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SUPERSTITION, SCIENCE, AND MODERN ED- UCATION

IN the literature of today some of us encounter a very commonplace axiom. This axiom is indeed so commonplace that many of us are likely to overlook its real significance. To those who have lived and have striven to progress with Time its real meaning is obvious, but the fact must be accepted that there is a great multitude traveling Life's Highway that has never considered this axiom even in brief. To state this axiom briefly and concisely is rather difficult. Dr. A. A. Knowlton sums it up nicely in this statement: "Everything that occurs in nature is natural and has an explanation in natural laws, whether we know what that explanation is or not." This is sometime called the fundamental axiom of the scientific method.

It is true in a general way that the teaching of certain scientific subjects in the schools is receiving more and more attention. The study of science subjects is being emphasized more today than ever before. More thought is given to the selection of competent and well trained teachers. The higher institutions of learning are placing greater requirements in the curricula for degrees in science. A broader and more solid background is being required for students who are to specialize in one or more branches of science. Many instructors of science in the colleges and universities are decrying the fact that the high schools are passing students on to the colleges without the proper background and more recently do we hear the instructors exhort the teachers in the secondary school to instil a scientific attitude into all students, whether the

students are to go to college or not. It is urged that a scientific attitude is of real value in the liberal arts as well as in the scientific and technical courses.

What is the scientific attitude? It is a state of mind. This state of mind is characterized by a willingness to abide by the facts as one knows them and the eagerness to seek new relation between these known facts. Should a student emerge from the high school with a well formed scientific attitude and an appreciation of the fundamental axiom, it is a general opinion of teachers that these students will progress more rapidly in every course of study, and will be much more easily directed toward self-education.

The average student will say that science, physics, chemistry, biology, are "hard." They say that in order to make in a scientific subject the same grades as they attain in other subjects they must spend twice the time in study and preparation. Surely there is some reason for this, and, if possible, the teachers of science should determine this reason, and strive to make at least a cultural knowledge in science a bit less difficult for the student to acquire. Let us list some probable causes.

It is my opinion that the student who has never attained any spark of the scientific attitude finds science a lifeless, cut and dried and grossly uninteresting subject. This type of student looks upon physics as a jumble of silly and useless laws, a mass of unrelated facts that one must take for granted, perhaps retain by brute memory until the next periodic test is past history, and then cram into a reserved and quite limited mental void for the examination.

What has been said about physics applies to chemistry. But here the student is con-

fronted with a new problem. In order to have even a limited knowledge of chemistry students must at once begin to increase vastly their vocabulary. The student taking the first year college course in chemistry adds approximately two thousand new words to his vocabulary. Now in taking a language course for an academic year, the average student does not have a speaking knowledge of two thousand words in that foreign language. Too, words that they use in general conversation occur in science but here these words take on a different shade of meaning and must be used in a less liberal sense. There are words that sound very much alike and in a way convey much the same meaning in some types of conversation, but in science great care must be exercised in using these words. For example "absorb" and "adsorb." The former in a phenomenon of surface tension and accounts for capillarity. A blotter "absorbs" ink. Adsorption is the phenomenon of a substance occluding in its intermolecular spaces the molecules of another substance. Thus a bit of charcoal placed in the food compartment of an ice chest aids in the removal of odors by adsorption.

Perhaps teachers could create a more general interest in science and inspire students to attain a scientific attitude if they took more time to cite excerpts from the history of science. Or one could take a very useful and commonplace modern invention and briefly review the different progressions in scientific research that made the invention possible, and take great care to point out plainly to the students that it has been those people possessed of a scientific attitude that deserve in a great measure the credit for advancing civilization to its present state.

Man was not given dominion over the material world. The human race in reality is self-made, speaking of course in the same sense as when we speak of any one individual as being self-made. The human

race has most assuredly elevated itself from humble surroundings to the pinnacle of power. The way was not smooth; on the contrary, we have achieved prosperity through a long and stubborn fight in an environment that persistently resists any and all efforts towards modification and control. Man has by degrees supplanted the inertia of nature by active hostility of menaces so real and frightful that they have been personified as demons and evil gods who must be propitiated by sacrifice. The human race has attained success in the face of stupendous odds. Insects, carnivora, flood, famine, pestilence and disease have time and again threatened the very existence of the race. Nature's greatest and most valuable gift to man is not dominion but the ability to attain dominion. The dominion which mankind today exercises in some degree over the active agents and material resources of the physical world has been won by the continued use of intellectual endowments bestowed upon the race at its birth.

