

and are lauded for their healthful activity possibilities. Knowledge of gardening grows rapidly with the years. The production of one crop of radishes makes one feel, the next year, like a veteran gardener with a storehouse full of know-how.

START A LIBRARY. The formation of a library does not need to be a lavish outlay of money at one time. It does mean the gathering together of textbooks, magazines with a biological theme, pamphlets of a similar nature, and other biologicals of a related character in one accessible area. You will be surprised with the speed with which your library will grow in size when you formulate a plan for its improvement and development.

IS SUCCESS IN BIOLOGY IMPORTANT? The people of biology believe that it is. In our

opening paragraph we stated "biology is life and living." It always will be. In this regard everyone respects LIFE and holds it in high esteem. They also enjoy LIVING and want to continue to do so. For a good life one must learn living as an art.

WHAT YOU CAN DO ABOUT IT. The success suggestions mentioned are approaches you may make to the subject. There are no short-cuts to success but there are aids. These should not be considered as goals, but as methods for easier learning. These are not to take the place of ordinary correct study habits. They do not in any way relieve scholastic application. They are to serve as a compliment and supplement to regular laboratory and classroom work.

Trivia for Teaching

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Every teacher eventually finds a few simple methods for successfully teaching certain parts of the work, judged on the percentage of students who remember. Whether the items mentioned in this article are important in teaching high school biology you are as able to judge as I.

When the class is studying circulation in the human body, connect the a of the words anterior and auricle with the a-shaped cavities of the heart, and the v of ventricle with the v-shaped cavities. Also, associate the a of arteries with the a in away from. When I discovered the V-A-V-A-c-plan I felt pleased with myself. Perhaps others have thought of it long ago. The first V is for Vein. In no two places in the circulation do two V's or two A's come together. Always it is Vein-Auricle-Ventricle-Artery-capillary-Vein, etc. Charts with their blue and red coloring plan are apt to be mislead-

ing. But the V-A-V-A-plan always works in the systemic circulation.

You may not consider it important to remember average lung capacity. It interests students and helps to develop better posture, I feel. We use a wide-mouthed glass jar of a gallon or gallon-and-a-half capacity. There should be several glass tubes which can be sterilized, to slip into the long rubber tube for mouth-pieces. The jar is marked conspicuously with adhesive tape to show every 100 cu. in. when inverted. Assuming the biology laboratory has at least one sink, proceed by the water-displacement method, having a student inhale all the air he can then exhale into the tube to see how much water can be displaced from the jar. A few students will be able to empty the 231 cu. in. and they will remain proud and extra-chesty for a week following. When computing

capacity, add half as much as that expelled for the residual air. Every student wishes to try it—some after school.

Some educators in the field of science have advised classroom teachers not to bother much about classification. Students, they said, do not want to know what a thing is, but how does it work. This may be true in some fields of science and with some ages, but it is not true of biology students in high schools. Year after year, five sections a day of biology students have entered the laboratory to inquire of a strange object on my demonstration desk, "What is it?" They never ask first how it breathes or how its blood circulates. The second question is, "Where did you get it?" For that reason we keep lists of specimens brought in.

By basing the teaching of plants or animals on their classification the student learns many times what he could learn about a single living thing. Taxonomy should not be carried to extreme during the year of beginning work, but it makes a wonderful framework for knowledge. Since students are to learn the scheme of classification it is important to remember the order of terms—kingdom, phylum, class, order, family, genus, species. This is difficult. Then use the old method of devising a sentence the words of which begin with k.. p.. c.. o.. f.. g.. s.. . Sub-phyla and other subs will naturally fall into the right place. For several years my students have learned this by the catchy sentence: Kathryn pulled candy on Friday. Great Stuff! Many others have been devised but none has helped as has this one.

As to the value of sealed gardens for teaching the cycles of oxygen, nitrogen, and water I have written before in this magazine.* Balanced aquaria help also

*"Silent Teaching," *American Biology Teacher*, Vol. 7, No. 7, p. 149, Apr. 1945.

in theory and in aiding a young fisherman in keeping his bait alive.

