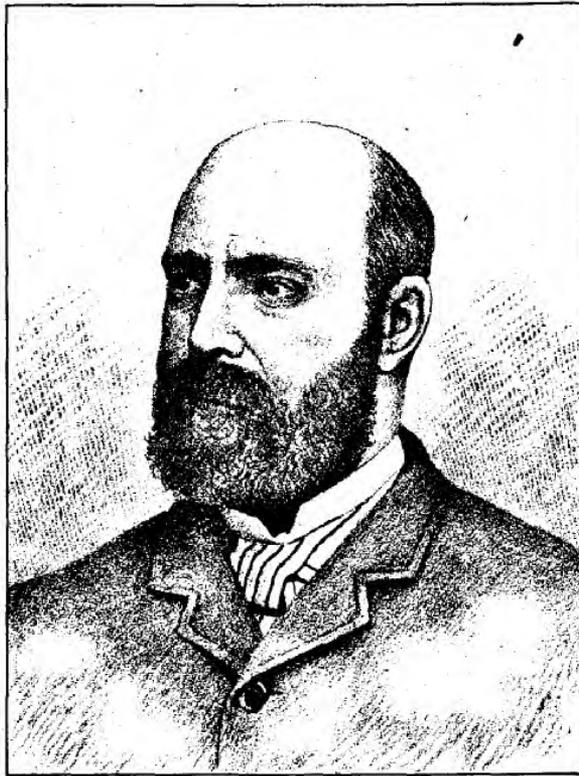


# CHRISTIAN EDUCATOR

A SCHOOL AND HOME MAGAZINE

JUNE



HERR OTTO SALOMON,  
DIRECTOR SLOYD SEMINARY AT NAAS, SWEDEN.

1898

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## SOME CONTRIBUTORS TO THE EDUCATOR FOR 1898-99.

We never felt more confident than now that we can promise our readers an educational magazine of the highest class for the next year. While we can not at present name all of our prominent contributors during the year, we are able to make the following announcements:—

**J. L. Snyder, A. M., Ph. D.,** President of the Michigan Agricultural College, will write from time to time on subjects of special interest to rural teachers and school patrons.

**J. H. Kellogg, M. D.,** Superintendent of the Battle Creek Sanitarium and President of the American Medical Missionary College, will write occasionally on the fundamental principles of philanthropic education.

**Booker T. Washington,** Principal of the Tuskegee Normal and Industrial Institute, will give his views on the importance of a general industrial education.

**Prof. A. T. Jones,** Editor of the *Review and Herald*, will contribute occasionally on general subjects of educational interest.

**H. G. Brownell, C. E.,** Director of the Louisville (Ky.) Manual Training High School, **Prof. A. J. Bristol, Mrs. E. M. F. Long,** and others, will deal with the subject of systematic hand-training.

**A. B. Olsen, M. D., M. S.,** Professor of Physiology and Pathology, American Medical Missionary College, will conduct an illustrated series of scientific studies in Physiology. The work will be intensely interesting and practical. The series begins in this number. (pp. 18-20.)

**A. W. Kelley, Ph. D.,** Professor of Natural Science, Battle Creek College, conducts a similar series of lessons in Elementary Biology, in our "Nature's Laboratory" Department. (Lesson 2 in this number.) **L. Zella Sparks, Critic Teacher, Normal Training-School, Ypsilanti, Mich.,** and **Dr. L. A. Reed, of Jacksonville, Ill.,** will also contribute interesting articles on the study of Nature.

**Col. Francis W. Parker,** the well-known originator of the "Quincy Methods," and Principal of the Chicago Normal School, will continue his interesting occasional contributions.

**G. Bamberger,** Superintendent of the Chicago Jewish Training School, will also continue his excellent articles on manual training and kindred subjects.

**Prof. C. D. Smith, M. S.,** Director of the Experiment Station, Michigan Agricultural College, will give much valuable assistance in conducting our "Farm Department." The intention is to make this of the greatest practical and educational value to all the members of the farm home.

**Mrs. S. M. I. Henry,** National Evangelist of the Woman's Christian Temperance Union, will conduct our "Home School" Department. Her long experience as a home teacher and public worker fitly qualifies her to answer the perplexing questions that often arise in the school and home training of children.

Occasional articles on special phases of moral and Christian education will be received from **President E. A. Sutherland,** and **Prof. Frederick Griggs,** of Battle Creek College; **President W. T. Bland,** Union (Neb.) College; **Principal J. H. Haughey,** South Lancaster (Mass.) Academy; and **Dr. David Paulson,** of the American Medical Missionary College.

Among our leading contributors from foreign lands are **Mrs. E. G. White** (Cooranbung, Australia), Author of "Christian Education," "Steps to Christ," "Gospel Temperance," etc.; **Prof. W. W. Prescott,** London, Eng.; **President J. L. Shaw,** Claremont College, Kenilworth, South Africa; **Principal W. E. Howell,** of the Chinese Training School, Honolulu, H. I.; and **Prof. W. C. Grainger,** Tokio, Japan.

In addition to these contributors and departments, the editor of the EDUCATOR will personally continue the discussion of "The Modern Educational Problem;" "The Mutual Responsibilities of Teacher and Parent;" and the question of "A Christian Educator's Association." The following series will also be editorially conducted: "The Great Educational Reformers;" "Moral and Pedagogical Psychology;" "The Best Correlation of Studies;" and "The Relations of Parochial and Public Schools."

Other topics and contributors will be announced in our September number. See Publishers' Page, last cover.

# THE CHRISTIAN EDUCATOR

An Illustrated Monthly Magazine

Edited by FRANK WILLIAM HOWE.

VOL. II.

JUNE, 1898.

No. '6.

## VACATION TIME.

It has been said that a thoroughly good teacher never can take a vacation — meaning that the work of such a one is always on his mind and heart, and every incident of life in the schoolroom or out has its direct relation to the duties of his calling. It is true that some teachers can never rid themselves of the sense of responsibility. When one year's work is done, they are immediately beset with anxieties concerning the next. But occasional relief from the monotony of care is an absolute necessity for long-continued service. Even locomotives have to be "rested" after an unusually hard run. Machinists affirm that the tough, unfeeling steel must have a period of entire freedom from strain, in order to regain its normal tension. A light hammering, continued indefinitely, will finally crystallize and fracture the strongest bar.

No such comparisons are needed, however, to convince teachers that they need a vacation at this season of the year. The only needful suggestion is, that while the dumb machine rests in entire inaction, the wise teacher finds his rest in a healthful change of occupation. The teacher's natural vacation resort is to the outer world, to the charms and invitations and sweet recompenses of nature. Every one of us who can afford it will immediately take some trip homeward to the old farm; or if home is in the city, we shall flee to the hills and woods and lakes, by railway, steamer, 'cycle, or by slower "foot-pounds" of wearied energy. Witness the perennial popularity of teachers' excursions, camping tours, and the great assemblies. If the now civilized man was ever nomadic, surely the best evidence of it is the instinct to hie away and live in the woods. The one who never feels this migratory yearning has lost the surest hold on life itself.

This resort to nature is the purest, most rational, and wholesomest recreation for teachers, parents, children, and everybody else. The pity of it is that we do not take more of it all the way along throughout the whole year. The conditions of

modern school and family life seem to confine these opportunities to brief intervals, few and far between. Improvement for both and all can come only by keeping close to the conditions that must obtain in the normal human life. Let us learn more and teach more of nature, not as a fad, but as a permanent, fundamental essential in the requirements of a right education.

And now, while the EDUCATOR extends its warmest,—no, its *heartiest* congratulations to all who can take a good, long, restful change of occupation for the summer, we are pleased to announce that the EDUCATOR itself will take a vacation during July and August. This practise is common with educational journals, and with the opportunities it affords, the EDUCATOR expects to become more useful than ever before to all its readers. Our September number may be expected in the latter part of August, and will be of special interest and value to teachers and parents in its adaptation to the opening weeks of another school year.

## NUGGETS.<sup>1</sup>

THE prosperity of a large and populous nation depends: (1) upon the division of the land into small parcels; (2) upon the education of the proprietors of the soil.—*Justin S. Morrill.*

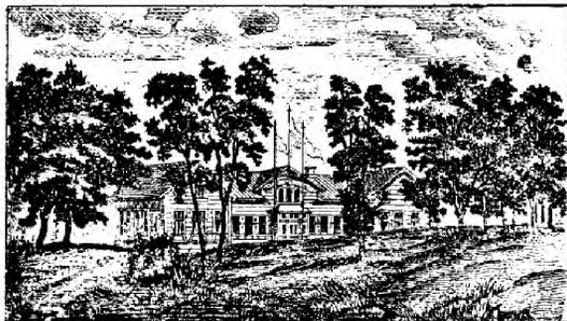
"THE chief end and object in educating the farmer is to teach him to subordinate himself," and all animal and vegetable life around him, to those inexorable laws, moral and physical, the violation of which meets with swift retribution.—*Pres. Joseph R. Williams.*

It will not be doubted that, with reference either to individual or national welfare, agriculture is of primary importance. Institutions for promoting it grow up, supported by the public purse; and to what object can it be dedicated with greater propriety?—*George Washington.*

<sup>1</sup> From the Michigan Agricultural College Calendar.

THE ORIGINAL SLOYD SCHOOL.

The Nääs Normal College is located in the town of that name, about twenty miles northeast of Gothenburg, Sweden. It was founded in 1874 by Herr August Abrahamson, on his own estate. This estate is a very valuable one, which formerly belonged to Christian II, when that part of Sweden



NAAS SLOYDLARARE SEMINARIUM.

still belonged to Denmark. Herr Abrahamson purchased it in 1868, and has greatly improved and beautified it.

The principal building on the estate is Herr Abrahamson's castle. It has the appearance of, and is furnished like, a royal palace, being adorned with many masterpieces of art from home and abroad. It has an immense dining-hall, in which a banquet is given to the students at the close of each term.

The castle stands on a peninsula, and is surrounded by one of the most beautiful private parks in Sweden. Besides adding to nature's liberal hand all that the art of man could do to make the place a veritable paradise of beauty, Herr Abrahamson has caused it to become noted throughout Europe, and quite extensively in other countries, by reason of the educational institution which he has established there.

The sloyd movement began in Sweden in the late '60's. Impressed by the new movement, Herr Abrahamson, in February, 1872, opened a workshop for boys at Nääs, and two years later, another for girls, with his nephew Herr Otto Salomon as director. Seven hours out of ten were given to some kind of sloyd: for boys, wood-sloyd, turning, chip carving, or saddlery; and for girls, weaving, sewing, and cooking. The remaining three hours were devoted to mathematics, drawing, and physiography.

In 1874 Herr Salomon was appointed inspector of sloyd schools for the middle district of Älfsborg län, a position which he still holds. In the same year the demand for sloyd teachers had become so great that a department for training teachers was opened in connection with the boys' and girls' school at Nääs. The course was to last one year, and besides sloyd, was to embrace mathematics, natural science, the Swedish language, drawing, and pedagogy. There were but four students the first year, but as Herr Salomon himself said, "the snowflake was the mother of the avalanche." The attendance increased so rapidly that various buildings for the accommodation of students became a necessity, and commodious dormitories and dining-rooms were added. In the year ending with the spring of 1897, the attendance was very large. Up to that date two thousand six hundred and twenty-seven teachers had taken courses in the school. One thousand nine hundred and fifty-seven of these were Swedes and fifty-three Norwegians. England and Wales sent two hundred and fifty-six, Finland sixty, and the United States forty-six. It is surprising to know that so many nationalities have been represented by students in sloyd at Nääs. Japan, Chile, Italy, Hungary, Iceland, Uruguay, Russia, Switzerland, Spain, Holland, and even Abyssinia, have all sent students to this justly celebrated school.



NAAS.

The liberality of Herr Abrahamson, and the interest which he feels in this line of educational work, has made this a free school, there being no charge for anything except board. Thus all the world is free to study sloyd at the best-equipped school in the world, the only condition being that the instruction there obtained shall be used for the benefit of

children somewhere. The original idea in establishing the school was economical rather than educational. It was a movement for home industries, designed to give the children of the laboring classes a knowledge of, and to instil a love for, manual labor. Herr Salomon, however, was not long satisfied to see hand-work taught for utilitarian purposes only. He thought it should have educational value as well, and in 1877 he paid a visit to Uno Cygnaeus, in Finland, for the purpose of investigating his system and methods. Cygnaeus was the original founder of sloyd, and had obtained his ideas of education from the writings of Froebel

a strong effort to unite the sloyd and folk schools. As a result, sloyd is now taught in the sixteen hundred elementary schools of Sweden.

One thing became clear at once: teachers must be provided. So in 1878 he instituted six-weeks' vacation courses for the special benefit of the teachers of the district of which he was inspector, at the same time continuing the regular twelve-months' courses. In 1882 a radical change was made. The twelve-months' courses were entirely discontinued, and the short courses were thrown open, first to all Sweden, and eventually to teachers from abroad. Thus, from a small beginning,



FIRST-YEAR SLOYD MODELS.

and Pestalozzi. From the time of Herr Salomon's visit in 1877 to the death of Cygnaeus, in 1888, they kept up a constant correspondence and interchange of ideas.

Herr Salomon subjected all kinds of manual work taught in the schools to certain educational tests, and became satisfied that no material was so well adapted to the purpose of formative education as wood. Since then all other material has been abandoned in favor of wood, and Herr Salomon has bent his energies in the direction of perfecting a system of wood-work based on scientific principles. Instead of employing artisans, as in the beginning, to teach children trades, he became convinced that only teachers could make sloyd a successful educational agency, and he therefore determined to make

for the benefit of the children on a single estate, this school has gradually enlarged until its reputation and influence have become world-wide.

Four six-weeks' courses are given each year, two in summer and two in winter, for the purpose of giving teachers from all countries an opportunity to obtain sufficient knowledge of this important branch of education to utilize it in connection with their regular school work.

The general principles of sloyd are summed up by Herr Salomon in the following words:—

Sloyd is a system of educational hand-work. Why do we not call it carpentry? Because it is different in several essential features. Carpentry is a trade, and the principles which underlie it are entirely utilitarian, whereas sloyd is solely a means of formative education. Its purpose is not to turn out carpenters, but to develop

the mental, moral, and physical powers of children. It cultivates manual dexterity, self-reliance, accuracy, carefulness, patience, perseverance, and especially does it train the faculty of attention, and develop the power of concentration. Sloyd, properly taught, will be found to supply an educational value not furnished by the subjects usually taught in the schools, and in that sense we regard its introduction as necessary.

