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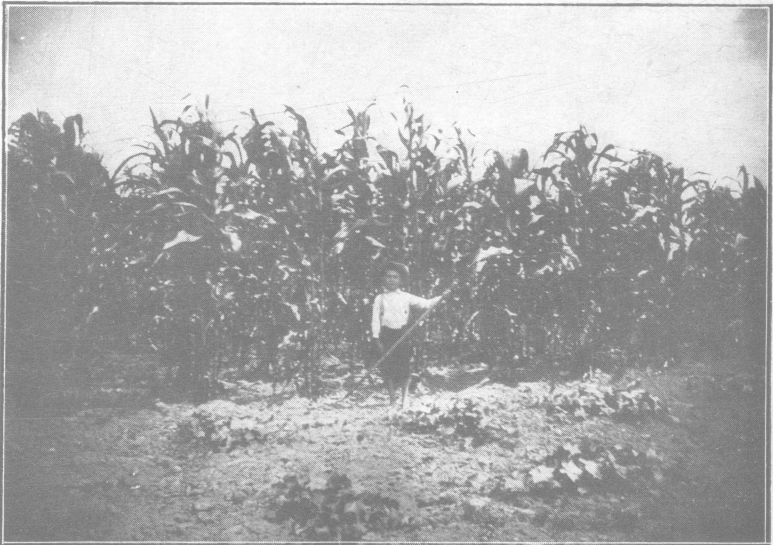
THE MONARCH BUTTERFLY

PROF. HERBERT OSBORN

SOIL AND DRAINAGE

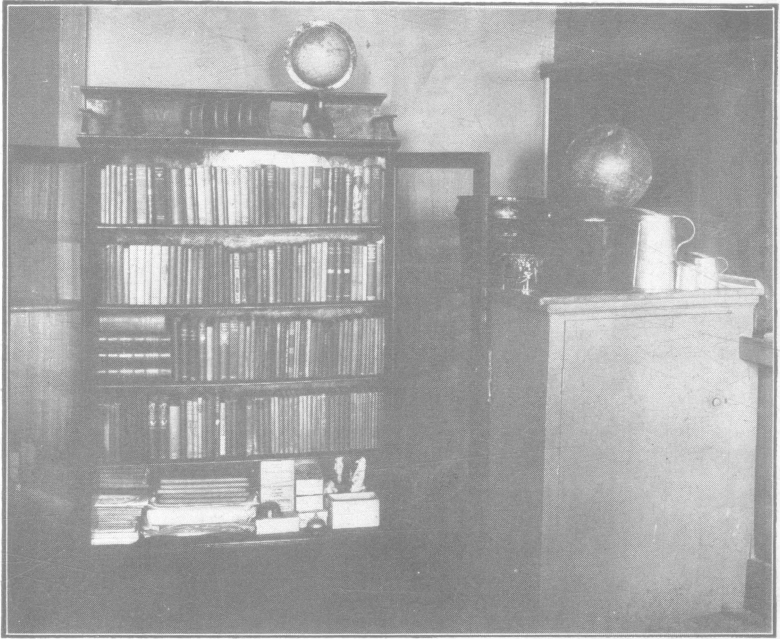
Experiments for Elementary Schools

A. B. GRAHAM



From the School to the Farm

PUBLISHED MONTHLY BY THE OHIO STATE UNIVERSITY
COLUMBUS



AN UP-TO-DATE COUNTRY SCHOOL LIBRARY

Here are found the simplest and best texts on Elementary Agriculture and home made apparatus for experimental work. The State Traveling Library has been used in this school.

NOVEMBER.