Recent authorities tell us that it has been perhaps a quarter of a million years since human beings appeared upon this earth, yet there is no positive evidence available that the mental capacity of the race has increased to any extent in many thousands of years. Can it be true that knowledge is ever on the increase and wisdom is a constant? In all history the progress of the human race has been and is divided into epochs of increasing knowledge rather than into epochs of increasing ability. The average student will be quick to recognize some of the very conspicuous milestones that mark some of these epochs; man's discovery of a source of food, the utilization of fire, the domestication of an animal, the use of new materials for making tools or clothing or weapons, the building of boats, the use of the lever as a simple machine to lessen the labor of man, wheeled vehicles, the discovery of the

process of smelting metals, water wheels, steam engines, internal combustion engines, telephone, and radio.

The duration of each epoch has not been the same, for in many cases and especially in the earlier ones, progress has been extremely slow. A few years ago a crude fist hatchet chipped from flint was unearthed in a gravel bed. It has been estimated that this fist hatchet was made fifty thousand years ago. Thus you see it required four-fifths of the total age of the race to obtain possession of knowledge concerning the properties of the most obviously available tool-making material, as well as a very high degree of skill in chipping the rough stone to the desired form.

But once the idea of a tool with a sharpened cutting edge became the heritage of the race, elaboration in this line was comparatively rapid. The lapse of time between the crude and fragile sun-dried brick and the massive and durable stone masonry of the Great Pyramid was but one hundred and fifty years.

By grouping several of these epochs a new division of the progress of man comes into being—Periods of Civilization. Some writers have said that the modern period began in 1770 with Hargreave's invention of the spinning jenny. Only fifteen years later Cartwright patented the power loom.

Having briefly reviewed the material progress of man and having set a date for the beginning of the modern period, it is well to take a look-in on the intellectual status of man at this time.

Now a great many years prior to 1770 there existed in the two oldest universities, Bologna and Padua, two chairs for the teaching of Astrology. Let it be clearly understood that the teaching of astrology has been banished from the colleges and universities of today. On second thought, the writer modifies the foregoing statement to read: The universities of the old world

have placed an absolute tabu on the teaching of astrology. The first statement may be true, but it is well to define astrology according to the New International Encyclopedia which says that "Astrology is the most ancient form of superstition." Again the Americana Encyclopedia concludes its article on astrology as follows: It still flourishes, however, in Asia and Africa and is a means of livelihood to many charlatans who prey upon the lower classes of all countries." From your own experience, would it have been an error to include America, yes, these United States, among those that harbor the teaching and practice of such utter nonsense?

To get at a glance what the educated people of this or any other progressive country think of astrology, walk into any large and well-booked library and ask to see books relative to astrology. If the books are arranged on the scientific Dewey system, that is, if books of a kind are all together, and each group has a number, we will easily find "Astrology." Now what books do we find in this section of the stack? Here is what we will find in one modern public library:

- 132. Mental Derangement.
- 132 Witchcraft
- 133.4 Witches
- 133.5 Astrology
- 133.6 Palmistry
- 133.9 Spiritism.

After consulting the index, we go to the section where these books are kept, and we find only one lone volume on the shelf. The librarian informs us that all of the books except one, "Medical Astrology" and one other, kept locked in a case, are loaned out. The reason the one book is kept under lock and key is that it is always out, and the former copy was stolen. A more detailed consultation with the librarian reveals the fact that the locked-up book is the *twenty-fifth edition* of "Solar Biology."

This visit to the public library convinces one that such books must be read, and in great demand. It is reasonable to believe that these books contain much information and we at once attempt to procure a copy of this very popular "Solar Biology" that bears such a learned title.

Within the covers of this "Solar Biology" these statements are found: The planet Saturn has an evil effect; the planet Jupiter has control over the liver; a child born under the influence of Mercury will have a sullen disposition. The reader of this book could write a "Solar Biology" and say that Saturn has a good effect, and that Jupiter has control over the heart and that the child that has the most sunny disposition was born under the influence of Mercury. But, the reader will say: "Surely a man that wrote the "Solar Biology" must know, and surely the author would not make such statements unless he knew they were true.

