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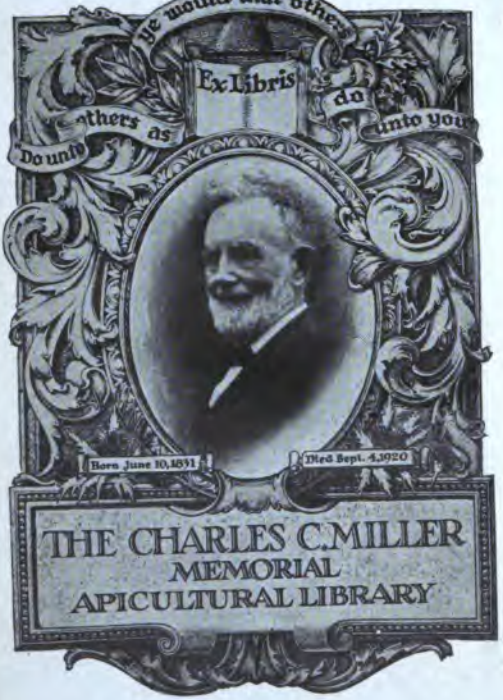

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THE BLESSED BEES

BY

JOHN ALLEN

NEW YORK
G. P. PUTNAM'S SONS
182 FIFTH AVENUE
1879

PREFACE.

THIS record of a year's work gives the experiences and results of my beginning in a business which is to me a constant pleasure, and the source of a good income. Bee-keeping, by old methods, was believed to be ruled by chance; the bee-keeper who had good luck obtained some honey from his hives by the slaughter of his bees over the brimstone pit; the bee-keeper who had bad luck found himself, sooner or later, the owner of a beggarly array of empty hives. Bee-keeping, by modern methods, depends not upon luck but upon knowledge; it is an art just as much as growing wheat or fruit or stock; the profits which may be gained from it are just as certain as the profits from any other branch of rural labor, and are much larger.

To write these chapters has been to me a labor of love. I hope they may serve in some measure to diffuse a knowledge of bee-culture, and to call attention to its pleasures and its profits.

JOHN ALLEN.

LINNSWICK, MARCH 11, 1878.

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THE BLESSED BEES.

I.

CLOUD.

My room was No. 14 in the old boarding hall, just at the head of the first flight of stairs. I stood at the window watching for the mail-boy, who was much later than usual that night. For an hour he had been due. It was a long and weary hour to me, during which study had been impossible. After what seemed an endless time I heard his step coming by the college. I forced myself to sit down quietly at the table. The boy would distribute the mail in the steward's rooms below in a few minutes, and as he came up stairs my room was first. I should soon know if there was a message for me. No news would be good news. I listened eagerly and soon heard his step on the stair. Would he pass my door? I hoped so, fervently. He came on. He stopped and knocked. He had something

for me. It was, as I feared it would be, a telegram. My nervousness had gone, I was quiet now. I opened it and read:

Your father is worse. Come home at once.

MARY ALLEN.

My hope was gone now. I knew my mother would not have sent such a message unless there was real danger. There was no time for anything but action; indeed, there was scarcely time for that. I asked my chum, Tom, to pick up my things, ready for packing, while I should go across to Bircham's for a horse and wagon. On the way over I stopped at the President's door, and obtained leave of absence from college. It was after nine o'clock, and Bircham had gone to bed. But I roused him, and he promised to be at the boarding-hall at five o'clock in the morning. The train left Lansing at six, and an hour would give us ample time, especially if we took the lower town road, as it was best to do, since they were grading the other. When I got back to the room Tom had everything ready for packing; but before beginning, I went to the rooms of several of my special friends to say good-bye. They were manly fellows, full of pluck and kindliness. They all wanted to help me, but there was really nothing they could do, and they had the good sense to see it, and not trouble me. Then the old trunk was soon packed. Tom said he

would call me at half-past four, and insisted on my going to bed. It was not easy to sleep, at first it seemed impossible. But I knew that for several days I must be able to give solid help at home, and should need whatever strength I had. After an hour of determination sleep came. At four o'clock I awoke, without Tom's calling, and at once prepared for my journey. When all was ready, and my trunk waiting in the hall, I went down for a few minutes to the college grounds. They were very dear to me, and the feeling was strong upon me that it might be years before I should see them again. The walks, the old oaks on the lawn, the young oaks in groves, the flower garden, the greenhouses, the vegetable garden,—in the ten minutes at my disposal I glanced at them all. I had done many happy hours work in them. They had brought to me a wealth of beauty. How beautiful they were in the early light of that quiet September morning! On returning to the hall I found Bircham at the door, and my belongings already bestowed in his one-horse lumber wagon. Tom and I shook hands, and the wagon drove off. I looked back when we were nearly at the plank-road. Tom stood at the horse-block. He waved his hand and turned into the hall. In a few minutes the oak woods shut the college from sight. This was years ago, and I have not seen it since. Year by year I hear of its growth

and prosperity, and am glad. It was a happy home to me for almost two years.

Bircham was not a talkative companion, and left me to myself. The station was reached in time, soon the train came up from Jackson, and I was on my homeward way. Once seated and going on as fast as steam would carry me, I had time to think. It seemed certain that my father was in serious danger. Two days before, my mother had written that he was ill of typhoid fever, but had bidden me stay quietly at my studies, for she would send if there was any danger. She had sent. There was danger, danger that in the prime of life my father should go away to return to us no more. The tie by which each member of his family was bound to him was very strong. His clear sense, his sympathetic nature, his love of home, had made him a friend and companion to us all. He was sick unto death and I was seventy miles away. It seemed as if no train ever went so slow, that no hours ever were so interminably long. When the brakeman shouted "Portland," it seemed as if we had been all day on the route, but it was only a distance of twenty-six miles from Lansing. I settled down into the corner of the seat, pulled my cap over my eyes, and resolutely tried not to think. To this end I began to repeat in order all the propositions in my text-book in Geometry. But the effort not

to think of home, and what at that very moment might be taking place there, was vain. The familiar words of the geometrical propositions were mechanically repeated, but my mind was elsewhere. I remember now that it was a sunny day, and that often hundreds of acres, covered with brilliant golden-rod and coreopsis, offered a gorgeous expanse of richest gold. But for me the skies and fields were leaden.

The weary day wore on, and just after noon the train reached Howard. As I stepped upon the platform my brother Will met me. He said only, "Father is very sick. I came over early this morning, and brought Jack for you to ride home. Leave your trunk with the stage-driver, to come on in the morning." In five minutes we were on the way. The horses had been fed at Howard, and had rested since eight o'clock that morning. The roads were good. It was only ten miles home. Without unduly urging our horses, which were daily used on the farm, we could make the distance in an hour and a half. I learned as we went on that father had been somewhat ill for a week. Three days before, he became worse, when the first letter had been sent to me. The morning before, the doctor had expressed doubts of his recovery, and the telegram for my return had been dispatched. He was failing rapidly when Will left for Howard that

morning. If we would see him alive we must reach home soon. Our good farm-horses seemed to partake of our eagerness. The day was growing cool, and, for animals not used to the road, they made good time. In an hour and a quarter we reached the home clearing. Our log-house was a quarter of a mile further, at the opposite side of the "forty." We could see the doctor's gig, and the horse of a neighbor, at the gate. In a moment our horses were there also. As we went up the path the door opened, and my mother stood in the door-way. A glance at her face told me all. My father was dead.

I will not relate the incidents of the next few days. Into every home Death has come. All know the deep experiences of sorrow. All have felt reluctance to speak of those sacred experiences to others. It is enough to say that kind neighbors from all about us gave friendly help. Not a few told of the good words and deeds of him who was gone away. September gave one of its brightest days for the funeral. After the "earth to earth" had been said, we returned to our home,—a home full of sorrow, indeed, but not desolate, for we had glad memories of his pure life and his loving heart. There were, too, very strong ties of affection between us all, that gave us now strength and courage. Each helped the other to bear the burden.

The beautiful day was drawing to a close as we reached home. A neighbor woman desired to remain and help my mother for the night, but mother said no. She preferred that we should be alone. We all avoided mention of our sorrow, and all began the usual evening work of the farm and house. It was better so. When we gathered in mother's room at last, for the evening hour before our early bed-time, she read to us the fourteenth chapter of St. John, and as she read the humble room seemed pervaded by a strengthening spirit. Surely it was the presence of the promised Comforter.

II.

GLEAM.

ON going up with Will to our attic-room it was impossible for me to go at once to sleep. My father's sudden death brought a great change to us all, a change about which I could not help thinking. He had been fairly successful, as success is counted among pioneer farmers. He had begun to care for himself when a boy of thirteen, and from that time had been dependent entirely upon his own labor. He had given himself a good education, married at twenty-six, moved from the East upon our present farm six years later, had put up good log buildings, cleared sixty acres and subdued it thoroughly, put out, ten years before his death, fifteen acres in apple trees, kept his farm well stocked with such animals as were needed, and, at his death, left everything free from debt. As such things are calculated in the backwoods of Michigan our prospects were by no means desperate. Will and I were accustomed to hard work. We could easily take care of the farm, and do it well. And the farm would take care

of us; that is, we should have enough to eat and wear, and could live as did our neighbors. But father had often talked over with us his plans for the future,—plans, as to his children, far different from merely living on the farm from year to year, with scarcely more culture than the oxen that pulled our plow. For farming he had a strong liking. For the intelligent farmer he had a high respect. But farmers who submitted to be tyrannized over by their acres, their crops, and their stock; farmers who cared little for the best education for themselves and their children, roused in him a manly indignation. He had sent me to Lansing to attend the Agricultural College, expecting that I would graduate there, then spend two years at Harvard. Will was to have a similar course. He hoped that we would, after our school education was finished, choose farming for a profession. But in this we were to be free to follow our own bent. My sister Lucy was to go to Cornell when prepared for college, and bring to his country home, when she graduated, all the womanly grace and culture that the schools can give.

As I thought over, in the stillness of that lonesome night, these plans and hopes which had been so dear to my father, there seemed no chance of their accomplishment in the case of Will and myself. We must look after the farm, keep up the home for

us all. Probably we should be able to give my sister the culture which had been planned, but our own education must be given up, so far as college and association with other students, were concerned. The thought was very bitter. More bitter than this, however, was the thought that mother must continue her severe toil. We had hoped that in another year she might have rest from the self-sacrificing care she had for many years given her family, go for a long visit among early friends in Massachusetts, and take up many of the threads of life that had been dropped since she had been a pioneer in the backwoods. This hope, also, must, for the present, be given up. She could not leave her family. If she could have done this, there was no way to get the money for her expenses. She must go on for years in the old way. Nay, perhaps her labors and self-denials would be increased.

The prospect, certainly, was not bright. I shrunk from no hard work. I was willing to struggle against difficulties and endure poverty. But for mother, rest and change were necessary. Will and Lucy were worthy of the best culture the schools could give. My own hopes seemed to me honorable and worthy of accomplishment. To give all these up was a grievous disappointment. It was far into the night before I could quiet myself for sleep.

In the morning I began with Will the farm-work.

The wheat was already sown, twenty acres of it. But potatoes were not dug, nor corn husked, nor buckwheat threshed. The orchard was now yielding well, and the apples were to be gathered and marketed. As we worked we discussed the future. Will agreed that for him and me our father's plans must be given up. He assented more easily than I had expected, but I think he did not fully realize what the giving up those plans meant for our whole lives. He was a year younger than I, and he had not been waked up by two years at college. Our farm was well located on a gentle rise sloping to the east and south. Through its southern and western parts ran a good-sized creek, one of the feeders of the Muskegon river. Twenty acres of the land along the creek had never been cleared, and both up and down the creek this forest extended far beyond the limits of our farm. Our fields and fences, orchard and buildings were all in good condition, and it was a real delight to push forward our work during the fine days of the last of September and the first of October. The potatoes were not an average yield, the season in July had been a little too dry and hot for them. But the corn yielded largely, and the buckwheat gave an excellent crop. But our principal labor and pleasure were in the orchard. This had been father's special pride. He had procured the best varieties of apples adapted to

our climate, and had cared for them in the best manner. All the approved works on fruit-culture had, from year to year, found their way to his shelves. He had been an authority on apples through all the country. The orchard had never given so large a crop as that fall. There were seven hundred trees, and nearly all were well laden. There were scarcely any orchards in the vicinity in bearing condition. When ours was first put out father had been looked on, by many of the surrounding farmers, as a foolish visionary. But he had looked ahead. He foresaw that the country would rapidly develop; that the great lumber regions near us would give a large market for apples; that railroads would be built and thus an outlet secured to the markets south and west. So he had contented himself with log buildings, and had planted the orchard. Now his wise forethought came to our help when he had forever gone from us.

To gather the apples and take them to market was by no means a small work. But experience in former years with smaller crops had taught us how to manage. A portion of the crop was to be marketed at once, a portion was to be stored for marketing in the spring. Our apples were well known as of the best quality. The buyers in Howard were competing somewhat for superior fruit, some desiring to send it to the lumber camps,

others to ship it south. We determined, therefore, to market our crop there. In marketing the previous smaller crops we had used four large wagon boxes, made long and high, in which to haul the fruit to Howard. After wheat sowing with us, there is a lull in work, so we easily procured pickers to gather the fruit, and three teams, in addition to our own, for hauling it. The light ladders, the baskets, all the appurtenances for picking were in good order. It was on a most beautiful day that the four wagons, each with one of the large boxes on it, were driven to the orchard, and the pickers began their merry work. We began picking just after dinner, so that the fruit might be perfectly dry. Before night the boxes were filled, and covered with blankets to protect them from the damp night air. Early in the morning we went to Howard, sold the four loads, deposited the money in the bank, and were home again at noon. In the afternoon the pickers were again at work, and the wagons were filled in readiness for the next morning. So the work went on until we had drawn to market, and sold for cash, 3,169 bushels—all of our crop which was to be sold that fall. We received 73 cents per bushel. After paying all expenses of picking and hauling, our crop of apples, for fall market, netted us the comfortable sum of $1,196.47. The average yield per tree had been more than seven and a half bushels.

