# A Visit at Rothamsted

By Ford S. Price

Well known as the Rothamsted Experiment Stations is all over the world, I looked in vain for it on the map. After a great deal of search and inquiry I finally discovered that it was located in Hertfordshire, which is one of the English counties, not far north of London. From my guide-book I learned that the unagricultural gentleman who wrote it gives but a single line to the place, concerning which whole volumes have been written, thus: "Not far from Harpenden is located the Rothamsted Experimental Station."

Visiting this farm was not the chief object of my visit to England. But I vowed that I would not leave the country until I had seen the institution, and walked over those fields which have become almost historic.

The ride from London to Harpenden showed that Rothamsted is located in a section very typical of Southern England. The fields are rolling, the more hilly portions being wooded. Small grains and hay are the chief crops, indicating that the soil is rather heavy, which is the case. On account of the scarcity of lumber, the English have turned to a very permanent type of farm buildings, mainly brick with red tile roofs. Now and then, through the car-window, one gets a glimpse of a big mansion, which signifies that the country round belongs, or once did, to the owner of the large house, "My Lord of the Manor." Within the last ten years the English have been breaking up these big estates, and the more prosperous farmers are buying farms of their own.

Harpenden, the village near Rothamsted, is a quaint old-fashioned English town, with its inns and curious old shops, with an occasional garage to modernize the place, and a few thatched roofs to give it a rural aspect. The village green, or commons, of which many English villages boast, stretches through the centre of the town and far up past the entrance to the grounds of Rothamsted.

At the inn at which I decided to spend the night they told me that Rothamsted was only a short way up the green. The innkeeper also volunteered the information that a great many people from all parts of the world visited Harpenden to see Rothamsted. It was with no little pride that he showed me his Visitors' Register, which contained names of people from a great many foreign lands.

Walking up the common I soon came to Rothamsted. In front of the main building is a huge boulder, on which has been carved this inscription: "To commemorate the completion of fifty years of continuous experiments (the first of their kind) in agriculture, conducted at Rothamsted by Sir John Bennet Lawes and Joseph Henry Gilbert, A.D. 1893." Immediately back of this memorial stands the main building of the Rothamsted Station, a modest two-storey brick structure, which houses practically all of the laboratories, offices and library. A stranger is impressed by the simplicity and modesty of the place. It is a fact that more building space is needed, but this world-famous institution has only a meagre income, derived almost wholly from gifts of its founder, Sir John Bennet Lawes. The English government has not been liberal toward its upkeep, and only a small amount of money has been given by other private interests.

**Began With a Dispute.**

The experiments at Rothamsted were really started as the result of an argument between Sir John Lawes and the German scientist, Justus von Liebig. Liebig held that if plants were supplied with other minerals, the carbon and nitrogen necessary for their growth would be obtained from the air. Lawes held that nitrogen was also a necessity in the soil, and proceeded to demonstrate his belief. The fact was that both were right and both wrong, but the truth of nitrogen fixation by legumes was not proved for nearly a half-century after the founding of Rothamsted.

For my own sake, I regretted that E. J. Russel, Director of the Station, was on his vacation when I visited Rothamsted. I was assured, however, that all the employees would be glad to talk with me, and that the guide would take me anywhere that I desired to go. This guide was a young agricultural student of Cambridge University, and was spending his summer vacation taking visitors over the grounds. He proved to be thoroughly familiar with all the lines of work being carried on, and took me into every nook and corner of Rothamsted.

**Wheat Continuously.**

My first wonder as I walked out over these famous fields and listened to the explanations of the guide was, why it was planned in the beginning so that crops would be grown continuously on the same soil. I soon learned, however, that when the experiments were planned about eighty years ago, little definite knowledge was possessed as to the why of soil fertility and crop production. For example, on Broadbalk field, the most famous of all, wheat has been grown continuously for more than eighty years. One plot on this field has had no plant food added in any form during this time. Another plot has received an annual dressing of fourteen loads of barnyard manure, while the other plots, some twenty in all, receive ammonia or nitrate salts or minerals in different combinations and amounts. The average yield of the unfertilized plot, up to 1912, was 12.6 bushels per acre, for a period of sixty-one years. The yield started at about fifteen bushels in 1840, and has fallen until now the yield seems to be about stationary at ten bushels per acre, with no sign of soil exhaustion. Such a crop is of course not a profitable one. Where the minerals have been supplied, but no nitrogen, as on plot 5, the yield for the same period has been 14.5 bushels.