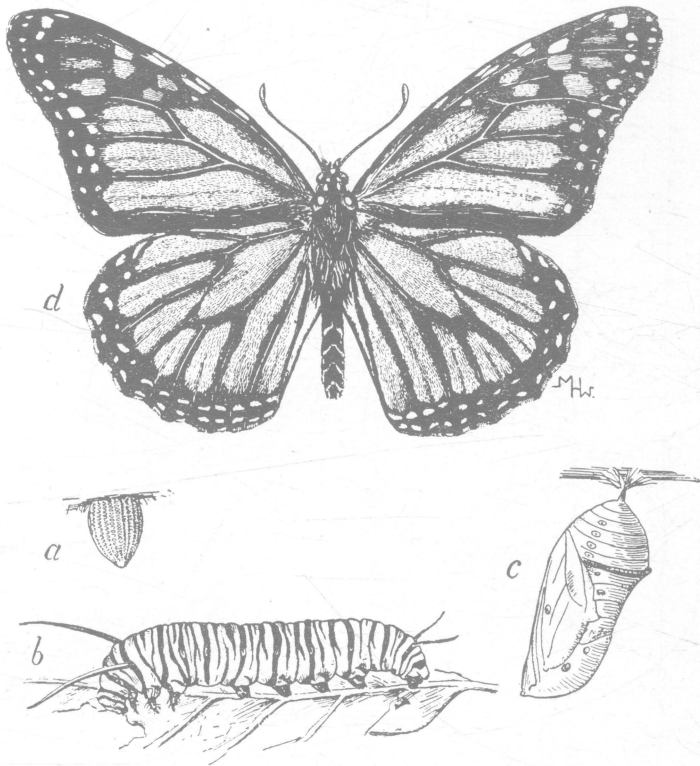
Yet one smile more, departing, distant sun !
 One mellow smile through the soft vapory air,
Ere, o'er the frozen earth, the loud winds run,
 Or snows are sifted o'er the meadows bare
One smile on the brown hills and naked trees,
 And the dark rocks whose summer wreaths are cast,
And the blue Gentian flower, that, in the breeze,
 Nods lonely, of her beauteous race the last
Yet a few sunny days, in which the bee
 Shall murmur by the hedge that skirts the way,
The cricket chirp upon the russet lea,
 And man delight to linger in thy ray
Yet one rich smile, and we will try to bear
 The piercing winter frost, and winds, and darkened air.

—*William Cullen Bryant.*

THE MONARCH BUTTERFLY.

PROF. HERBERT OSBORN.

This common, handsome butterfly is familiar probably to every one who reads these lines, at least, in its butterfly stage. Few perhaps are acquainted with the other stages in its interesting life history, or with



(After Jordan and Kellogg)

THE MONARCH BUTTERFLY

- a.* Egg magnified. *b.* Larva (commonly found on milkweed).
c. Chrysalis from which the butterfly (*d.*) comes.

the way in which it spends the larger part of the year. Were it not so common it would probably be considered one of our most handsome butterflies, but owing to its great abundance we are apt to forget its handsome characteristics. The adult insect or butterfly, so abundant

at the present, probably is to be found in any part of the state. The accompanying figure will recall it at once to any who may not know it by the above name.

These adults remain fairly common until cool weather comes on, and then they will gradually disappear, or, in some instances, immense flocks of them may be noticed clustering among the shade trees along roadsides, and, perhaps careful watching will show that their general line of flight is southward. These adults are destined to survive the winter in some locality farther south than that in which they grew, and it is even questioned whether any individuals survive in this latitude. In the spring we will see, however, occasional individuals faded and somewhat frayed in appearance which may have survived the winter here or have migrated northward from their place of hibernation or wintering. Such individuals select suitable places upon which they deposit their eggs. The eggs shown in the figure are small and minutely corrugated as seen by the microscope. They hatch in a few days and the caterpillar which results begins feeding upon the plant. It passes through several moults, or periods at which it sheds its skin and increases rapidly in size, completing its growth as a caterpillar before midsummer. Then a striking change takes place. The caterpillar shortens in length, casts off the skin, and the resulting chrysalis, by a dexterous movement of the hindmost part of the body, hooks itself into a little web of silk that has been spun upon a leaf and in that manner hangs itself securely.

The chrysalis is smooth with a series of silvery spots forming a circle behind the middle of the body, a hanging head portion without any moveable parts, the only motion possible being in the part next to the attachment.

