

3-1929

A Bird Study Plan

Winifred Gilbert
Iowa State Teachers College

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Recommended Citation

Gilbert, Winifred (1929) "A Bird Study Plan," *Science Bulletin*: Vol. 1: No. 5, Article 8.
Available at: https://scholarworks.uni.edu/science_bulletin/vol1/iss5/8

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the process whereby green plants in the presence of sunlight take in carbon dioxide and water and manufacture carbohydrates. In this process, oxygen is a waste product and energy is stored. There is no more fundamental process in nature than photosynthesis. It is the first step in the manufacture of all food for plants and animals, including man. Without this process, there would be no food and hence no life, with the possible exception of a few bacteria which can secure their energy from inorganic compounds. Most of the work of the world is done by the energy that green plants have secured from the sun in photosynthesis. This process is the most unique process in plants and one of the most important in all nature.

These two processes, respiration and photosynthesis, go on simultaneously in a green plant in the light. The carbon dioxide released in respiration is used up in the chlorophyll bearing cells in photosynthesis without being given off so that it can be measured or detected. Under favorable conditions in the light, photosynthesis goes on much more rapidly than respiration, consequently more carbon dioxide is required than is released in respiration, and carbon dioxide will be taken from the air and oxygen released. Photosynthesis thus masks respiration if the gas exchange is the means used for recognition.

The two processes are exactly opposites.

Photosynthesis

1. Builds carbohydrates.
2. Stores energy.
3. Takes in CO_2 and H_2O .
4. Releases O_2 .
5. Increases weight.
6. Goes on only in cells with chlorophyll.
7. Goes on only in light.

Respiration

1. Destroys carbohydrates.
2. Releases energy.
3. Releases CO_2 and H_2O .
4. Usually uses O_2 .
5. Decreases weight.
6. Goes on in all cells.
7. Goes on both in light and darkness.

It takes these two processes, working together, to make life possible. The green plants in photosynthesis capture the energy from the sun,

and plants and animals live by utilizing this energy which they release again in respiration. There is no fundamental difference in the respiration of plants and of animals. The misunderstanding is due to a misconception as to the nature of respiration and to ignorance concerning photosynthesis.

It is important that high school pupils should realize the importance of photosynthesis in nature. The misconception concerning respiration and photosynthesis should be corrected since these processes deal with the very nature of life itself.

C. W. LANTZ

A BIRD STUDY PLAN

General Science

Examination of the subject matter of the most commonly used general science texts in Iowa shows the topic of "bird life" to be meager or wholly lacking.

It is true, of course, that physical materials predominate over biological content in the general science textbooks, and merely as the result of the opinions, reinforced by speculation, of those who have established the course content of general science. It may be that this is best. But the fact must be kept clearly in mind that nobody knows whether the present generally accepted selection of materials for the course is best. Those who are interested in the progressive development of such courses cannot allow the subject matter selection to remain as it is without challenging its appropriateness.

Why not encourage the study of bird life in a course which has for one of its objectives, "the acquaintance of pupils with physical and biological environment?" Bird study is also a good medium for the attainment of "worthy use of leisure," an objective set forth by the Commission on the Reorganization of Secondary Education.

Bird life is one of the common forms of animal life in any vicinity. In fact, with the exception of insects, it represents our most common form of animal life. Approximately 600,000 species of animals are known to science. Something like 18,000 kinds of birds alone are found in the

world; about 1200 different kinds are recorded from North America; and of these approximately 350 species occur in Iowa. Not only is the number of species large, but also the number of individuals of each species. Authorities estimate that in the United States there are 3,800,000,000 nesting birds of all kinds. Add to this the numbers of birds that pass through the United States on their migratory journey, and you can readily see what an abundance of an active, graceful, beautiful, and interesting type of animal life we have in our community.

Not only are birds one of our most common forms of animal life but they are also one of the most useful. They perform a most valuable service to man by keeping weeds, insects, and gnawing animals in check. The Chief of the United States Bureau of Entomology has estimated that insects cause an annual loss of more than \$700,000,000 in the United States. A considerable amount of damage is sustained by Iowa farmers through the activities of rodents, as gophers, rats, mice and rabbits. Nature's method for controlling these pests is principally through the agency of birds. Yet not more than one Iowan out of one hundred can identify thirty of our 350 species of birds, and he usually knows even less about their habits.

In recognition of the individual interests and varying capacities of pre-adolescent pupils, certain extra-curricular activities should be offered to supplement the regular class work. Every boy and girl in the class should be urged to undertake a few group or individual problems during the school year. Bird life might be included in these problems because of its appeal to the pupils' interest.

Following are a few brief problems and references that might be used for these extra-curricular activities and which, when completed, could be used for class reports, nature study or science clubs, and assembly programs.

A. How may we become acquainted with our useful and interesting bird neighbors?

1. List common birds of the vicinity which you can identify.
2. Compile a list of birds that are found in your region during the year.

