And in botany, exhibits are possible that will be an aid in the teaching of some branch of the subject. Forestry, extinct plants, evolution and descent of certain types, these and other subjects may be treated in museum exhibits.

These examples might be amplified indefinitely, but enough have been given to show that the museum is a potent agency in modern education, a fact that is, perhaps, not fully realized by educators in general. The museum is too often thought of as a storeroom or mausoleum in which musty specimens are stored away to be pored over by spectacled savants who live in a world by themselves. It is sadly true that this conception is not without foundation, for there are many museums in universities, colleges, normal schools, and academies, which are this and nothing else. But the modern museum is a vastly different thing, filled with objects potentially arranged, awaiting use by all progressive teachers.

In closing, may I use the words of one of England's greatest museum men, Sir William H. Flower, who says, "It is not the objects placed in a museum that constitute its value, so much as the method in which they are displayed and the use made of them for the purpose of instruction."

¹Read before the Biology section of the Illinois State Academy of Science at Rockford, April 23, 1922.

GETTING NEW STUFF ACROSS.

BY HENRY FLURY,

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This is a slangy title which I have purposely chosen because it has a "straight from the shoulder" or businesslike ring to it. I see in my mind a clear picture of an earnest, clean-shaven man behind a long table, leaning over face to face with a customer, making a sale. He is "putting the deal across." That is what every good science teacher ought to be doing—"selling" science to his pupils.

The methods of the salesman have something to commend them to the teacher. The salesman does not haul a load of merchandise up in front of his customer and then dump it there and ask for a bid. No, what he does first is to "create a desire" on the part of the prospective customer for the thing he is selling. Applying this to the teacher, he has one of the "best sellers" on the market if he knows how to put it across. How can this be done?

From the stone age down, the mind of man has ever been speculative, people love to theorize, and biographical studies reveal that the so-called "genius" has been the person who was able to dream great dreams and harness those dreams to material expressions. I remember seeing a beautiful oil painting called "Reunion," in which an entrancingly rapturous woman is swept up into the ether in the arms of an angel of the opposite sex. It represented to me a union of matter and spirit. In our high school work if we can capture this theorizing tendency and harness it to every day life without getting too far afield, we have a powerful lever of successful instruction. Some of the newer discoveries and the theories following in their wake afford a fruitful field for the intellectual harvest. However, let us have due regard as to what the place of theory is with reference to fact.

Theories come and theories go and "the path of scientific progress is strewn with beliefs which have been abandoned for lack of evidence, as burst shells strew a battlefield, and it is our boast that they are *abandoned*, and *not lugged along* the line of march."¹ But they do serve a useful purpose in giving us a synthetic view of the universe. Science teaching in the past has emphasized the analytic mood which was eminently proper in an age that accepted superstition equally with fact but the time has now come for getting ourselves together. The specialist will run us into a hole with his analyses if we don't correlate his findings with those of others. Slosson has shown us this aspect in his *Creative Chemistry*.² Bergson, one of the greatest philosophers of modern times, deals with it in *Creative Evolution*.³ The trend of thought today, after the war, is constructive; we are on the threshold of a new age of human progress and the human mind and soul thrills with the wonderful possibilities.⁴ Surely, the science teacher has "something to sell."

The unity of the different sciences must be shown; they are not discrete but interdependent. Chemistry must be defined as the science of matter and energy with emphasis on the nature and constitution of the matter; physics must be defined as the science of matter and energy with emphasis on the forms of energy, its measurement and transformations; biology must be defined as the science that deals with life and that embraces the laws of chemistry and physics, though not necessarily limited solely to

¹*The Foundations of Zoology*, Wm. K. Brooks, Macmillan.

²*Creative Chemistry*, Edwin E. Slosson.

³*Creative Evolution*, Henri Bergson.

