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Atmospheric Pressure

L. Begeman
Iowa State Teachers College

mer culling of year old hens, after they have been laying for ten or eleven months; also, the selection, from the previously banded good pullets, of those which now show evidence of heavy production and continued good health. The matter of health cannot well be overstressed, since we wish to produce chickens for our laying flock, having the greatest possible disease resistance.

The studies thus far are preliminary to the actual work of selecting the breeding flock — a task which should be undertaken soon. It would be very desirable if you could find a flock in which the procedure above mentioned had been carried out, because you could limit your selection to those birds which had been approved as pullets and year old hens. In very few cases will such conditions be found and you will be obliged to go to the general flock to select the birds for the breeding pen. When selecting the hens for this pen, the health and strength must always take first rank, since the hen does not transmit her tendency for heavy egg production to her daughters. Where the raising of males for breeding stock is being emphasized, the producing qualities of the hens must be strongly stressed. With these facts in mind, the class should be equipped to select the breeding flock, employing a method similar to that used in culling. The number of hens for the breeding flock should be determined by the number of eggs required for hatching at any one time and the length of time over which the setting eggs may safely be collected and kept. It will be well to select a few extra birds in order to provide against accidents and to be able to discard any one whose eggs are of undesirable shape or color. Such egg defects must not be perpetuated in the flock.

In conclusion, I would again stress the value of a community survey and a comparison of results as the basis for class discussion.

H. EARL RATH

Will Science Bulletin be published next year? That depends on whether the Editor can show results this year. So far, you have maintained a discreet silence. Do you vote "yes" or "no" for volume two?

A Correction

Due to an error in the print shop, the continued article of the January issue was closed in the middle of a sentence. Beg your pardon.

ATMOSPHERIC PRESSURE (Concluded)

Physics

An account of the experiment reached Paris the next year and came to the notice of Pascal. He could not try the experiment until 1646 when glass tubes were available to him. Pascal reasoned that if the atmosphere supported the mercury column, the height of the column should be lessened when the apparatus was carried to a high altitude. He tried to verify his theory by carrying the tube to the top of a high church spire but without much success. He finally wrote to his brother-in-law at Auvergne, France, requesting him to try the experiment on Puy de Dome, a high mountain in that locality. Imagine Pascal's joy when he learned that the mercury column fell three inches when carried to the top of the mountain. It is interesting to know that a tablet has been placed at the foot of this mountain, carrying a brief description of this famous experiment. A student of the writer was a member of a detachment of the American expeditionary force which was encamped for several months at the base of this mountain. The Torricellian experiment created as much of a sensation in its time as television has of late. We are told that scientists were almost speechless with astonishment.

Pascal, grasping clearly the practical significance of atmospheric pressure, began the study of the siphon. He also devised the familiar balloon experiment. A half inflated toy balloon is placed under the receiver of an air-pump and subjected to varying pressure by partially exhausting the air. As this proceeds the balloon gradually enlarges. When air is now gradually admitted the balloon flattens. Since Pascal had no air pump he was obliged to vary the pressure by carrying the balloon to different elevations on a mountain.

Another experiment of great historical importance deals with the "Magdeburg hemispheres". This ex-

periment, devised by Otto von Guericke in Magdeburg, Germany, is much more striking than that of Toricelli. It is interesting to know that all of von Guericke's experiments on air pressure were entirely original, being devised without knowledge of the experimental work in Italy and France. Von Guericke invented the air pump and used it in all of his experiments. His hemispheres were fifteen inches in diameter and were made to fit with an air tight joint. After pumping the air from the sphere it required sixteen horses, eight hitched to each hemisphere, to pull them apart. Besides this experiment, von Guericke performed many others just as interesting. By devising a water barometer, he proved experimentally that a water column would rise more than thirty feet under atmospheric pressure. He used this barometer to predict weather conditions. He also devised a pair of hollow lifting cylinders by means of which he was able to lift from twenty to thiry men. The cylinders were so made that one would fit snugly into the other and telescope completely when evacuated. The achievements of Torricelli and von Guericke were truly wonderful in their day. Both of these historic characters would make excellent subjects for papers to be presented before the Science Club of the high school.

Pupils in the physics class should be taught how to calculate atmospheric pressure from the height of the barometric column. At sea level, for instance, the barometric column averages about 30 inches during the year. This column just balances the weight of a column of air extending upward from the earth's surface to the outer limits of the atmosphere. Hence, assuming the mercury column to have a cross-section of one square inch, the atmospheric pressure is calculated by dividing thirty cubic inches of mercury by 1728 to convert it to cubic feet. This quotient is then multiplied by 62.4, the weight in pounds of a cubic foot of water, and again by 13.6, the specific gravity of mercury. The final result will be 14.7 pounds per square inch, the atmospheric pressure at sea level.

The classroom apparatus for the study of atmospheric pressure should include as a minimum the following articles: a three foot glass tube for Torricelli's experiment, glass models of a simple suction pump and of a force pump, rubber tubing and bottles to illustrate the action of the siphon, Magdeburg hemispheres, and an air pump. If the school has city water, an ordinary filter pump costing about a dollar will give better service than most air pumps. When discussing pumps the widely used rotary pump should not be omitted. Practically every automobile is equipped with one for circulating water through the radiator and jacket of the engine. The school should also own a barometer, either aneroid or mercurial. The aneroid type is so largely used that one can be found in nearly every community.

In connection with the study of normal atmospheric pressure and its variations, no good instructor will neglect references to some of the notable inventions utilizing compressed air. Among these might be mentioned the Westinghouse air brake for trains and street cars; air riveters for hammering red hot rivets in place in the construction of skyscrapers, bridges and other steel structures; and pneumatic tubes for distributing mail and for making change in large stores. The pneumatic tubes in the New York Life Insurance building in New York city distribute an amount of mail and packages daily equal to that of a city of eight thousand inhabitants. Compressed air lifting cylinders are used in foundries and factories for lifting heavy objects. Cylinders of compressed air are used to open and close the doors of street cars and for slow, automatic closing of doors in public buildings. We motor on compressed air and sit on air inflated cushions. Surely this is an age of air as well as of electricity.

The laboratory work on air pressure must be limited to a series of qualitative experiments. If a barometer is available the pupils should be required to make daily readings for a week or two. These readings should finally be graphed to show the daily variations in atmospheric pressure. Other interesting experiments in atmospheric pressure are listed in the General Science article of this month.

L. BEGEMAN