The adult insect which emerges from this chrysalis after a period of several days is our familiar butterfly and the series of stages from egg to adult is complete. These adults, however, deposit eggs within a short time for a second generation of caterpillars which mature in early autumn, changing to chrysalids and produce the butterflies which are so abundant and conspicuous in the autumn weeks. We have here, then, an excellent illustration of the transformations of an insect and one that can readily be followed by any individual who will take the trouble to locate the eggs or larva. They occur normally on milkweed, and examination of milkweed plants at the proper season will usually disclose a number of individuals in either egg, caterpillar, or chrysalis stage. The species seems quite strictly limited to milkweed as a diet, and has probably accustomed itself to the peculiar juices of these plants. On account of its feeding upon a plant which is counted a useless weed, the butterfly may be considered as harmless, or even as serving a useful purpose, to the extent that it checks the growth of these plants.

SOILS AND DRAINAGE.

A. B. GRAHAM.

1

After at least an inch of the top soil has been scraped away, place a small handful of the fresh or damp soil in a clean saucer. Mix with it enough rain-water to make a soft mud. Carefully push into this mud a small piece of litmus paper leaving at least an inch uncovered. Let it remain at least two minutes. Remove carefully and cleanse by drawing it backward and forward through the rain-water.

If the end in the mud has turned a brickish red, the soil is sour or what is known as an acid soil. (Litmus paper and a sheet for making the record will be furnished free upon application to the Department of Agricultural Extension, O. S. U., Columbus, O.).



EDUCATION FOR THE FARM

These children have just returned from a noon-hour field trip. They are now learning the names of plants, stones, and insects. Some are testing soils for acid.

Probably it would be better to try the litmus paper in a little vinegar just to see what color an acid turns it. Try it in a little lye or soapy water to see what color it turns. Now put it back in the vinegar. Again place it in the lye.

2

Put a piece of partially slacked lime the size of a walnut or buckeye in a quart jar or can. Fill the can nearly full of water. Stir the lime and water and let it settle. When the water has cleared try it with litmus paper.

Pour a little vinegar into a tea-cup and try it with litmus paper.

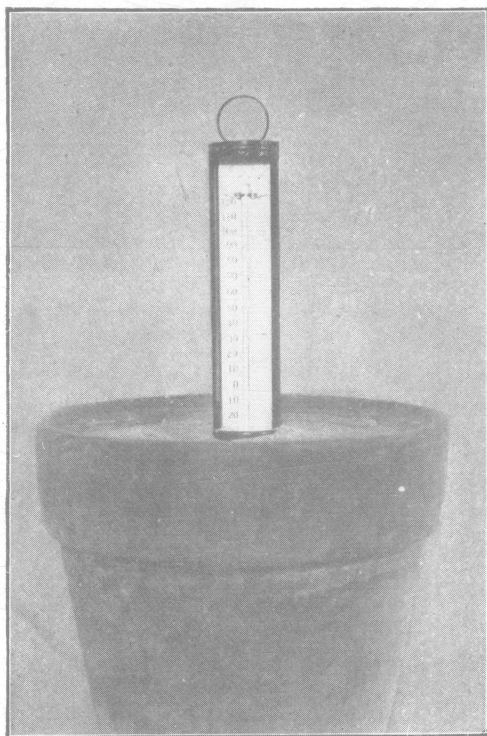
What color indicates an acid or sour substance? What color indicates an alkali?

Take a piece of litmus paper that has not been used and, after pouring a little clear lime water into the vinegar, try just the tip of it in

this mixture to see if it is still acid. If it shows red, tear off this red tip. Pour in a little more lime water and test with the paper again. Keep on until you have added enough lime water to prevent the litmus paper turning either red or blue. The mixture is now said to be neutral.

A neutral soil is to be desired. If you have found a sour or acid soil, sprinkle lime over it to neutralize it. Wood ashes may be used. Try the soil where you find clover will not grow, or where there is sour grass or sorrel growing.

Try the commercial fertilizers with litmus papers after they have been dampened. Use rain water instead of well water. Try well water with litmus paper.



(After Goodrich)

ASCERTAINING THE TEMPERATURE OF SOIL. (See Experiment No. 4)

(Remember that when the litmus paper is dampened there is a slight change in color. This change signifies nothing in this work.)