On plots 6, 7 and 8 the treatment has been the same as on plot 5, except that plot 6 receives 200 pounds of ammonium salts, plot 7, 400 pounds, and plot 8, 600 pounds. The wheat on these plots proved to be regular stair steps, the three plots yielding an average of 23.2 bushels, 32.1 bushels, and 36.6 bushels respectively. These yields show the law of diminishing returns—that after a certain point little more can be secured from extremely heavy applications of fertilizer.

It has been found that fertilizers of soluble nitrogen are more effective for a fall-sown crop like wheat, when a small portion is put on in the fall and the balance in the spring. This is the way the ammonia fertilizers are applied, except on one or two check plots. The reason for this is that the wheat crop does not grow rapidly enough in the autumn to assimilate the nitrates as fast as they become available, and they leach out in drainage water during winter.

Plot 2, which receives an annual dressing of manure, has had an average yield for sixty-one years of 35.2 bushels.

I could not help wondering what would happen if the manured plot mentioned above were to receive also a liberal application of phosphoric acid, or if manure were added to plot 8, which now gets 600 pounds of ammonia, or, again, if all these plots were placed under a good rotation with clover. For it is very evident that on most plots some of the plant-foods are present in large enough quantities to support much larger crop yields. Fortunately we do get a comparison between the unmanured plot, wheat after fallow with no fertilizer, and wheat in a rotation with no fertilizer. Here are the yields, an average for fifteen of the same years:

Continuous wheat—

Broadbalk field, Plot 3....11.3 bus.

Wheat after fallow—

Hoos field, Plot 0 .....17.2 bus.

Rotation wheat—

Agdell field, Plots 21-22...26.9 bus.

The fallow plot is cultivated one year and planted to wheat the next. The rotation plots are grown in a four-year rotation with a legume.

As all these facts were narrated to me by the guide, I asked if all crops showed this ability to live in the same soil year after year. He replied that while certain crops, barley for instance, did almost as well as wheat, other crops did not have this virtue, due to insects, soil exhaustion, crop sickness, or a combination of all causes. He showed me the plot on Hoos field where potatoes were grown continuously from 1876 to 1921, when the yield got so low that it was evident the soil was exhausted for potatoes.

**Trying to Exhaust the Soil.**

In another experiment the object was to exhaust the soil completely. Oats were grown for a few years until they failed. Then barley was seeded for a few years, at first with good results, but later it failed. Now wheat is being produced on this ground with no signs yet of crop failure. The ability of wheat to grow where barley and oats fail is no doubt due to its deeper rooting habit and its ability to get much plant-food from deeper layers in the soil, but even this deep rooting habit does not keep some crops, as for example, red clover. In 1849 a start was made to grow red clover continuously, and in the next twenty-seven years red clover was seeded on this land fifteen times, but only seven crops were produced. Even after an intermission when no clover was grown and the land fallowed or cropped, only the first red clover crop following was successful. On a rich garden soil, however, red clover has produced tremendous crops, but the yield has declined for a period of over sixty years. It seems likely that "clover sickness," and not soil exhaustion, is the cause of clover failures where continuous culture is practiced.

On little Hoos field I saw the plots where they test the fertilizer and manures remaining in the soil. Here, the guide explained, was an experiment planned to assist tenants and landlords in settling disputes concerning fertility added to the soil by a tenant leaving a farm. As would be expected, soluble nitrogen fertilizers are used up by the crop, or leach-out, the first year. Basic slag has little or no effect on crops the first year. Rape-cake lasts about two years. Other fertilizers and manures are used up by crops at the rate of one-half the first year, one-fourth the second year, one-eighth the third year, one-sixteenth the fourth year, etc. These experiments show, therefore, that a small amount of fertilizer remains in the ground almost indefinitely.