⁴*System of Animate Nature* (2 vols.), J. Arthur Thompson, Henry Holt, 1920.

them, because the cell has apparently an originative or selective power of its own. Geology comes in to explain the strata and reveal the fossils that supply missing links in the chains of plant and animal evolutions. Chemistry comes to the aid of geology and vice versa. They dovetail, they interpenetrate; it is only our *purpose* or our method of study (analysis) which separates them. They are a unity. If we can get visions of the symphony, if we can get the master formulae that makes nature a harmonic and rational system, we are getting somewhere. The stoker down in the hold of the ship doesn't know where he is or where he is going. The captain on the bridge, however, has a broad and comprehensive outlook and is able to steer a sensible course. Let us be captains and be able to give our pupils some of these larger and more comprehensive conceptions of what the whole "fuss" of education is about. Then I am sure they will make better citizens as well as better college-fodder.

There is a great deal of talk now about radio telegraphy and telephony; it is in the daily papers and magazines; there is much wise palavering about "wave-lengths", vacuum tubes and the ether. Here is a good chance for the science teacher to utilize these popular words to elaborate on the ideas (and, perhaps, just as important, lack of ideas) of the "ether" and extend them to the other forms of energy.

While we are speaking of the much discussed ether it might be well to listen to what that electrical wizard, Dr. Charles P. Steinmetz, has to say⁵ when he denies the existence of a substance that is not a substance, of something that is a solid of high rigidity while at the same moment it has the tenuity or rarity so that all heavenly bodies whirl through it without the least friction. Such a contradiction must be abandoned, he argues. Is the ether, then to be one of the "beliefs which strew the path of scientific progress which has been abandoned for lack of evidence" as Brooks suggests?

We have organized a radio club in the student body and have installed a two stage amplifier triode set with good results. Interest is created all along the line when they experience and handle those objects which involve quite a little theory.

The close relation between heat waves, light waves, electric waves and magnetic waves should be shown. The fact of periodic vibration, of the commonness of simple harmonic motion, of rhythm, of harmony and beauty can be brought out.

The wonders of the spectroscope, the romance of helium being

⁵*Popular Radio*, p. 161, July, 1922.

discovered on the sun many years before it was found on the earth, lend themselves to this treatment.

Radioactivity, the problem of the sun's heat, the sun as a source of energy—these present a fruitful field for speculation.

The importance of temperature and pressure, the manufacture of liquid air, the isolation of the rare gases, the service of mathematics in the infinite series and how the series were applied to electro-dynamics shows the interrelation of science and mathematics.

The fineness of precision of modern instruments, the contributions of astronomy—these afford the basis for stimulating mental activity.

These larger and newer conceptions when properly developed will create a taste for science—and that is the most that a high school course can do. A course in high school English does not make writers of the students; a course in science does not make scientists of them, and getting the new stuff across does help to give them a more intelligent understanding of the world in which they live.

PRODUCTION OF ALUMINUM IN 1921.

The value of the aluminum produced in the United States in 1921 was \$10,906,000, as compared with \$41,375,000 in 1920, according to the United States Geological Survey, Department of the Interior. This great decrease was due not only to a decrease in the price of the metal but to the large curtailment of its use in the automotive industries. The price quoted was steady at 28 cents a pound from January until the middle of July, when it was cut to 24.5 and to 25 cents, remaining so until the first of December, when it was cut to 20 cents. Imported aluminum could be bought throughout the year at 2 to 3 cents below the prices quoted for domestic metal of the same grade.

The imports of semi-manufactured aluminum in 1921 were 32,665,300 pounds, as compared with 39,298,650 pounds in 1920. The exports of aluminum in 1921 were 2,196,100 pounds, as compared with 9,407,650 pounds in 1920.

PROFESSOR JOHN M. COULTER, OF CHICAGO, A TRUSTEE OF THE THOMPSON INSTITUTE FOR PLANT RESEARCH.

Chicago, June 30.—The board of trustees of the Thompson Institute for Plant Research at Yonkers, New York, includes two botanists as scientific advisers, one of them being Professor John Merle Coulter, Head of the Department of Botany at the University of Chicago. The director of the Institute is Dr. William Crocker, formerly of the university faculty, who received his Doctor's degree at Chicago in 1906.

The Institute, which was established by William Boyce Thompson, of New York City, is to investigate the fundamental problems connected with plants, some of which will have a practical application to plant production. The laboratories have been planned and are in course of construction.