3

Some warm day this fall, place in the sun three tin pans. In one put some dry sand, in one some wet sand, and in the third water. Let them remain for an hour or more. Which one has become the warmest? Which will become the warmest well-drained land, or land not drained?

the lamp while the lamp was not in use? Why break the crust in the soil after a rain?

4

Place an ordinary thermometer three or four inches deep in some black soil. In another place where there is clay soil put another thermometer just as deep as the one in the loam. Which shows the highest temperature?

5

In each of two small flower pots or in tin cans plant a grain of corn about an inch and a half or two inches deep. Stop the hole in the bottom of one of the flower pots and keep enough water on this one to keep the soil entirely covered. Keep the other reasonably well moistened. If the seed is in a can punch holes in the bottom. Note which one sprouts first? Why do not plant growers paint or glaze their flower pots?

6

Try mixing thoroughly equal parts of sand, clay, and the very blackest and finest rotten wood or rotten leaves. Does it not resemble a very good soil you know of?

7

Put some clay, sand, and the rottenest of wood, leaves, or grass in small boxes each by itself. Pour the same quantity of water on each. Place under the stove and let them dry. What difference do you note? Try the same quantity of water on No. 6. What is the result? Does clay soil on a knoll need drainage? Does it need to be tilled in any way different from other soils? What is humus?

Why can not air get into clay soils as well as into loams?

8

We all know that if more water is poured on a sponge after it is thoroughly saturated, a quantity of water equal to what was poured on runs out. So it is with the soil. It will hold water just as the sponge, but it may not be able to get rid of the excess that is rained down upon it for days, quite as rapidly as the sponge. If there is drainage—the tile drain in particular—all this water it doesn't need to hold will flow away.

But the question arises as to what kind of soils will hold the most water. You know that a blotter or a lump of sugar or a sponge will take up as much water as it can hold if simply laid in a little water which is added to from time to time.

To find which of two soils will hold water best, let us take two lamp chimneys and over the lower end of each tie tightly a piece of cheese-cloth. Now fill one with a clay soil and the other with a loam. Be careful not to pack the soil in one any firmer than in the other. Carefully place both in a flat pan of water. Place thin sticks under each so that each will be level and the water can get under each. Pour more water in the pan after awhile. Let them set an hour or more. In which one has water risen highest? Of what use is it to know this?

Why do you knock off the bit of charred wick in the coal-oil lamp? Did you ever find that oil had run out of the wick down onto the bowl of

8

Thrust your hand into an apparently dry pile of sand. No doubt you found it damp. There was a blanket of dry sand — not a crust — which kept the moisture in the sand from evaporating rapidly. Why should the upper soil be stirred often? This blanket, whether it be of sand, straw, or fine soil is called a mulch.

Fill a large flower pot with loam which has been thoroughly dried. Weigh the pot and loam with a spring balance, (See that it will show ounces, for the weighing must be done accurately). Pour in water very slowly until it runs from the hole in the bottom of the pot. Wait until



RUST AND ROT GREATER THAN WEAR AND TEAR

the water has ceased running. Weigh again and determine the per cent of water the loam would hold. It would be well to know what the flower-pot weighed before putting the loam in it.

Try the same experiment with dry clay or with sand.

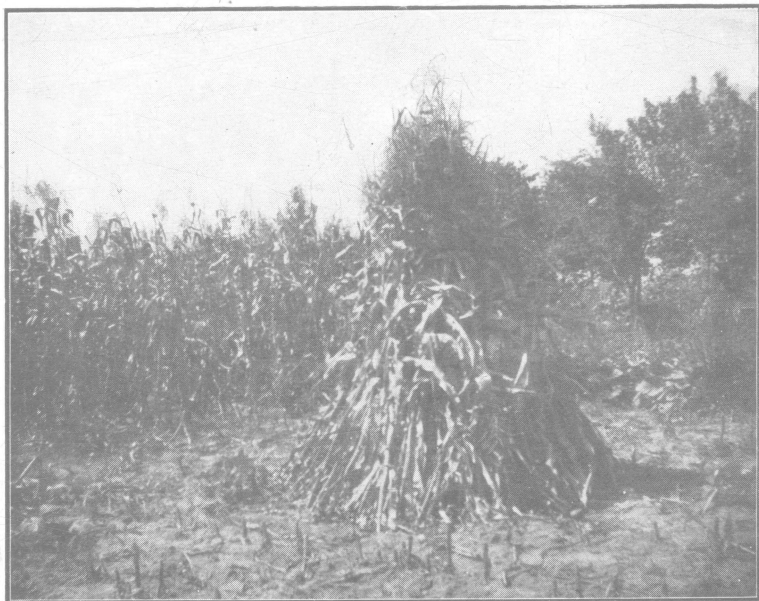
The water you see running away corresponds to the water that should be taken away from soils by tile drains.

