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## Frogs: Living Tools of Science

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## Frogs: Living Tools of Science

Roger Volker

Webster City Junior College

The lowly frog has long been the biologist's friend. As a small vertebrate available in large numbers, this amphibian has been made the high point of every biology class across the country, since the turn of the century. Millions of frogs, reeking from their bath of formaldehyde preservative, have been cut up in hundreds of science classrooms and their livers, hearts, and lungs have been probed and dissected as students studied their anatomy in an attempt to better understand how the higher animals, including man, are put together.

As a specimen for dissection the frog, dead or alive, is excellent. His body organs and their arrangement are so similar to the human that some aspects are directly comparable. However, the availability of live frogs for biology classes makes possible their use in a great number of ways other than dissection. (Live frogs may be obtained all year round; see note at end of article.)

For decades frog leg muscles have been used in experiments to determine the role muscles and nerves play together in skeletal movement. Much valuable information on cardiac muscle, including the effect of drugs, has been gained by work involving the frog heart. The large leg muscle, the gastrocnemius, has been involved in experiments to determine the factors contributing to muscle fatigue. It is this muscle that is so useful in biology classes when hooked to a kymograph to record muscle response.

Living frogs harbor a number of interesting parasites which may be studied during a basic course in biology. Three species of one of the major groups of animals, the Phylum Platyhelminthes, are found in the frog bladder, lungs, and rectum re-

spectively. **Hematolechus**, the frog lung fluke, is found almost universally in frogs collected here in Iowa. My classes find this particular parasite in about 75% of the freshly killed frogs they dissect. No special instructions are needed for dissecting to find these flukes, though the Source-book listed at the end of the article does give details on the process.

The lower intestinal tract of the frog is populated by four species of digestive-aiding protozoans, and these may be removed and observed by cutting out a portion of the intestine, smearing some of the contents on a slide, and covering with a cover slip. Careful microscope manipulation and proper microscope illumination are needed, but even 10th grade biology students can find the large ciliate, **Opalina**, if such a preparation is carefully made using the intestine of a freshly killed frog.

Instructions on pithing or anesthetizing frogs are given in the Source-book, in the bibliography below.

Experiments in physiology illustrating oxygen uptake and carbon dioxide discharge can be performed simply by housing the frog in a home-made "respirometer" constructed using an instant coffee jar, some rubber tubing, and a few chemicals. In a later issue of the Journal I hope to submit plans for making this respirometer, which I have used with great success in teaching biology. Experiments in radiochemistry using isotopes of phosphorus and iodine can be done. These two isotopes are then traced with a geiger tube to the bones and thyroid gland, respectively.

The lowly frog can be much more than "something to cut up" in biology. Properly used, it is an integral part of a course in life science, and can be

(Continued page 16)

## REVIEWS

**Chemistry Problems**, Joseph F. Castka. Holt, Rinehart and Winston, copyright 1962. Paperback.

This is a source book for the above average chemistry student. The teacher of CHEM Study will find this an especially useful reference book. Chapter 11 develops the major ideas of atomic and molecular structure along with current theories of chemical bonding. Chapter 12 deals with crystals and solid state. Both chapters 11 and 12 are enhanced by a great many diagrams and illustrations. For those who have not, until recently, been thinking in terms of problems related to bonding, molecular structure and solid state the large number of problems in these areas (with detailed answers) will make this book a valuable addition to the science library.

Floyd Sturtevant

### IOWA SCIENCE TALENT SEARCH

(Continued from page 8)

port from 1949 through 1952, contributing about \$21,000 in scholarships to about 196 winners.

The Iowa Science Talent Search is achieving its goal of encouraging potential scientists to pursue science careers. Besides the cash scholarships

Reports from many colleges reveal that honor grade point averages have been earned by about three-fourths of the Talent Search winners. Many have attended Iowa colleges while many others have attended schools throughout the country. Several of the early winners have earned Ph.D. degrees. Some are now working in science and medicine. A large number are still in graduate school and college, but a high proportion are successfully pursuing careers in science.

#### Literature Cited

- F. E. Brown, "Science Talent Searches," *Proc. Ia. Acad. Sci.*, 59, 63-70 (1952).  
 "Reports of the Committee on Science Talent Search," *Ibid.*, 69, 22 (1962).  
 "State Science Talent Searches," 1962-63, report by Science Clubs of America, 1719 N Street, N.W., Washington 6, D.C.

**Vanishing Animals, Preserving Nature's Rarities**, Philip Street. E. P. Dutton and Co., Inc. Copyright 1963.

This is a book that either scientist or non-scientist might read with interest and profit. Mr. Street covers a wide variety of animals from the great auk to the Komodo dragon. He tells of many animals that are perhaps unknown to most of us but that, nevertheless, deserve our efforts to prevent their extinction. And, if the animal is extinct, might it "live" again? One learns that efforts are being made to bring such animals back again by applying the principle that no animal can be considered completely extinct whose heritable constitution still exists. This constitution, though altered by crosses with other species does exist and by use of present day knowledge of heredity can be brought back! This book will make excellent reading for students in junior and senior high school.

Jean Crane

### IOWA GEOLOGICAL SURVEY

(Continued from page 12)

Samples of rocks and fossils are distributed to schools and private individuals upon request. Information, advice, and direct assistance in the increasing development of water and mineral resources are given to the limit of Geological Survey funds and personnel.

#### FROGS

(Continued from page 13)

utilized to demonstrate most of the basic life processes.

#### References

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 Kudo, R. R. *Protozoology*. 4th Ed. Charles C. Thomas, Publisher. Springfield, Illinois. 1963  
 Manwell, R. D. *Introduction to Protozoology*. St. Martin's Press. New York, N. Y. 1961  
 Morholt, E., Brandwein, P. F., and Joseph, A. A. *Sourcebook for the Biological Sciences*. Harcourt, Brace, and World, Inc. New York, N. Y. 1958

Live frogs may be obtained from E. G. Steinhilber and Co., Inc., Oshkosh, Wisconsin. Cost about \$1.00 a dozen.