For the accomplishment of these ends, several sets of graded models have been prepared, certain fixed principles being kept in view in their preparation.

1. The models must be useful from the child's standpoint.

2. The work should not involve fatiguing preparatory exercises.

3. The work must afford variety.

4. Children must be capable of doing the work themselves.

5. The work must be real work, not a pretense at it.

6. The object made should become the property of the child.

On this last point I give Herr Salomon's own words:—

The child desires the object, and loves possession of the results of its own work. From an economical and social point of view it might be all very well to sell it. It has been argued that since the wood is not the child's, the child should not have it; to which it may be answered: Since the labor and skill expended on the production of the article are the child's, the school should not have it. Those who pose as defenders of the child's morals in this respect are mostly those who have an interest in the appropriation of the models. The adults at Nääs are always very proud to take possession of their models at the end of their courses, to pack them with care, and bear them away as treasures to their homes in other lands. And if this be the case with adults, is it not reasonable to suppose that this sentiment is intensified in children? And will not the knowledge that they are to become the happy possessors of the results of their own labor, give greater zest in every way to their endeavors, and thus assist in making them love the work more?

Herr Salomon's interests are not narrowed to the single subject of sloyd. His three or four lectures a day in several languages demonstrate his famili-

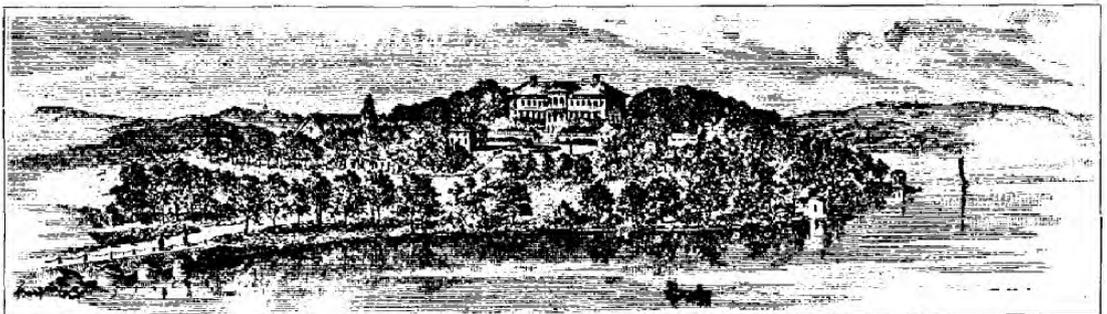
arity with general educational literature. He has edited and translated a series of educational classics, and by travel and correspondence keeps in close touch with the educational world. Nääs has the best sloyd school in the world; but that is not all. It is the place where professors and teachers of all degrees and nationalities delight to meet for mutual interchange of ideas. Yet modestly Herr Solomon says of his own work, "The same moment that I find myself unable to make a further advance, to give my cause the benefit of new ideas, I should think it right at once to retire, and let another take my place." Mrs. E. M. F. LONG.

SINCE the foregoing article was written, intelligence has been received of the recent death of Herr Abrahamson, at the advanced age of more than eighty years. More than half these years were unselfishly spent in the interests of education.

It was after the death of his beloved young wife, who was a renowned singer, that he devoted himself to the work which in recent years has made him famous and been of such lasting benefit to the world at large. The cause of education is everywhere greatly indebted to August Abrahamson; and it is gratifying to know that he who gave the industrial line of work such efficient aid in what may be called its pioneer days, when the opposition to that branch of education was so great that he was constrained to give the children money in order to interest them in it, could also witness its remarkable advance in more recent years.

In his own country he received many honors. He was appointed commander of the first body of Vasa- and Nord-stjärneordnarnes, and was an honorary member of the Agricultural Academy. He also received many marks of distinction from societies in other countries.

Herr August Abrahamson will be missed and mourned by people of many nationalities who have shared the benefits of his school, and the hospitalities of his home. He was interred in a beautiful place on his own estate. E. M. F. L.



WHAT IS EDUCATION? <sup>1</sup>

THE future university will be different than the present. It has a crude beginning, perhaps; but it is a beautiful beginning. Suppose we have, instead of books, when we enter it, kitchen work, scrubbing floors, washing dishes, etc. Now suppose we had some rules for doing that, and also an examination: "What is a spoon? What is a knife? What is cooking?" The rules are all given, and you learn them, and say them in school! That is about what we are doing now. If you should learn such rules, and commence saying them over to show that you can cook, who would hire you? No one. Thank God, the prevailing education has not entered this region of living so much as into that of early life. The greatest saying upon the subject of education that has been made in this age was made by a Michigan man,— "Education is not a preparation for life; it *is* life." Education is not something that brings you a treasure from afar off. The treasure is right close at hand. It is what you work out each day.

What is the ideal recitation? Why, the ideal recitation is this,— a little community who are trying to help each other with all their might and main, and the highest ideal of doing in that hour or minute is to help all the rest. Now for the new plan, as I understand it. A young man or woman comes in and wants an education. He is put at work, not at books, at first. You find out what he can do, how he can work, how helpful he is, how trustworthy he is, how skilful he is, how striving he is in his work, how persistent, in all that makes up success. Now this is done step by step, and every step is a step of practical work, doing something; and when you do anything well and thoroughly, that means that you are called to do something higher. And so on, step by step. There is a demand for you to study; study is not left out. The trouble with the study of books is that it comes first, when you don't feel the need of it. But if you go to work, and proceed step by step, you help some one. What a chance there is for sympathy in such a school as this! Think of putting all the universities of this country on the solution of the problem of helping the sick, the dying, and the vicious. Think what ministers we should have if they would understand that this is education, and do this work instead of going about with stiff chokers and solemn looks. But I have no word of irreverence to say; I am only speaking of this vital thing. There is now the best spirit

that I have ever found, or ever seen, shaped in a crude form, but which may be an outline toward the highest education in the future university. The hunger for knowledge comes through the doing of a thing — the skilful doing of a thing — after this comes the hunger for knowledge. Otherwise you will not hunger, but you simply do it in order to get your mark and your promotion. And without your mark you don't know where you are. But when you are washing dishes or scrubbing a floor or waiting upon the table, you know where you are at without the marks.

Now I want to lay down a fundamental doctrine. You are only educated by work, and that work must have an end and aim,— a work in which you feel in your soul that there is something higher that you are striving for. The other method is vague, and indefinite, and you feel it is a loss of time when you are complying with the demands of the school; you do it in a far-off way, and think to yourself, "Some day I will be great and strong, if I study away through the long years of school life."—"To-day, if you will hear his voice." "Now is the accepted time." That is the great doctrine.

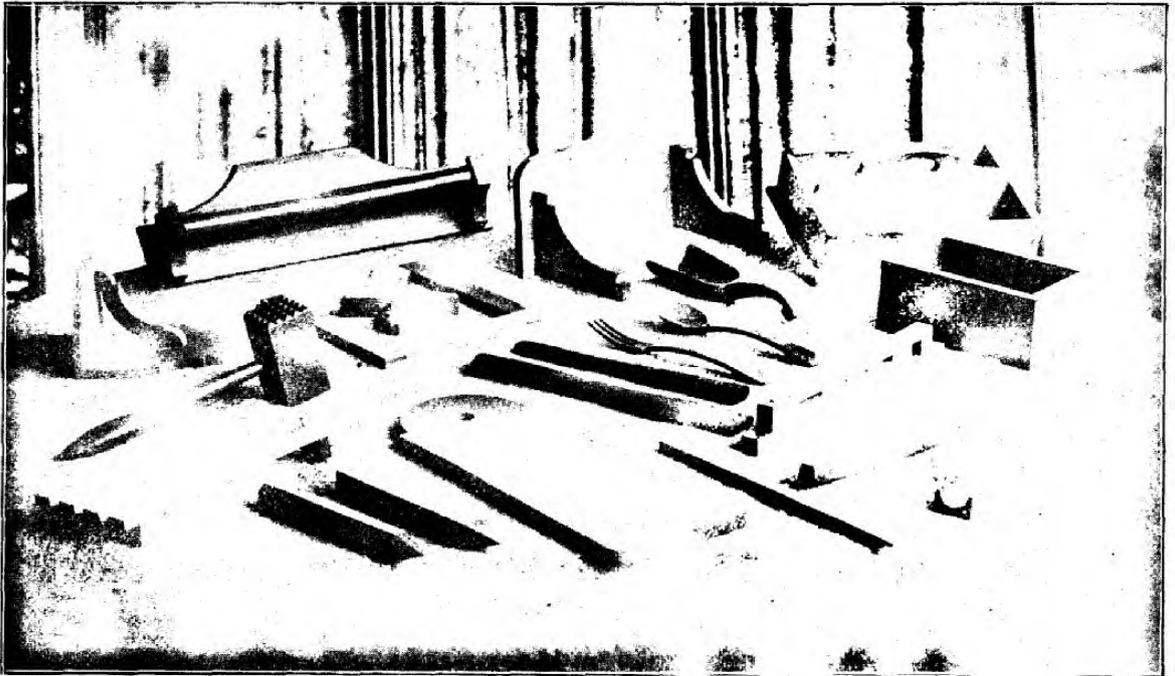
I must begin farther back. There is a great abyss between the school and the home to-day. The mother does n't know what the child is doing in school unless he brings home a mark, a mark that tells exactly what he has done. Education should be such that the mother would know just what the child is doing without a mark. A good girl, when she comes home from school, will not go into the parlor and play on the piano, and leave the floors unscrubbed and the beds unmade. When children are educated aright at school, they will make home a beautiful place.

Now if I had a farm and a college, as you have here, I would put them together so close that you would n't know one from the other. Work makes you, and the good it does is the brain and thought you put into your work. The ordinary person will plow through the fields and never have a thought beyond; but that is not education. I want to say here that my five years' work on a farm was better than all the rest of my education; — the little that I got; — it was better than that obtained in any university; for I learned to work and think. I taught school twenty years before I knew that the work I did, with my hands, was of any use in education. Is not that a chasm wide and deep between the old education and the new? Every bit of work that you do well, skilfully, with your heart in it, that is education, and the more brain and thought you put into it, the more education

<sup>1</sup> A lecture before the students of Battle Creek College. Concluded from the May EDUCATOR.

there is in it. When you are holding the plow,—or riding it, as I think they do now,—you come upon a question of great importance: “What is the soil?” “How is it ground up?” “How was it brought here?” “Whose work do you see all around you?”—The work of the infinite God, working through nature. Then you must come to the river-work, in grinding up the soil, making it finer, and bringing it from the upper part of the river-basin, and spreading it out over the farm. One fifth of all the people of the world live on the products of land made by rivers. Touch a particle of soil, touch anything in this world, and, if thou

plants and the other mysteries of life: the same questions arise in regard to all of them. Here is the anatomy and the physiology of the cell, and the differentiation of species, and so on until you come to infinity again. Then you come to the animals, you can study all of them on the farm. Then when you get into the schoolroom you should have a teacher who knows all about the farm, and who has studied these things, and as he explains them to you, the farm is made glorious by the study in the school. You see I am now thinking about the ideal college—the college that has got to come, if people have common sense. Every one



SOME SECOND-YEAR SLOYD MODELS.

thinkest, it leads thee to the Infinite, the never-ending One.

Then there is the question of moisture, and what it does for crops and for the soil. Then comes the question of the water-table, of capillary attraction, of the marvel of life, and of the production of the particles of soil, the chemical problem of the wonderful growth of plants, the coming of the rain, of the clouds, and of the everlasting movement of all things in the economy of God's laws. “But stop,” says one, “that is not education.” O, it is “*Arma virumque cano*,”—that is education! I may not pronounce it correctly,—perhaps I have not,—and it has made a great difference in my life. [Laughter.]

Then there is the problem of the leaves and the

is at work in such a school. There is an infinity of questions in science which, in any university in this world, can be best studied on the farm. Thank God that you were born on the farm, and raised on a farm, if that is the case. Education—as it was—has made boys and girls think that there was nothing for them on the farm; and so they leave the farm and congest in the great cities, and become “counter-jumpers,” and wear high collars. It is better to be farmers, by quite a good deal, than to be some teachers; but the day is coming when these farms are going to be glorified with taste and beauty, because the farmers are there to do it.

Now I do not believe that every one should be trained to be a farmer; he should be trained to

search and find his own vocation, as I have said, but this goes into it, and thus he will make a better doctor, minister, or lawyer. I can not conceive of a good minister, on such a morning as this, in these days, preaching anything else but the glory of God in this great resurrection time of the spring. The heart of the man who is close to nature is the heart that is close to God, and he will feel the beautifying influence of that life.

I would also have in this model school a manual training department, where boys and girls learn to work with their hands; not that they are going to be cabinet-makers, etc.; but to be trained to the use of every group of muscles, as they do in this gymnasium over the way. Now suppose you can have a training in which every group of muscles can be used for the best purpose, and then a *product* that comes out of that sort of knowledge; that is what the world needs. And it is surely coming.

Finally, the greatest question of all the ages is the question of education. There is no other question. The world once had such an education as we have now—a medieval education. It was an education into subjects, to be subject to the king, to the hierarchy, etc. That was a peculiar kind of education, and there was one class left out of that education, and that was the highest. I can illustrate it in this way: Think of Kaiser Wilhelm—the Emperor William—entering a schoolroom like this and talking in this way, in English: “My pupils, I want you to study everything that is good, and everything that will exalt you, and the greatest question that I have to study is the good of the German empire. Now I want you to study the question of class. Is it right to have this condition of classes and titles? Is it right to keep society stratified? I want you to study the question also whether I am God’s anointed or not. I want you to study also all these political questions that make up the good of all. These are the questions we are going to have studied in our school.” Suppose the Emperor William should make such a speech as that,—an earthquake would be nothing to what would follow! I want you to see this point. The German people have gone farthest of any people in the study of education, but they have stopped; the tree was truncated, cut off near the ground. They stopped because they could not tell the children that they were to be highest. And the great Herbartian system teaches that children should be trained in the same classes; that they would be discontented in going from one class to another. This is the secret. The education

that almost dominates this country is an education projected from the Old World. We have an education of subjects; how to get you to study without thinking has been the great problem—how to get you to investigate truth without investigating.