**Miscellaneous Tests.**

On some temporary plots the comparative efficacy of French and German potash was being tried out on potatoes. On this field, too, a new fertilizer is being tested, a barnyard manure made by spraying straw piles with a substance which causes their rapid decay. The substance used is a culture of bacteria in a weak ammonia solution such as urine, or ammonium sulphate. When straw piles are treated with this spray they decay rapidly, and rot down into a mass looking like untramped manure. Considering that the spray itself contains ammonia and that a straw pile so treated would have little chance for leaching, the manure resulting from this process should be a very effective fertilizer. The idea for this process came during the war, when the country needed high food production, and this offered a method of getting fertilizer more cheaply and quickly than by ordinary methods. The fact that materials used are inexpensive is of course an important advantage.

Another new and interesting experiment which is being tried out at Rothamsted is the stimulation of crop growth by electricity. The work is carried on by passing a weak current through the soil. This has been tried out in pot cultures and on half-acre plots, with an increase of growth on those plots of about 20 per cent. While this fact may never be of practical importance on a large farm, especially while the cost of electricity is so high, it may have its uses in greenhouse or other intensive farming. The mere fact that crop growth is stimulated by an influence like an electrical discharge, is in itself most interesting.

**Drainage Losses Tested.**

The work which has been done at Rothamsted on drainage, and especially the analysis of drainage water, is the oldest and most extensive in the world. The amount of water draining through soils at twenty, forty and sixty inches in depth, has been measured since 1870 by specially constructed rain gauges. Each plot on Broadbalk field is tiled lengthwise, and all of these tile empty into a brick trough which extends the entire width of the field. From these drains the water can be analyzed at any time, and from this field and from the drain gauges themselves come a goodly portion of our knowledge of losses of fertilizers, lime, etc., and losses from different cultivation methods.

The field experiments at Rothamsted are all connected with the soil and with its relation to crop production. Experiments in plant breeding, animal breeding and nutrition, etc., are carried on at other institutions. In the laboratories at Rothamsted a large force of trained employees are engaged in making analyses and studies of different sides of soil work. Entomologists are making studies of the insect life of the soil. As many as 7,000,000 insects of different species per acre are found in these soils to a depth of nine inches. This means more than 100 to each square foot. The number is found to be much greater in plots wrich receive barnyard manure.

A very interesting incident occured recently in the bacteriological laboratory, when a phenol of carbolic acid solution was used to sterilize a soil, and subsequent counts showed more bacteria present than before. Repeated trials proved that there is a group of bacteria in the soil which actually feed on phenol, and which this solution is fatal to most forms of bacterial life, these particular strains grew, developed and multiplied on it.

These are a few of the things one can learn by spending a day at Rothamsted. One must admire the unselfish work of Sir John Bennet Lawes, his tenacity of purpose and his noble endowment of the station. Much credit must go to his chief aid and adviser Sir Joseph Henry Gilbert, to whom much of the painstaking work at Rothamsted for the first sixty years can be credited. The foresight and earnestness of these two men may well serve as a guide to experimenters throughout the world. To their earnestness, their devotion, their far-sightedness and their unselfishness, scientific agriculture is indebted for the information and experience of eighty years of continuous field experiments, and the laboratory analysis and deductions which form our greatest single store of knowledge of the soil and its functions in existence to-day.

## Nitrogen Is Free.

Of course, there are times when it is advisable to buy nitrogen. But this is not necessary when a proper system of farming has been followed. Why should we buy this expensive plant food element when there are millions of pounds circulating over every farm, and when it is possible to take this nitrogen from the air and lock it up in the soil where it can be released for the use of plants? Furthermore, it is not only inexpensive to take the nitrogen from the air and put it in the soil, but the process can be carried on while the farmer is making a profit out of the field. This can all be done through the proper use of legume plants. This proper use of alfalfa, clover, sweet clover, vetch and other legumes is certain to be the foundation of our future agriculture. The farmers who learn their lessen early will have greater advantage from it than those who are tardy in taking full advantage of these nitrogen-fixing plants.

