herds of semi-domesticated reindeer. They were there to escape the heat of the summer in southern Lapland. The herds were not watched either by dogs or by their Lapp owners. No Santa Claus was with the reindeer either. The Lapp civilization is based on a reindeer economy. The Lapps are nomads and with their household possessions follow the annual migration of the reindeer. The Lapps milk the reindeer; make cheese of the milk; eat the reindeer steak which I found delicious; use the skins; and train some of the reindeer to be draught animals. We saw several families of Lapps. They are short of stature; the men average only five feet in height. The men, women, and children wear bright costumes. They are of a dark blue or green and are bound with red, yellow, and green bands on the shoulders, across the chest, down the sleeve, around the hem of the sleeve, and around the hem of the long jacket. The man's cap has a pompom of bright red wool yarn about eight inches in diameter. It is a costume such as this that Linnaeus wears in the portrait of him that is so well known. However the type of hat that Linnaeus wore is not seen on the modern Lapp.

The Seventh International Botanical Congress was a most pleasant and profitable experience for me. It was stimulating to meet botanists from other countries; to see new scenery; to enjoy new experiences, especially the excursion to North Sweden. At your meetings in Elmira today you are not eating reindeer steak or seeing the midnight sun. However may I say that I hope sincerely that the day will be one of pleasure and satisfaction to you. I hope also that when there is an International Congress in your individual scientific interest you will be able to attend and will have a real good time.

Experiment With Biology in a Core Curriculum

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At a recent meeting of the CHICAGO BIOLOGY ROUND TABLE, Dr. Paul R. Pierce talked on the statement of philosophy and aims of the Curriculum Council of the Chicago Public Schools. After indicating how the various groups including lay people will work together on planning the total school program he discussed the importance of biology in the curriculum. Since Dr. Pierce is Assistant Superintendent in charge of Instruction and Guidance in the Chicago Public Schools his ideas are of some interest here in the metropolitan area. He has been active as a leader with organizations and committees. He has been quoted freely by authors of textbooks in education. The purpose of this article is to present some of the results of the research, experimentation and planning in which he and his associates were engaged during the fourteen years he was principal of Wells High School, Chicago.

A CORE CURRICULUM FOR WELLS

Wells, like many high schools, is located in a community with special edu-

* The "Old Fossil" of *Biology Laboratories.*

cational problems. When the high school was established in 1935, Dr. Pierce and his associates decided that the then existing curriculum, on a parity with and similar to many in the United States today, would not entirely meet the needs of the community and its students. They began the task of drafting a curriculum more adapted to the specific abilities, capacities, and probable needs of all the students. The curriculum evolved was composed of certain concurrently taught core learning fields. These consisted of: science, communicative arts, social science, physical education, music and art. Each field covered a several-semester parallel sequence. It is beyond the scope of this article to state how they arrived at this curriculum pattern. We will confine ourselves to the place of biology in the science core learning field in their new curriculum.

Philosophical Implications

It is important, however, that we understand the philosophical implications for the curriculum change. In 1859 the English philosopher, Herbert Spencer, wrote "What Knowledge Is The Most Worth." This work has profoundly influenced the curricula and other phases of education in this country and is still an important factor in many schools. Early in this century Spencer's classification of worth-while knowledge was restated in the Cardinal Principles of Secondary Education. Writers and educators using the "Cardinal Principles" as a bible broke them down still further. The old curriculum at the time Wells was opened was built around this philosophy.

Another method of thinking also exerted its influence. About the time of Spencer, Charles Peirce, William James, and others formed a Metaphysics Club while attending Harvard University. Charles Peirce proposed certain principles of education which were restated by William James in his pragmatic philosophy. Many educators since then have adopted this philosophy to use in schools. John Dewey is an excellent example of one of these educators. The philosophy of today has developed into a functional, unified, workable, educational philosophy. It has for its basis: growth, ideals, interests, and self-control for all children. This pragmatic system reflects the influence of the Wells Curriculum and the writings of Bobbitt, Charters, Fitzpatrick and other recent curriculum specialists.

Science as a Core Learning Field

In the science core learning field a goodly amount of time is reserved for biology. The biology course follows a general introductory science course of two semesters and precedes the physical science. This is the commonly accepted method. The time element is discussed further in the article.

Life Science as a Type of Biology

Life Science is used in some parts of the country in place of biology—it aptly phrases the biology at Wells. The biology is functional and helpful. It is concerned with the student as a person: his emotions, his physical well-being, his interests, and his thoughts. It is a biology for him to live by. It is alive and continuous. *Continuous* because he may study development and its relation to improvement for the future.

It commands the attention of the student because it is practical. It is a take-home type which can be used daily in his association with others. It is coordinate, tangible, and worth while. It is not a biology of the anomalies of the subject no matter how interesting such deviation might appear.