The Roxbury Russets were to be kept until the spring. They were put in large piles on sandy knolls in the orchard, covered with straw and then with sand until safe against the severest frosts. We knew by experience that they would keep in this way perfectly. The yield was about the same per tree as the other part of the orchard. We buried 2,080 bushels. The profitable yield from the orchard gave me much encouragement. It promised rest and change for my mother, and education for my sister. It would increase in productiveness for several years to come. Should the yield average as large as it had been this year I was now quite certain of our ability to do many things which had been talked over in my father's plans.

Under two or three of the apple trees nearest the house were ranged some hives of bees. They had been special pets of my father's. He enjoyed seeing them, and hearing their industrious hum. He had been taught in his youth to keep bees in the old way, and as he had never expected any profit from them he had kept them as he was taught. They were in box hives, with a place for putting small honey-boxes on top. We had usually obtained enough honey for family use; sometimes there had been a few score pounds to sell. Now that the pressure of fall work was over I went one day to examine these bees. I found seventeen swarms in

good, common, box-hives. There had been ten the previous spring. The increase for the year had been but seven. The boxes had been put on the last of August, and were nearly all full, so that now I took from each hive an average of twenty-four pounds of good box-honey. I learned that father had taken from the ten old hives thirty pounds each just after white-clover, in July. Thus the result of the ten hives for the year had been over seventy pounds of good comb honey per hive, and an increase of seven swarms. A very good result, indeed, as it then seemed to me, for I knew scarcely anything about bees or their management. While at the college I had seen bees in movable-comb hives, and had two or three times heard Prof. Cook speak in most enthusiastic terms of the pleasures and profits of bee-keeping. With the superior wisdom common to boys of sixteen, I had regarded his enthusiasm as an amiable weakness, and had smiled at the idea of making much money from so small a business as keeping bees. I had, however, procured a copy of his little *Manual of the Apiary*, intending to give it to father that he might get some hints to increase his enjoyment with his pets. Now I went to my trunk and looked out the book, to see if it had anything to say about wintering bees, for I remembered hearing father say that this was the great stumbling-block in the way of successful bee-keeping. Often

a large portion of the swarms would perish in the winter; sometimes the sorry bee-keeper would find himself in the spring the owner only of a long array of empty hives. Our bees had done so well for the season it seemed worth while to winter them if possible, so to Prof. Cook I turned for knowledge.

As I ran down the index page my eye chanced to strike the words *Profits of Bee-keeping.* I turned to the body of the book to see what the profits were. I was much surprised as I read, and thought at first there must be some mistake. After reading the passage over three or four times it seemed certain that it said what the author had intended to say, but the statement seemed quite incredible. He said: *An experienced apiarist may invest in bees any spring in Michigan, with the absolute certainty of more than doubling his investment the first season, while a net gain of four hundred per cent. causes no surprise to the bee-keepers of our state. During the past season an investment in bees has returned to me five hundred per cent., and though this has been a good season for honey, yet I have done better than this several times. No less than three farmers of our state who possess good improved farms, and also keep about one hundred colonies of bees each, have told me within a few weeks that their income from their bees far exceeded that from their farms.*

These statements at first seemed so wild as to be

simply absurd. But when I came to compare them with the proceeds of our ten swarms in box-hives for that very year the absurdity all vanished. Our account with our ten swarms would have stood as follows:

CR.		
By 708 lbs. box honey, at 20 cts. per lb. . . .		$141 60
" 7 swarms, at $5 00 each, ...		35 00
		$176 60
DR.		
To 7 new hives, for increase, at 50 cts. each, .	$ 3 50	
" 162 5-lb. honey-boxes, at 10 cts. each, . .	16 20	
		19 70
Net gain in one year on 10 swarms, .		$156 90

Common black bees in box-hives were worth at that time in our neighborhood $5.00 per hive. Our ten swarms in the spring, then, represented an investment of $50. On this investment we had cleared that year $156 90—or more than 313 per cent. If, with black bees in box-hives, we had been so successful, might it not be reasonable that with Italian bees in movable-comb hives, and the skillful use of all modern appliances, a gain of 500 *per cent. per annum* could be made, as Prof. Cook had said? His statement no longer seemed absurd. His little book on bees had set me thinking—thinking so seriously that I went about in a dreamy state for a week. Was there not in these bees a chance for me to

achieve the culture, the travel, the good works in many ways for our family, which my father had planned for so many years, but which his untimely death had blighted?[1]

[1] The figures refer to the notes in the appendix.

III.

UTOPIA.

IN the little book on bees there was an advertisement of a monthly periodical, devoted to bee culture. I sent for a specimen copy, which came in a few days. It was read with great interest, and corroborated all the statements in Prof. Cook's book as to profits. In this periodical, I found advertisements of two others, devoted to the same subject. I sent also for specimens of these. When they came and were read, I sent subscriptions for a year to each of them, and purchased all the back volumes of one of them. I sent also for Quinby's *Mysteries of Bee-keeping*, and for Langstroth on *The Hive and Honey Bee*. These two books were both most excellent in their time, but the improvements in bee-keeping since they were written, have been so great, that in many things they were not up with the times. Prof. Cook, and the three magazines, and the back volumes of the one, became my text-books, and were most diligently studied.

Meanwhile the season was running on. I learned

that bees had usually wintered best in good, dry cellars, perfectly dark, kept at a temperature of 40 to 45 degrees. I prepared our cellar, and at the proper time put the seventeen swarms into it. Then other preparations were made for winter. Wood was to be hauled and cut. Will and I soon hauled from the woods along the creek, an abundant supply. It had been corded there the winter before, and was now in good condition. A man, who ran a horse-power saw, was engaged for a day, and a tremendous pile of wood was sawed. Barns, stables, corn-cribs, cellar, wood-pile were now ready for the severe weather which winter always brings in this latitude.

I had engaged to teach the school in an adjacent district for four months, at forty-two dollars per month. It was three miles from home, and I should need to remain in my district from Monday morning to Friday night. Lucy, it was determined, should board near the school-house in my district, and attend my school. As this would leave the family at home rather small, mother decided to take the teacher in our own district to board for the winter. This teacher was a warm friend of mother's, and would be good company for her during the winter. She was in everyway a competent teacher, and Will would be one of her pupils. He would look after the stock nights and mornings, and be "man of the house."

My school began the middle of November. It was not difficult to manage. I enjoyed teaching. For me there was a pleasure in teaching the three or four little children how to read by the word method. And the daily drills in grammar, arithmetic, and geography were so pleasant to me, that the pupils soon caught my spirit and made rapid progress. All external facilities were of the most meagre character, as they must be in a new country. The house was made of logs, the door in one end, two small windows in the other end and in each of the sides. A large box-stove stood in the centre. Around the sides against the walls, were fastened wide boards, slightly inclined, for the pupils' desks. They sat at these desks on benches, with their backs toward the centre of the room. Of maps, charts, globes we had none whatever, but there was a good black-board. Such a building with no apparatus seems very primitive compared with the elegant structures, and abundance of material for illustration now provided for the public schools in many of our cities and villages. But I doubt if any more eager pupils assemble in those costly buildings, than came day after day, often through wind and snow, to that rude house in the back-woods. They came from the newly cleared fields wherein they had wrought all summer, and from whence they had just gathered the abundant harvest. They came from houses small and rude,

where, since last winter's school closed, they had cooked and scrubbed, made butter and cheese, washed and ironed, and with skillful fingers had cut and made the family garments. To these boys and girls the four months' school was a boon highly prized. They were zealous and quick-witted pupils. It was a pleasure to see the clearness with which they would analyze a problem in Algebra. Our reading books were of the good old kind, made up of selections from English classics. How often, as we read the stirring passages, did the cheek of boy or girl flush with sympathy, the eye sparkle with pleasure, and the lines around the mouth assume a firmer tenseness. As the weeks wore on, I was glad to believe that when the school was done, and the boys and girls were again at work on the farms, and in their humble kitchens, something of earnestness, of beauty, and of aspiration, caught from their term of study, would dignify their lives.

When the school was once in good running order I had plenty of time to devote to my books on bees. They had for me a strong fascination. I read them until late at night, and was busy with them again in the early morning. I began with the first number of the magazine, of which I had the back volumes, and read them every word, advertisements and all. No question as to bee management, sent up by some new beginner, escaped me. No article, by any of

the older bee-keepers, but was read and read again. Every report as to success or failures was carefully pondered. Most of the advertisements requested readers to send for circulars, a request which I accepted, and soon had a pile of documents about hives, extractors, smokers, and Italian queens. I read Prof. Cook's "Manual," turned back and read again, then re-read portions on points about which I was not clear. Then I imagined that I was beginning the season with a hive of bees, and went over every process in bee-keeping time after time, until the whole theory was as familiar to me as the alphabet. I was so entirely absorbed, and went about with such an absent air, that some of the good gossips of the district began to say that the school-master was in love. Often my pencil was in hand, and old envelopes, the margins of newspapers, and odd scraps were covered with figures. The bee journals said that often, by the system of nucleus swarming, as many as three new, good swarms of bees could be made in one season from one old one, so that beginning with one in the spring, you would have four in the fall. They said, too, that in addition to this, honey to the value of ten dollars could be secured from the old hive, helped, perhaps, somewhat by a little that the first new ones would give.[3] When I put this statement in figures, and carried the calculation out for a few years, it assumed

startling proportions. The result was so incredible, that for a long time I refused to believe, and went again to my books and journals to see if there were not some mistake. But I could find no error. The statements as to increase and profits were clear and positive. There seemed no chance for me to have gone wrong. If an increase of three swarms were received from each old one, then the old one and the three new ones would give four swarms in the fall for each one with which I began in the spring. If, now, an average yield of honey be secured from these new swarms, the first season, sufficient to pay for their hives, and a yield from the old hive worth ten dollars, here is the result for five years, assuming that I begun with five hives:

HIVES.	DOLLARS.
5x4 — 20	5x10 — $ 50.00
20x4 — 80	20x10 — 200.00
80x4 — 320	80x10 — 800.00
220x4 — 1280	320x10 — 3,200.00
1280x4 — 5120	1280x10 — 12,800.00

At the end of five years, I should have 5120 swarms of bees, and an income of $12,800; and both bees and income increasing in a quadruple ratio.

Of course I saw that this calculation did not take into account the poor seasons in which little honey or increase could be made, nor the losses from wintering, disease, etc. Nor did I neglect the fact that after the third year I should be unable to manage

the work alone, but must establish apiaries in different places, and trust the work to competent assistants, being general superintendent myself. Shutting my eyes to the above glittering array of figures, I started out again on a more moderate basis. I had now in the cellar at home, the seventeen strong swarms in box hives. I could easily buy from some keeper of bees, in the southern part of the county, for not more than five dollars each, thirteen swarms more, so as to begin the season with thirty swarms. These I would transfer to movable-frame hives, and run them for extracted honey. Again my facile pencil sought the paper. Taking a most moderate view of the increase, it seemed that I could keep my old hives very strong in bees, and make one and a half new swarms from each old one, so as to have at the close of the season two and one-half good swarms for each old one with which I began. I had always heard father say that ours was a good location for bees, and the result of last year seemed to prove it. From the statements in the journals, and from the experience with our ten swarms of the past year, it did not seem irrational to expect, in a good location and with good management, five dollars worth of honey from each old hive per year; and from the new swarms enough to pay for hives and frames. Omitting fractions the yearly results for five years would stand thus:

HIVES.		DOLLARS.	
30x2½	= 75	30x5	= $ 150
75x2½	= 187	75x5	= 375
187x2½	= 467	187x5	= 935
467x2½	= 1167	467x5	= 2335
1167x2½	= 2917	1167x5	= 5835

At the end of five years I should have 2917 swarms of bees, all paid for, and should have an income of $5,835, with stock and income increasing at the ratio of 2½. Again I went over everything to be sure that there were no errors in my data or my calculations. I was so absorbed in my bee-keeping studies, that I fear for some days the school was taught somewhat mechanically. Finally I locked up all my bee-keeping literature for a week, and resorted to the binomial formula and the Pickwick Papers to clear up all mental fogs and hallucinations. At the end of the week my data and calculations seemed all right. There certainly was no mistake in the theory. Was it possible to put the theory into successful practice? I decided to try.

IV.

BEGINNINGS.

IT was the middle of January when this determination was reached. It was already time to begin. My school would not close for two months, but much could be done in the way of preparation even while I was teaching. My first outlay had been for bee-literature. The books and journals had opened to me the whole science of bee-culture. I looked over again all the advertisements, and made out another list of books, including the recent back volumes of all the journals published in America. This purchase, with what I had bought before, amounted to $34 65. It was a somewhat extravagant expenditure, will be the thought of many. But I wanted as full knowledge of the experiences of others as could be obtained. The books and journals gave this experience quite fully, reporting failures as well as successes. There was no way in which I could so easily make the acquaintance of bee-keepers as through their writings. There was no practicable way of learning what had been found

out about different hives, frames, methods of management, and races of bees, except to read the published experience of those who had tried them. Laying out a few dollars in books now, might save one from mistakes involving much vexation and many thousands of dollars. I made up my mind that it was economical to be wisely extravagant in buying books.