And what has been the trouble? The trouble has been that there has been an honest doubt in regard to the ability of the subject, a lack of faith in the ability of the people to be citizens, and to govern themselves. To-day Europe would like to see us go down, because we are trying the experiment of a free government. Now what does a free government mean? Allow each individual—each personality possessing a soul—to be led by belief of truth, and the doing of truth, into the highest of human happiness. That is faith. Faith is a universal need—faith in God and man, faith in the possibilities of man’s development. There is a sort of faith in the idea of democracy, but faith is lacking in the divinity of childhood,—and sometimes in teachers.

The day, then, is coming,—the dawning of the day has come,—when a new and better education is to be introduced—not an education into subjects, but into citizens. Liberty is to be the watchword as it has been in all the past—liberty for each person to find freedom, and that freedom means perfect obedience to God.

“Rejoice, O young man, in thy youth!” Rejoice, O young woman; for there is an opportunity coming for thee, grand and beautiful, to work out that which was begun in thee by the Father,—to work out that work which has been represented in every cause of freedom in the past. O young man, God is with thee if thou wilt put thy heart on the one question of helping mankind. Put love into thy work. Work steadily for others, and for their good, and thou wilt be led by the same One who came to us in the valley of Bethlehem. He will come to us every day of our lives—and every hour—if we put our souls into this great problem of education. In the college, then, and in the school, let us work out this great problem; and there is no better place on earth for doing this than in this place, where you have made such marked advances in real, genuine education.

FRANCIS W. PARKER.

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JUST so soon and so far as we pour into all our schools the songs, poems, and literature of mercy toward the lower creatures, just so soon and so far shall we reach the roots not only of cruelty but of crime.—*George T. Angell.*

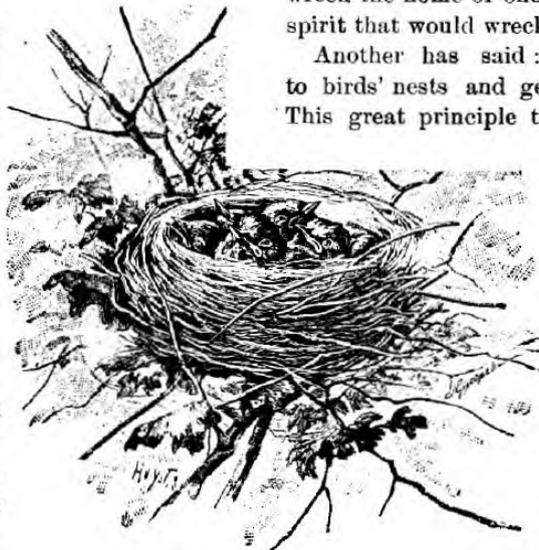
## TEACHERS AND SONG-BIRDS.



IN a report of the Smithsonian Institute, it is stated that "civilized man is sweeping the wild birds off the face of the earth at such a rate that before long hardly any species of feathered creatures will survive except those that are domesticated." The Massachusetts Audubon Society reports: "Of late years, the destruction of bird life has increased to an alarming rate. So great is this destruction that the existence of a number of our most useful species is seriously threatened."

"The objections to this wanton and cruel destruction of bird life are not sentimental only. If continued, it will soon not only deprive us of one of the most attractive features of rural life, but will surely work a vast amount of harm to the farmers by removing one of the most efficient checks on the increase of insects." The second annual report of the New York Zoological Society (1898) says: "Unless man is willing to accept a place in the list of predatory animals which have no other thought than the wolfish instinct to slay every living species save their own, he is bound by the unwritten laws of civilization to protect from annihilation the beasts and birds that still beautify the earth, and still make it interesting. The only way to save our birds and mammals from annihilation is to arouse an active national sentiment in favor of their preservation."

Laws are in force in many States for the protection of birds. Various societies are distributing literature in an attempt to form public opinion in this matter; but it is the school-teachers of this country who must undertake to build a national sentiment against the destruction of bird life, by bringing the question everywhere before the rising generation. Not only can the teacher form in the minds of the children, sentiment that will bear fruit in their future life, but, especially with boys, this sentiment can be made to bring forth good results at once.



Mr. W. T. Hornaday, director of the New York Zoological Park, writes: "The persecution of our birds during their nesting season by egg collectors, and by boys generally, has become so universal as to demand immediate and special attention."

Mr. J. Warren Jacobs, Waynesburg, Pa., says: "Numbers of boys from seven to twelve years of age continually rob the birds that nest in the town and its immediate vicinity. Many simply upset the nests and break the eggs; others throw eggs at each other, while some choose to blow the eggs and keep them in cigar boxes. One father brought his son — who was a 'rare collector' — to my place, to 'strike a deal' for the sale of three cigar boxes full of eggs — the fruits of the boy's season's work."

The majority of boys are not wilfully cruel; the desire to "collect" something, and to "kill something," are only perverted forms of legitimate activities, which only the teacher and parent can direct aright. By nature studies, by encouraging the observation and study of birds, a sentiment will be created in their favor. The child will learn to love the birds, and when the facts are everywhere understood, there is little doubt but that this wanton destruction will cease.

This subject is one that has a very important bearing on the formation of character. The Rev. Wm. Day writes: "A man who would wantonly, and with ruthless hand, destroy a bird's nest, and wreck the home of one of God's creatures, has the spirit that would wreck any home."

Another has said: "Men can not be cruel to birds' nests and gentle to children's cradles." This great principle that every Christian teacher and parent will recognize applies, of course, not alone to birds, but to every living creature.

"He prayeth best who loveth  
best  
All things, both great and  
small;  
For the dear God who loveth  
us,  
He made and loveth all."

While the destruction of the eggs and young of our song birds is a considerable



cause of their decrease, the greatest cause is doubtless the use of their skins and feathers for millinery purposes; and among our schoolgirls—the women of the next generation—there is a magnificent field for the teacher to do missionary work in this matter. It is perhaps hardly realized what awful devastation this demand for all kinds of birds' skins is causing.

A United States senator writes as follows in the *Boston Advertiser*: "It is said that England exports more than 25,000,000 dead birds every year, and that their skins and feathers are made into articles to adorn women. In all Europe 300,000,000 birds are sacrificed every year for this purpose. In Chicago one dealer receives in a single season 32,000,000 humming-birds and 300,000 other birds of different varieties, or their wings. Some people call the objection to all this 'mere sentiment.' So is the objection to murdering children a sentiment."

The use of the aigrette, so commonly worn, is a marked instance of an evil that should be restrained before too late. It is obtained from the egret or snowy heron. It is developed only in the female bird, and is retained only during the breeding season. Chapman, in his "Birds of Eastern North America" says: "The curse of beauty has numbered the days of this, the most dainty and peaceful of herons. Twenty years ago it was abundant in the South. Now it is the rarest of its family. The delicate aigrettes which it donned as its nuptial dress were its death warrant. Women demanded from the bird its wedding plumes, and man supplied the demand. The Florida herons have gone, and now he is pursuing the helpless birds to the uttermost parts of the earth. Mercilessly they are shot down at their roosts or nest-

ing grounds, the coveted feathers are stripped from their backs, the carcasses are left to rot, while the young in the nests above are starving."

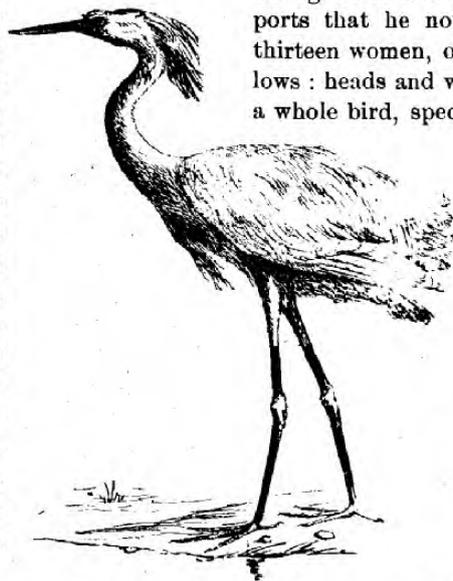
Many ladies wear a number of these aigrettes or spires in their hats, and each means the destruction of a mother heron, and probably the death by slow starvation of her young ones. An ornithologist riding in a Madison Avenue (New York) car reports that he noted there were in it at one time thirteen women, of whom eleven wore birds, as follows: heads and wings of three European starlings; a whole bird, species unknown, of foreign origin; seven warblers, representing four different species; a large tern; some heads and wings of three shore finches; one half of a gallinule; a small sea swallow; a blue turtle-dove; a vireo, and a yellow breasted chat; and the usual array of ostrich plumes *à la mode*."

"One of the strangest anomalies of modern civilization," says W. T. Hornaday, "is the spectacle of the modern woman—the refined, the tender-hearted, the merciful and compassionate—suddenly transformed into a creature heedlessly destructive of bird life, and in practice as bloodthirsty as the most sanguinary birds of prey."

Those who are identified with this destruction of bird life must be educated away from it. The pulpit, the press, the law, societies for the protection of birds, may do much; but it is to the educators of the coming man and woman, especially to the teachers of our schools, that this divine mission of touching the hearts and minds of the generation which will be shortly stepping into our place, has been delegated; and influence exerted in this direction can not but be in the truest sense a work for God and humanity.

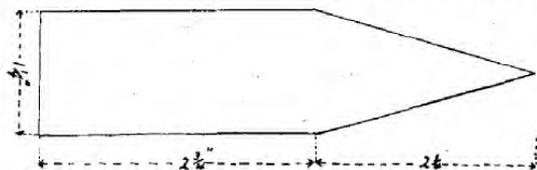
WALTER K. JAMES.

[The attention of teachers is directed to some "Suggestions for Bird-study" on page 15, by the writer of this article.—Ed.]



## EDUCATIONAL HAND-WORK.—NO. 2.

ANY line of work that is to be educational must be in accord with the laws of mind development. Prominent among these is that of self-activity; so in what shall be suggested in this article, it should be constantly borne in mind that in every way the children are to be encouraged to think, in order that their work with the knife may be the outgrowth of their own thought, and not merely an attempt to do something required of them. As far as possible let them suggest things to be made. Of course, in many cases they will suggest too difficult tasks; for they will be guided by only one principle of education; viz., interest. This is a very important one, however, and for lack of proper attention to it, many a teacher has failed, although

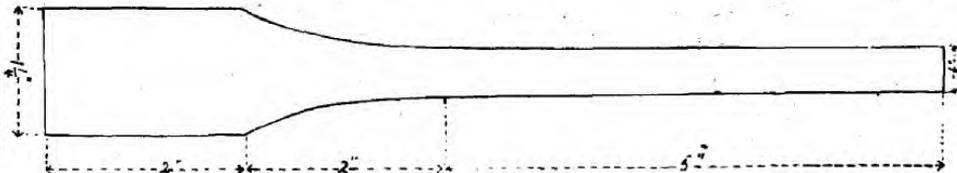


following quite closely rules evolved from other important principles of correct teaching.

In the accompanying illustrations will be found suggestions for useful models that will require sufficient repetition of the straight-line exercise described last month.

In accordance with the Scripture principle of "here a little and there a little," it is necessary to make haste slowly, bringing into each new exercise a repetition of what has just been done, with enough that is new to sustain the interest. It requires tact so to vary an exercise that a reasonable degree of skill shall be acquired in whittling to a straight line, and yet maintain the interest; especially is this true of younger pupils.

In all mechanical work, it is necessary to have a definite conception of what is to be produced, and nothing will be more effectual in securing this than to make a drawing of each model. First, let the children estimate the various dimensions of the finished piece that you have already made. If circumstances will permit, let them next measure it. Having now discovered the dimensions, let each one, with the



model in full view, make a free-hand drawing, using neither straight-edge nor rule. The dimensions should be indicated as in these cuts.

For the benefit of those who have never had instruction along these lines, I may suggest that it would be well to have the children make a light short line where they think the four sides of a rectangle would come. Through these lines, let them next draw light lines forming the rectangle, which will in turn form the basis of the complete drawing. The outline of the figure to be cut should now be marked over, making a heavy line. The children will be eager to see how near to measurement they have made their drawings.

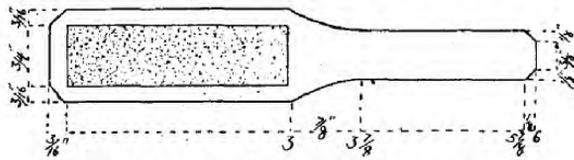
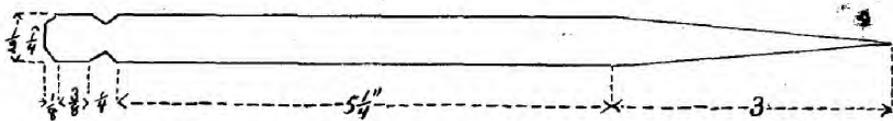
From the free-hand drawing a mechanical drawing or working-drawing, should be made. As it is quite a difficult task for beginners to manipulate the T-square and triangles of the draftsman, and these would be an additional expense, very satisfactory results can be obtained by using an unruled pad of convenient size. The horizontal lines may be made parallel with the lower edge, and the vertical ones with the left-hand edge. The teacher can draw from the pupils that it will be necessary to measure in two places only for each line, and will of course require them to decide where on the sheet the drawing shall be. Since these drawings are actual size, it will not be necessary to have the measurements indicated; but each should be numbered (in the upper right-hand corner), with the name of the thing neatly written or printed directly above the number, and the pupil's name in the lower right-hand corner. These will serve as a record of the pupil's advancement.

The material used should be of basswood or soft pine one-half inch thick. In case this is not easily obtained, a good substitute can be had in the thin packing-boxes of any grocery.

In all woodwork it is best to have a true face and edge, known as working-face and joint edge, from which to make all measurements and tests; and as far as possible let the work with the knife be in accordance with correct mechanical usage.

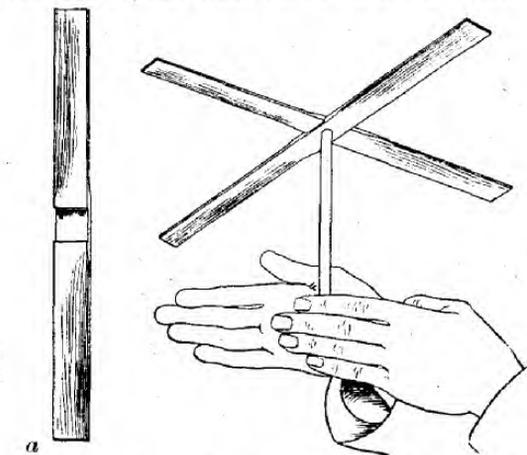
Have the pupils select as a working-face the one nearer true, marking it with an X, known as a "witness mark."