Method of Presentation

The method of presentation is based on action. One action phase is student

projects. These projects are initiated by the students and closely associated with their own lives. An example is cited here. A Wells school grounds beautification project was prepared by the students. The students of the biology classes followed this project from the stages of drafting board plans, planting the area to maintaining the finished project. One can think of many good reasons why such an "action" is feasible. Specifically it develops cooperation between students, maintenance men, and the community. It also motivates study and develops community mindedness.

In another line of action the teacher, when the occasion demanded, loaded her students into a bus and started for the country—a dairy farm. She let the students study firsthand how a glass of milk is synthesized. They could study the production of feed for the milch cows thru to the homogenized finished paper carton product. Again, the formative process of producing a pork chop.

These were but two kinds of action. There were many more kinds as interesting as these. It is very apparent that Dr. Pierce and his associates were firmly convinced that the biology of participation or doing is one of the inherent rights of presentation. It should be employed by the teaching teacher biologist for the benefit of the learning student biologist.

The Wells Curriculum Approach

A committee composed of members from the faculty, student body, parents, and community lay leaders divided the curriculum into seven functional phases. Each core subject field makes its contribution for carrying out these phases. To do this the biology course was composed of total-class "Cooperative Learning Enterprises" and individual "Concurrent Living Enterprises." Since their biology is human welfare, the Learning Enterprises dealt with phases of living, physical welfare. The Concurrent Living Enterprises were those which the student carried on outside of class and reported back to the school.

Some of the Cooperative Learning Enterprises, as aspects of major functions of living, are *Developing the Wells Campus,* as an aspect of the major function, satisfying aesthetic needs, *Keeping and Observing Living Things,* as an element of thinking and communicating ideas, *Taking Scientific Care of One's Body,* as a phase of advancing physical welfare, *Relating Life to Environment* for a number of the functions of living, *Becoming Young Men and Women* for building human relationships, *Utilizing Discoveries in Human Growth and Behavior* for several major functions of living.

Some of the Concurrent Living Enterprises were for individual action, such as *Planning and Eating Wholesome Meals* and *Having Regular Health Checkups.* In guiding these living and learning experiences the teacher enlisted the assistance of lunchroom manager, parents, community physicians and clinic personnel. Dr. Pierce and associates have conducted other experiments with the curriculum. Some of these studies naturally influenced biology. At Wells, with the full knowledge and consent of all accrediting agencies, he put into effect a five-period week for biology. We dyed-in-the-wool biologists would feel as if he was invading our inalienable rights with such action by not having a double laboratory period with seven periods per week devoted to the subject. The Wells staff, however, has reasons in this regard, the most important being that ALL Wells students were receiving biology. They were also being served a wider balanced learning pattern. The thinking is logical. There is no reason why every

subject needs to be semesters long. In the program of the future we can look for at least a part of it to be composed of units of varying length.

In summation it is apparent from the services of workers such as Wells staff members that biology is in good hands. We might point out some of the aspects of this. There is definite need for biological information and knowledge in the curriculum. Every student should receive some biological training. Biology should be presented to the students in such form as is commensurate with students' specific present and future needs, their ages, and needs for better living.

It is up to each of us to be teachers of living biology. Biology does not stay in the curriculum because they print biology textbooks nor because it was in the curriculum last semester. It is there only if we as teachers of biology do such a fine job with the subject that the 'powers that be' recognize that need.

What Should The Biology Teacher Be?

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Teachers of biology are often criticized for being poor teachers. They sometimes criticize themselves for not being as well prepared as they might be on some biology topic. School boards and university officials rank one teacher high — another low. Biology courses taught by some teachers are popular and seem to inspire and educate while courses taught by some others are called unpopular—uninstructive. What makes the difference? What are the qualities that make a good biology teacher? Aside from the general personality factors which make for success in any teaching field, what are the traits and qualifications that make a biology teacher successful? What, for instance, should be his or her college training? Should the emphasis be on subject matter, or on training in education? Should he or she be a BIOLOGY teacher, or a biology TEACHER?

Opinions of educators on that point are many and diverse. To get an estimate of how college biology people feel along this line, a poll was taken of 100 college biology departments and their opinions tabulated. The study was not intended to treat of those general personality traits which make for success in any teaching field, but to consider only the effects of training in biology.

The college training, according to the biology chairmen contacted in our survey, should contain more preparation in biology subjects than in education. The survey revealed that an average of 28.88 semester hours of credit in biological subjects were required of students majoring in biology in the schools polled. In many cases the requirements were stated as five six-hour courses. Several schools reported they required six courses—several listed seven four-hour courses.* Some schools reported on science majors teaching biology. For science majors the credit requirements were 22 semester hours of biology. The minimum reported was 20 hours of biology, and the maximum 64.

The requirements for education courses were a little more than half as much. The average number of required education hours reported was 15.5. The

* Some educators pointed out that it was not only the number of credits gained but also the subjects studied that was important.