My plan was to begin the season with not less than thirty swarms. I must purchase at least thirteen to add to those at home. The first of February I heard of a farmer, ten miles further south, who was going to Grand Traverse to grow fruit. He had some bees he wanted to sell. The next Saturday I drove to his place with a common large sleigh. He had nine swarms in fair condition. He willingly sold them at $4 50 per swarm. I turned the hives top end down, stood them on straw on the bottom of the sleigh, and drove home with no mishap. A few days later I heard of a vendue, at which some bees were to be sold. Here I found ten good box-hives, with the bees apparently in good condition, and plenty of stores. Bees were in no demand, and the ten hives were struck off to me at $4 25 per hive. They were taken home and ranged with my other purchase in the orchard, giving me, with the seventeen in the cellar, thirty-six hives to begin with.

Reports from all sides said that bees must be kept in movable-comb hives.[4] Early in my reading I learned that several different frames were in use, for holding the combs, and that each frame had its eager partisans. It was clear from the reports that either of the frames could be successfully used by a good manager. It was not easy for me to decide which was best for my purpose. But a decision must be made. After many days spent in considering the matter, weighing testimony from all sides as it came before me in the books and journals, looking as much as possible into the future and its development of my business, I decided upon using the Gallup frame.[5] I cannot now and here give all the reasons that led me to this decision. Perhaps when this record is finished the reasons will be sufficiently manifest.

As to hives, it appeared that those of plainest and simplest construction were best. On hives and frames there was no patent of any value. The Langstroth patent, which covered the movable-comb principle, had expired some years before. I concluded to use a perfectly plain box, with a lid like a trunk, long enough to hold twelve Gallup frames. These hives were to be so made that one could be set on top of another, making a second story to serve as a surplus receptacle to be worked for either comb or extracted honey. In

order to have the hives perfectly accurate in all respects it was best to send to an experienced bee-keeper for a pattern hive, by which I could have the material for my hives cut out at a sash and door factory in Howard. It would save expense in transportation to send for all the material I needed for the year at one time, and have it forwarded by freight. I took the circular of one of the dealers in apiarian supplies, and carefully prepared a list. My situation was so remote from all places where bee-keeping material could be obtained, that it seemed wisest to send for an abundance. If not all were needed the first year it would be on hand for another season. Beginning with thirty-six swarms of bees there would be needed as many hives for brood chambers, and as many more for second stories for surplus honey. If then the increase in swarms should be one and a half for each old one, there would be needed fifty-four hives for these, making in all one hundred and twenty-six hives. Twelve frames for a hive would make 1512 frames. My list of goods was as follows:

1	Two-story, pattern Gallup hive, .	$6 00
1600	Frames, at 5c.	80 00
1	Quinby smoker, ...	1 50
1	Honey extractor, ...	7 50
1	Uncapping knife, ...	1 00
2	Tarletane bee-veils, at 50c. . .	1 00
		$97 00

It was Saturday the 10th of February that I drove, in company with Will and my mother, to Howard to get a check for this amount, to inclose with my order. While there I made inquiries as to the best sash and door factory. It was necessary that the material for hives should be cut out with great nicety, so that every hive should be the exact counterpart of every other. I was unwilling to trust the work to any but the most skillful workmen. At the same time I wanted the cost to be as small as possible. Having mailed my order, I tried to dismiss bees from my mind until the articles should arrive. I spent the nights and Saturdays and Sundays among some friends. As a relief from school cares, and from my long absorption in study of bee literature and plans for my first season's campaign, I read *Romola* and *Robert Falconer*. Both books served as intellectual and moral tonics. As I closed the volume on the last page of *Romola* I could but feel deeply grateful for the gift to humanity of that great genius who had wrought into the book so much of the wealth of her own soul.

In a little more than two weeks I received notice from Howard that my goods had arrived. The following Friday afternoon I went home, and with Will's assistance, by ten o'clock at night, had put the work-shop which stood near the barn, in a corner of the orchard near where the bees were to be

placed, into good order for receiving material, and making hives. Saturday morning we drove to Howard with the sleigh. The articles had come in good condition. The frames had been somewhat bulky to box, yet the freight on the whole was but $4 60. I took my sample hive and drove to one after another of the sash factories and planing mills, explaining to the proprietors just what I wanted, and asking them to give me their lowest terms for furnishing first quality pine lumber for one hundred and fifty hives, and cutting it out after the pattern. The hives were not large, and would take but a small amount of lumber per hive. They were so simple in construction that the labor would not be great, but I made it distinctly understood that every piece must be exactly right. The largest mill, and the one having the best machinery, offered to do the job at 38 cents each,—$57 00 for the hundred and fifty hives. In most places it could not be done for so small a sum, but Howard is in the midst of the great pine regions, hence lumber is low. And the last of February is a season when little work is to be had, and as I offered to pay cash, the job was a good one for the manufacturer. He promised to have them cut out by the following Friday, when Will would drive over and get them, before the sleighing was gone.

Having attended to the hives I went to various stores and made the following purchases:

2	Hammers, at 75c.	$1 50
	Hand-saw,	1 50
	Back-saw,	1 25
	Square,	75
40	lbs. nails,	2 00
200	tin rabbets,	3 00
40	yds. good duck, at 20c.	8 00
10	gals. paint, at $2 00.	20 00
2	gals. boiled oil, at 65c.	1 30
2	gals. turpentine, at 55c.	1 10
	Putty,	25
15	good oak barrels, at $1 25.	18 75
		$59 40

These barrels were for extracted honey. If my bees should do as well as was often reported, these barrels would not be sufficient to contain the honey. It will be seen before this record is finished, that I obtained much more than honey enough to fill the barrels, and was compelled to order more in July. The barrels were to be made at the end of two weeks, the cooper being quite busy just then on a lot of flour-barrels for a neighboring mill. I consulted my memoranda, and could see no other article needed, except some scantling and boards from which to make bottom boards for the hives to stand on, and alighting boards on which the incoming bees could alight and crawl to the entrances to the hives. This lumber I could get at a mill near home. With my various purchases in the sleigh, with the promise of the material for hives by the next Friday, and the barrels in two weeks, I felt well content with my day's work. It was five

o'clock before we were ready to start for home. Then Will drove at a good pace over the smooth roads. The horses' well-corked shoes struck the hard beaten snow with a clear triumphant *crack*, most exhilarating to hear. A full moon lent its bright light, sparkling on the snowy fields with rich suggestions of oriental gems, and throwing ghostly shadows across the road as we now and then went through a stretch of pine or oak or maple forest. We made the ten miles with our farm horses in less than an hour and a half.

It was agreed that Will would go to the saw mill near us on the next Tuesday after school and get the scantling and boards for bottom boards, then take a half-holiday on Friday afternoon and get the hive material from Howard. We should then be ready for work in making and painting hives, and could employ our Saturdays in so doing.

But one thing further remained for me to do. My bees were all black ones, the common bee of the country. My study of bee literature had convinced me that the Italian bee was much to be preferred because more industrious, and more easily managed in consequence of its greater docility.[6] I had carefully studied the whole subject of Italianizing bees, and felt confident of my ability to do it. The sooner my common stock was changed for Italians, the larger would the honey harvest be,

and the greater would be my pleasure among the hives. I thereupon decided to Italianize at the earliest practicable time. To this end I at once sent out several letters to different importers of Italian bees, inquiring for what sum they could send me one strong swarm of Italians with a selected queen, purity and safe arrival guaranteed. To get a selected queen in the early spring would cost more than to wait and get one later. But I could not afford to wait. The improvement in my stock would more than make up for the extra expense. In a few days answers began to arrive. The dealers were not eager to sell selected queens in the spring; they could make more by breeding from them to supply the growing demand for Italians. But one of the most reliable importers had received an invoice of queens late the previous autumn, which he was wintering. He would give me a warranted swarm of pure Italians, with a selected queen, for $20 00. It was a large sum to pay for a single swarm of bees. It is to be remembered that this was several years ago. They are cheaper now. I could get the selected queen alone for $10 00. The queen was all I really needed, and if I had been an expert in handling bees, I should have sent only for the queen. But being a beginner, I felt there was some risk in my introducing a valuable queen to one of my black stocks. It was best and

most economical to be on the safe side. The full swarm was ordered to be sent at the earliest practicable moment. I then felt that my arrangements for beginning were completed.

The whole field had been carefully gone over time after time, and calculations made as to what was essential. The subject had so possessed me that for months I had lived in a land of bees. The expense of beginning may look somewhat large, to those not familiar with the subject, but as bee-culture was to be my profession it would be most satisfactory and economical to begin right, and to have everything of the best kind. I had now expended:

For Bee literature, ...	$34 65
" 19 swarms black bees, ...	83 00
" 1 swarm Italians, ...	20 00
" Pattern hive, frames, extractor, etc.	97 00
" Freight on same, ...	4 60
" Material for 150 hives, ...	57 00
" Tools, paint, duck, barrels, etc., .	59 40
" Lumber for bottom boards, etc., .	3 24
	$358 89

Before any practical experience in bee-keeping, before ever having opened a movable-comb hive, I had incurred this large expense. Many will call it rash. I shall prove that in my case it was wise. Still I should not advise this course generally, for in most cases it will lead to failure and disappointment.[7] It can only succeed where there has been a most careful study of the whole subject,

where one has in imagination performed every operation in the art of modern bee-keeping until thoroughly familiar with it, and where there is a strong determination to succeed as will lead to daily attention to the most minute details. Even if one has all these qualifications he cannot succeed as well as I did unless he has a location equally good. Bees collect honey from flowers. If there are but few honey-producing flowers they can get but little honey. If there is an abundance of honey-producing bloom they will, if wisely managed, gather very large quantities indeed.

The next Saturday morning Will and I began nailing hives. Thanks to our father's ideas of a practical education, we both knew how to use a hammer, still the work of putting hives together was new, and our progress was slow at first. There were four pieces for the body of each hive, and five for the lid. These were to be most accurately fitted together, and thoroughly nailed, for hives, exposed constantly to storms and changes of temperature, are liable to warp and split. We found that the cutting out had been done in a workmanlike manner. The measurements of the pieces were exact, and all fitted together perfectly. It was best to make haste slowly. Speed would come with practise. So we did not hurry, but fitted every piece carefully to its place, and put every nail in

well. After dinner, mother and Lucy came to the shop to look on for an hour, for the whole family partook of my enthusiasm, and all gave cordial sympathy. It was one of those charming days that sometimes come as harbingers of spring. The door of the shop was open and the bright sunshine streamed across the floor. The pungent fragrance of the pine lumber filled the air with a stimulating odor. Our hammers kept up an industrious clatter. Mother sat upon a finished hive, her busy fingers engaged in knitting. Lucy played among the hives and materials in happy, girlish ways. It was a glad hour, only saddened by memories of him who would have been our leader and inspirer, now, alas, in bodily presence, to give us help no more.

When night came Will had nailed thirteen hives and I fifteen. Having acquired some deftness in handling the pieces we thought we could do better in future, and probably finish the lot in about four days. My school closed the next Friday, March 16th, then my whole time was given to the hives, and the work went on rapidly. When they were all nailed, painting was begun. The paint which had been procured was of three colors, pure white, a dark blue, and a brilliant red. The different colors would aid the bees in marking their hives, and would have a more picturesque effect when grouped in the orchard than if all were one color. Besides

red, white, and blue had pleasant patriotic suggestions, and it is well to be patriotic even in bee hives! Each hive received two good coats. On April 5th, the last one was painted, and the next day they were carefully stored, ready for use whenever wanted.

The bees in the cellar had kept well. The temperature had been steadily cold, and the cellar had been kept generally at about 40 degrees. The time was now approaching when they must be taken out and put on their summer stands, for on some days it was impossible to keep the cellar at a lower temperature than 50 degrees. The hives purchased had been grouped in the orchard in the places where they were to remain. The others when taken from the cellar were to be so arranged that the whole would be in the most convenient position for work. I determined to prepare a place large enough for 200 swarms of bees, should I ever desire to keep so many at home.

The orchard in this part sloped gently to the south and east. The rising ground at the rear would help to break the force of the winds, but as additional protection I decided to put a tight board fence, seven feet high, on the west, north, and east of the part devoted to bees. A piece one hundred feet square was laid out. For the three sides required 300 feet of fence, to make which would require 2100

feet of board, 30 posts, and 600 feet of two by four scantling. This material was all bought at the nearest mill, at a cost of $33 45 for the whole.

A laborer was secured at a dollar and a quarter a day to dig the holes and set the posts. This he did in two days and a half. The rest of the work I did myself, and soon had the pleasure of seeing the bee-yard nicely inclosed. Then the fence was thoroughly whitewashed, both for looks and economy. When this was done the whole cost of the fence for material, labor, and white-wash amounted to $39 98. The fence was finished April 12th. The next day was warm and bright. About ten o'clock with Will's help, the bees were taken from the cellar and set on their summer stands. The little fellows, after their long winter in darkness, had a gala day indeed. They played in the warm sun for hours with all the abandon of happy children.

They seemed in perfect condition. At evening as I went from hive to hive, I found that but few dead bees had been brought out, as the bees had done their spring cleaning and tidied up their houses on this, their first day of sunlight. My first experience in wintering in the cellar had been a success. I found on a subsequent examination that those which had been kept in the cellar were much stronger in bees than those I had purchased, which had been wintered in the open air.

It was not best to begin transferring to my new hives until there was sufficient bloom for the bees to be busily at work. The alders and willows had been giving a little pollen, to the bees which were in the open air, by the last of March. Soft maple and silver maple, were very abundant. They began to open in profusion two days after the hives were taken from the cellar.

Everything was now prepared, and I had time to study again the situation.