Use a pure-bred sire if there is one in the neighborhood. Scrub stock costs much and returns little. Sell or eat the scrubs.

## How We Waged War on the Quack Grass.

Not long ago quack grass, one of the greatest plant pests, appeared along the roadside which borders our farm. The plot was about two acres, and is a gravelly loam soil. We immediately plowed the whole tract of land from the fence to the wheel track. In fact, we even moved the fence back several feet to enable us to keep the roots under control, then dragged the plot with spring-tooth harrow, following it up with the disk harrow, which aided much in destroying the rootlets. Sprouts appeared after a few weeks and the plot was harrowed again.

Each time, as it was harrowed, we went over the ground with a mattock, and grubbed out the grass the grew close to trees and telephone poles. Usually we dragged the plot every three weeks, which was quite sufficient to keep the grass down.

After two seasons we planted potatoes on this ground and realized a fair crop. Not a spear of the grass may be found along our roadside today, though our neighbor's farm across the road is literally overrun with it.

Occasionally some of the grass sprouts along a fence. These are usually well-bunched patches, and we have found that tarred-paper roofing, spread over the grass with edges slightly lapped, smothered this invasion when well weighted down with sod and stones.

A stone pile located on a quack-grass patch will exterminate it quickly if the stones are well heaped and there are enough of them.

Around fence posts, frees, and stumps, where the paper cannot be applied, the plants must be dug out every three or four weeks, and after a season or less they will die out. This work is best done when the ground is dry. Salt is sometimes used to kill small clumps of the grass, but as a rule it is too expensive to be of much value as an exterminator.

## Why I Plant Gladioli.

The gladiolus is about the most satisfactory farm flower I grow. It is beautiful, blooms over a long period, can hardly be excelled for cutting, and needs no painstaking care.

I never need to get down on the ground to weed gladioli out, for they come up so soon and with such heavy stalks that an occasional hoeing will keep them clean. No pruning or disbudding is necessary, and I have only to cut the stalks when the first two or three blooms are open to have them last in the house for a week. And if I leave them on the plants when the first spike has ceased to bloom, one or two less vigorous spikes will follow. In range of colors and shades they rank among the best, and never appear coarse in texture. In short, they are fine flowers, and have become one of the most popular for summer sales in the cities.

I never have any trouble keeping the bulbs over winter. They need only to be kept from frost and in a dry place to come out in the spring in perfect shape. They will keep very nicely on a shelf in a dry cellar.

As they increase quite freely, you can soon have a fine collection without much cash outlay.—Agnes Hilco.

## An Incinerator for Every Home.

An incinerator in which to burn refuse should be in every home, as it lessens the danger of fire and prevents burning papers from being scattered by the wind. We keep ours setting by the back door and all waste is thrown in, such as rags, papers, etc. When it is full it is carried out away from the buildings and set on fire.

A piece of small mesh chicken wire about three feet high and ten feet long formed the cylinder part and was reinforced by pieces of heavy wire being lashed to the top and bottom and four pieces up and down the sides. Two pieces three feet square formed the top and bottom and were fastened to heavy wire circles and the bottom was fastened to the cylinder all around. The top one, or lid, was hinged to one side and a piece of loose wire placed on the side to fasten it down when the refuse was being burned.—J. L. F.

## Hogs on Pasture.

The successful hog grower knows the value of good pasture. He is not only able to keep the young pigs growing rapidly and continuously, but he is also able to keep his stock hogs in the pink of condition through the use of green feed. In turning the hogs out, it should be the aim of every farmer to see that the animals have shade and water. If natural shade is not provided, then some sort of artificial shelter should be constructed. Plenty of good fresh water should also be made easily available to the animals.

