it may have any color. It may be white, rose color, black, red, or even colorless. As to form it may be massive, crystalline, dense, or fine-grained. When in form of crystals, it is always six-sided, often capped with a six-sided pyramid. Crystals of quartz, however, are generally found in caves, cavities or veins of the bedrock.

There are two classes of quartz; crystalline and dense or waxy. The common varieties of crystalline quartz are rock crystals, either transparent, iron-stained, smoky, milky, or amethyst, ferruginous or iron-stained, and geodes. The second class is dense and fine-grained. Any dense, transluctent quartz, (that is, quartz that lets the light through) is called chalcedony. The common varieties are agate, chert, flint, and jasper. There are many kinds of agates, as landscape, banded, and bloodstone. Banded agates are forms of chalcedony that have different colored bands. They are often found in gravel banks or along the gravel of streams. Landscape agates are so named because they contain oxide of iron which often takes the form of a bird, tree, or waterfall. Agatized wood is common in Arizona, Yellowstone Park, and many other places in the west. The most common varieties of chalcedony, where limestone is the bedrock, are chert, flint, and jasper. Chert is a dense gray or yellowish chalcedony, much like beeswax in appearance. It keeps a sharp edge and is very hard. Flint is often black in color and covered with a chalky white coating. Jasper is any red chert. Often a geode, which was originally a cavity in bed rock is filled with some secandary mineral. Often the cavity, instead of being filled with crystalline quartz contains chalcedony which frequently takes the form of a bunch of grapes, called botyroidal quartz.

All varieties of quartz, when weathered or broken up, form sand. Sand cemented together forms our sandstone.

Encourage your pupils to select the different varieties of quartz and then if you do not know them secure a simple reference book and help the children to classify them. In a short time they will become familiar with the most common varieties that may be picked up on the surface almost any place.

Later, I will discuss some of the other common minerals that are abundant on the surface.

E. J. Cable