VALUE OF EXPERIMENTS AND EXPERIENCE.

Experimental work in agriculture means very little if the eyes of those making the experiments have not been made to see. Accurate observation is the necessary antecedent to drawing proper conclusions.

Whatever is to be prepared for carrying on the work, which is planned in the preceding pages, let the boys construct or arrange. Let them handle the material; let them get their hands dirty. Whatever of pleasure comes from succeeding, or whatever of disappointment comes from failure, let them experience it. If they don't do just as you would do, what difference does it make so long as they keep within the bounds of directions or conditions.

What you would do would perhaps differ a little from what some one else would do in carrying on experimental work. Breakages now and then? Yes. Cut fingers? Yes. And many other things of a similar nature will happen. Such things are part of the price paid for experience.



THE FOURTH STEP IN A WASHINGTON TOWNSHIP (FRANKLIN CO.) BOY'S EXPERIMENT

Who cares for a correspondence course in swimming? The boy who learns to swim gets water in his ears, eyes, and mouth; occasionally he goes under. All is well so long as a new footing can be gained. What boy has not plowed out a hill of corn? A boy who is once thoroughly impressed with the reason why he should walk somewhat behind the plow handles will never need a second parental warning. What boy doesn't recall having been brushed from the back of his favorite old horse by a low hanging limb as he came lazily riding along up the oft traveled wood path?

Let them have some experience. Some will be unpleasant. But all will be helpful. It has been said that experience keeps a dear school and that fools learn in no other. We are quite sure that many a

wise man has worked out and presented his thesis in the great school of experience.

It is all very pleasant to read about how work is done, but it is the doing of it that counts.



LOOKING FOR THE ANSWER TO HIS QUESTION

Nature will answer. This boy has been asking questions and receiving answers about corn for three years.

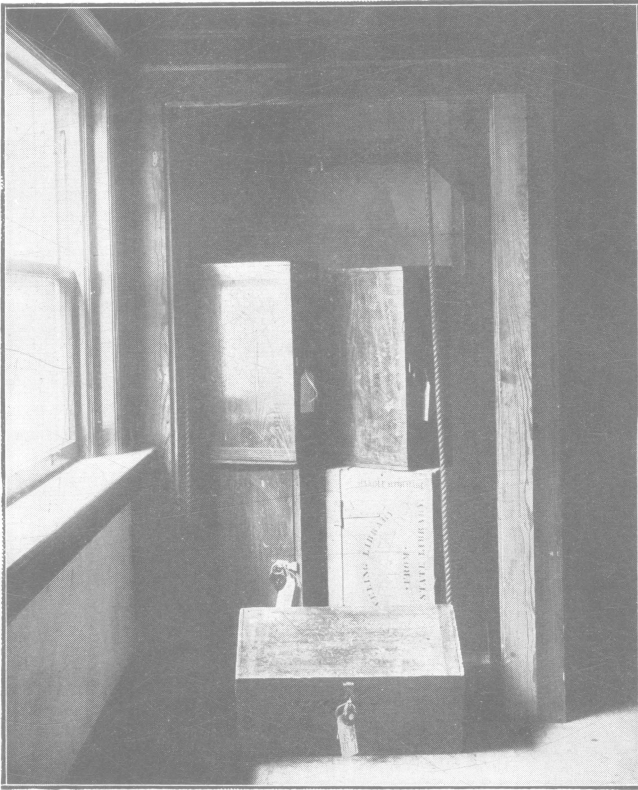
QUESTION NATURE NOT THE BOOK.