## Chinese Eating More Meat.

The old prejudice against the consumption of meat in China has gradually broken down. Beef particularly is now being largely consumed. The cow is used so extensively in China for power purposes that if its flesh were used for food a scarcity of animals for farm work would ensue. It is only within the last decade that the movement of using cattle for food has started. Canned meats are now being sold there in large quantities.

The steamers Majestic and Leviathan are each 100 feet wide.

# Parents as Educators

## That Problem of Obedience—By Edith Lochridge Reid

Have you ever stopped to consider that most of the annoying things that children do are not deliberate disobedience? Most of the time they act either thoughtlessly or through mistake.

Just glance over to-day for instance in your own home. You feel tired and nervous and know that things have seemed to go wrong. And you probably have scolded the children for doing things that made you trouble or work. But did they really mean to?

Julia tore her new gingham dress climbing a tree to rescue Muggins, the pet kitty. Now Julia didn't say, "I'm going to climb this tree and tear my dress because mother isn't looking." But she came along home from school and saw poor kitty yowling from the topmost branch, where Fido had chased her. And in Julia's heart was just one desire,—to help her pet down. She acted on impulse and not because she intended to disobey.

Now the hole is in the dress and has to be mended,—but surely if we think of the accident as such and not as a direct disregard of our commands, we can feel no resentment toward the child. We mothers all tore our dresses when we were small and our mothers had to mend them. So let us not classify such acts as these under disobedience. But let us now consider another incident. You have told Julia not to loiter on the way home from school; but she goes over to Mary's and plays until five o'clock and you do not know where she is. This is direct disobedience. But right here is a secret which every mother knows although she may not admit it. If a child has been consistently taught to come home at once from the very first day she started to school, she will never go to another child's house and stay until five o'clock without permission. This is the vital point. There must be no hit-and-miss obedience. To spank a child one day for loitering and then go off to the club the next day and leave her to wander about as she pleases after school is not consistent discipline and any child soon realizes this. Constant obedience becomes instinctive habit, and the success of the whole system depends on starting in time to discipline and maintain a steady hand even though it sometimes is inconvenient for the parents.

When baby first starts deliberately to throw his spoon off his high chair and throw his porridge about, that is the time to teach obedience to the laws of table manners. When he first hits you with his little fist because you have reproved him for a misdemeanor—that is the time to instil into his mind a respect for authority, and do it each time he strikes until it becomes a habit with him to respect you and your commands.

The secret of making obedience a habit is keeping a steady hold over the child's actions and directing him always in each little action until deliberate disobedience is reduced to a minimum. To forbid the child not to do a thing one day and then to permit him to do the same thing the next day is a course of action which gives him no definite idea of what real obedience is. "Consistency—thou art a jewel" is no more truly applicable anywhere than in discipline of children. And the next law of successful training in obedience is to discriminate wisely between the act of impulse and the malice-aforethought conduct.

# THE CHILDREN'S HOUR

**How Boys and Girls Make Money.**

Everywhere bright boys and girls are eager to earn their own spending money. A teacher of Fourth Class boys and girls placed this question as a subject for their English work: "What are you doing, or what have you done, to make money?"

A very few admitted that they had earned none at all. The answers of the others, greatly condensed, are given here as suggestions to our young folks who are anxious to make money.

The champion money-maker set up a bicycle repair shop in a shed back of his home, and in the two months' vacation earned $98, above expenses for materials. Others wrote:

"I load the bread wagons that go out from a small bakery near my home each morning."

"I take care of a neighbor's baby for three hours every Saturday and am paid a dollar. Occasionally the child is left with me during the evening, at the same rate, while the parents attend some entertainment."

"I take care of a neighbor's chickens while the owner takes trips or goes visiting."

"I work in the mailing-room of an evening paper, at fifty cents an hour."

"After school each day I work in the package elevator of a store, at twenty-five cents an hour. Usually put in about three hours."