From what my father had said, and from my own observation, I had reason to think the location a good one for bee-keeping. Our farm contained 80 acres, somewhat rolling, sloping gradually to the east and south. At the west and north lay an extensive tract of sugar-maple woodland. A few rods south of the house ran the road on the section line. Beyond the road was a small stream, one of the branches of the Muskegon river. The stream was bordered on both sides far away in both directions with woods, in which were numerous linn or basswood trees, and not a few willows of different species, and many soft and silver maples. Further east and south were many farms, already pretty well under cultivation. Some of these farms had orchards just coming into bearing; all of them had young trees set out, which would be fruiting in a few years. Everywhere in meadows and pastures,

along the fences and the roadsides, and in every neglected corner the white-clover grew in profusion. In its season there was enough of it to afford pasturage to ten thousand swarms of bees. Nearly every farm had its patch of buckwheat in the fall. In every direction were occasional swamps where boneset, asters, golden-rod, and coreopsis gave a wealth of fall blossoms. And hearts-ease, often called smart-weed which in looks it closely resembles, was sure to over-run nearly every cultivated field which was somewhat neglected. I could thus count on good pasturage for bees from willows, maples, apple-blossoms, and raspberries in the early part of the season, from white-clover and linn a few weeks later, from buckwheat, hearts-ease, and the profusion of swamp flowers in the fall. In these respects no location could have been better for my business. Though the location was thus desirable, perhaps as good as any in the northern states, there were, so far as I could learn, three periods of some days, or possibly of two or three weeks each, during which there would be little that the bees could do. After sugar-maple and fruit-blossoms until the beginning of white-clover the pasturage would be very meagre. Then from the end of the linn and white-clover bloom until buckwheat and other fall flowers began to open, would come another period of idleness. Finally after the first frosts had cut off the

bloom, so that scarcely any honey could be gathered, would come two or three weeks of beautiful weather, during which the bees would have no work. These times of enforced idleness, coming at periods when the weather is usually excellent for the bees to work, seemed to me a serious drawback. If one's bees could work every pleasant day, from early spring until late in the fall, the honey product would be immensly increased. It was a problem upon which I began to think from day to day; with what success will be seen by and by.

Satisfied that my location was as good as could be found in the north, and putting aside the subject of periods of enforced idleness as one of the questions that would do to chew upon, I next reviewed my hives, frames, and apparatus. In the light of all that I could learn from books and bee journals, my arrangements were perfect, except that I discovered two or three omissions in purchasing. The hives must be set perfectly level, if I would have the combs hang true in the frames. For this purpose a spirit-level was needed. While extracting honey the extractor would need to stand in the work-shop at one side of the bee-yard. Hence the frames must be carried from the hives to the shop, and to do this some kind of a comb-carrier was necessary. The Quinby smoker[8] would be of use only as there was material for it to make

smoke from. Old cotton cloth tied into rolls large enough to fit loosely in the barrel of the smoker is often used for this purpose. But rotten wood, especially decayed sugar-maple, is by far the best material. For this I should not have far to seek in the great maple woods near us. I went one day with the wagon, and in two hours came back with fuel enough to supply the smoker for several years, —clean, sweet maple, rotten enough to cut like cheese, but still retaining its shape perfectly.

There would be needed, also, molasses-gates, or rather honey-gates, for drawing honey from the barrels, and an auger to bore holes in barrel-heads for putting in the gates. I made a drawing of a comb-carrier to be made of tin, large enough to hold six frames, the frames to hang in the carrier just as they hang in the hive, the carrier to have two bails so as to carry easily without tilting, even if it chanced to be loaded more heavily at one side than the other. I went to Howard and instructed a tinner to make two of these carriers; then made the other purchases, including a pair of good scissors; a small butcher knife for trimming combs when transferring; a kind of chisel-knife, being merely a broad, thin chisel, twenty inches long, having a square end sharpened for cutting combs from the sides of the old hives before taking to pieces; a ball of strong cotton twine; and an atomizer, the use of which

will appear by-and-by. These purchases made quite an additional bill.

Level,	$1 50
Scissors,	75
2 Comb-carriers,	3 50
15 Honey-gates, at 50c.	7 50
Butcher-knife,	50
Auger,	1 00
Chisel-knife,	50
Atomizer,	1 50
Cord,	20
	$16 95

The willows had given some pollen since the last of March, and the bees had been carrying it into the hives every warm day. April 15th, the maples began to open, the weather was warm, and the bees were very active. The next day being equally pleasant I determined to begin transferring. About ten o'clock when many of the bees were out in the woods, I turned one of the box hives top end down and set upon it one of my new hives. Then wrapping a blanket around the junction of the two, to stop every crevice and exclude the light, I rapped smartly with a stick on the outside of the old hive for about a minute to alarm the bees, and set them to filling themselves with honey. Then keeping up an occasional rap I waited for about ten minutes, by which time I judged that every bee had gorged itself. Then I rapped more loudly and briskly to drive the bees from the lower old hive up into the new one. In ten minutes more I lifted off the new

hive, and found that nearly all the bees had left their old quarters and were clustered in the new hive. The new hive was now set on the old one's stand, so that the returning bees would find a home, and the old one carried to the shop.

Most box-hives are built with two pieces crossing each other at right angles from the centres of opposite sides. These cross-pieces I sawed off by thrusting the saw down close up to the side. Then with the long chisel-knife the combs were cut free from the sides of the hive all around, so as to leave them attached only to the top of the hive, and as the hive was then standing on its top the combs of course would be left standing on the top, if the sides of the hive were taken away. Then with a mallet and a strong chisel I pried the sides apart, took them off, and, quicker than I can write this account, had them removed and the combs standing upright before me. Then I ran the knife along the top board, loosened the first comb, and laid it on a table which had been covered with a woolen blanket so as not to bruise the young brood. Then an empty frame was laid on the comb and with a very thin, keen knife the comb was cut the size of the frame. This comb was then fastened into the frame by simply tying two cotton cords from top to bottom around the frame at about three inches from each end. In a moment this frame was ready and hung

in a comb-carrier placed handy to receive it. Then another comb was taken, and so on until all had been fitted into frames. The old hives were about twenty inches high, and were filled with comb to the bottom. My frames were about 10¾ inches square inside measure, hence after filling a frame with the top part of one of the old combs there was a piece left nearly large enough to fill another frame. At this early period of the year these lower ends of the old combs have neither brood nor honey. I carefully put them into frames and stored them away for future use. Thus I had a full frame and a frame nearly full from each of the old combs. There was plenty of honey in the hive for all possible needs of the bees, and towards the tops of the central combs there was a fine patch of brood, some of it already sealed and hatching, so that from this first old hive I got five frames of brood. In taking the hive to pieces one comb had become badly broken, this with all the trimmings and crooked pieces of comb were carefully put aside. I took pains to sort the comb as much as possible, putting the worker comb in frames separate from the drone comb. Of course it was not always possible to avoid having the two kinds of comb in the same frame, but I made as many frames of almost pure worker comb as somewhat rapid working on my part would allow. From this hive I filled ten frames full, and had six frames nearly full.

When my ten frames, including the five containing brood, were ready they were carried out to the bees in their new hive. When I opened this hive, and began to hang in the frames of comb and brood the bees eagerly clustered upon them. I found that in an hour and twenty minutes from the time of beginning the first hive the transfer was nicely finished up. Another hive was finished before dinner. As my new hives had lids and were not the same shape as the old ones, it was not convenient to place them on the old ones to drum the bees into them. So I took the old hive from which I had first transferred, cut it down to ten inches high, nailed the pieces again, and used this for a drumming-box. It was set on the old hive, the bees drummed into it, then it was set on the stand while I was transferring the combs. The combs were then properly arranged in a new hive, a piece of duck just the size of the hive nicely spread over the frames, the new hive was taken out, the drumming-box removed from the stand and the hive set on. A sheet was then spread in front of the hive and the bees shaken from the drumming-box upon the sheet. The scent of the comb at once attracted them to the hive, aud they crawled rapidly in.

By four o'clock that day I had transferred five swarms. It was a very good day's work for a beginner. Hard work it was, too, and night found me very

tired. I had never seen a swarm of bees transferred. I knew nothing about it except what the books and journals told me. But in mind I had many times carefully gone over the whole process, so that when the time came for real work I had a theoretical familiarity with it. I knew exactly how I wanted to do it. I had prepared every cord; every tool was in perfect order, and in its place; the hives and frames were exactly right. But it is practise only that can make perfect. In spite of all my care some confusion would creep in. Tools and material would get out of place. My movements were slow and awkward. So I was very weary with my first day of actual work among the bees. All before this had been preparation. Now had come the real work, and it was not all poetry by any means. To lift and carry hives required muscle. To handle the combs with hands sticky with honey was not pleasant. To work quietly and rapidly with innumerable bees flying around, and not a few creeping over one's clothing, required a certain nerve. Prof. Cook had said in his book that nobody need be stung. Some of the writers in the journals had made light of stings. Perhaps if one could begin bee-keeping already possessed of the experience of a veteran, he need not get stung. But experience can come only with actual work among bees. A beginner is almost sure to get stung somewhat. If he is intelligent,

cautious, and self-possessed he need get stung but little. A few stings, however, have a way of so making themselves felt that the person stung is willing to affirm that their name is legion. My swollen hands this first night testified that I had received a portion of the discipline a beginner must expect. I applied hartshorn liniment, wrapped my hands in cloths wet in cold water, went to bed, and forgot stings in sound sleep.

The next day I transferred six, and after that seven a day until all were in their new hives. The whole job was finished before noon on the sixth day.

When all was done I had the thirty-six swarms of bees with an average of ten frames of good comb to each swarm, and one hundred and eighty-seven frames more, nearly or quite full of comb. Some of these frames were filled with pieces of comb which had been carefully fitted together, and I found afterwards that such frames were nearly as good as those filled with a single perfect comb. The bees fastened the pieces together, and used them readily for both honey and brood.

It was Saturday night, April 22d, that I found my preliminary work was done. The bees were in their new homes and working merrily. The frames of comb not then needed by the bees were neatly stored in empty hives. The lot of broken combs, nearly filling a barrel, were ready for melting into wax. I

felt now that I was fairly launched in my life-work.

I sat in the orchard in the genial April twilight, looked over my hives, planned for the work that was to come, and heartly enjoyed the peaceful stillness. In that evening hour the hives were all silent, but I knew that on the morrow the tens of thouands of workers would be foraging with busy hum in the maple forest to gather honey for themselves and me.

Just then Will came from the post-office with a letter. It was a notice from the express agent at Howard that a hive of bees addressed to me was in his hands. The Italians had arrived; my transferring was done none too soon. Attention must now be given to the important work of raising Italian queens, and introducing them to my black stocks.

V.

ITALIANIZING.

On Monday morning at four o'clock I was off for Howard with the light spring wagon. At seven o'clock the express office was reached, and the hive was received, apparently in good condition. The day was warm and the bees naturally seemed anxious to get out, many of them crowding to the ventilating holes, which had been covered with wire-cloth. The expressage was three dollars, making the hive of Italians cost me twenty-three dollars. But they had a selected queen, imported from Italy the previous fall, and if I was at all successful in rearing queens from her she would be worth to me at least a hundred dollars the first season, and indefinite hundreds in seasons following.

Soon after seven o'clock my good horses were on the track toward home, which was reached before eleven. The bees were at once taken to a stand which had been prepared for them, and the entrance to the hive opened. They crowded out with eagerness, and played in the sunny air with much joy. The hive had come from several degrees further

south than my place, where the season was somewhat earlier, and I was delighted with seeing a few drones among the first to fly out. My first work with the Italians must be to secure a good supply of pure drones.

The Italians had come in a hive of different pattern from mine, having a frame longer and shallower. Against this frame I have not a word to say, for in the hands of many intelligent bee-keepers it has given excellent results; but in order to work with ease and profit it was essential to have all my bees in hives of the same kind. I therefore went at once to work to transfer them to one of my hives. When the hive was opened the frames were found all right. They had been securely fastened at both top and bottom so that there could be no shaking about while on the journey. After removing the fastenings the frames were lifted from the hive, and the bees shaken back into the hive. Then the frames were carried to the shop to transfer the combs. There were ten frames of good comb. Six of the frames had each a nice patch of brood, which did not seem to have been injured by the journey. A part of this was drone brood, some of which was hatching. It took but a few minutes to transfer the combs to my frames. In doing this I noticed in one of the combs a number of fresh-laid eggs, assuring me that the queen was all right. In transferring

I had put the drone brood in two frames, which I took to one of my strongest black stocks, and inserted them in the centre, in place of two frames of brood which were taken out and given to one of the weak stocks. The remaining combs from the Italian hive I put in one of my hives, carried it out and set it where the old hive was, spread a sheet in front and shook the bees from the old hive upon it. They at once began to crawl to the hive, and I sat down and watched carefully, hoping to get a sight of my new and precious queen. She was easily found, and gave me much satisfaction, being large, healthy-looking, and light-colored. All the bees in the hive seemed to be pure Italians, being distinctly marked with the three brilliant orange bands on the abdomen.

Having now the pure imported Italian queen my object was to rear young queens from her eggs, and to insure their fertilization by drones raised from her eggs, then my queens being pure, and fertilised by pure drones, all their progeny would be pure Italians, and so in a few weeks after introducing these young queens to my black-stocks all my bees would be pure Italians, for in the working season the worker-bee lives only about six weeks.[9] The old ones die off, and their places are taken by the young bees raised in the hive. If, then, in every hive there was a pure Italian queen, depositing eggs, the

pure bees grown from these eggs would supply the places of the black-bees as they gradually died off. Where one has black bees, or where there are black bees kept in the near vicinity, there is no certainty that the queens will mate with Italian drones. On about the fifth day after hatching, the young queens leave the hive for their wedding journey. They simply take a flight in the air for the purpose of meeting the drone. Having met him, they return to the hive, never to leave it again, except they should lead out a swarm. Now if black drones are numerous, it is quite probable the queens will mate with them, then, however pure-blooded the queens may be, their progeny will be hybrids. Upon the problem of securing pure fertilization for the young queens I intended to rear from the imported Italian mother, I had studied a good deal for the past three months.