1. How far into the ground does rain go?
2. Why is the soil not filled by the rain?
3. Upon what do plants feed?
4. Do plants hunt food, or, is it brought to them?
5. Are the largest roots in dry or wet soil?
6. Upon what do plants feed in dry weather?
7. Which will retain moisture longest, sand, clay or loam?
8. Is it an advantage or a disadvantage for land to slope? Why?
9. Which is the warmer, a dry soil or a wet one?
10. Lay a thermometer on a stone and then on the ground. What difference do you notice?

WHAT TO READ.

BOYS.

I don't care to give you very much advice about what books and papers you should read because older folks sometimes want you to read nothing but "solid reading." Solid reading is like solid food: it is sometimes hard to digest. However, they are both worth taking if they will nourish and build up. Pilgrim's Progress is very good when you are ready for it: Burke's "Conciliation" may be out of your reach:



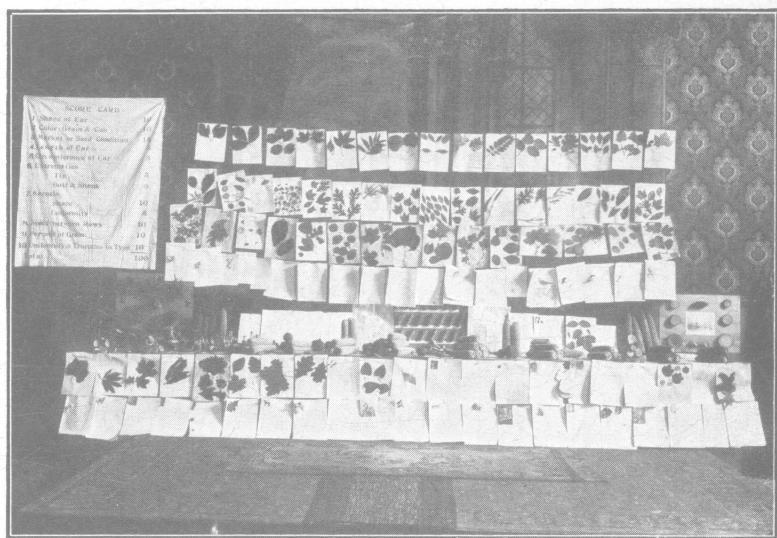
TRAVELING LIBRARY BOXES

Just leaving the State House for a trip to a Township of Five Sub-Districts. Write the State Librarian. These books have been carefully selected for country schools. You pay the expressage, that's all.

but if you want something to which you can say, "That's me. I had an experience like that just the other day. That's what I've been thinking," get a copy of Charles Dudley Warner's "Being a Boy," or, Louis May Alcott's "Old Fashioned Girl."

If you have been reading McGuffey's Fifth Reader, turn to chapter four of "Being a Boy," and the setting for "A Farm Without a Boy" is given. You know there are flowers that are prettier when used as borders; some are prettier when near those higher or lower than they. One who takes pictures of landscapes takes care to select a suitable setting for the principal object. So it is with a character or chapter of a story. A character is given such a place in the story that it seems to be the one person you are interested in. A chapter is so placed as to make it strong. What is necessary to give a character or chapter its setting must be properly arranged to lead up to and follow it.

In the "Old Fashioned Girl" you will find Polly and the red-headed Tom represent a plain, common girl of unusual good sense, and a mischievous boy who likes fun but not cruelty.



An Exhibition of the Work of the Bath Township (Green Co.) Agricultural Club at a Farmers' Institute at Fairfield, Ohio.

GIRLS.

The "Old Fashioned Girl" is quite as good for you as for the boys. Really, I think you will like it better.

If you want to read something over which you may laugh and perhaps drop a tear, get a copy of "The Bird's Christmas Carol." There are not over sixty-five pages, and it can be read in a very short time.

The "Dog of Flanders" shows us something of the kicks and cuffs a dog experiences. So many dogs are treated kindly that we sometimes forget what a rough life some of our dog friends live.

These books should be in every school library if not in every home.