"I chop wood at twenty-five cents an hour, earning about $2 a week and strengthening my muscles better than in the gym."

"By cutting neighbors' lawns and our own I usually earn $1.50 each Saturday."

"Cutting fruit at a cannery during the summer gives me all my spending money for a year. One can put in whatever time wished and is paid thirty-five cents a box.

"I deliver papers from an auto—750 a morning—and am paid a regular salary of $20 a month. A man drives the car."

"I raise pigeons all the year round and, having found a regular market, clear good money."

"I sell papers in a hospital, carrying several kinds and a weekly magazine."

"Caddying at the gold club pays me from $1.75 to $2.75 a day. They pay seventy-five cents for a 9-hole game, $1 for 18 holes. By carrying two bags whenever I can, I double my money."

"I raised poppies on a vacant lot, and cleared $100 selling seed. Sold a few blossoms, but the seed is more valuable. They are easy to raise, though they require plenty of water and regular watering."

"I raised parsley to supply a certain meat market the year round. I raised it outdoors in the summer, and in boxes indoors in the winter."

"I sorted lemons at $2 a day during the summer, and do it occasionally on Saturdays."

"I spend but four hours a day in school, working afternoons in a telephone office at $12 a week."

"I crochet yokes, babies' caps and boudoir caps for a friend who owns a dry goods store."

"I make kites for little boys and those who do not know how, using bright colors, odd shapes and fancy tails."

"I raise and advertise choice bulbs."

Painting leather goods for a novelty store made one artistic girl's pin-money.

One of the boys, almost grown in size, ran a press to make bottoms for [illegible], receiving a salary of $22.50 a week.

An older girl mends the family stockings and those of an overworked neighbor. One picked berries on a ranch, any number raised chickens and rabbits and made gardens of their own, not a few running little market-stads along the highways, putting up attractive booths, selling flowers, fruits, eggs, and produce of all kinds.

## Curing Clover for Poultry.

There is so much talk about clover as winter feed for laying hens that I thought I would explain how to cure it to the best advantage. Clover is one of the best and cheapest foods for the poultry, as it can be stored and used as green food during the winter. To obtain the best results, clover should be cut from early to full bloom, for not only at this time is the largest per cent. of the food value in the clover, but if cut at this time a second, and even a third crop can be harvested.

The nitrogenous elements of the clover are the most valuable for feeding purposes and it is therefore important to cut the clover at the time of their greatest development. Cutting the clover at just the right time and curing it so as to prevent the loss of these valuable elements will result in a feed of real value the coming winter.

The clover should be cut during the latter part of the day when it is free from dew and moisture, for this will save time in curing it. The following day after the clover has dried and wilted, shake it up and turn it over. Let dry until the leaves are nearly dry. However, if left too long, the leaves will crumble and be lost in the handling of the hay. Turn it once more and give it another hour of sunshine and it is ready to be bunched into cocks. Keep these small and turn them over the second day, then on the third or fourth day you can put the clover in the haymow.

Clover cut, cured and harvested as above should come out of the mow in winter sweet and nice. The clover can be fed to the fowls by simply throwing a bunch of the hay on the poultry house floor every day or two, letting the fowls strips off the leaves and eat them as they choose.

Another good way is to cut up the clover very fine, using about the same bulk of cut clover as of grain, cornmeal, wheat middlings or whatever is to be fed with it. This should be thoroughly scalded and cooked. When it is to be fed in the morning the mess should be prepared the evening before and allowed to stand in a covered kettle and steam over night. Enough water should be used to make the mash moist. If the mash is so dry as to crumble it is apt to be wasted. Clover fed in the form here outlined or in the shape of meal is a wonderful aid to egg production for hens.

We heartily pray Thee to send Thy Holy Spirit into the hearts of them that possess the grounds and pastures of the earth, that they, remembering themselves to be Thy tenants, may not rack out the rent of their houses and lands.—A Prayer for Landlords, from the Prayer Book of King Edward VI.