After whittling the first edge straight and square with this face, it too should be marked in the same manner. By the rule and try-square the remainder of the outline can be marked in pencil, and then the whittling will follow. In making measurements where more than one are in the same line, as in the length of any of these drawings, the liability of error is lessened by marking them all without moving the rule.



The third and fourth drawings illustrate work that will give variety enough to sustain interest in the process, as well as interest in the finished product, an end to be continually sought. The dotted space in the fourth is to have glued upon it with liquid glue a piece of fine sandpaper. This will be found very convenient to use in the schoolroom, for keeping the lead-pencil sharp for work where a fine point is needed, as in drawing.

As a suggestion of something that will interest a boy, and at the same time require quite accurate work to make it successful, we have included a drawing of this little aerial machine. After the



two parts, like *a*, have been whittied out and joined at right angles, nail with a square brad or tack into the end of a round stick about the size of a new lead-pencil,—a pencil itself will do. It can be started by rolling the pencil between the hands. Perhaps some child will devise a means of making

it rise higher by using a string, as with a top. Have the children study out which way it should be whirled to make it rise. Even in toys there are many opportunities for leading the young mind to make observations in the line of scientific investigation.

A. J. BRISTOL.

SEWING-SCHOOLS.

In April, 1893, a conference of sewing-school workers was held at New York, which demonstrated the need of a permanent organization to bring together the various agencies for teaching sewing. This led to the formation, in the autumn of the same year, of what is now known as the New York Association of Sewing-Schools.

The aim of the association, as set forth in the second article of its constitution, is "to act as a center of information for sewing-schools, and to formulate and carry out such plans, and arrange for such meetings and classes, as may be deemed advisable for the future development of the work." It was also voted that the association be "non-sectarian, and not represent any particular systems of sewing;" but its object should be to put within the reach of its members information concerning new methods and theories, and enable them to study these by means of conferences, exhibitions, and whatever other agencies might best serve the purpose. Any school or association that teaches sewing may become a member of this association by the annual payment of one dollar.

In May, 1895, an exhibition of sewing was held at the Hotel Waldorf, in New York City, when there was a most interesting display, and success outran expectation; and it was determined that in the spring of 1897 a larger and more complete exhibition should be held. Through the Department of State at Washington the diplomatic and consular representatives of the United States in Europe were requested to invite the governments to which they were accredited to participate in this exhibition. This invitation was responded to by thirty-one schools under the direction of the school board of London, by the public schools of Geneva and Zurich, the public schools of Stockholm, the professional schools of Brussels and Ghent, the government schools of Honolulu, and those of Japan.

The exhibition was held in the American Art

Galle~~tes~~, and included, besides the foreign exhibits mentioned, a great many from various parts of the United States, showing work done in a large variety of schools. In nearly every case those who had had the work in charge in the different schools were present with their displays, to participate in the conferences which were held.

To say it was an enthusiastic gathering but imperfectly expresses the facts. The very air was full of enthusiasm. In the impulse that has come to manual training during the past few years, there has been a new realization of the importance of sewing, so that in addition to the practical home and commercial value of needlework, its great educational value is beginning to be appreciated. The subjects under discussion were, "Sewing in Church Schools and Institutes," "Sewing in Public Schools," and "Sewing in Training and Technical Schools." The spirit of helpfulness was felt everywhere, and it seemed to be the aim of all concerned to uplift this department of manual training, and especially to emphasize it as an educational factor. It was the universal opinion of those present that children connected with schools where sewing is taught are broader-minded, and, withal, if they pass through the entire course laid out in this department, they gain a knowledge so practical that it will serve them as bread-winners; and that, instead of drifting into shops as clerks, or into hotels as waitresses, or positions of a similar kind, they are able to have a business of their own. While the result arrived at in the school is intellectual ability along with hand training, yet it can be made in the end to serve a practical purpose.

But, in order to teach this subject, a special training and adaptability is needed, the same as in any other line of teaching. To be an expert seamstress is but one of the many qualifications necessary as an equipment for teaching this line of work. One should be acquainted with the different kinds of weaving, and understand the construction of the different looms, be able to take a piece of the raw material and trace it through the different processes through which it has to pass in order to come out a finished piece of cloth.

Again, courses in sewing should have for their aim the development of character in the child. Special attention should be given to child study and psychology, so that the mental need of the individual child shall be known. The power of attention, temperament, physical condition, home influence, and the manual ability of each pupil, must be considered in order to guide the teacher in her work. It should be the study of the teacher

to give a broad outlook to the subject of sewing, developing taste and an appreciation of the truly beautiful in a healthful covering of the body, and in the decoration of the home. Discussions with the children on new stitches, the manufacture of textiles, cost of materials, and kindred subjects, will be found to develop in the child the ability to express his ideas, as well as to widen his interests, and give him a better appreciation of work and workers.

MRS. H. BELLE BRISTOL.

[During the coming school year the EDUCATOR will present a connected series of illustrated lessons on industrial sewing. These will be addressed to teachers and mothers, and designed to give practical help in developing the educational and domestic value of this important line of hand work.—ED.]

#### HOUSEKEEPER'S ALPHABET.

- A**NTS—Scatter branches of sweet fern where they congregate.
- B**rooms—Hang in cellar-way to keep pliant and soft.
- C**offee—Keep securely covered, as its odor affects other articles.
- D**ish of hot water in oven prevents cake from scorching.
- E**conomize time, health, and means, and you will never beg.
- F**lour—Keep cool, dry, and closely covered.
- G**lass—Clean with tablespoonful of ammonia in quart of rain-water.
- H**erbs—Gather on a dry day when beginning to blossom. Keep in paper sack.
- I**nk stains—Immediately saturate with milk; rub vigorously with a cloth.
- J**ars—To prevent, remember it takes two to make a quarrel.
- Keep an account of your expenditures and income.
- L**ove lightens labor.
- M**oney—Count change when you receive it.
- N**utmegs—Always grate blossom end first.
- O**ranges keep best wrapped in soft paper.
- P**arsnips are best in March and April. Keep in ground till spring.
- Q**uicksilver and white of egg destroys bed-bugs.
- R**ice should be large, plump, and white. Old rice may have insects.
- S**calds and light burns—Dress with white of egg.
- T**able napkins should never be starched.
- Use a cement of ashes, salt, and water for cracks in stove.
- V**ariety is the best culinary spice.
- W**atch your back yard for dirt and bones.
- X**antippe was a scold; don't imitate her.
- Y**outh is best preserved by cheerfulness.
- Z**inc-lined or iron sinks are better than wooden ones.

## "SUMMER SCHOOLS."

THIS is the busy season on the farm. Everything is hurried; work must go on early and late; father, mother, hired men, and all the children who are old enough, must put forth every effort to save and market the season's bounties. The farmer's busiest period comes in the "long vacation" of the schools. And the farmer who depends upon the help of sons and daughters in this busy season sometimes expects too much at the start.

Farmers and other manual workers are often inclined to regard school work as mere play. They do not understand how a boy or girl can come fresh from school and still be tired and lacking in energy. They forget, if they ever learned, that brain fatigue is much more enervating than mere physical labor. Allowance must always be made for recuperation from the ills of school life. I use "ills" advisedly, for there are many things to be regretted in the common course of school education. Notwithstanding our modern devotion to science study, the teaching of physiology and hygiene in all the public schools, the popularity of athletics and calisthenics, and notwithstanding the fact that our popular education is often unjustly made the object of crankish assaults from every quarter, it still remains too true that in the schools young men and women are ruined for practical life—sometimes.

It is not the place here to prescribe a thorough-going cure for all these ills. In matters of such magnitude, improvements always come slowly. But farmers, as the most numerous class of interested patrons and supporters of the schools, can do much to influence their improvement. The boys and girls of the farm should bring the discipline and advantages of school training into the service of the home. Education is not a failure to the farmer whose sons and daughters take earnest and intelligent hold upon the problems of the farm home. But the interest must be mutual. The practical things that should be learned at school will never flourish on the farm unless there is a favoring soil and atmosphere. Instead of roundly criticizing the schools, the farmer must himself be able to teach the schoolman—or at least the schoolma'am—what is needed. He must conduct a continuous home university on his own estate. His school-trained sons and daughters may be

professors and instructors in it, but he must have the wisdom to manage and direct it into the development of the highest form of home education.

The summer vacation is the time to inaugurate the annual sessions of this home university. Every day should give work to the mind as well as body. There is no good reason why study should close with the school year, nor why bodily labor should stop with its beginning. Our schools would all be better if manual training were made an integral part of the whole year's work; our homes would all be better if intellectual training were blended with every form of manual occupation; our homes, schools, society,—the whole world, would be immeasurably better if mental and manual training were so systematically interrelated and adjusted that their total co-ordinated influence should be to develop and enrich the fullest reach of our moral nature.

Let us have a summer school that shall expand into a genuine home university, embracing in its affiliations the farm, the school, the city home, the teacher, parent, children,—everybody whose purpose is self-improvement the whole year round.

FRANK WILLIAM HOWE.

[The EDUCATOR offers itself as the official organ of such a "home university." Any who feel like encouraging a movement in this direction are invited to read the proposition on page 28 for "A Christian Educator's Association," and then send us their word of advice and fellowship.—ED.]

## A HOME-MADE HORSE-POWER.

MANY farmers go through a daily round of mere mechanical drudgery that often creates a distaste in the feelings of their children for the farm life as a whole. Putting brains into the work and utilizing everything to the best advantage, always keeps the interest fresh and growing. Here is the way one farmer in Tracy, O., put brains and interest into his work:—

I took an old mower that I had thrown aside, took off cutter-bar and attachments, removed one drive-wheel, bored a hole through thrashing-floor of barn same size as spindle, and edged up the machine on four-inch blocks, keying up spindle underneath the floor to hold machine from "lifting up," and securely braced the frame laterally.

I then fastened an eight-foot sweep securely to the remaining wheel, the "master-wheel," to hitch to. Removed the crank-wheel and attached a home-made tumbling-rod to crank-shaft, and also to pulley-shaft,

having an eight-inch home-made belt pulley attached; I thus had a one-horse-power complete.

I attached an extra frame to one side of the feed-cutter to afford fastenings for a belt pulley. Took an old four-inch drill cog-wheel and fastened on shaft bearing a four-inch belt pulley, and secured this to frame of cutter, adjusting so that cog-wheel on pulley-shaft meshed nicely with cog-wheel on cutter-shaft (having removed the large cog-wheel and crank used for hand-power). An old six-inch thrasher belt, which had been thrown aside, completed the rig.

I can now cut as much fodder in two hours, with one horse, as I could cut by hand in one day.

### A SIMPLE AQUARIUM.

A LEAFLET for the use of public-school teachers, recently issued by the Cornell University college of agriculture, gives directions for the making of an aquarium. The writer says:—



“An aquarium with living, moving insects in it is a very interesting ornament for the window-sill of a schoolroom. A glass candy jar or even a butter jar may be transformed into such an aquarium thus: First put into the jar a layer of sand about two inches deep; in this sand plant some small water weeds, and then add a layer of gravel or pebbles; then nearly fill the jar with rain-water, pouring it in carefully, so as not to disturb the plants.

The plants will keep the water in a right condition for the water insects to live in; more water should be added from time to time to replace that which evaporates. In such an aquarium place any insects found in water, and watch their habits.”

We commend this plan of observation and study to the members of our Farm Home University, and would be glad to hear from any who try it.

### A CHICKEN PROTECTOR.

PROBABLY many of our boys and girls on the farm have seen small chickens run over, knocked about, or severely pecked by grown fowls while feeding. In every flock there are one or more outcasts that are kept from ever getting their proper share of the common meal. Perhaps it has never occurred to the farm boy that there is any way to prevent this except to stand guard and “shoo” the big hens away from the little ones. A writer in the *Agricultural Epitomist* suggests a better way.

The handy thing we have in mind, and which we use now, or rather several of them, is a slat frame four feet high and four feet square, with the bottom slat up three or four inches from the ground, which enables the young chickens to pass in and out freely, while it successfully precludes the grown fowls. Within the slatted frames we place all food and water for the young chickens, and inside they eat and drink in peace.

Where there are chickens of different ages, the bottom slats may be placed at different heights from the ground, so that the larger young chickens may be shut out from the little pens where the youngest chickens are fed.

These little feed frames are the very handiest things in the chicken business. They save work and worry and give food and satisfaction to the little chickens.

THE great interest manifested by our readers in the “Spray Calendar” noticed in this column last month, leads us to reprint the paragraph in this number. The calendar is published by the Horticultural Division of Cornell Agricultural Experiment Station, and the *EDUCATOR* is authorized to send it free to any parent or teacher requesting it. It gives the full formulæ for making all the spray mixtures needed for the apple, apricot, bean, beet, blackberry, cabbage, cauliflower, carnation, celery, cherry, chrysanthemums, cranberry, cucumber, currant, dewberry, eggplant, gooseberry, grape, hollyhock, nectarine, nursery stock, peach, pear, plum, potato, quince, raspberry, rose, strawberry, squash, tomato, and violet. The illustration below is copied from the calendar, and shows how the solutions may be applied. Send at once to the *EDUCATOR* for the “Spray Calendar.”



## SUGGESTIONS FOR BIRD-STUDY.

1. It is well to get children to make daily notes regarding the birds in the neighborhood. These may be either entered in a "commonplace book," or sent in weekly in the form of a written exercise.

2. The teacher who is interested in the study of birds will be able to give the children some definite nature study in this subject quite frequently.

3. Each child or group of children may take some special duty in watching the habits of the birds. These will vary with the season,— the nesting time, the migratory season, the winter, etc.

4. Practical kindness to birds may be shown at certain seasons of the year, as in the feeding of the birds in the winter, or the building of bird-houses in the spring.

5. In teaching about the birds, colored plates are preferable to bird skins or stuffed specimens, for ordinary school work, except in or near cities where there is a natural history museum containing good specimens.

W. K. JAMES.

## SOME FOOD FOR SCIENTIFIC THOUGHT.

THE teacher who weaves personal observation and independent thought into his daily work, is the one to whom the world looks for all real advancement, and it is to encourage this class of public benefactors that the following suggestive queries are introduced. Some of the questions are simple, and intended only to call out thought from such as are just entering the field of physics, while others present problems, upon which we would be pleased to receive, at any time, the best thoughts and suggestions of any who may have experienced difficulty along these lines. To many of these questions, answers are given in our text-books; but are you personally satisfied with these answers? In this issue we present only a few items, as suggestive questions, expecting in future numbers to introduce more of this class of work, and also a full discussion of the general underlying principles that are involved in these questions. We have, in this introduction, confined the list entirely to the field of solar light and heat, selecting but a few of the queries that arise therein.