We use frog dissection as an introduction to the study of human anatomy and physiology, rather than as a study of a low vertebrate. "There is nothing like so interesting to ourselves as ourselves." The differences in anatomy only serve to help students to remember functions.

Both boys and girls should learn to use a clinical thermometer. If the girls get this in Homemaking the boys can get it in Biology. First come the instructions for cleaning, shaking down, reading. Then let each student take and read at least one other student's temperature or his own. This can be done while other laboratory work is going on.

Have yardsticks fastened permanently to a doorway in the laboratory for making records of each pupil's height. Do this in early September and again in early May, two-thirds of a year. Fifteen-year-olds like it, and I think it is a reminder of good posture. Many come in the next year to measure and ask me to look up the record.

Walking is the activity we engage in most. Yet do you know any place where this is taught our pupils? The Englishman says that most Americans walk incorrectly, "In two lines," and we can readily note this from footprints in the snow or by walking behind a person. If you know how to walk, to stand, to sit, have a lesson on this. You may be able to do it by illustrating faulty posture.

Demonstration experiments on the senses should have two results: Knowledge of more than "the five senses," and wider appreciations. One student attendant at a public movie-theater asked ten patrons in succession how many senses we have. Eight said unhesitatingly that we have five, one thought

more than five, and one said "at least ten." To students who know more about these several avenues of learning and enjoyment come new appreciations. Why not enjoy balance and temperature? Also, he will do better writing and less monotonous conversing than the person who tells only what he sees.

Have students keep note books for the value to themselves, not just to impress teachers. Eventually they find the notes more useful if orderly, with properly headed pages and a proper table of contents. Research experiments should be recorded for others. And distinguish between research experiments and demonstration experiments. Before the end of his first year in biology a student should know the value of identical set-ups in a controlled experiment.

Some texts explain Mendel's Laws of Unit Character, Dominance, and Segregation by representing all four genes involved with capital letters. Better to make the recessive a small letter, the dominant a capital, and the results are much more easily interpreted. Any group of students can rate 90% accuracy in manipulating one pair of characters by Mendel's Laws. I never feel that the knowledge is worth much, for every plant or animal has more than one pair of hereditary characters. But it illustrates a principle and if attempted at all it should be learned, not guessed at.

Some high school students sneeze widely and openly down some neighbor's neck. This may be brought up by a discussion of the relative merits of cloth handkerchiefs and paper handkerchiefs and they will get the idea. Or it may just be brought up. But many do not know: both sides of the nose should not be held shut at the same time in an attempt to open clogged Eustachian tubes; the mouth should be rinsed while brushing

teeth in order to dislodge food from between cheeks and gums; that continuous sweets in the saliva due to the use of soft drinks, gum, candies, continuous lunches, invite dental caries. These are embarrassing to mention to self-considered adults. But even the over-worked ear specialists and dentists want young people to know these facts.

Truly these are trivia among all the other things which must be learned and taught during a year of beginning biology. But our lives seem to depend on trivia.

A GRAPH AS A TIME SAVER IN GRADE CALCULATION

Although the use of graphs in making calculations is common in some fields, few teachers seem to take advantage of this time saving method of calculating grades on a percentage basis when the total possible points does not equal 100. The construction of a graph for this purpose using regular graph paper is a simple matter.

The illustration shows a straight line graph for converting numerical scores of a test having a maximum possible score of 80 to percentage grades. Since no scores were below 35, the vertical scale for scores starts with 30 and goes up to 80. Since it is obvious that the lowest percentage grade is then somewhat above 40, the horizontal scale for percentage grades starts at 40 and goes up to 100. In order to construct a line which will provide a per cent grade for each score grade on this test, 40% of 80 (i.e., 32) is taken as the beginning point of a straight line on the left score scale and the line is drawn from this point to a point representing the highest possible score on the vertical axis (80) and 100% on the horizontal axis. By using graph paper with