Keep live stock that keeps you. Underfed live stock never pays. Scant pasture, poor feed, and poor animals are only a burden of expense. Why pay the bills?

Calves with ring worm should be given a good scrubbing with soap and water and the affected parts treated with some such mixture as sulphur and lard ointment.

# METHODS OF REARING QUEENS

The queen is the mother of the colony, and unless she is a good one the colony cannot be productive. It is, therefore, necessary that all beekeepers should pay particular attention to the quality of their queens.

Although it is sometimes necessary to purchase queens from professional breeders, it is often advisable and more economical for the beekeeper to rear his own queens from colonies showing desirable characteristics. The chief characteristics required in breeding queens are: prolificness, vigorous offspring, non-swarming tendencies, purity of race, gentleness, disease resistance. Only queens having these characters should be used as breeders.

The easiest method of rearing a few queens from selected stock is to remove the queens from the colonies at the beginning of the main honey flow. Ten days after the queen is removed, ripe cells will be found in the colony; these can be removed carefully and used for requeening other colonies or placed in prepared mating boxes. The same results may be obtained by caging the queen within the hive for ten days. Another simple plan, where only a few cells are required is to place a newly drawn comb into the colony containing the breeding queen. As soon as this comb is filled with eggs and young larvae, give it to a queenless colony or one in which the queen is being superseded. In ten days this comb will contain a number of ripe cells ready for distribution.

The following plan is a good one where a larger number of queens are required and is one that was used extensively by the late Dr. Miller. Into a new frame place two pieces of foundation about three inches wide at the base and tapering down to a point reaching nearly down to the bottom bar of the frame. Place this frame in the colony containing the breeding queen. In a few days the foundation will be drawn out and filled with eggs and larvae. Trim away the edges of the combs down to the youngest larvae and place the frame in a strong colony from which the queen has been removed. In ten days this frame will contain large numbers of ripe cells.

Most queen breeders use the artificial queen cups, as conditions can be controlled most readily by this method. The queen cells are made by dipping a stick with one end carefully rounded to the size of a queen cell, into melted wax and allowing it to cool. Repeat the dipping four times. The cell is then removed from the stick and is ready for use. A large number of these cells can be made in a short time. The cells can be fastened to a special carrier by a drop of hot wax or each cell may be fastened to a separate wooden base and then placed on the carrier.

The cells should first be primed with as small amount of royal jelly, taken from a natural queen cell, and young worker larvae, not more than two days old, are carefully transferred from the comb to the artificial cells. Care must be taken not to let the larvae get chilled or dried out. As soon as the cells are grafted they are given to a colony that is superseding its queen or to a colony that is made queenless and most of its brood removed. Then days later the cells will be ripe and ready for distribution.

Queen breeding equipment can be obtained from most of the dealers in bee supplies.

More complete details of the above methods can be obtained from any of the text books on beekeeping.—C. B. Gooderham, Dominion Apiarist.

## A Lost Ship.

It lies beneath the waters, fathoms deep,
Rotting and rusting through the centuries;
Dand morses hide its golden piracies
And sea snakes through its broken cabins creep
And o'er its sunken treasures vigil keep;
Bones whiten on its slimy, gutted deck
And great fish at this human fodder peck,
While o'er its masts grim monsters whine and leap.

Sometimes the divers, like strange idols clad,
Descend upon its ruined, ancient hulk,
And shudder, as they watch the sea folk skulk,
Trailing the misty wraits that noiseless pad
Through this drowned ship that sailed from Salem town,
And left no man to tell how it went down.

—Charlotte Becker.

How many sticks go to the building of a bird's nest?—None; they are all carried.

Grow root crops on small pieces of new land. They yield heavily and make good feeds, besides furnishing vegetables for the table.

Monotony is bad for the nerves; it is a good plan to change the small details of your daily life, if possible, in order to bring a fresh interest.

If a dairyman will consistently use the very best herd sires, it is possible for him to obtain and select the very best females in his herd for breeding purposes, he can double production in four generations, claims R. W. Wade.