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Anniversaries of Science

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ANNIVERSARIES OF SCIENCE

General

To know biography is to have a knowledge of history. By a study of the biography of our scientists we may secure a very satisfactory knowledge of the development of most scientific discoveries. The life and works of many of the noted scientists present a story of adventure and achievement which to the young may become a great inspiration.

The brief references in our textbooks to notable discoveries seldom arouse very much enthusiasm nor do they relate them to the science as a living and developing subject. Too frequently the pupil assumes that discovery arises through some stroke of genius, and that scientific ideas spring full-grown and completely formulated from the mind of their discoverer.

Much interest and enthusiasm in a subject or a discovery is aroused when the pupil begins to look up the records and sees the many contributing causes that led to its development. For example, Archimedes is given the credit for discovering the rules for determining density, but the student commits them to memory without in any wise knowing the circumstances which contributed to their discovery. To Archimedes it was a thrilling affair. When the student studies his life, these rules become a vital factor in his interest in density. During the investigation of the subject, many other very fundamental facts concerning physics are secured, showing its important relationship to other subjects. Our text books seldom arrange for such biographical studies, thus making it difficult to know how or when to present them.

We keep alive the achievements of our national heroes by celebrating their birthdays, or we arouse patriotism by celebrating the anniversary of some historic event. Why not in our science subjects commemorate the birthdays of some of our noted scientists and arrange a program for a class period? At this time various members of the class may present short biographies and discuss various subjects which the scientist has been vitally instrumental in developing. Or we may take the anniversary of some remarkable discovery and have papers prepared concerning the people and the events leading up to it. An example of this would be the discovery of oxygen by Joseph Priestly. Much more interest in oxygen and its discovery might be so secured. At the same time, the student would secure a better understanding of the early conditions of scientific study both as to lack of equipment and information, and to erroneous ideas which had to be overcome.

In the field of biological science there is no one who has stimulated the idea of careful, systematic study more than Charles Darwin. Although his conclusions have aroused bitter controversy, they have evoked much careful research and have given to the world a fund of information. Papers on his travels and work would be very profitable.

Asa Gray did a great work in organizing a systematic study of plant life. A careful survey of his life and work would inspire a love for plants that is much needed today.

It may be difficult to classify Louis Pasteur definitely with either biological or chemical science but this very fact makes his investigations all the more rich in topics for study. His early ambition lead him into

chemistry, in which he made some notable discoveries. These prepared him for his biological and medical contributions, resulting later in the great Pasteur Institute in France.

It would not be difficult to prepare a program on the life and works of Sir Isaac Newton. His mathematical achievements and investigations in the field of physics offer many possibilities for papers.

Among others that would make an interesting program would be Galileo, John Dalton, Louis Agassiz, and Blaise Pascol.

Should the reader care to follow out the ideas suggested above, the following brief bibliography will be of service. (1) For reference work for all of them we would recommend the standard encyclopedias, such as "Britannica" and "The New International." (2) Archimedes (about 287-212 B.C.) "Library of Historic Characters," Vol. 6, by A. R. Spafford and others; "History of Science" by H. S. Williams. (3) Joseph Priestly (1733-1804) "A History of the Sciences, Chemistry," Vol. 1, by Edward Thorpe; "History of Chemistry" by F. P. Venable. (4) Charles Darwin (1809-1882) "Library of Historic Characters," Vol. 10, by A. R. Spafford and others; "Charles Darwin and Other English Thinkers" by S. P. Cadman; "The Evolution of Charles Darwin" by George Amos Dorsey; "Biographies of Eminent Persons," Vol. 3; "Darwin" by Gamaliel Bradford. (5) Asa Gray (1810-1888) "Leading American Men of Science," by D. S. Jordan. (6) Louis Pasteur (1822-1895) "Library of Historic Characters," Vol. 10, by A. B. Spafford and others; "Life of Pasteur" by Rene Vallery-Radot; "Pasteur and His Works" by L. Descour. (7) Sir Isaac Newton (1642-1727) "Library of Historic Characters," Vol. 10, by A. R. Spafford and others; "Book of Days, Sir Issac Newton and the Apple," Vol. 2, by R. Chambers; "Dictionary of National Biography," Vol. 14; "A History of Science," Vol. 2, by H. S. Williams. (8) Galileo (1564-1642) "Radiant Suns" by Agnes Gilbern; "Beacon Lights of History," Vol. 3, by J. Lord; "Encyclopedia of Universal History," Vol. 2, by J. C. Ridpath.

O. B. READ

MOLECULAR FORCES

Physics

(Continued from April issue)

The three states of matter denoted as solids, liquids and gases are different phenomena of matter arising from a change in the intensity of molecular attractions.

By the application of heat iron can be made to change from a solid to a liquid and finally into a gaseous state. In changing from a solid to a liquid, the molecules of a substance are forced by heat from a fixed vibratory condition into a mobile vibratory state. Hence it is evident that in the liquid state the molecular attractions are much less intense than in the solid state. Then, as the liquid state gives place to the gaseous state, the molecular attractions must become exceedingly small, as evidenced by the high speeds of the molecules of gases.

The three most prominent phenomena arising from molecular attractions and discussed in elementary physics are those of surface tension, capillarity and crystallization. These phenomena are exceedingly interesting and play a very important role in the processes of nature and in the inventions of man.

In discussing surface tension the instructor should emphasize particularly its practical side. The term itself is quite abstract to the beginning pupil and hence its discussion should be placed on a commonplace basis. The phenomenon is most strikingly illustrated in the free surface of a liquid, as the free surface of water in a tumbler. The impression should not be created, however, that water has a monopoly on this property. It pertains to all kinds of fluids.

How surface tension arises out of the molecular attraction in the surface layer of a liquid is quite clearly presented in most high school texts and need not be discussed here. The important task for the instructor is to bring the pupil to see that there is a tension—a contractile force—acting in the surface film of a liquid as of water in a tumbler. He should first be shown by experimental demonstration that the surface of a liquid is in quite a different physical condition from its interior. A heavy