To grow the young queens from the eggs of the pure mother was easy. But if I had the numerous black drones which my thirty-six hives of black bees would soon produce, flying in pursuit of my beautiful young Italian virgins, when they went out for their marriage flight, it would not be easy to secure their pure fertilization; indeed it would be impossible. About the time I sent for the swarm of Italians I had hit upon a plan which seemed possible. I determined to make it succeed

so far as my work and care could control success. These are the data of my plan:

1. No bees of any kind were kept by any person nearer to me than four miles. One farmer four miles away had a few swarms of black bees, but there seemed little probability that my young queens would meet drones from his hives.

2. So far as I could learn there were no wild bees in the woods in that neighborhood. No bee-trees had ever been found. Still the fear of wild bees gave me some uneasiness, for should there chance to be a few swarms of wild bees in hollow trees along the stream, within a mile or two, they might seriously interfere with my plans. My only course was to assume that there were none, and go on.

3. The only black drones, then, against which I must guard were those which my own hives would produce. It seemed to me that this could be done, and in my transferring it had been constantly kept in mind.

4. It will be remembered that I spoke in the previous chapter about keeping the worker-comb and the drone-comb, as far as possible, in separate frames. I had then carefully selected a number of the fine combs, in which drone-cells were most abundant, and put them in frames by themselves. From the frames containing brood I had carefully cut all the patches of drone-brood, and all capped drone-cells,

which were not thus cut out, I had mercilessly beheaded with a small sharp knife. Then in giving frames of comb to my hives after transferring, I had given them only frames containing worker-comb, and perhaps a few drone-cells scattered here and there.

5. All persons know that bees kill off their drones in the fall, and raise new ones in the spring before they will be needed. My hives, then, on the day I gave them their combs after transferring, had no hatched drones, they had no capped drone-brood, and they had but few drone-cells in any of their combs. It was possible that in some of these few drone-cells there were drone larvæ just ready to cap. Unless I could guard against these possible drones they would probably give me trouble.

6. After drone brood has been capped over it is at least fourteen days before it hatches. Assuming that there were some drone larvæ, just ready to be capped, in the frames when they were given to the bees after transferring, this brood would hatch out on the fourteenth day after. If, now, on the thirteenth day after, I examined each comb, and beheaded every capped drone in his cell, there would be no danger of any black drones appearing within another two weeks, when I could again examine and behead. This course involved a good deal of care and labor in looking over the combs two or

three times, and beheading the drone brood, but I determined to adopt it, for I could see no other way of securing purely fertilized queens the first year.

7. If a hive of bees, at any season of the year when there are eggs or larvæ not more than three days old in the combs, be deprived of its queen, the bees will at once proceed to supply themselves with a new queen. This they do by constructing a number of queen-cells, usually from five to twelve, into each of which they put a worker egg or a worker larva, and then feed this with a peculiar kind of food called royal jelly, whereupon this egg or larva, which if left in a worker cell and fed upon worker food would have grown to be a worker-bee, develops into a queen-bee. Eight days from the laying of the egg this young queen arrives at the age when the workers seal her up in her cell, to undergo her final transformation. On the sixteenth day from the egg the young queens are full grown, and, if undisturbed, will come out perfect queens. At any time, between sealing up and hatching, the queen-cells may be taken from the hive, and, if inserted in another queenless hive, will usually be accepted and allowed to hatch. The cells may also be hatched by artificial heat.

8. I had the few drones which had hatched in the Italian hive before its arrival, and the few that would hatch from day to day from the two frames

of drone brood which I had taken from the Italians and given to the hive of blacks. But I feared these drones were too few. Hence my first thought was to secure more pure drones from the eggs of the royal lady from Italy. To this end I opened the hive of Italians just before sunset on the day of its arrival, and inserted in the very midst of the frames containing brood one of the frames of drone comb prepared when I was transferring. The next evening I examined this frame and finding it had eggs in a large number of cells, I gave it to a good colony of blacks, and inserted in its place another frame of drone comb. This I did for three days in succession, getting as many frames, each supplied with about two thousand drone eggs, which frames were given to as many black stocks. In addition to laying the drone eggs in these frames the Italian queen had deposited not a few eggs in the outer margins of the four frames containing brood, mentioned above as having been found when the combs were transferred. And she had laid a number of eggs also in two other frames, so that on the evening of April 27th there were six frames containing eggs and larvæ. The queen would not have laid so many eggs if I had not stimulated her by feeding the hive every night with about a pound of pure sugar syrup. The bees gathered some honey and plenty of pollen from the willows and maples during the day, and

then having the feed of syrup at night the whole hive had been excited to such activity that the good queen had been roused to do her best in laying eggs.

9. I had now made provision for an abundant supply of drones. Two frames of pure worker comb were now put in the centre of the Italian hive, and the hive then left undisturbed for three days.

Worker eggs and worker larvæ in as many frames as possible, were what I wanted now from the Italians, for from their eggs and larvæ I would grow my new queens. These new queens were not to be grown in the Italian hive, for I could not force the Italians to build queen-cells unless I took away their queen. If I took away their queen I must introduce her to one of my black stocks. As a beginner is not always skillful in introducing, he may so do it that the bees will not receive the queen, but will kill her and cast her from the hive. I was not willing to run this risk with my costly imported queen. And it was not at all necessary to run the risk, for the new queens could just as well be grown in hives of black bees, provided I killed their queen and took from them all their own frames of comb, and gave them frames of eggs and larvæ from the Italian hive. They would then have no eggs or larvæ except what had come from the imported mother, hence the queens they would grow would all be pure Italians. A common dung-hill fowl

will hatch the finest Brahma eggs, and care for the chickens. So black bees will take care of pure Italian eggs, and rear from such eggs pure Italian queens.

10. April 28th was the thirteenth day from the beginning of the transferring. It was possible that by the next day a few black drones would begin to hatch from those stocks first transferred. I was prepared to begin the exterminating war against these black drones. Will was called in to help. We had a hard day's work before us. We desired to work rapidly, and not to be in danger of stings. Our trowsers were tucked into our boots, so that no bees could crawl up our legs. We discarded coats for the day, and wore woolen shirts instead, so that there could be no crawling of bees under the coats, up our backs and around our necks. Close-fitting gloves were put on, which buttoned tightly around the wrists over the wristbands of our shirts. Then putting on the bee-veils, we were quite proof against the most vigorous onsets of any angry bees. Such close protection is usually quite unnecessary.

I now go among my hives fearlessly, with neither gloves nor veil. But then I had little experience, and it was easier and pleasanter to protect oneself than endure the discomfort and delay which even a few stings might cause. The smoker was ready, and plenty of fuel to fill it as often as necessary. At

8 o'clock I blew some smoke in at the entrance of a hive. After waiting a few minutes a second hive was smoked, that these bees might be filling themselves while the first was being examined. Bees, if alarmed by smoke or in any other way, at once fill themselves with honey, and when thus full of honey they are very quiet, having little disposition to sting. Then seating ourselves on low stools at the side of the hive, so that my left-hand was next the hive, the lid was taken off. I lifted the first frame with my left hand, rested the bottom of it on the edge of the hive, and glanced quickly over the side of the comb towards me. My right-hand was free, and held a keen knife with which I rapidly beheaded every capped drone-cell. Will did the beheading on the other side. On some combs we found a few drone-cells, but most of them had none at all. In nine minutes from the time we sat down, every frame in the first hive had been examined, drones beheaded, frames replaced, and hive shut. Then, first blowing smoke into the third, we opened the second. So we kept on, and in little more than six hours and a half we had gone over all the hives, averaging about 11 minutes to a hive. As we examined those hives containing the inserted frames of Italian drone eggs and brood, I noticed that they were all in good condition.

There was no danger of any black drones appear-

ing under 14 days, when I would again examine, and behead. The drones from the first two frames of Italian brood were becoming more numerous every day. As it takes 24 days from the egg for drones to come forth, the frame of drone eggs obtained from the Italians on the 24th of April, would have hatching drones on the 18th of May. Drones would be coming from the other frames on following days. It takes 16 days from the egg for a queen bee to hatch out. Five days after hatching she will fly out to meet the drone, that is in 21 days from the egg she is ready for her marriage flight. If measures were taken on the 1st of May, to force the bees to rear queens, the queen cells would not be begun before the next day, and some of them would be built on following days. Hence if the bees should rear queens from the eggs, the first ones would be ready for the drones May 22d. But in all probability they would rear some of the queens from larvæ two or three days old, and such ones would come forth two or three days earlier. Thus it was probable that if I began queen-rearing May 1st, some of the earliest queens would be ready for the drones May 19th and 20th, just when my drones would be coming out. This was what I wanted. On the afternoon of May 1st, I made arrangements to force two hives of black bees to rear queens from Italian eggs or larvæ.

Two of what seemed to be the strongest, most prosperous swarms of blacks were selected. I looked over the frames of one until the queen was found and beheaded. Then the frames were lifted from the hive, one after another, the bees shaken back into the hive, and the frames taken away, leaving not a particle of its own comb in the hive. The same was done for the second selected swarm. Then I took from the Italian hive the frames containing eggs and larvæ, of which there were eight, shook all the bees back into the hive, and carried the frames to the hives of blacks which had just been deprived of their own combs. Taking a sharp knife I cut off a small portion of the lower and side margins of the Italian combs, and then cut deep notches in the newly cut margins. This brought newly cut edges of comb right among the eggs and larvæ, thus giving the bees the best conditions for construction of queen cells. Then four of these frames were put into each of the selected hives of blacks, and three frames of empty comb were put in with them. All the bees were crowded on these seven frames so as to make a smaller hive very full of bees, insuring the rapid construction of queen-cells, the most careful nursing of the queen larvæ, and that high temperature in the hive which is best for the growth of bees. Then I had done all in my power to facilitate queen-rearing. The hives were

shut with a determination that I would not open them until the 12th day, when it would be necessary to remove from each queen-rearing hive all the queen-cells but one, and to give one queen-cell to each of the nucleus hives prepared for their reception. To stimulate these queen-rearing hives to the greatest activity I fed each of them about a half pound of pure sugar syrup every night for five nights. I have since learned that at that season they would have done just as well without this. After these two hives had been arranged for queen-rearing, twelve frames of the brood which had been taken from them were given to the Italians, in which they gladly went to work. The other frames, taken from the queen-rearing hives, were distributed among my weakest stocks. It had been a hard day's work, not finished until 7 o'clock. Then I went early to bed, and dreamed of virgin Italian queens flying in terror from pursuing hordes of headless drones.

The next day I began to arrange the nucleus hives. A nucleus hive is a hive for a small swarm of bees, usually two or three frames. Where any number of young queens are reared they are usually hatched in nuclei, but the queen cells are not grown in them. To insure the best queens, the cells must be grown in strong swarms; but after they are capped they may be hatched in nuclei. Often small hives are made especially for nucleus swarms.

This is usually the case where long and shallow frames are used. But with my small square Gallup frame, I could use the regular hives and frames for the nuclei. When the regular hives are used for nuclei, it is much easier to build up these nuclei into regular swarms. After your young queens are hatched and fertilized, if you want to increase the number of your swarms, you have only to take frames of the hatching brood from your strong stocks and give them to these nuclei. The brood will hatch and be at home in the nucleus, and so each nucleus is rapidly built up into a strong stock. My object now was not to increase the number of my swarms, but to obtain fertile Italian queens, to give to my black stocks. Making allowance for the loss of a few queens when they went on their marriage flight, or from my inexperience in introducing them to the blacks, I concluded to make arrangements to hatch forty cells. Forty of the empty hives were suitably provided with division boards, which could be moved back and forth in the hives, and so contract one end to as small proportions as desired, and were then properly located in the orchard. Then, while waiting for the queen-cells to be capped, there was time for other work among the hives that were gathering honey, of which more will be said in the next chapter. I want first to tell the whole story of the queens.

It seemed to me that it would be best to let the queens come as near maturity as posssible, before taking them from the parent hive. I might safely wait until the twelfth day from the date of giving the queenless blacks the Italian frames. On the eleventh day, twelve of the weakest of the black stocks were selected. Each hive was carefully looked over and the queen removed. Then these twelve swarms were broken up into forty nuclei. There were frames enough to give each nucleus three. The nuclei were made towards night, and the hives were shut until ten o'clock next day. Then as I opened the entrances, I leaned a board against the hives before the entrances. The bees coming out and meeting this unusual obsruction were led to mark their new location, and so would return to it, instead of going back to their old hive. At one o'clock everything seeming right about the nuclei, and all things looking propitious, I opened one of the queen-rearing hives. It was for me an interesting moment. Another move of the hand would bring to light one of the frames upon which I expected to find queen-cells. The frames were carefully moved apart so as to remove all danger of bruising cells as the frame was lifted, then it was taken out. I was not disappointed. On that comb there were seven large fine-looking cells. The other three frames had respectively five, eight and nine

cells, making twenty-nine in this hive. All but one were carefully cut out, and laid on a bed of cotton-wool in a shallow basket prepared for the purpose. The other hive was then opened and found to contain thirty-one cells. After leaving one in each hive this gave me fifty-eight excellent capped cells.[10] There were but forty nuclei, so I selected forty of the finest cells, and going from nucleus to nucleus, grafted a cell into one of the combs of each. This was done by cutting a shoulder in the comb in the frame, of the right shape to receive the small piece of comb attached to the cell. In not a few cases when the cells had been close together and so scarcely any comb was attached to them after they were cut apart, I simply held the cell, point downward, between two frames of comb, then moved one frame slightly toward the other, so as to press gently upon the bit of comb attached to the cell. The pressure would keep the cell in place until the inclosed queen should hatch. Before night every nucleus had its cell.