This is what is generally called "belief in authority." This very thing has stood as a giant handicap to progressive people and has been a tremendous stumbling block ever looming up in the path of the real teacher who tries to guide the mental processes of the coming generation into lanes of greater intellectual freedom. This superior insight or the mystic source of knowledge of others has become a trust by a great many people, and this trust has controlled the opinions and actions of men and misled them from the earliest time down to the discovery in Galileo's age that *experience* is the source of truth. But allow a stronger quotation, Henri Poincaré, the great mathematical philosopher, and a brother of the late president of France, says "Experiment is the only source of truth."

Have you ever picked up a popular periodical published in the United States and read advertisements similar to the following?

If your life is not expressing harmony on all levels—physically, mentally, emotionally, financially, spiritually, the cause is in your name. Have it analyzed scientifically. A change of name is a change of destiny. Write me today enclosing \$1.00 for my Mystic Self-Help Letter. I can help you. Rev. X. L. T., National Authority on Numerology-Astrology.

How many people do you know who have responded to such an advertisement and parted with the sum.

There is a publication of twelve years standing, called "The New Thought, Bahai." Allow the quotation of two remarkable advertisements.

Rev. . . R. F. Z. . . F. B. P. I. . . . D. D. . . Ph. D. . . . D. Sc. Prominent Spiritualist, crystal gazer, medium, psychic, mystic, yogi, healer, occultist, psychologist, astrologer, numerologist, lecturer and teacher. Send full name, date of birth and questions. Short readings, \$3; general readings, \$5; full reading, \$10.

Here is another "New Thought" practitioner's offer to help you:

Psychic and Clairvoyant Readings! Send \$1.00, ask five questions: You will be helped. What has Solar Biology for you? Send date of birth and \$2.00; you will be surprised! Do you suffer physically? Why not try Nature's Remedies? Pure dry herbs! One month's treatment! Send lock of hair for diagnosis. Rev. S. P. Q.

Here we have again "Solar Biology," and a request for date of birth—and \$2.00! Don't forget the lock of hair for diagnosis! And the title Rev.! Surely we do not have to part with the two dollars and shear a lock of hair to be surprised!

Perhaps this does not strike home to you; perhaps you will be inclined to pass it up as a happening in long years past. Perhaps you associate such silly nonsense with the time in our fair land when eccentric but innocent people were convicted of possessing a sinister and mystic power and were punished by torturous means, so horrible that the present day savage would blush and vote "thumbs down." But you are wrong.

Less than a year ago, in a nearby state, a state boasting of a cultured population, a state dotted here and there with the finest of educational institutions, a very brutal

murder was committed. An investigation disclosed the fact that a queer old hermit was murdered merely because he resisted a forced attempt to secure a lock of his hair. The lock of hair had been advised by a man generally called a pow-wow doctor. Today there is a young man placed beyond the pale of society in a barred prison, doomed to spend many sorrowful days, denied activities and companionship of his choice, and perhaps emerge from this prison in later years as distinctively marked as a leper is marked.

Closer home yet, in a bordering state, the writer was called upon to make a complete yet hasty analysis of a "love powder." Without prying into the history of the sample, the analyst found that the so-called "love powder" was a pure grade of an arsenate of a heavy metal. Very toxic indeed. Later it was learned that a "Mystic Doctor" was selling this tiny bit of lethal chemical to those who were experiencing domestic difficulties, advising the complaining person to administer the dose to the uncherished one without the knowledge and consent of the recipient of the powder. The "doctor's" fee ranged from \$5 to \$500. Death and agonizing illness of long duration followed in the wake of the poison. The courts convicted, and again our penal institutions are populated.

Now these people are not insane, such fact is established in that they were convicted after they had been proven sane. But why such atrocious happening in this advanced age of ours? It is largely because the leaders of our country, the statesmen, law makers, educators, teachers, parents and preachers are not fostering a development and appreciation of the fundamental axiom and the scientific attitude. The claim is not being made or even inferred that an appreciation and practice of the scientific attitude will be a panacea for all ills, but it is my firm belief that progress and the unearthing of truth will be more rapid.