1. How can a heat ray, as such, reach us, after having spent nearly eight minutes, in its journey of

some 93,000,000 miles from the sun, surrounded by a temperature of at least — 200° F. ?

2. If heat, as such, comes directly from the sun why are the tops of our highest mountains covered with snow, while at the same time tropical fruits grow in abundance in the valleys below ?

3. What relation does solar heat bear to solar light ?

4. At which end of the solar spectrum do we find the greater number of heat rays ?

5. Why is this so ?

6. Why is the umbra of a sun-spot dark ?

7. How do you harmonize the answer usually given to this question with the nebular hypothesis ?

8. Is there an obvious reason for the electrical disturbances so noticeable during the presence of sun spots ?

9. How do you account for the fact that in the light obtained from the candle, the gas-jet, and the burning of wood, coal, etc., there is a scarcity of the blue, indigo, and violet rays; while in the electric light these rays are found to be present in greater numbers ?

10. Why is the rising full moon, in the summer season, of a deep orange color, while in the zenith it gives a more nearly white reflection ?

[By request of the editor, the foregoing introduction and questions have been contributed by one who is deeply interested in advanced scientific investigation. To some the questions may appear easy, perhaps to others somewhat obscure; probably few teachers would undertake to answer the whole list off-hand. Yet these questions involve subjects that are daily taught in our public schools. The EDUCATOR takes this occasion to promise a full discussion of them (beginning in September), and at the same time invites answers to these questions from any who are interested. The best answers will be published, either by themselves or as parts of a general symposium on the whole subject.— ED.]

## THE ECONOMY OF NATURE.

MAUPERTUIS, a mathematician of the seventeenth century, has made what may be regarded, when rightly considered, one of the most important contributions to modern science. Adopting the theological dogma that God, being unerringly wise, wastes no energy, and that everything in nature must therefore be done with perfect economy of force, he assumed that all natural phenomena, considered mathematically, would be seen to demonstrate the universal application of this law. This theological dogma has come to be known in mechanics as the principle of least action, or the law

of least time; but it is not generally explained clearly in our text-books on physics. Without passing judgment upon it as a dogma,—the truth of which is affirmed by every enlightened conception of God,—some illustrations may be offered of its application in the phenomena of light.

It is a well-known fact in physics that when light passes from one medium of given density, as air, into another medium of different density, as water, its rays are bent or refracted at the point where it leaves the one medium to enter the other. A simple experiment will make this clear, and also furnish an illustration for some further deductions. Construct a rectangular box, having one side of glass. Now, throw a slender beam of light  $S$  (Fig. 1) over the edge of the box and along the glass side. Mark the point  $A$  where it falls upon the bottom of the box. Next, fill the box with water, clouding the water slightly with a few drops of an alcoholic solution of mastic, or a little milk. You will now see that the ray of light passes in a straight line to the point  $C$ , where it touches the water. At the point  $C$  it bends, and then through the water passes in a perfectly straight line to the point  $B$ . The path of the beam in the air, and the path of the beam within the water, are straight lines, but the beam is bent down, or refracted, from the water surface. Why is light so bent, or refracted?

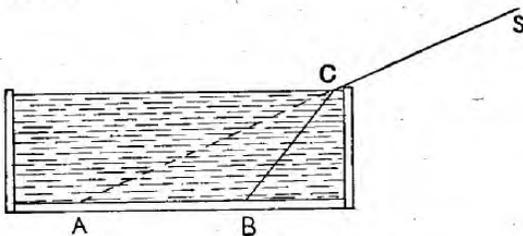


FIG. 1.

Careful experiments have proved that the velocity of light is less in a dense than in a rare medium. Light travels more rapidly in air than in water, since air is less dense than water. Remembering that the velocity of light in air and in water is different, we may get a fairly clear idea of why light is refracted without entering into the mathematical discussion of the matter, though it is only by mathematics that we can prove what I shall here state.

If a man were to travel over uniform ground, from a point  $A$  to a point  $B$  (see Fig. 2), in the

least possible time, his path should be a straight line joining the two points. If, however,  $A$  is on smooth and level ground, where he can run with a velocity of eight miles an hour, while  $B$  is on plowed ground, where his speed can not exceed six miles per

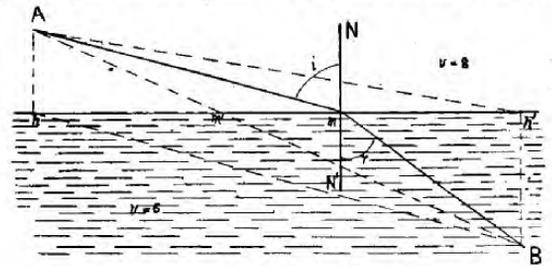


FIG. 2.

hour, the boundary between the two surfaces being  $hm'm'h'$ , then his path must be differently chosen.

By selecting some path  $AmB$  (a bent line), the total distance traveled is greater than  $Am'B$  (the straight line joining the two points); but a larger fraction of it is over the smooth ground, where the velocity is greater. By choosing the point  $m$  to the right of  $m'$ , an advantage in time is gained, notwithstanding the greater distance. But if  $m$  is chosen too far to the right, as at  $h'$ , the increase in the total distance will be too great, even though a larger part of it is over smooth ground. The point  $m$  should be so chosen that the runner is refracted at the boundary, as light is refracted in passing from one medium to another.

Now, let us reconsider what we have observed. The velocity of light is less in the denser medium; hence, light can travel more rapidly in air than in water. Then, in order to pass to a point  $B$  in water with perfect economy of force, the light must not move in a straight line  $Am'B$ , because of its greater retardation in passing so far through the water. But the ray passes as far through the air as the law of the conservation of energy will allow, or to the point  $m$ , and then bends and passes directly to the point  $B$ . Any point  $B$  in the water thus receives the rays of light in the least possible time in which the light can possibly pass to them from  $A$ . There is but one path which light in passing from one medium to another can take and economize force, and that one path light does take. By any other path it would waste time, and hence energy. What a delicate arrangement is this! There are ten thousand paths which chance might give to light, but only one which perfect Wisdom could give it. Shall I be censured then if I affirm that perfect Wisdom gave light this path?

Jacksonville, Ill.

L. A. REED.

Conducted by MRS. S. M. I. HENRY.

## OUR BOYS AND GIRLS.

*Question.*<sup>1</sup>—What shall we do with our boys and girls during vacation?

*Answer.*—Vacation should be hailed by the home folks as an opportunity for becoming acquainted. Every day should be considered precious, for as things go these days, the children have small chance to learn to understand their parents; and parents to discover what is folded up in the child-nature. Outward manifestations can never be more than an index to the inward life, and to confine one's self to the study of an index would be to remain unenlightened as to the treatment of any subject discussed in the book. During the school year, the larger part of his time, and the more serious work of the child's life, is outside the home.

Vacation must be a busy time, and this fact should only contribute to the end which is desired. The children should work. Real physical labor is the very best tonic for the entire being, wearied as it often is by school life. Children as a rule come out of the school year with a sense of exhaustion which makes work seem cruel. The idea of rest is uppermost, and to many rest means idleness, fun, frolic, lying around in hammocks, and reading the lightest of literature. This is the world's view of the case, and our children are in danger of becoming inoculated with it; especially if in its schools they meet the world as it is. They can, however, soon be led to know from experience that the most delicious rest results from a simple change to physical, instead of mental, labor. If the work of house and field be permeated with the right spirit, they will find it better than "fun," especially if each child has been regarded as a part of the home business concern, and realizes that his efforts count practically, not only toward his own education, but toward the prosperity of the family.

Everything should be so arranged that all will work together. There should be frequent excursions together into some of nature's haunts. I like that word "together," as it comes in so strong in 1 Cor. 3:9. Since God himself employed it in speaking of his people and himself, it all the more clearly illustrates what should be between us and our children. "We are laborers together;" that means at the same time, on the same job, for the

same purpose, each to do his part for the success of the whole, to share in all the responsibilities and burdens, losses and gains.

According to his age and strength, the child should take from the shoulders of father and mother the burdens which must by and by naturally come to him. To shift a load from shoulder to shoulder once in a while will bring rest to each. One can often rest better in taking up the burden which another has grown so weary of carrying that he must lay it down. Let the sixteen-year-old boy manage the farm. Let a daily or weekly home council for the discussion of all plans be held, and let the boy learn the value of father's experience by having a chance to develop any original ideas which may be latent within him, as well as learn to honor his leaders by having his position as manager respected. If he manifests an arbitrary spirit, such as lays him open to the charge of "big-headedness," all the more is there reason that he should be given the opportunity to learn what is involved in management. Put the housekeeping into the hands of the ten-year old girl, subject to the same conditions, while father and mother for the time being withdraw into the background.

It is not beneath the dignity of the college boy to put on a sweeping cap and apron (have the apron divided so that each half can be tied around the leg), and with broom and dust-pan go over the house and thoroughly renovate it once a week, while mother rests from the broom by taking up the duster. It will also be a good thing for the big strong "lumbering fellow" to learn to handle said duster, and to have practise in the gentler muscular exercise of arranging the pretty things in parlor and chamber.

Let the "student" of the family have the most active life during vacation. Set the dull scholar, who did not "pass," to teaching a home school for an hour two or three times a week. Let the musician give lessons in the use of voice and instrument. Study together, and apply "science in the kitchen," and while the family sewing is being done, talk to each other about that glorious clothing-upon with Christ and his righteousness, which is the covering of his saints. Let every growing thing illustrate how we are in all things to grow up into our living Head, and the reaping time point to the moral which the headstrong boy and girl may need most of all to learn.

<sup>1</sup> See note on this Department inside first cover.

Conducted by A. B. OLSEN, M. D., M. S.

## WHAT IS PHYSIOLOGY? WHY SHOULD WE STUDY IT?

It is quite impossible in one article to give anything like a complete introduction to the almost boundless science of physiology; hence, we shall content ourselves with a rather fragmentary discussion of the subject. First we shall attempt to present some of the subject-matter embraced in this branch of nature study, and also show its relation to some of the other biological sciences. Then we shall consider the second question, and endeavor to explain the great importance of the study of physiology, in affording the necessary knowledge for comprehending the laws of life, which are the laws of God.

These laws, although often lightly spoken of, and ignored by the multitude, are of sacred importance, and should receive our careful attention. It is the will of the Creator that man should take ample time to study this wonderful body, and the various laws that regulate it, and such study, properly conducted, will always elevate and ennoble the mind, and bring us into a better appreciation, not only of the laws of our physical being, but also of those that bring us into communion with a spiritual God.

In order to begin the study, it will be necessary to understand the meaning of certain terms that will be frequently used. Biology—derived from Greek *bios*, life, and *logos*, discourse—is the science which deals with living things. The study of biology includes both animal and plant life. All living things belong to either one or the other of the two kingdoms, animal and vegetable, and these two approach each other so closely that there is really no sharp line of demarcation to separate them; they finally meet, like two lines that are not exactly parallel. The lowest forms of animal life shade gradually and imperceptibly into the lowest of vegetable organisms.

The study of life involves a knowledge of structure as well as of function. Indeed, it is impossible

to comprehend thoroughly the action of any organ without understanding its structure. Thus we have two branches of biology,—Anatomy, or the study of form and structure, and Physiology, the study of the actions and properties of the body. In order to see the finer structure of any organism, it is necessary to use a microscope. This instrument enlarges or magnifies objects, so that the invisible becomes visible. Such study is called microscopical anatomy, or Histology. Anatomy also embraces Embryology, which is a study of the primary development or growth of an organism.

Physiology literally means a study of nature, and to the ancient Greeks it included both biology and physics. Since then the term has been narrowed, and now has to do with vital phenomena only. It attempts to explain the varied activities of life, and the uses of the different organs for physical and mental ends. While anatomy has to do with a lifeless body and dead tissues, physiology is pre-eminently the science of life, of living beings. This readily explains why anatomy is comparatively an exact science, and has, by the aid of modern microscopical and chemical methods, reached a remarkable degree of perfection; while physiology is only well started on its course, and has yet many fields to explore. Physiology is emphatically still in an evolutionary stage, and might well be compared “to

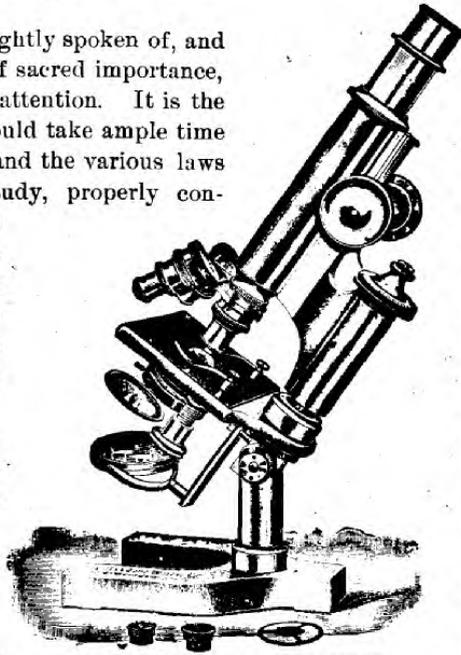


FIG. 1.—COMPOUND MICROSCOPE.

a living, growing plant, with some stout and useful branches, well raised into the light, others but part grown, and many still represented by unfolded buds.” Physiology will always be progressing, and will never be perfect nor complete.

For these reasons many of the problems of life still remain unsolved, and this gives rise to almost numberless theories and hypotheses. Varied explanations of different phenomena are offered, and these become confusing, the student often being led farther from the truth, rather than toward it.

This should teach us the importance of a thorough knowledge of the form and structure, the connections, and the mode of growth, of the organism, and hence, of making anatomy the basis of all physiological research. It is indeed the true foundation of physiology.

But while we avoid the snares and pitfalls of the theorist, we must not altogether abandon speculative and original thought. Leaving one extreme, let us beware of following another, and thus narrowing our study and crippling our work. If we can shun the useless and absurd, we shall do well.

Physiology may be concerned with either animal or vegetable life. Again, it may pertain to man or to the lower animals. We shall study human physiology chiefly.