EXHIBITION OF CHILDREN'S WORK.

There is no better place for an exhibit of the children's work in elementary agriculture than at the Farmers' Institute. Adults are always interested in the work of the children; if not, they should be. At the Farmers' Institute is an opportunity to unite more closely the farmers, the teachers, and the pupils.

At such meetings the writer has seen, during an intermission, a farmer and a crowd of young people discussing the principal points of interest in an ear of corn, after a talk on corn by a regular institute instructor. The boys are impressed with the importance of farmers' problems. The fact that some of our best scientists have been and are taking up some of the difficult questions for the farmer again impresses children. They



An Exhibition of the Work of the Springfield Township (Clark Co.) Agricultural Club at a Farmers' Institute at Springfield, Ohio.

soon find just as fascinating work on the farm as they would expect to find anywhere.

There soon springs up a desire to make investigations such as they hear their elders talking about. Soon experimental work and reading are entered upon. There are now a few excellent text-books on Elementary Agriculture which should be in every rural school library.

At the Morrow County Fair this October an exhibition of the work of boys' and girls' agricultural clubs was one of the most interesting features.

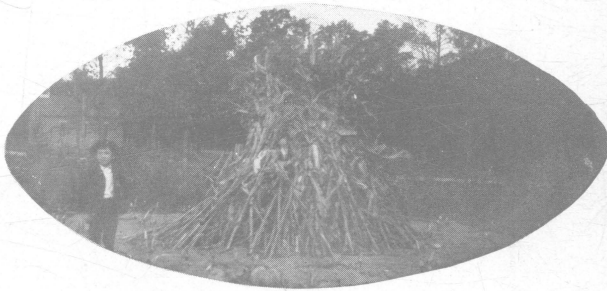
The interest that impels a child to do good work at this impressionable period of the child's life will be increased so much under the in-

spiration of a zealous teacher and parent that we need have but little fear as to the earnestness and care with which the farming of the future is done.

THE NATURE STUDY IDEA.

“Nature study often sets our thinking in the direction of our daily doing. It relates the school room to the life the child is to lead. It makes the common and familiar affairs seem to be worth while. Essentially it is not an ideal for the school any more than it is for the home; but so completely do we delegate all work of teaching to the school, that nature-study effort comes to be, in practice, a school-room subject. I wish every parent as well as every professional teacher, could see the importance of first instructing the child in the very things that it is doing and the very objects that it is seeing. The ideal of the parent or the teacher should be to bring the child into sympathetic relation with its world; but whatever may be in the mind or hope of the teacher, so far as the child is concerned the nature-sympathy must come as a natural effort of actual observation of definite objects and phenomena.”

L. H. Bailey, Cornell University.



HAROLD DARST AND HIS CORN

COVINGTON, O., R. D. No. 1,

DEAR MR. GRAHAM:

In regard to photographs of my corn I send you kodak picture I had taken. Please return what you can not use. The one is taken when the corn is growing with a pickel patch in front.

The other is only one shock of corn cut up that we may get the school-house, which is only 15 rods away.

I got the prize from our township, \$1.25. I was eight years old when the picture was taken,

Yours truly,

HAROLD DARST.

SWEET SUMMER'S GONE AWAY.

S. C. HANSON.

1. There's a pur - ple tint on the wood - land leaves, And the winds are up all day,
 2. On the brown - ing fields the spi - der spins, Where the lambs no lon - ger play,
 3. There are lov - ing arms for ba - by dear, Tho' the skies are chill and gray,

There's a rust - ling heard in the yel - low sheaves, And it seems to sad - ly say,
 And the crick - et now his hip be - gins, And the quail is whistling gay.
 And a co - sey home nest all the year, And sweet kiss - es ev - 'ry day.

CHORUS

"Sweet sum mer," "Sweet sum mer," Sweet sum - mer's gone a - way;
 "Sweet sum - mer's gone away," "Sweet sum mer's gone a - way,"

"Sweet sum mer," "Sweet sum - mer,"
 sum mer's gone a - way," "Sweet sum - mer's gone a - way," "Sweet sam - mer's gone a - way."