3. What birds are permanent residents of your region? Which are summer residents? Which are winter residents?

4. Try to identify birds by their songs.

B. What special adaptations for living does the bird group possess?

1. Advantages of the shape of the body.

2. Adaptations of birds for flight, perching, food-getting and nest-building.

3. Use of tails.

4. How does the bird's sense of sight and of hearing compare with that of other animals?

5. Purpose of color of birds.

C. In what way is bird life of importance and value to man?

1. In what ways do birds contribute to the enjoyment and happiness of the world?

2. What determines the economic value of birds?

3. Why do birds consume such enormous amounts of food?

4. What birds are the most valuable insect eating ones? Which are the most valuable destroyers of insect pests? Which aid in keeping rodent pests in check? What birds are scavengers?

5. In what ways may some birds be considered harmful to man?

6. Make a special study of hawks and owls. Most people think any hawk is a chicken hawk. Only two hawks are destructive in this state (Cooper's and Sharp shinned). Pupils will find by a study of their food that most hawks are very useful to the farmer.

7. Look up Pennsylvania's experience, when they placed a bounty on hawks and owls. A bounty of 50 cents a head was placed on hawks and owls and in a year and a half \$90,000 had been paid in bounties; but in the meantime rodents had increased to such an extent that \$3,850,000 worth of damage had been done.

D. What are the chief dangers which threaten bird life?

1. Why is the cat considered by most authorities as the greatest enemy of birds?

2. What birds are now being exterminated for the value of their plumage?

3. What are the natural enemies of bird life?
 4. Is the English sparrow harmful to other birds?
 5. What are the perils of migration?
- E. How may our valuable bird life be protected and conserved?
1. Reasons for bird protection.
 2. Methods of protection—by federal government, by state, by the home and in game preserves.
 3. What are the methods and devices used to attract birds about the home?
 4. Prepare feeding stations for school grounds and for the home.
 5. Make bird baths and houses for the home.
 6. Keep feeding stations supplied with food.

A large amount of supplementary material is available.

A. Visual aids.

1. A free bird chart, Church and Dwight, 27 Cedar St., New York City.
2. Set of bird posters with bulletin material on back. Price \$2.50, International Harvester Co., Agricultural Extension Dept., Chicago.
3. Bird leaflets. Five cents each, National Association of Audobon Societies, 1974 Broadway, New York City.
4. Three sets of bird slides, Extension Dept., University of Iowa, Iowa City.
5. Slides for rent, International Harvester Co., Chicago.

B. Bulletins.

1. A Plea for Our Hawks, 5 cents, American Nature Association, Washington, D. C.
2. Summer Birds of an Iowa Farm, Service Bulletin, No. 142, Extension Dept., Iowa State College, Ames.
3. Farmers Bulletin No. 506, Food of Some Well-known Birds. Farmers Bulletin No. 497, Food of Game, Aquatic and Rapacious Birds. Farmers Bulletin No. 1102, Crow in Relation to Agriculture. Farmers Bulletin No. 912, How to Attract Birds in East Central States. Farmers Bulletin No. 493, English Sparrow as a Pest. Farmers Bulletin No. 630, Some

Common Birds Useful to the Farmer.

Farmers Bulletin No. 1456, Homes for Birds.

All free, U. S. Dept. of Agriculture, Washington, D. C.

4. Bird Migration, Bulletin 185, 10 cents, Supt. of Documents, Gov't. Printing Office, Washington, D. C.
 5. State Fish and Game Laws, State Game Warden, Des Moines.
- C. Books.
1. Wild Bird Guests—Baynes.
 2. Handbook of Birds—Chapman.
 3. Handbook of Nature Study—Comstock.
 4. Our Vanishing Wild Life—Hornaday.
 5. The Bird Study Book—Pearson.
 6. Bird Guide—Reed.
 7. Birds in Their Relation to Man—Weed and Dearborn.
 8. Bird Craft—Wright.

WINIFRED GILBERT

PROFESSIONAL GROWTH

Chemistry

An official in a small school system was discussing the requirements for a good teacher. "We prefer teachers," he said, "who will outgrow their position in our school." What greater challenge to professional growth could be offered to a teacher in service? When the routine tasks of class work and paper correcting are over, some will consider the day's work done. And so it is for the unprogressive, tread-mill type of instructor. But for such, his chosen work is merely a job and not a profession. The professionally minded teacher realizes that unremitting, systematic efforts for self improvement must never cease as long as he continues to teach.

Next in importance to the necessity for professional growth are the means available for its accomplishment. A brief study of these would be profitable. Professional reading will rank first. It may be of three types. In reverse order of importance they are, popular scientific articles, "method" articles and books, and articles in professional magazines and books which deal with subject matter.

(To be continued)

R. W. GETCHELL