As my object was to secure queens for my black stocks, some may wonder why I took all this trouble with nuclei. Why not have deprived all my black stocks of their queens, and then have given a capped cell to each stock? This course could have been followed and with success; but it would have been much less advantageous than the one I pur-

sued, as will at once appear by an easy calculation. After the capped queen-cells were put in the nuclei, there would be an average of four days before they would hatch; then five days would pass before the queen would go out to meet the drone, and longer, if the fifth and some following days should chance to be cloudy; then two days more before the fertilized queens would begin to lay; making a period of at least eleven days after the nuclei were made before the queens would begin to lay. If, instead of making nuclei, I had destroyed all my black queens and given the queen-cells directly to the black stocks, each stock then would have been for at least eleven days without a laying queen. A first-rate queen will lay 3,000 eggs a day. We will suppose that mine would have laid 2,500 a day. In one hive for eleven days this would have been a loss of 27,500 bees. In the thirty-six hives, the aggregate loss would have been 990,000 bees. I destroyed twelve queens and made their stocks into nuclei, so by my method I lost the use of twelve queens for the eleven days, in all, a loss of 330,000 bees by the nucleus method, against a loss of 990,000 by the other method. This is a clear gain by the nucleus method of 660,000 bees. This, too, was during the time when bees must be raised to gather the white-clover honey which comes soon after. A loss of so many bees at this season would have seriously less-

ened my honey harvest, and so have made the receipts of the year much smaller.

On the eleventh day after making the nuclei I examined five of them, simply by lifting up the frames to see if any eggs were in the cells. The presence of eggs would show that the queens had begun to lay. Four of them showed eggs, but the fifth none. The next day I examined this fifth one again and found eggs, as also in six more which I opened. Then preparations were made for introducing queens to the black stocks. That afternoon I looked over twelve of the twenty-two stocks which remained after the nuclei were made, found the queens and removed them. Then opening a nucleus I found its queen, caged her in a small wire-cloth cage about the size of my thumb, and suspended this cage between two combs in one of the black stocks just made queenless. So the work went on until a caged queen was in each of the twelve black stocks. The next morning I uncaged these queens, smeared a little honey on them, and let them crawl down among the bees. In every case they seemed to receive her gladly. Then the other ten stocks had their old queens removed, and a caged one put in, which was liberated the following morning in the same way. On the fourth day afterwards I examined all and found fresh eggs in twenty, showing that the queens had been received and were at

work. In the other two there were no eggs, and queen-cells had been started, proving that for some cause in these two the introduced queens had been rejected. I destroyed the queen-cells and sprayed every comb with peppermint water from the atomizer. Two queens were then sprayed, and allowed at once to crawl between the combs. I found by a subsequent examination that they were accepted.

Thus twenty-four of my nuclei had done their work, had yielded me fertile queens. Four more had no queens. They were probably lost in returning from the marriage flight. These twenty-eight nuclei I at once united with ten that had fertile queens. The uniting was done by spraying the frames in a nucleus, then spraying the frames to be put in, and stopping up the entrance for a night after they were united. They gave no trouble, did not quarrel, and all knew their places. I helped these ten swarms made by uniting nuclei, by giving them frames of hatching brood from the strong stocks, and by exchanging some of their empty frames for those full of brood taken from other hives, until all the ten had twelve frames each. I desired to have every hive as strong as possible. All the twenty-two which had not been used for rearing queen-cells, nor broken up into nuclei for hatching them were now very strong, and could easily spare a frame or two to help those which had

been rearing queens for all. The other two nuclei were kept so as to have their queens to supply any stock that might accidentally become queenless.

It was the twenty-ninth of May that the work of Italianizing was completed. The work had been really exciting. I entered into it with an abandon which I believe is seldom found. People often complain that their work is slavish toil. Mine had been a daily delight. Although several years have passed since then, and I now number my hives by the thousand, still as I write this account of those absorbing days something of the old enthusiasm stirs within me. I was only seventeen. My mother, my brother, my sister, and our farm of eighty acres made up my little world,—a world in which it would seem to many that life must be very monotonous. For me life had always been happy, now it was glorified by enthusiastic devotion to a chosen calling. Here in the heart of Michigan, far from what is called society, I had created a world which had for me a stronger interest than any of the throbbing centres of human life. I am not sure but my work in rearing those beautiful insects, being for them a providence to secure every best condition of life, was far nobler than that of the titled courtiers who attend upon queens and kings in the great hive of human life. Nay, I am sure; it was nobler. My work was strengthening to the body, and sweetening to the soul.

VI.

APPLE BLOSSOMS.

While queen-rearing was going on, other work was not at a stand-still. In transferring I had learned very accurately the condition of every stock. All had honey enough; all had pollen stored for the brood; all had brood coming forward, yet some were in much better condition than others. All of my original hives, which had been wintered in the cellar with careful attention to temperature, were strong in bees. They seemed almost to fill the hive even at that early season of the year. Those which I had purchased had an abundance of honey, but they had fewer bees than my old ones. I at once turned attention to rearing bees, for a hive that is weak in bees will scarcely gather honey enough for its own use, but one that is very strong in bees will, in a good location and a good season, store a large quantity of surplus honey. My aim in keeping bees was to make a profit from them, and to do this I must have every hive boiling over with faithful workers.

The alders, the willows of different species, and the white and red maples gave sufficient pollen and honey to promote brood rearing before April 15th, hence when I began to transfer, all the hives had some hatching brood, and other brood, in all stages of growth. As soon as the bees were in the movable-comb hives, I began systematic effort to stimulate the queens to lay. Some of my efforts gave much amusement to those of my neighbors who learned about them. Early in the season it is important that the hives be kept quite warm, so that the queens will lay, and so that the young brood will not be chilled. Yet early in the season we often have cool days, and the nights are usually quite cool. To prevent the escape of the heat generated by the bees in the hive, I had some small comfortables made, the exact length and width of the hives, and with these the tops of the frames containing the comb were closely covered. On top of these quilts I put two or three thicknesses of carpet. My wise neighbors, who had always seen bees kept in the old, careless way, laughed not a little at "that young Allen, who was tucking his bees up in bed comforts." Their fun gave me no uneasiness, for I felt quite certain that before many months were gone the laugh would be in my favor. I could remember when they had made similar complimentary remarks about my

father's putting out so large an orchard, but the preceding harvest from that orchard had given us more clean cash than any farmer in our neighborhood had received from his farm for three years.

The entrances to the hives were so arranged that on cool nights and windy days they could be nearly closed, leaving only space for one or two bees to pop out or in at once. The bees bred in April and May would be my servants, to fill the hives several times with honey from the luscious harvest that would come in June, with the blooming of white clover and linn. May 1st was the great day for inaugurating queen-rearing. The next day I looked over every hive, and carefully examined every comb. In order to keep the temperature of the hive as high as possible in the early spring, it is important to crowd the bees together on as many frames only as they will comfortably cover. I reduced most of the hives to six or seven frames, having those containing brood in the centre. The next day I again opened every hive, and lifting out the rear frame I shoved the combs back from the centre, and put this rear one, which contained no brood, in the centre. In this way I was giving the queen a whole frame of empty cells in the central and warmest part of the hive, where she could fill the cells with eggs. I repeated this process about once in two days, putting in more frames when those already

in were filled, until all the hives were full of frames, and every frame was nearly full of brood. In this work of building up the swarms to the strongest point, the empty combs, which I mentioned as having been stored away at the time of transferring, were of great value. Without them it would have been impossible for me to have made the hives so strong, for it is not possible for the bees to make new comb in the early, cool weather.

The strongest hives were full of brood much sooner than the others; then they were made to give some frames of brood to weaker ones, so as to bring all up to the highest standard. Before queen-rearing was over nearly every hive was full. When the thirty-eight nuclei were united into ten hives, a few frames were needed to fill them out, which were also taken from the ablest stocks, and their places filled with empty combs. It will be remembered that at first I had thirty-six black stocks, and one Italian. Two blacks had been used to raise queen cells, and twelve had been broken up into nuclei to hatch the cells. Now, in uniting all but two of these nuclei, they were put into ten stocks. Hence I now had thirty-five full stocks, and the two nuclei.

The opening of hives about every other day had kept me well informed as to the honey in them. From willows and soft and silver maples enough

honey was secured to make the hives gain several pounds in weight. Of the sugar maple there were large numbers of trees within a mile of me, and when they opened, the bees had pasturage as good as could be asked. They worked merrily, and in two days I noticed the hives were about full of brood and honey. This was while the queen-rearing was going on, when there were but twenty-five hives. Extracting was begun next morning. The day was still and warm. The bees were flying rapidly to and from the maple woods. The first hive was smoked a little, opened, the frames lifted in succession, and the bees shaken into the hive. The frames were hung in a carrier, and taken to the shop, where the extractor was firmly set, at such a height that the honey could run from it into the bung of a barrel. Being curious to know the number of pounds I should get on this, my first honey day, I had arranged to draw the honey from the extractor into a pail, and then pour into the barrel. By weighing the first pailful, and counting the number of pailfuls, the whole number of pounds would be known.

The extractor[11] held two frames at a time. As the honey was not yet capped over, there was no labor in uncapping. Two frames were put in, and I turned the crank slowly at first. The speed was increased until I heard the honey fly out against

the sides of the can. The frames all had brood in them, of which a good deal was, of course, not yet sealed. From frames containing both brood and honey, the honey can be thrown without injuring the brood, if one is careful to turn with just the right speed. After a few trials I got the knack of it, and could throw out the honey without disturbing a single growing larva. The honey having been thrown from these first combs, they were returned to their hive, and another hive was opened, and so the work went on. It was not by any means easy work for a beginner. A pretty wide experience has convinced me that extracting is not easy work for an old bee keeper. Lifting the combs from the hive, shaking off the bees, carrying the combs to and from the extractor—all are hard work. When five o'clock came, and the day's work was done, I was very tired. But the result of the work was so stimulating that my weariness was almost forgotten. From the thirteen hives, opened that day, had been taken two hundred and twenty-six pounds of honey, an average of more than seventeen pounds per hive. The extensive maple forest was yielding to my strong stocks a most abundant harvest.

That night after the shop was cleared up, and every thing in order for the next day, I sat down to put in writing, and to consider in all its aspects, a plan which had come into my mind as I was work-

ing over the extractor. I will here set down the date upon which my plan of work for the year was finally based—a plan which achieved such a brilliant success as to be almost incredible, except to those who have some acquaintance with the methods and results of modern bee keeping.

1. By extracting from the hives every two or three days during an abundant yield of honey, the bees are stimulated by the loss of their stores to such unremitting industry, that the number of pounds of honey obtained from a hive is greatly increased. The reports spoke not unfrequently of getting three hundred pounds. Sometimes four hundred pounds per hive were obtained during the season.

2. By extracting frequently the cells are emptied of honey, and so are ready for the queen to lay in. And as the bees are bringing in honey rapidly, she is stimulated to do her best. So the hive is kept full of growing brood, and very strong in mature bees old enough to work.

3. The honey extracted from the combs before it has been sealed up in the cells by the bees is thinner, and not so good in flavor as when it has been left in the combs until sealed. But if left until sealed, the bees are not stimulated to so great industry, and a much smaller number of pounds is secured.

4. The demand for extracted honey, even of the best quality, is not so great as for comb honey, and the price per pound is usually not more than two-thirds as much as the price of comb honey.

5. After apple blossoms would come a period of no bloom until white clover should open, during which the bees would obtain scarcely enough honey to keep them rearing brood. After white clover and linn there would be another season of inactivity, and another after the first frost in the fall. During these idle seasons it would be best to feed the hives a little every day, in order to keep them rearing brood.

6. Then I asked myself this question: *Could the honey be extracted often during a honey harvest, and then when the time of no bloom came, and the bees were forced to idleness, could this honey be fed back to them, and be stored by them in nice, new comb, and ripened so as to obtain nearly as many pounds of comb honey as had been taken of extracted honey?*

7. It will be seen that by the frequent extracting the large quantity of thin honey would be secured; and the combs being often emptied, the queen would have empty cells for her eggs, and so be kept laying. Then, when the period of scarcity came, by feeding this honey back, a stimulus would be given the queen. The bees, too, would be kept busy feeding the young brood, and storing the honey in

combs suitable for market, and ripening it, when otherwise they would be idle, not getting honey enough from day to day to supply the needs of the hive, and hence consuming a part of what they had already stored.

8. So far as I could see, it seemed certain:

(*a*) That whatever honey was fed to a hive would be kept by the bees in the hive. For them to take it outside the hive would be contrary to all that was known of the nature of the bees.

(*b*). That a portion of what was fed them would be consumed by the bees themselves, but they would eat no more than they needed. It was most profitable for me that they should have all they needed.

(*c*). That some of what was fed them would be fed to the young brood. The more they used for this purpose the better for me. The more bees raised in the hive the more workers there would be to store honey when the white clover and linn opened their nectar-laden blooms.

(*d*). That whatever the bees did not eat themselves, nor feed to the young brood, would be stored in combs in the most marketable shape.

(*e*). That the number of pounds of comb-honey would be less than the extracted honey fed the bees, but the comb-honey would be worth so much more per pound, that, after making a large deduc-

tion for loss in weight, the value of the comb-honey would be more than the value of the extracted honey.