Let us think over a few facts, and then wonder what undisputed claim do we as a nation have to world supremacy. In this land of John Hopkins, Mayo Brothers Clinic, Mellon and Rockefeller Institutes, we actually have great states that license men to diagnose and treat disease who have had no general education and have never studied the science of health and disease. Do we find this to be true in the smaller nations of Europe, for instance, Holland?

There are thousands and thousands of farmers in our country who are truly classified as astrological farmers. These farmers plant everything yes, even fence posts by some astrological sign. Success or failure is attributed to the good or evil effect of some planet. There lives within the radius of a few miles of the writer a man who derives a part of his livelihood from writing each year an almanac containing much astrological data. But this takes place within the confines of a country that has the finest Department of Agriculture in the world.

The day is fast approaching when one will fear social ostracism who tells what this or that "healer" did for her after "all the doctors had given her up." I hope we are just approaching dawn now.

In closing, it surely will be well to outline to the teachers that they have a responsibility in another sense than seeing that their students accumulate by a laborious process great masses of facts pertaining to several subjects. It is to guide them into using a helpful attitude to face the many original problems of this complex economic existence. The characteristics of the scientific attitude have been briefly summed as follows:

- I. Delay in response during which there may be time for reflection.
- II. Habit of weighing evidence with respect to its soundness and adequacy.
- III. Conviction of universal basic cause-and-effect relation, rendering untenable

- superstition, 'unexplained mysteries'; too ready credulity; tendency to magnify the importance of coincidence.
- IV. Respect for another's point of view, an open-mindedness and willingness to be convinced by evidence.
- V. Sensitive curiosity concerning reasons for happenings, coupled with persistence until the real reasons have been found."

A true appreciation and a steady utilization of these five characteristics will be possible to those who can accept the fundamental axiom with which this paper opened.

H. G. PICKETT

GENERAL SCIENCE TEACHING IN VIRGINIA TODAY

(II)

THIS article is a continuation of the study of the status of general science instruction in Virginia today, the first study having been published in the *VIRGINIA TEACHER* for October, 1928 (p. 237-243). The article contains the following sections: I. Survey (partial) of General Science courses given in Virginia, II. The Training of the General Science Teacher in Virginia, III. General Science Textbooks, IV. The Harrisonburg Water System: A Project in General Science, V. The Laboratory for General Science and Other Sciences, VI. Ways to Create Interest of Pupils in General Science, VII. How Modern Courses in General Science Carry Out the Seven Cardinal Principles, VIII. Conclusions.

The material for the above sections was worked out for the most part by groups of students¹ in a course in General Science

¹The following members of a class in the Organization of General Science co-operated in the preparation of this article: Mary Louise Blankenbaker, Mae Bass, Elizabeth Cockerill, Ethel M. Crown, Elizabeth Davis, J. Eugenia Eley, Mary Greene, Alice V. Nuckols, Olga M. Petterson, Elsie H. Quisenberry, Mrs. Christine L. Rodes, Elsie Shelhorse, Ruby A. Stewart, and Catherine E. Yancey.

given in the Fall Quarter, 1928, at the State Teachers College, Harrisonburg, Va.

The O'Shea Survey Report² has indicated several places in the educational system of the state which need improvement or change in order that the system may be on a par with the more progressive states of the Union. Since some of the aspects which need improvement concern science and the "scientific attitude," it seemed appropriate to study the general problem of teaching the most fundamental of the high school sciences (general science), keeping in mind both the discovery of the best modern practice, and the actual conditions and needs of the state.

A few extracts from the O'Shea Report may not be amiss here, as suggesting the importance of the right kind of science instruction; "Virginia has emphasized verbalism and symbolism rather than realism"; "Virginia education, taken as a whole, but allowing exceptions, is not dynamic. It is not designed to make pupils either interested in or capable of dealing with the material or sociological conditions surrounding them"; "In school and in college they (pupils and students) employ the faculty of memory largely rather than scientific reasoning or creative imagination"; "In the lower schools there has not been until recently any study of nature, and there is only a negligible amount of such study now. In the higher institutions science has occupied a subordinate place. So far as it has been possible for the survey staff to analyze the interests and the modes of thinking of the people of Virginia, it appears that they are not as a people scientific-minded."

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Survey (Partial) of General Science Courses Given in Virginia in 1927-28

The members of the general science class

²M. V. O'Shea—Report to the Educational Commission of Virginia of a Survey of the Public Educational System of the State, Richmond, 1928.