There is scarcely a more fascinating subject for thought and study than that of life. No one has yet been able to tell definitely what life is. It is invisible; no one has seen life. But the varied and numerous manifestations of life are readily observed, and furnish an inexhaustible supply of food for thought and meditation. Life is the result of continual changes. Activity is the sign of life, and without activity no life exists. When action ceases, death follows. These changes, which every part of the body is continually undergoing, are called metabolic processes, or metabolism. There are two kinds, — constructive, or those which build up the tissue elements, repair tissue-waste, and provide energy; and destructive, or those which break down tissue and liberate energy. Thus the body is constantly undergoing change; new elements are introduced to replace those that are worn out and dead. Food serves the purpose of building up and restoring the organs of the body. It enters into, and becomes a part of, the living substance.

The body is made up of organs, such as the skin, brain, liver, etc.; these again are formed from tissues, such as connective tissue, muscle, nerves, etc., and these are composed of cells. A cell may be defined as a minute mass of protoplasm. This term is derived from Greek *protos*, first, and *plasso*, form, and really means first, or primary, living substance. It is essential to life; for without protoplasm no life could exist. It is a very complex albuminous substance, through which life is manifested.

Each cell is a living element, then, which possesses all the necessary functions of life. The human body is made up of countless millions of delicate microscopic elements, and when all these cells are properly nourished, and work together in harmony, we have a state of being called health.

As one author expresses it, health is ease, and ill-health is disease.

But in order to maintain this harmony, it is necessary to observe the laws of our bodies, which have been ordained by the Creator. These important laws are simple and easily comprehended, yet often neglected or deliberately disobeyed, and as a direct result, disease is multiplied and death hastened. Dr. Schofield, in his book on "How to Keep Healthy," gives the following unique classification of

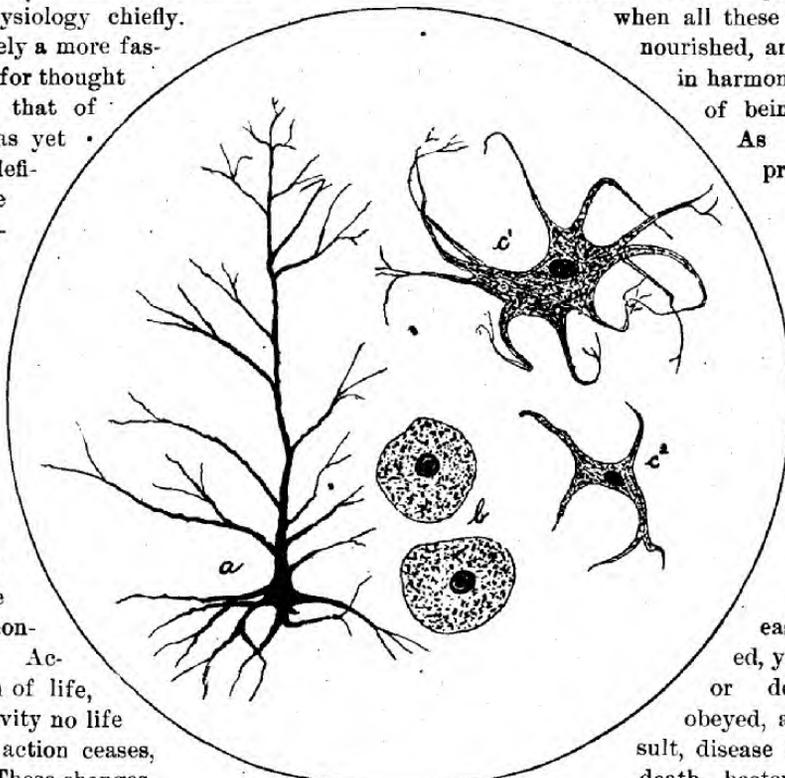


FIG. 2.—NERVE-CELLS.  
a, from cerebrum (brain); b, from a ganglion;  
c1, c2, large and small cells from spinal  
cord. Magnified 96 diameters.

some of the causes of death: —

- Most fatal.....Willful neglect.
- Fatal.....Carelessness.
- Less fatal.....Ignorance.
- Least fatal.....Superstition and quackery.

Thus we see that, according to this author, willful neglect heads the list. This may not be altogether true, yet it is a matter of common observation that people do not put into practise all the knowledge at their command; in other words, they know better than they do.

Although simple, the laws of life are varied, and will bear close investigation and study. Among

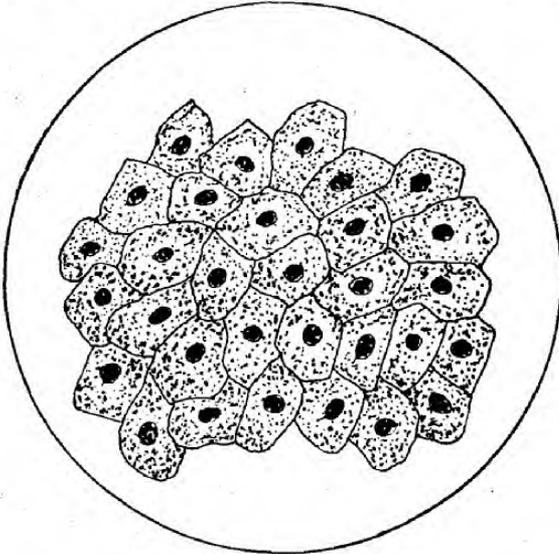


FIG. 3.—SQUAMOUS EPITHELIUM.  
From the skin of a frog, viewed from the surface.  
Magnified 450 diameters.

these laws are those which relate to heredity, predisposition, vital resistance, immunity, etc. All the numerous actions of the organs are regulated, by natural laws, and when these are followed, we have the most favorable conditions for life. Our environment should receive careful attention; and not less important is the care of our bodies in all

its detail and minutia. All these, and much more, are embraced in the study of physiology.

As already indicated, physiology of necessity requires a good knowledge of anatomy, and so in studying an organ or some part of the body, we shall first tell about its structure, and how it is built up, and then proceed to discuss its functions, and the laws governing their healthy action. Physiology also goes further, and overlaps the domain of Hygiene. This is a French term, and might be defined as the science of health. It is derived from the Greek *hygies*, healthy.

In studying physiology, simple experiments will be used as a means for correct observation. The best knowledge, that which is most valuable from a practical standpoint, is obtained chiefly by obser-

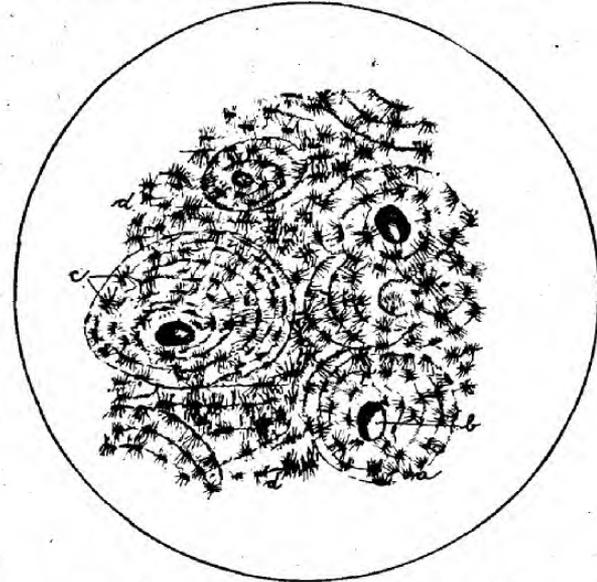


FIG. 5.—TRANSVERSE SECTION OF COMPACT HUMAN BONE.  
a, concentric lamellæ forming a Haversian system; b, Haversian canal; c, lacunæ, or spaces in which the bone cells lie; d, interstitial lamellæ. Magnified 96 diameters.

vation. That which our eyes have seen and our hands have handled is best comprehended and best remembered.

In the succeeding articles in this department of the EDUCATOR, each lesson will be followed by suggestions and explanations for a few practical and easily performed experiments, and these will be found not only interesting, but also instructive. Questions to bring out the most important facts will accompany each lesson; but these will be merely suggestive, and by no means exhaustive.

The writer invites all readers of the EDUCATOR, teachers, parents, or students, to engage personally in these studies. It is intended to make them of the highest practical value in the school and home.

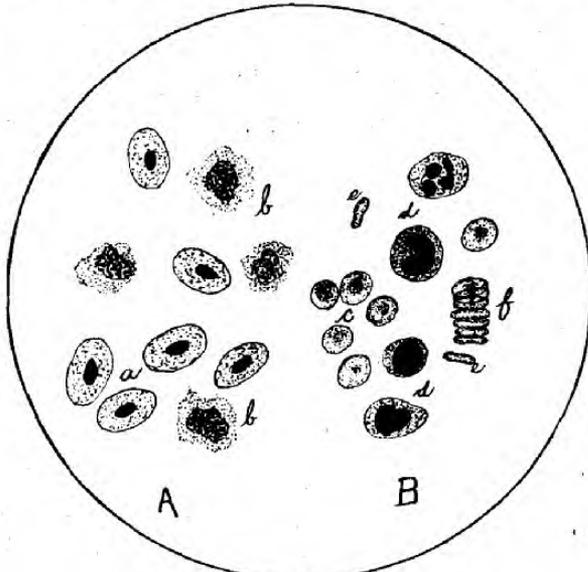


FIG. 4.—BLOOD CELLS.

A, from the blood of a frog: a, red blood cells; b, white blood cells; B, from human blood: c, red blood cells; d, white blood cells, or leucocytes; e, red blood cells seen on edge, dumb-bell shape; f, rouleau of red blood cells (coin-pile arrangement).  
Magnified 450 diameters.

## THE VALUE OF PROFESSIONAL STUDY.

MUCH has been said and written on this important subject. What is offered in these articles should be understood in the sense that "professional study" includes not only the interests of teachers, but of parents as well. Parents and teachers, regarded as fellow students of child-culture, have certain mutual advantages to be gained in studying together the best conceptions and methods of child-training in the home and in the school.

There is a science, as well as an art, of teaching that must be carefully studied by teacher and parent. Doubtless the art of teaching was first developed; but the art of one generation, recorded, criticized, and modified, becomes the science of the next. Experience is not only a dear teacher, but the only teacher. Mere theories never teach until they have been approved or condemned by experience. No one, and especially the educator of youth, can disregard or ignore the value of educational experience. Such experience is the foundation of educational science, and the study of it is the study of the science of teaching.

The advantages of such study have been set forth by a well-known educational writer as follows:—

The science of teaching gives,—

1. The power of prevision and revision.
2. The ability to invent and reconstruct.
3. Inspiration and versatility.
4. A shorter transit from cause to effect.
5. The inward satisfaction of working in the light.

The value of these results can be made apparent to parents as well as teachers by a simple, popular exposition. Prevision is foresight, revision is "hindsight." It has been said that "foresight is better than hindsight;" but foresight is impossible without the hindsight. The man or woman who can not sum up the present facts of an accomplished process, and discern therein the essential factors that made it a success or a failure, can not see the probable results of any new course of action. Herein it is that science, being a study of experience,— or perhaps better, the results of such study,— enables us to draw out and systematize the principles that underlie and govern in all orderly action. We are all continually, it may be

unconsciously, making deductions of this kind from our own experience and observation. The practical value of them depends upon the accuracy of the observations, and the number of decisive cases. "Science" is simply the technical name for the classified, systematic statement of conclusions from experience. Strictly speaking, science is a statement of things *known*, not of theories and conjectures.

Invention is the practical side of prevision, as reconstruction is of revision. The teacher or parent whose knowledge — science — of certain facts as the products of certain causes, has given him a clear insight into all the essential elements of a given case, learns how to use means to ends, how to apply new solvents to old problems, new cloth to old patterns.

Above all other persons the parent and teacher needs inspiration and versatility,— the deep earnestness of one engaged in eternal tasks, and the quick alertness to turn a ready front to every new difficulty. The parent and teacher who is not himself inspired, can not inspire children to the highest ideals of life. And equally the parent and teacher who can not adapt himself with instant readiness to the peculiar needs of every child, lacks the versatility required in his profession. Nothing gives this inspiration and versatility but a thorough acquaintance with educational science.

This is the age of quick returns. React against it as we may, we can not stay the world's hurry. Short cuts in education are at a premium; the real educator's problem is to make the cuts *deep* enough to last. We can not merge the ocean of wisdom and the ocean of ignorance except through a channel that cuts at least to the high-water mark. Short cuts are the graves, or trophies, of a laudable effort to economize time and energy. As never before we need to learn how to shorten the transit from cause to effect. The times demand a wiser economy of educational agencies. Old plans must give way to new conditions, old ideals may survive only by investing themselves in the vigor of new conceptions. Only the true science of education can give certainty of view and feeling in the midst of latter-day tentations. And among the very foremost requirements of the "new higher education" is the recognition of the individuality of the child, his freedom from the shackles of scholastic inheritance,

his instruction in the care of the body, the training of his highest moral powers, and the mutual responsibility of parents and teachers in the working out of his character and destiny. These are themes that must have a fuller and most careful consideration.

The teacher and parent who are earnestly engaged in such a co-operative study of the science of education can never become fixed and tenoned in the groove of custom. The feeling of fellowship in a great work, the greatest among men, is an inspiration that transcends all passing chagrins and defeats, and lifts teaching, teacher, and taught, into the realm of the highest. And with this intelligent, sympathetic collaboration, the present time offers the grandest prospect of reaching the best development of educational possibilities that the race has ever seen.

FRANK WILLIAM HOWE.

[This article is the second of an EDUCATOR series designed to be of equal interest and value to both teachers and parents.]

### EDUCATION FOR THE BLIND.

FOR over one hundred years, different men in the land have been studying and planning ways and means for the aid and advancement of blind people. Many schools have been established, the first of which was in Liverpool, England, about one hundred years ago. Some workshops also have been established, where only blind people are employed. Much has been done for improving the condition of the blind by the British and Foreign Blind Association. Mr. Armitage was the founder of this association, and appropriated large sums of money from his own property to prosecute its various lines of work. The object of the association is to develop ideas of progress in the education and employment of the blind.

By printing books and tracts in literature and music, the association aims to further the literary and musical development of blind people. It seeks to publish works of only the highest value in art, literature, and music, because publications for the blind are necessarily very expensive, and their circulation quite limited. In order to reduce the cost of these to the blind, this association seeks to secure large funds donated by interested individuals and societies, and invests these sums at good rates of interest, using the interest thus obtained to reduce the cost of books, music, and other publications.