After looking the subject over in all its aspects I determined to try the experiment of feeding back to the bees whatever honey I had on hand after apple-blossoms. By the result of this experiment I could tell whether it was wise to continue this method. It was somewhat venturesome for a young beginner to enter upon an untried field, but my father had taught me that, if an idea had common sense in its favor, not to be afraid of it because it was new. The next morning I sent off an order for material for five hundred honey boxes, four sides glass, to hold about two and a-half pounds of honey each. They would come by express to Howard in time for use when apple-blossoms should fail.

Three days later apple-blossoms opened. Our orchard was a sea of bloom, and in every orchard near the bloom was equally profuse. The bees were in a paradise of sweets. In two days I again extracted, getting on an average twenty-three pounds per hive. And four days later I took again an average of nineteen pounds per hive. Then, as the season of bloom was approaching a close, I allowed the hives to be filled up. The honey-boxes came to hand all right. They were nicely cut out, and the work of putting them together was easy and

pleasant. I arranged for putting on each hive boxes to contain sixty pounds of comb-honey.

Feeders were prepared by making shallow troughs two inches wide, one and a-quarter inches deep, and a half-inch shorter than the inside width of a frame for comb. One of these was set on the bottom bar of a frame and fastened by driving small nails into its ends from the sides of the frame. One end of this trough was placed close against the side bar on one side, which made it lack one-half an inch of extending to the side bar on the other side. A quarter of an inch above this trough another was fastened in the same way, except that its end was brought close to the side bar on the opposite side from the first one, and thus an open space of half an inch was left for pouring honey into the trough beneath it. So one trough was put above another until the frame was filled, making seven in the frame. Each of the troughs, if full, held about one pound of honey, so that seven pounds could be fed at once. That no bees might fall into the feeders, and be drowned, a very thin piece of wood, such as is used for the backs of picture-frames, was laid into each trough. This, being slightly smaller than the trough, would rise and fall in it, and give the bees a secure footing.

Having the feeders all ready, and the boxes for sixty pounds of honey per hive all prepared on

racks so that the whole could be set on or lifted off at once, I extracted closely from every hive, removed all the combs except those containing brood, crowded the bees on these brood combs, and put in the division boards, then set on the rack of boxes, put on a super which nicely shut in the boxes, and still had room in the rear end for hanging in the feeder. At dusk, when no bees were flying, I went along by the rear end of the hives, filled the feeders from a large tin pail with a spout, and hung them into the supers, just as a frame would hang. At this first feeding every feeder was filled with honey, for I wanted so to excite the bees by giving them suddenly a large quantity, as to lead them to begin vigorously in the boxes at once. On examination in the morning I found that the feeders were empty, but that work had been commenced in only a few of the boxes. I inferred that the larger part of this first feed had been stored in the vacant part of the brood-combs and drew the moral that in future the brood combs must be full, either of brood or honey, before feeding for comb-honey was begun. I filled the feeders again that morning, and at night found that work was going on in many of the boxes. Again at night the feeders were filled, and in the morning they were empty, comb was being built in nearly all the boxes, and stored in them. I did not fill the feeders again this morning, for it was not

best to have the bees in the hive in the daytime. If the feeders were supplied with honey the bees would remain in. If no honey was in the feeders they would fly out and collect what could be found, even if it was very little. By feeding at dusk they could empty the feeders by morning, and so be ready to go to the fields and woods. So the feeding was kept up. In ten days every box was nearly full. Then for two days only a small amount was fed, so as to give the bees a chance to fill and seal every cell. At the end of twelve days I took from each hive the twenty-four boxes nicely filled with capped honey, as beautiful as was ever made from apple blossoms. It was most attractive to the eye, and of good flavor.

Thus, before a pound of the white clover and linn harvest had been taken I had received from maples and apple blossoms 2,100 pounds of comb-honey in the best shape for market. Comb-honey was then worth twenty-five cents a pound, or $525 for the lot. Already the money invested in bees was more than returned to me. Already my success gave a surety for the success of plans for the future. I saw my many different apiaries in favorable locations for miles around; the whole country yielding nectar to my millions of eager workers; the luscious harvest filling my storehouses with sweets more delicate than the famed honey of

Hymettus; the distant markets of the world sending to me the returns which would bring ease and comfort for my mother's old age, and culture for my sister, my brother, and myself. The whole world of literature, travel, art, was to come from the blessed bees that worked with such ceaseless industry under the direction of my skill. It was a happy dream. A dream that well might give quicker beat to my eager heart, and nerve to a hand as young as mine. A dream which the harvest from maples and apple blossoms assured me had foundations in solid reality.

VII.

WHITE CLOVER AND LINN.

ALL things were now in readiness for the white clover to open its dainty globes, so full of food for my friends, the bees. I watched its progress with an expectant eagerness. It grew in great abundance, and gave promise of an almost measureless flow of nectar. How small and insignificant it seemed beside the great linn trees, some of them sixty feet high, that held up their mighty crowns of leaves to the warm embrace of the summer sun. Some of the linn trees, growing in more open places, branched near the ground, and I was able easily to observe the swelling flower buds. Every tree had its millions. In a few days every bud would open, and every small flower would be a chalice, daily filled, by the beneficent hand of nature, with the honey which the tireless bees would hasten to carry to the hives. The delicate clover, modestly creeping everywhere, and the majestic linns, noble monarchs of the woods, were equally my friends. On the 12th of June the clover began to open in the

most favored places. Two days later it was so abundant that the bees seemed in a quiet, happy intoxication. Long before sunrise the earliest were afield. Not until almost dark did the last belated wanderer fly home with its sweet burden.

Most of the frames in the first stories were nearly or quite full of brood. It had been my persistent effort to get these frames so full of brood, that when the clover should open, there would be scarcely any empty cells for storing honey in the lower stories, and hence the bees, in their eagerness to find room, would be willing to begin in the second stories at once. These second stories had been kept near the hives they were to go on, and provided with frames. There were yet one hundred and eight frames of the drone comb and inferior worker comb, which had been stored away when transferring. Three of these frames were put in each super. On the morning of the second day after white clover opened the supers were put on. First the lid of the hive was taken off, and the quilt removed from the frames. Then the second story was set on the first, the frames adjusted at the proper distance, the quilt spread on the frames, and the lid put on, making simply a two-story hive, the lower story for brood, and the upper for surplus honey.

Next morning I examined a few supers, and in every one found the bees at work repairing the old

comb, and already starting new combs in the empty frames. The increase of room had come at the right time. I hoped it might entirely prevent swarming, as well as give abundant room for surplus stores. The weather was warm and clear. The clover kept opening its wealth of blooms. The bees worked in an abandon of enjoyment. The combs were built with surprising rapidity, and as fast as built were filled with honey. In each super there were nine frames to be filled with new comb. In twelve days they had, in nearly all the hives, every frame filled with new comb, and every comb filled with honey waiting to be sealed. It would take no small amount of time and honey for them to make the wax and seal it. For my purpose it was just as well to extract before sealed.

Again I prepared to extract. As I hoped to find no brood in the second stories, I prepared to handle the frames in a little different manner. I went first to the two hives most distant from the shop, took six frames from the second story of each, then closed the hives, and left them until they should be reached in turn. The twelve frames were taken to the shop, the honey extracted, and they were then taken to the hive, where regular operations were to begin. From the second story of this hive the twelve full frames were taken, and the twelve empty frames hung at once in their place, and the hives immedi-

ately closed. The bees would go to work without hesitation in the empty comb, and so confusion and loss of time were avoided. The honey was extracted now from the twelve frames just taken, and they were used for the next hive, and so on until every hive had been attended to. It took two days of hard work to extract from the thirty-five hives, but it was interesting and exciting labor. The result showed an average of five and a half pounds of honey to a frame, sixty-six pounds to a hive, or 2,310 in all.

The bees continued work day after day with the quiet, happy air, so delightful to every bee keeper, for it assures him that his hives are being filled. To sit among the hives was to surround oneself with a ceaseless sound of joyous humming. Large numbers of workers were constantly leaving and returning. Now and then a clumsy drone would go booming past, making up in quantity of noise for lack of industry. As all the supers were now supplied with combs, of course it took less time to fill them with honey. On the eighth day I again extracted, and obtained an average of fifty-nine pounds per hive, 2,065 pounds from the thirty-five. I found in two or three cases that the queens had got into the upper stories, and nearly filled one or two combs with eggs. Such frames I gave to the two nuclei, left after Italianizing.

Now the linn opened its myriads of flowers, and the bees left the white clover for its superior attractions. They flew back and forth in a kind of quiet delirium. I had read glowing accounts of the large amounts of honey sometimes obtained from linn, but the reality surpassed all my expectations. In six days the supers were again ready to extract, and yielded 2,485 pounds.[12] If linn flowers lasted through the summer, they would make a bee keeper's paradise. Unfortunately they last only ten or twelve days. Towards the last of their season they did not yield so well. On the eleventh day after their opening I observed that bees were working again on white clover, so I extracted at once, in order to keep the linn honey as far as possible by itself. This time the yield was 1,505 pounds.

The white clover again gave the bees a field in which they worked with a passion of acquisitiveness. In eleven days more the season begun to fail, the clover bloom was disappearing. Finally on July 22d a hot sun and dry wind made the flowers disappear as if by magic. Instead of the carpet of white there was an array of innumerable brown balls. I stood in the door of the shop, looked out over the wide fields, and at the broad stretch of forest, and then into the infinite depths of the summer sky, which seemed filled with the presence of that Over Soul, that is everywhere the Life of all

life. His laws working through blooms and bees had again and again filled my hives with precious stores.

My preparations had been made to increase the number of my swarms as soon as white clover failed, and then to set all the hives to storing the honey in boxes for market. Preparatory to increasing the swarms I extracted all honey from the supers, and set the empty frames back, to be cleansed up by the bees. This last yield gave me 1,997 pounds, an average of more than fifty-seven pounds per hive.

The whole harvest from white clover and linn was:

DATE.	POUNDS PER HIVE.	AMOUNT.
June 27 . . .	66, white clover	= 2,310
July 5 . . .	59, " "	= 2,065
July 11 . . .	71, linn,	= 2,485
July 16 . . .	43, "	= 1,505
July 23 . . .	57, white clover	= 1,997
		10,362

This great success was a surprise and a triumph to me. The journals indeed gave reports of very large yields, now from white clover and now from linn, but in no case had so large a yield as mine been reported from both in the same season.

This great yield was due to several causes:

1. The hives were all very strong in bees. No swarms had issued, and none had been made. My

method of management had kept the brood chamber almost full of brood from early in the spring.

2. The second stories, put on at the right time, had given space for storing, which had been at once used by the bees.

3. The location was most excellent. White clover and linn were in boundless profusion.

4. The weather had been good.

5. The frequent extracting had stimulated the bees to work to the utmost.

It was now July 23. Buckwheat would begin to bloom about August 15th to 20th. Now I must work for an increase of swarms. The first steps in this direction had already been taken.

VIII.

NUCLEUS SWARMING.

UP to this time I had been so fortunate as to have no swarms issue from the hive. I say fortunate, because it is best to keep one's bees at work securing honey. If they swarm, the old stock, from which the swarm issues, is weakened, and the new stock is not strong enough to store much surplus. If all hives can be kept full of bees until after white clover, they will then in most locations, have gathered the main harvest of the year. The bee-keeper can then make as many new swarms as his judgment approves. But it is not easy to keep bees from swarming until so late in the season. Unless very cautiously managed they will sometimes swarm so much as to weaken nearly every stock, and so destroy all hopes of a large yield of surplus honey. My success in keeping them from swarming gave me much pleasure. It was a real triumph to succeed in my first year where so many veteran bee-keepers fail. My success in preventing swarming was due in large measure to these two reasons:

1. To the young queens. In Italianizing I had given to every hive a young queen. A hive with a young queen is much less likely to swarm than a hive with a queen a year or two old.

2. To the second stories. As soon as white clover opened, the supers, filled with frames, had been put on. This doubled the capacity of the hive, and set the bees at work to store honey. They did not feel any necessity for swarming.

I had planned in the spring to make during the season one and a half new swarms for each old one, so as to have in the fall, including the old one, two and a half swarms for each one with which I began.

These new swarms were to be made on the nucleus system. To make them the first essential was fertile queens. Twelve days before the white clover harvest would fail, as nearly as I could calculate, I had again, as in the spring, set two hives to rearing queens. The original swarm of Italians was again deprived of its combs for this purpose, for I preferred that all the queens should be grown from the eggs of the imported mother, for she had proved to be an excellent, full-blooded Italian. The queens reared from her in the spring had before this filled all my hives with beautiful, orange-banded, Italian workers.