The association also interests the public in various parts of the world, and especially in England, to contribute large sums of money to be used in estab-

lishing "Loan Libraries," in the large cities. But its philanthropy is not limited merely to the intellectual interests of the blind; in all its work, wherever blind people may be employed in the compiling, printing, or distribution of these publications, they are given the preference.

There is a similar organization of ladies, who work as an auxiliary to this association, and who seek in every way to patronize, encourage, and advertise the ability of blind workmen, and the character of shops, stores, etc., conducted by them.

There is another society working toward the same end, known as the Blind Tea Company. They establish agents all over the United Kingdom, to sell tea, coffee, spices, and other salable articles. Here again, only blind people are employed; and this association gives very encouraging reports from their agents.—*A. O. Wilson.*

## The Reading Circle

[This series of questions on Page's masterpiece is designed as a guide to independent or reading-circle study. They are suggestive rather than exhaustive, and may at least serve to remind us how much the profession of teaching is indebted to the old masters. This lesson completes this series. A new course will begin in the September number.]

### "THEORY AND PRACTISE"

#### SECTIONS II TO VII, CHAPTER XV.

What is the importance of: Teacher's friendship for pupils, Resisting "the beginnings," General reproof, Accuracy, A cheerful countenance, Apt illustrations.

How does Page illustrate the difference between "articles" and "media"?

Describe "Page's Thunderstorm" and its effects.

#### CHAPTER XVI.

Can the teacher ever expect to find his chief reward in pecuniary compensations? Are teachers better paid now than formerly?

What are the principal non-pecuniary rewards enjoyed by the teaching profession? What emphasis does Page place upon the religious motives in teaching? Can any teacher be truly successful who is unregardful of these considerations?

#### CHAPTER XVII.

What are the general and legal relations of patrons, trustees, superintendents, principals, and subordinate teachers?

What are the prerogatives of the board of directors? Of the superintendent? Of the teacher?

How far may parents interfere with the prescribed course of study?

How far may the board condition a pupil's membership on regularity of attendance?

What is the legal status of written excuses? Of corporal punishment?

Who has authority to expel or suspend? To detain after school?

What are the territorial limits of the teacher's jurisdiction? What is the importance of written contracts?

# NATURE'S LABORATORY

Conducted by A. W. KELLEY, PH. D., M. D.

## NATURE STUDY.—NO. 2.

### THE COMMON WHEAT PLANT.

**T**HE grain-bearing, or corn, plants are called cereals, from Ceres, whom the ancients regarded as the goddess of corn and harvests. Formerly that one of the grains upon which any people depended chiefly for its food, was called by that people "corn," as wheat in England, oats in the north of Scotland, rye on the southern shores of the Baltic, and maize, or Indian corn, in North America.

The cereals comprise one of the largest and most important of the natural orders of the plant kingdom; this order is known in botany as the *Gramineæ*, commonly called the grass family. This department of the plant kingdom is too vast to be explored in a single study, but it is of interest to form a slight acquaintance with at least some of its members. It is from this family that not only the human family, but a large number of animals, are supplied with food. "Our daily bread," is derived from the cereals. All the plants in this order are readily recognized by their strong family resemblance; first, by their leaves, which are for the most part long and grass-like, with parallel veins; that is, the veins all run lengthwise of the leaf.

The botanic name of common wheat is *Triticum vulgare*,—*triticum* signifying "to grind into flour." Wheat is both annual and biennial, having the culm (the name given to the stems of grasses) round and smooth, from three to five feet high, bearing a head or spike at the top. The spike is more or less four-sided, and

is crowded with spikelets, which usually bear from two to five flowers, and which contain the grains or kernels of wheat, although not often more than two perfect kernels are developed in a spikelet.

If we examine a head of wheat carefully, we shall find at the base of each spikelet two husks, or scales of chaff. (See Fig. 1, a.) These are called "glumes." After the glumes we find that each separate grain is also inclosed in chaff. These are called *paleæ*. (Fig. 1, b.)

Should we examine the wheat when it is in full bloom, we would discover that it has beautiful blossoms; on each little spikelet the glumes and paleæ open, and from beneath three thread-like *stamens* protrude; on the end of each is suspended the silver-white *anther* loaded with *pollen*, with which to fertilize the *ovule* through the feather-like *style* which rises from the top of the ovule (Fig. 2), and which also protrudes from beneath the paleæ (Fig. 1). It will be noticed that the flower has no corolla—nor is it needed, the glumes and paleæ serving the same purpose.

The study of cereals can be done at any season of the year, and affords a good object-lesson for parent, teacher, and pupils. Our observations should then be extended to other members of the grass family.

Summer wheat, *Triticum aestivum* (commonly called "spring wheat"), which is sown in early spring and harvested the same season, is less hardy than winter wheat, the head is more slender, and its glumes are usually provided with much longer awns or beards (Fig. 1).

As all farmer boys know, winter wheat (*T. hibernum*), is sown in early autumn. It lives through the winter, and ripens its seed the following summer. There are over seventy varieties of winter wheat, such as bearded, beardless, white-chaff, red-chaff, etc. Many of them are much alike, differing only in color and form, or in time of ripening; some, being more hardy, are better adapted to colder regions than others.

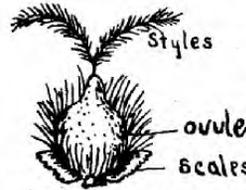


FIG. 2.

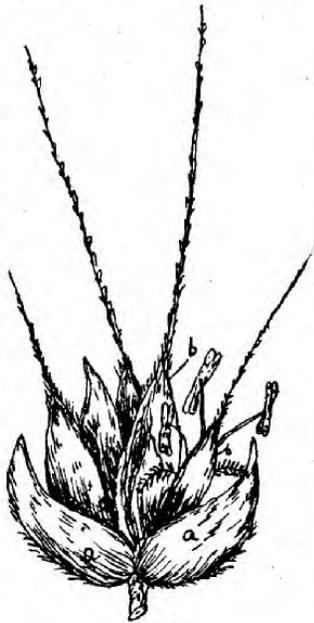


FIG. 1.

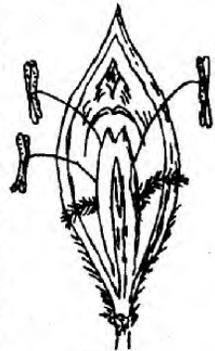


FIG. 3.

There is also a kind of wheat called "mountain spelt wheat," grown in mountainous regions where common wheat will not ripen. It is a very early variety of spring wheat, but the grain is shrunken and light, yielding but little flour, and that of a very poor quality.

Wheat straw is much used in the manufacture of straw hats. The best straw for this purpose is obtained from the chalky lands of Italy. The famous Leghorn hats are made from straw of a bearded variety of wheat that grows only about fifteen inches high, on the poor, sandy soils along the river Arno; the wheat is pulled green, and afterwards bleached.

The culture of wheat is a most important one over a large area of the north temperate zone, and affords an excellent subject for study, not only of the plant itself, but of its whole life-history, from the time of sowing until it reaches our table in the form of bread or other food.

The following topics may be suggested for the further study of wheat: Time of sowing; How much is sown to the acre; How much is obtained per acre; How the soil is prepared; What is summer fallowing; Time and modes of harvesting and threshing, ancient and modern; The grinding of wheat; The process of bread-making, etc.

PERHAPS no more interesting and profitable line of nature study for the summer could be named, than is suggested by a study of our forest trees and their summer visitors, the birds and insects. In order to pursue such a study most successfully, it will be necessary to make a collection of leaves, flowers, and fruit of the various trees studied, also drawings and written descriptions of the trees, these to be carefully preserved for further study during the winter; while the study of birds calls for the closest observation of form and color, with description of their habits, construction of nests, time and place of nesting, etc.

TANDEM bicycles and other tandems have been known for many years, but it has remained for Dr. Crampton of Columbia University to improve (?) on nature by manufacturing a tandem moth. Two of the caterpillars in the pupa, or cocoon stage, are cut in two, and the thorax of one joined to the abdomen of the other, the junction being sealed by paraffin. It is said that these mutilated pupæ develop into monstrosities with four wings, but do

not live for any length of time. It is not claimed that scientific results of any value have been derived from these experiments, which seem like a wanton abuse of nature.

#### WHY LATIN IS USED BY PHYSICIANS.

"I DON'T see," said the man who was leaning against the drug-store counter, "why a doctor can't write his prescription in English, instead of Latin."

The druggist said, "You think, I suppose, that the doctor writes his prescription in Latin so it can't be read so easily—so the layman can't steal his trade and learn what he is giving him. But that's all wrong. In the first place, Latin is a more exact and concise language than English, and, being a dead language, does not change, as all living languages do.

"Then, again, since a very large part of all the drugs in use are botanical, they have in the pharmacopœia the same names that they have in botany—the scientific names. Two thirds of such drugs have n't any English names, and so could n't be written in English.

"But suppose a doctor did write a prescription in English for an uneducated patient. The patient reads it, thinks he remembers it, and so tries to get it filled from memory the second time. Suppose, for instance, it calls for iodide of potassium and he got it confused with cyanide of potassium. He could safely take ten grains of the first, but one grain of the second would kill him as dead as a mackerel. That's an exaggerated case, but it will serve for an illustration. Don't you see how the Latin is a protection and a safeguard to the patient? Prescriptions in Latin he can't read, and consequently does n't try to remember.

"Now for a final reason. Latin is a language that is used by scientific men the world over, and no other language is. You can get Latin prescriptions filled in any country on the face of the earth where there is a drug-store. We had a prescription come in here the other day, which we had put up originally, and which had since been stamped by druggists in London, Paris, Berlin, Constantinople, Cairo, and Calcutta. What good would an English prescription be in St. Petersburg?"—*New York Herald*.

It has been found that seeds may be kept a year or more in a vacuum, and that while in the vacuum they do not exhale nitrogen or carbonic acid.

**Annexation.**—The annexation of the Hawaiian Islands is a topic that periodically rises into prominence. Just now annexation seems much more probable than at any previous time. Indeed, some think that American annexation projects may ultimately embrace not only Hawaii and the Philippines, but also Cuba, Canada, England, and possibly Spain and Germany.

**Liquefied Air.**—One of the most surprising discoveries of the present day is that of the liquefaction of air. Perhaps it is no more astonishing than that water should become solid ice. But ordinary people would never have thought it possible to freeze air and make a liquid of it; yet the scientists have done this. Some remarkable phenomena are reported in connection with the new discovery, but some time must elapse before its practical value can be demonstrated. It is considered, however, as one of the most important attainments of science since the discovery of the X-ray.

**Bees in the Schoolroom.**—The busyness of bees is an old-time example long held up before school-children as an incentive to industry, order, and sweetness—without unpleasant reference to the “business end” in view; but it is seldom, probably, that the bees themselves are displayed, while at work, within the schoolroom. In certain grades, however, of the Normal Training School at Ypsilanti, Mich., a hive of bees is fastened to one of the window-sills of the study room in such a way that the bees have free access to it, in and out of the window, but not into the room. Glass walls covered by wooden doors give opportunity to observe all the work carried on in the interior of the hive. This study of bees is part of a carefully arranged plan of nature study provided in all the grades of this model school.

**Spelling Reform.**—The glaring inconsistencies of English spelling, and the time and energy wasted in writing and printing the language, has caused numerous spelling reformers to arise, most of them with new phonetic alphabets to be adopted by English-speaking people, thus solving the diffi-

culty. The race, however, is conservative, and it is difficult indeed for it to adopt any such radical reform. Language grows and decays by slow degrees, and its development can not be hastened or retarded by the enactments of learned societies or enthusiastic individuals. So far it has not been apparent that any of the newly-proposed scientific alphabets can be more easily learned or used than the old standards. As an illustration of this, Professor Peck of the *Bookman*, with such types as his magazine afforded, presents the following humorous stanza as a fair example of phonetic spelling reform:—

Litl Wili had ä monki,  
 Claiming up ä yelö stik;  
 Hi sukt dhi yelö pänt ol of,  
 It mäd him dethli sik;  
 Dhi huming-top iz sailent now,  
 Dhi bol iz läd asaid,  
 And dhi munki duzent jump around,  
 Sins litl Wili daid.

**The Philippines.**—Many newspapers are now inquiring, “What shall we do with the Philippines?” The insurgents under General Aguinaldo may settle the question for us. Six months ago, no one could have predicted that this problem would be before us. It has raised an issue of the greatest importance in regard to our future foreign policy; it is a good time now to read Washington’s Farewell Address. The advocates of an “Imperial America” urge that our retention of the Philippines is a necessity to protect our future “Eastern interests,” and to provide for the expansion consequent upon our national growth. Their opponents point out the fact that the islands are but half-civilized, incapable of self-government, remote from our means of protection, and deserving of entire independence, if anything. One thing is certain, that if the United States retains the Philippines, it will be impossible long to keep aloof from “entangling alliances.”

**A Model Manual Training School.**—For ten years Superintendent Gabriel Bamberger, with the hearty co-operation of the Hebrew charitable and philanthropic association which he represents, has

been carrying on a model manual training school for poor children, in the city of Chicago. In connection with its tenth annual report Prof. Charles R. Henderson, of the University of Chicago, thus expresses his views concerning the school:—

I regard this school as one of the most significant and distinctive experiments within my knowledge. The manual training work is practical, systematic, and directed by a thorough comprehension of the educational end sought and of the order of development in the child. The school management seems to be free from all the driving, coercive features which discourage and warp so many children. The idea is personal perfection, not the selfish strain to beat the others. I feel sure that this school, supported by private enterprise, independent of the necessary reputation of a vast system, yet sympathetic toward all schools, has a power to introduce new ideas without shock or violence. This is part of the mission of the Jewish Training School,—to show advanced educational ideas actually in successful operation. It is rendering a service to the city and to the cause of education by spending its money on the wisest and most fruitful form of philanthropy—preparing youth to take care of themselves in the struggles of existence, and at the same time to be kind and amiable to all.

**Military and Naval Organization.**—Recent events have created much interest, and some uncertainty, in the relative rank of naval and military officers. The rear-admiralship is now the highest grade in the American navy. Formerly, it was that of vice-admiral, which was successfully filled by Farragut, Porter, and Rowan. The grade of admiral was created in 1866, but ceased in 1890 and 1891 by the death of the only incumbents. The ascending grades, from the graduate of the United States Naval Academy upward, are as follows: cadet, ensign, master, lieutenant, lieutenant commander, commander, captain, commodore, and rear-admiral. The corresponding grades in the American army, from the highest downward, are: lieutenant-general, major-general, brigadier-general, colonel, lieutenant-colonel, major, captain, first and second lieutenants, sergeant, and corporal. The corresponding military divisions arranged in the same order of rank, are: The army as a whole; a corps, of two or more divisions; a division, of two or more brigades; a brigade, of two or more regiments; a regiment, of three battalions; a battalion, of four companies; a company (100 men), of two platoons or several squads. To this it may be added that a battery of artillery is six guns; a troop is a company of cavalry; a squadron is two or more troops of cavalry, or a number of ships detached from a fleet for special duty; and a flotilla is a fleet of small vessels.

## Queries for Students?

ON THE MAY EDUCATOR.

[Send for free sample copy.]

1. What is bacteriology? the X-ray? technology? entomology?

2. What is the meaning of "gumption," genius, blueprint, monitor, vogue, mart, hiatus, acuity, tentative, water-table?

3. Where do we usually find the word "wot" used? What does it mean?

4. What is the distinction between diplomatic and consular representatives? Between vocation and avocation? Between affected and effected?

5. How is "maintenance" sometimes mispronounced? Perspiration? Is there any relation between "veterinary" and veteran? "Pupa" and pupil? What is the primary meaning of "orthodox"?

6. Who was Xantippe? Comenius? Who is Justin S. Morrill? Who is president of Cornell University? Where is it? What was the Spanish Armada?

FOR JUNE.

1. WHAT are "assemblies;" "foot-pounds;" leucocytes, lamellæ, lacunæ? "Tentations"? Textiles?

2. What is the meaning of "Nord-stjärneordnarnes"? of Herr, Señor, Monsieur? Origin of "Mister"? of the curfew? How is "Mrs." pronounced; enervating, innervating? Distinction between the last two?

3. Who was Vasa; Uno Cygnaeus; Herbart; Audubon; Maupertuis? Who is Aguinaldo? The President of Columbia University? The author of the stanza on page 8? Who discovered the X-ray?

4. What is a heron; tern; gallinule; vireo; chat; umbra; penumbra? What is mastic; basswood; the nebular hypothesis; the botanical name of common wheat?

5. Why is Latin used by physicians? By scientists generally? What is the "pharmacopœia"?

6. Define: biology; anatomy; metabolism; protoplasm; immunity; cerebrum; squamous.

7. What is the "spindle" of a mowing machine; the "master-wheel"; "tumbling-rod"? What is the difference between a "pulley," "wheel," and "sheave"? What is the machinist's name for a "cog-wheel"?

8. Name the various official grades in the U. S. navy and army in the ascending order; the division of the army from company upward.



# OBSERVATIONS

“WHAT is so rare as a day in June”—except the feeling of personal thankfulness that life is not given for purposes of selfish enjoyment? The best way to worship is to study our blessings, and how to be a blessing.

---

THROUGHOUT our editorial remarks, and elsewhere in the *EDUCATOR*, the teacher is frequently referred to as “he” rather than “she.” We do not mean to ignore the usage in this respect that is coming to prevail in educational journals, but we are somewhat concerned about it. The exclusive use of “she” seems almost to imply the coming exclusion of men from the teaching profession,—which we dislike to believe. At any rate, so long as that has not yet come to pass, we think it is still proper to use “he” in the common generic sense.

---

WE may be pardoned for referring to one other point of usage. From the beginning, the *EDUCATOR* has used “can not” rather than “cannot.” We know quite a number of first-class publications that use the divided form exclusively. Some time ago we asked in our “Queries for students”—“Is there any better reason for the form ‘cannot’ than for maynot, mightnot, couldnot, wouldnot, or isnot?” We have no affirmative replies yet, and so pass the question along to teachers, and to our contemporary journals that still prefer “cannot.”

---

CURFEW ordinances are now in operation in more than three hundred of our middle Western towns and cities, including Lincoln, Omaha, Topeka, Denver, Kansas City, Evanston, Des Moines, and Indianapolis. The curfew rings at nine o'clock in summer and eight in winter. There may be some question of personal liberty and private rights involved in such ordinances; but there can be no question that it is infinitely better for children and youth to spend their evenings at home than to be consorting with the influences of the city street. The chief responsibility for moral protection can never be shifted, however, from parents to the municipality or to the State.

FEW parents realize the power of home surroundings in the formation of child character. An ill-kept kitchen, a slatternly sitting-room, each day build into the coming man or woman. The clean and orderly and beautiful are stepping-stones to the higher; while the dirty and disorderly educate down instead of up. Woman may not realize her possibilities in many fields, but in good housekeeping she has a hold on coming humanity that makes her a helper of the race and a builder of The Kingdom.—*H. L. Reade.*

---

ONE of the results of present patriotic (?) influences is to be seen in the following “picnic” which a Kansas schoolma'am declined to have—cited by one of her little boys:—

“O, Dewey was the morning  
Upon the first of May,  
And Dewey was the admiral  
Down in Manila bay,  
And Dewey were the regent's eyes—  
Those orbs of royal blue,  
And Dewey feel discouraged?  
I hardly think we dew.”

This teacher probably could not unreservedly agree with the sentiment of the last line. And yet there are Kansas people—and probably others—who object to discouraging such patriotism in the public schools!

---

BE what you would have your pupils become. Moral character is the first element of educative governing power. No bad person can govern well. Moral character—purity of heart and life—is the basis of true educative leadership. Jesus lived the one perfect life, and so is the fit leader of men. As you approach the perfect life, you become fit to lead your pupils up to a higher and better life. Moral character is the most potent of all forces. We despise and distrust a base, weak, mean man; but we trust and almost worship a pure, strong, true man. The pure, strong teacher is a living object-lesson and a fit leader of pupils. Such a teacher, above all, will foster the moral virtues and promote the growth of moral character. Conduct, and not scholarship, is the pre-eminent thing in education.—*Joseph Baldwin.*

### A CHRISTIAN EDUCATOR'S ASSOCIATION.

EVERY teacher belongs to an association of some kind, formal or informal, professional or social. Probably but few teachers, however, are embraced in any organic association that includes parents as well as teachers in its active membership. Or, to pass a step further, it is very improbable that many teachers and parents are co-members in any educational association that is avowedly and distinctively Christian in its ideals and purposes. The EDUCATOR strongly favors the inauguration of such an association, not for the purpose of multiplying organizations but for the mutual study of the problems that distinguish Christian from secular education. And we believe that many readers are ready to unite themselves for this kind of study.

We all understand the value of co-operative effort in education as in every other interest. If argument were needed as to the special value of co-operation between parents and teachers, reference might be made to nearly every leading article in this number of the EDUCATOR, and to many of its preceding numbers. The time now seems opportune to emphasize this subject upon the thought of all during the weeks of vacation. With the responses and suggestions which we hope to receive before the issue of our September number, the EDUCATOR should be in a position to crystallize the best thoughts of its best friends on this proposal.

In order to effective collaboration, it is of course necessary that there should be a common ground of interest and opinion. It is *not* necessary, at least in beginning, to devise a complicated machinery of constitutions, by-laws, officers, and what not. It is, however, proper to offer a suggested basis of common interest. As an approach to this, the EDUCATOR ventures to put forth the following as —

#### OUR EDUCATIONAL CREED.

1. We believe that merely intellectual education, having no intended reference to the development of moral character, is as likely to be harmful as beneficial to the individual and to society.

2. We believe that the best intellectual development can never be secured except in conjunction with the highest moral development of the individual, and vice versa.

3. We believe that neither the best intellectual nor moral development can be secured except in conjunction with the best physical health and development.

4. We believe that the highest development of body, mind, and character can not be secured except in accordance with the sanctions and principles of the Bible. Hence, —

5. We believe that only in true Christian education can be found the highest type of training and culture for man's physical, mental, and moral nature.

6. We believe that Christian parents should exercise and improve their ability to educate their own children at home, up to the age of eight or ten years, before committing them to the guidance of any but Christian teachers.

7. We believe in the fullest possible measure of intelligent co-operation between all teachers and parents, and that this can be secured only by means of educational association for mutual improvement.

The foregoing creed is not fixed nor infallible, but open to free discussion and amendment. It is proposed with the conviction that a study of what is embraced in it can not fail to be of great profit to all concerned. Among the questions which it suggests may be mentioned the following:—

The Mutual Responsibilities of Teacher and Parent.

The Kindergarten *vs.* the Home.

The Place of Manual and Moral Training.

The Best Correlation of Studies.

The Bible in Education.

The Relations of Parochial and Public Schools.

Christian Education *vs.* Pagan Education.

The EDUCATOR predicts that some of these are to become the great educational questions of the future, if they are not already of the present. Some of them have been discussed in former issues of this journal, the others will be presented as early as their interest warrants. Considered in connection with our other announcements for the coming year, the EDUCATOR commends them to the attention of its readers. The editor adds the personal request that all who feel responsive to these suggestions immediately indicate their interest by mailing their personal criticisms or encouragements to the EDUCATOR. With such practical illustrations of the benefits of educational co-operation, we confidently expect that the renewal of our usual relations in the September number will prove a mutual pleasure and advantage.

---

#### IF YOU — WRITE TO US.

If you wish to become a member of the "Christian Educator's Association" without fee or tariff, —

If you want to start a "Home University" for teachers, parents, and children, —

If you have a special interest in any department or subject to be treated in the EDUCATOR, —

If you are open to an arrangement for contributions to our columns, —

If you desire to send the EDUCATOR to your friends, — or

If you intend to subscribe yourself, —

*Kindly write to us.*

## PUBLISHERS' PAGE.

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#### OUR DEPARTMENTS FOR 1898-99.

DURING the next school year the EDUCATOR will maintain the following general departments, as indicated in the Contents (first cover) of this number:—

**General Articles.**—From our contributors in the United States and abroad. Each number will have an illustrated description of the work of some school that is devoted to normal or industrial education, as exemplified in the May number and in this. These articles are alone worth the year's subscription,—so our friends say.

**Industrial Education.**—Progressive lessons and practical suggestions to be used by teachers and parents for both boys and girls. No expensive tools or equipment required; adapted to the rural school and home, as well as the city or town.

**The Farm.**—A home university in the country.

**The Schoolroom.**—The teacher's treasury of useful information and timely class-room aids.

**The Home School.**—The fathers' and mothers' department of intelligent co-operation with teacher and pupils.

**Physiology and Hygiene.**—A most interesting and valuable course of original lessons on this important subject, introduced on page 18 of this number.

**Professional Study.**—For teachers and parents, looking to the fullest understanding and discharge of their

mutual duties. Simple discussions of standard educational doctrines. "The Reading Circle" is a sub-department devoted to independent or co-operative study of some standard educational masterpiece. Page's "Theory and Practise" is finished in this number. The next book will be announced in September; in the meantime our readers are invited to indicate their preferences.

**Nature's Laboratory.**—A year's study of nature; the first lesson in the May number, the second in this. These lessons are a guide to observation, not to be memorized from the page.

**Current Interests.**—Timely topics related to education and general information. A sub-department of "Queries for Students" may be used for quizzing pupils in general exercises.

**"Observations."**—Editorial notes and comments.

In addition to the foregoing we are prepared to announce that the following general subjects will be presented in the EDUCATOR sooner or later during the coming year, either in series or as symposia, participated in by practical teachers and educational authorities:—

The Great Educational Reformers.

The Modern Educational Problem.

Moral and Pedagogical Psychology.

The Mutual Responsibilities of Teacher and Parent.

Educational Foundations in the Bible.

The Art of Questioning.

The Best Correlation of Studies.

The Kindergarten *vs.* the Home.

The Place of Manual Training.

The Best English.

The Best Education for Business.

Principles and Methods of Moral Education.

The Relations of Parochial and Public Schools.

Christian Education *vs.* Pagan Education.

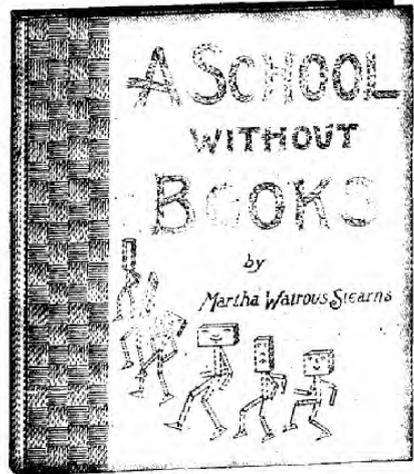
#### NOTICE

That this is the last number of the EDUCATOR until September. This is our "Vacation Number," and we believe it will be specially interesting to parents and teachers during the summer. It is a number that will "keep" for summer use. It should be especially attractive to teachers in the summer institutes who are looking for the best school paper to add to their present list. The EDUCATOR has no wish to displace any other educational journal; but it certainly contains much of great value that can not be found in others. Much care is also taken to present everything in the best typographical finish. The Publishers believe that if the EDUCATOR is compared page by page with other school journals, few will be found that equal it in the quality of matter, paper, printing, and illustrations. And the price puts it within the reach of all. *Agents wanted.*

# A School Without Books.

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MARTHA WATROUS STEARNS



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Takes up the matter of child education from an entirely new standpoint, — the at-home method of training the child in lines which will bring practical results from the work done. This book teaches the children how to manipulate and transform crude materials into serviceable objects, thereby training their perceptions, ideals, and senses better than any other method possible to employ.

## Testimonials.

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"I have examined the book carefully. Mrs. Stearns has some excellent ideas in regard to manual training and the teaching of children. It is very suggestive indeed, and I am sure will be very useful for teachers in their manual training work." — *Col. Francis W. Parker*, Principal Chicago Normal School.

\*\*

"I have examined the book and find it very suggestive of interesting devices in nature teaching. It is in harmony with the best methods now in vogue, and can not fail to suggest to the progressive teacher many ways of interesting his pupils." — *Prof. W. E. Yocum*, Pres. Florida Agricultural College.

\*\*

"It is suggestive and useful to teachers who wish to bring their pupils face to face with interesting things in nature." — *Prof. Wilbur S. Jackman*, Dep't of Natural Science, Chicago Normal School.

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"One of the most delightful and charming books I have read. The writer is evidently an artist in the broadest sense, and wields a very facile pen. This book will be found a treasure in any home. It ought to have a very large sale." — *J. H. Kellogg*, M. D., Supt. Battle Creek (Mich.) Sanitarium.

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