Her combs were taken, treated as spoken of in the chapter on Italianizing, and given to the two hives set apart for queen-rearing. The queen cells

were started in abundance. Six days after the combs were put in, I found thirty-two cells in one hive and thirty-nine in the other—a larger number than in the spring. Perhaps they started more because the weather was warmer, the honey coming in faster, and the hives stronger in bees. As soon as the clover harvest was done, I took twenty hives and divided them up into eighty three-frame nuclei. Of course there were the twenty queens from these divided hives. These were left in their old hives, but each had only three frames of brood. There were still fifteen of the old hives, full of frames of brood. From each of these I took five frames of hatching brood, then moved the other seven frames apart and alternated with them five empty frames, so as to fill the hive. Then the seventy-five frames taken from the fifteen hives were given to the twenty nuclei having queens, making four frames to give to each of fifteen, and three each to the other five. Then of course fifteen of these had seven frames each, and the other five six frames each. Now I moved the frames in these twenty nuclei apart, and alternated empty frames with them until the hives were full. Then to the whole thirty-five so prepared I gave an abundant feed. As the combs were nearly full of brood, the bees had no place to store this food, and hence were urged to begin new combs in the empty frames. Thus I had the whole thirty-

five industriously at work building combs, of which I needed a large supply, in addition to those in the supers, for the new swarms. The weather was warm, just right for comb building. I fed bountifully, and the combs went on with gratifying speed. As my queens were all young, these new combs contained scarcely any but worker cells.[13]

To each of the other sixty nuclei I gave a capped queen cell as described in the chapter on Italianizing. I had prepared a few more nuclei than my plan of increase required, in order that I might have queens enough, even if a few should be lost. It will be remembered that in the spring the queens were lost from four of the nuclei. It is quite probable that the young queens, returning from "their wedding journey," made a mistake, and entered the wrong nuclei. In arranging these new nuclei I took pains so to place them that each was easily distinguished both by color and position, so as to give the young queens all possible facilities in finding their own homes. For once I managed to overcome my passion for having everything in mathematical order, and put these nuclei in irregular groups, under trees somewhat distant from each other. As soon as they were thus arranged I opened each, moved the division board and the rear comb a little toward the back of the hive, and set in an empty frame. These sixty were then fed all

that they would take, and the bees began to fill the empty frame with comb. The combs built in the nuclei, without queens, always have nearly or quite all drone cells, but these combs are just as valuable for use in the second stories. I needed worker combs for the brood chambers, and combs in the second stories to contain surplus honey. For this last purpose the combs made up entirely of drone cells are fully as valuable. Hence I could profitably employ every bee, even in the queenless nuclei. Even these nuclei were pretty well supplied with bees, and as they had plenty of honey fed to them every night, their combs made good progress. In six days I gave each of them another empty frame, and by the time their queens were all laying, they had both frames full of comb. In ten days after putting in the queen cells forty-three of the nuclei, had laying queens. Three days later I again examined, and found that the other seventeen were all right. My precautions against the loss of queens had been successful. Not a single queen had failed.

The two nuclei, kept in the spring after Italianizing, had gradually been built up into strong stocks, by giving them the frames now and then found containing eggs or brood in the upper stories. These two and the other thirty-five had done good work in comb-building, during the time that the young queens were hatching, meeting the drones, and be-

ginning to lay. At the end of six days I had taken from them sixty frames of sealed brood and given one to each nucleus, putting empty frames in their places. At the end of the thirteen days, when all the nuclei were found to have laying queens, every one of the other thirty-seven was full of combs, and nearly every comb was full of brood or eggs. Now I must build up the nuclei as rapidly as the good queens would fill the new made comb wth eggs.

Each nucleus had three frames to begin with; each had built two combs; to each had been given one from the hives; hence in each there were now six frames. It would take six frames more to fill them full, or three hundred and sixty frames in all. To meet this demand I had the thirty-five supers each containing twelve frames, which had been used for surplus honey during the white clover and linn harvest. Of these frames one hundred and eight contained the drone comb sorted out when transferring, leaving two hundred and ninety-two frames of good worker comb, all built during that season. Seventy-seven more frames would give me a complement for the brood chamber of every hive, both old and new. From the thirty-seven hives I now took one hundred and twenty frames, containing larvæ and eggs, and gave two to each nucleus, thus increasing its number to eight. Bees do not often rear brood in the outside frames in a hive, so I took

the two frames of drone comb which had been built in each nucleus, and put one at the front and one at the rear, leaving the six frames for good worker comb between. The rear half of the frames were then removed back so as to make room for an empty comb in the centre of each nucleus. When this was done, each nucleus had six frames of worker comb containing brood and eggs, two frames of drone comb, one at each end, and the one frame of empty worker comb in the centre, where the young queen would rapidly fill it with eggs.

The places made vacant in the old hives by taking out frames were filled with two empty frames in each hive, and then frames of nice empty worker comb. The feeding was kept up, but as now there was not so much comb to build, the amount fed was much less. The feeding was done always at dusk, so that the bees might fly abroad by day, and gather whatever honey could be found. They gathered some every day, though the amount of course was small.

Four days later I took sixty frames of hatching brood from the old hives, then spread the brood and put in empty frames of worker combs. The sixty frames of brood were given to the nuclei, and then those hives also were filled with frames of worker comb. Twenty days after queen rearing was begun, I had sixty new swarms of bees—ninety-seven in all, including the old ones. These swarms were not yet as strong as the old ones had been before the

new ones were begun, yet they were by no means weak, for the old ones had been very strong indeed, and could well give up a portion of their bees, and the queens had been laying vigorously every day. All of them were very strong in brood, in all stages of growth. This brood was hatching every day, and so the number of bees was fast increasing. The increase could have been made in this way, during a season when but little honey was coming in, only by my method of feeding liberally. To rear brood and to build comb both, requires a generous amount of honey. Although the bees had gathered a little every day, I found, when my new swarms were all in order, that I had fed an average of thirty-one pounds of honey per hive, for the whole ninety-seven hives. This honey would have brought me in the market sixteen cents a pound, or $481.12 for the 3007 pounds fed, making each new swarm cost me $8.02. Then the hive and frames for each new swarm cost, including paint and quilt, $1.20. So the total cost of a swarm was $9.22.[12] But they were in every respect as perfect as bees and hives and frames could be. Italian bees not so good as mine and in hives much inferior, were then selling for $15. per swarm. At this rate there was a clear gain on the sixty swarms of $346.80. In no other branch of farming could I have made, in twenty days, a sum of money nearly as great.

IX.

COMB HONEY.

THE time for feeding the clover and linn harvest back to the bees, to be stored in combs, was getting very short. Not more than eight days could now be counted on before buckwheat would begin to open, and then every hive must be gathering the rich harvest from its innumerable blooms. The whole ninety-seven swarms were now in condition to engage in storing in combs. To this I had been looking forward, and had procured the necessary supers, feeders, and boxes. August 12th I put boxes on each hive to contain forty pounds of comb-honey, and that afternoon at two o'clock began feeding. To each hive was given a feeder full, not less than seven pounds. Everything had been arranged so that it was only necessary to fill the feeders and hang them into the rear ends of the hives, yet for so many hives this was no small job. I had two tin pails with spouts, holding twelve quarts each. The honey was drawn from the barrels into these pails, and the pails carried, by aid of a

yoke, to the place among the hives where they were needed. Then resting a pail on a stool, prepared for the purpose, the honey was quickly poured into a feeder and the feeder hung into the hive or super. Work as rapidly as I could, it took me rather more than three minutes to feed a hive. Before all were attended to it was dark, and a very tired young man went to bed that night before eight o'clock. In order to stimulate rapid comb building in every box, I had determined to fill the feeders again next morning. At daylight I was at the work, beginning where I had begun the day before. In nearly all the boxes comb was begun. The feeders were nearly empty. They were all filled before nine o'clock. I calculated that it would take the bees about the whole day to empty them this time, but afterwards I fed, in the morning, only about three pounds, so as to leave them a chance to fly out for several hours during the day, but gave a full feed in the evening. This calculation proved in the main correct. On the morning of the fourth day the boxes were nearly all full of comb, and the upper parts of the combs were already sealed. That evening I fed only about two pounds, and then for two days put only a small amount in each feeder. On the morning of the seventh day the honey in the boxes was all nicely sealed. It was only in time, for the buckwheat had begun to open. If I kept feed-

ing the white clover and linn to the bees, the darker honey which they gathered from the buckwheat would be mixed with the white, and so it would all have to sell for dark honey. Moreover, if the bees were fed in the hive, they would gather but little honey from the fields. The only course was at once to remove the filled boxes, and put in empty frames, to be filled with comb, for storing the harvest from buckwheat and other full flowers. It was a delight to take off the clean boxes, with their store of white honey so beautiful and delicate. I had fed an average of forty-six pounds of extracted honey to each hive. From this the bees had made enough wax for building comb, and had filled the comb with honey, so that each hive yielded forty pounds. It will be remembered that this extracted honey was thin and unripe. It would have brought then in market sixteen cents per pound. The value of the honey fed each hive was therefore $7.36. The forty pounds of comb-honey were worth readily, in clean cash, $10. There was, then, a clear profit of $2.64 per hive for feeding the honey back, and getting it stored in combs. Indeed, there was a gain larger than this, though it came in a way entirely unexpected by me. I had calculated that my boxes contained two and a half pounds of comb-honey. On sending them to market, later in the season, I found the custom was to sell such boxes

by gross weight. The wood and glass in each box weighed one-half a pound, hence the gross weight of each box was three pounds. The half pound of glass and wood in the box brought me the worth of a half pound of honey. So that I made a gain of one-fifth in the gross weight of my honey by having it stored in the boxes. The boxes sold for a good deal more than they cost me in the first place. This does not seem right, and yet after looking the matter all over I could not see where I had been at fault. I sent to the wholesale dealer what I rated as two and a half pounds of honey. He sold it, and sent me returns for three pounds. All could see just what they were purchasing, and need not buy unless they chose. I found that my honey was quickly taken from the hands of the wholesale merchants, and that the retailers sold it readily to the consumers at somewhat more than the regular market price. It is only an illustration of the fact that people will buy a very nice article, and that it pays to put whatever you have for sale in an attractive shape.

X.

FALL FLOWERS.

By my advice Will had sowed on our farm eight acres of buckwheat. It was much more than we usually sowed, but we knew that the grain would give a fair profit on the labor and expense, hence whatever honey the bees should make from it would be clear gain. I had offered to furnish seed to as many of the neighboring farmers within two miles, as would sow a patch of buckwheat on their farms, and had been called upon to furnish thirty-four bushels for this purpose, which had cost me $42.50. There were forty-three acres of buckwheat within two miles of our place. Most of it had been sown a little later than ours, and hence would open later.

Our buckwheat began to open August 20th. The next day I prepared the supers for the reception of the fall harvest. There was nothing to do but to put in all the frames of drone comb and then fill them up with empty frames. The hives having thus been put in order I could do no more. The bees, the buckwheat, and the other fall-flowers, must do the rest.

Buckwheat rapidly opened until great fields of white lay all around us, and the air was densely laden with its heavy perfume. It yielded honey most bountifully, as buckwheat often does in favorable years; though sometimes it gives scarcely any. The hives were not yet so full of bees as they had been before the new swarms were made, but the brood was rapidly hatching in every one of them. The buckwheat yielded so profusely that they seemed to gather honey as fast as during linn bloom. September 2nd, twelve days after putting on the supers, they were full enough to begin extracting. That day I extracted from twenty hives, aud kept taking twenty a day until all were done. I got an average of fifty-seven pounds per colony,—5529 pounds from the ninety-seven swarms.

Bees could have had no better pasturage. In addition to the buckwheat there was now a very large quantity of heartsease, a plant resembling smartweed, and often called by that name; but it is not smartweed, as anyone can tell by tasting the leaves. The leaves of smartweed have a very pungent, acrid taste; but the leaves of heartsease are nearly tasteless. From smartweed no honey is gathered, but heartsease is one of the best honey plants. It grew all around me, in every cultivated field, by road-sides, and along fences and streams. Then the swamps and borders of the woods were

full of boneset, and goldenrod, and aster, all of which yield much good honey. It was a bewildering array of sweets for the joy of the eager bees. They worked on buckwheat until about eleven o'clock each day, then, if the sun was bright, the flow of honey seemed to cease in buckwheat, and they betook themselves to other flowers, on which they worked until darkness drove them heavily laden to the hives. Bees were getting more abundant now, and pasturage was even better than when buckwheat first opened.

Frosts usually come in my vicinity about the tenth of September. Only a few days more would surely close honey-gathering for the year. I watched the weather with much interest. From the immense area of bloom the bees were gathering rapidly. Every day of good weather now meant nearly a thousand pounds of honey for my hives. The weather continued delightful, and the hives again grew heavy with their luscious stores. September 11th there was danger of a frost. At six o'clock the thermometer stood at 43 F., and the weather was growing colder. If the night continued clear the mercury would be below 32 F. before morning. But happily a change of wind brought propitious clouds, and we escaped. In the morning it was warmer again. Four days more of beautiful weather, then on the afternoon of the fifteenth

came a sudden change. A north wind set in about four o'clock. The bees rapidly sought the hives. The sky was cloudless. By six o'clock the thermometor was down to 37 F. It was now quite certain that we should have frost before morning.

The clear September night was most inviting. The stars shone out with a pure lustre. The wind had gone down and the trees were silent. I put on a thick coat and strolled out into my city of hives, whose millions of lilliputian workers had given me so many happy hours as the spring and summer and fall had gone by. They had richly repaid all my care. I had studied all their instincts, and had so managed as to adapt every circumstance to their needs. Faithful to those instincts, they had availed themselves of every effort on my part to facilitate their work. Now, on this calm night, had come the end of their gathering from field, and swamp, and forest. I looked at the thermometer which had been hung among the hives. At ten o'clock it stood at 33 F. In that still clear air it would continue falling, and before morning the delicate crystals of the merciless frost would blight the bloom far and near. When the morrow's sun should send down its genial rays, the millions of flowers would hang with faded beauty on lifeless stems, no longer the fairy laboratories for perfecting the nectar, which my faithful bees should gladly bring to the

waiting hives. I walked slowly along the rows of hives and touched them with caressing hand. I put down my ear to catch in its fullness, their deep contented roar. I sat down in my favorite seat under a spreading apple-tree, where during the last five months I had so often sat by day and by night, to have silent converse with my speechless friends. All around me, in the dim shadows of the orchard, were the hives; beyond rose the dark masses of the maple forest; above shone the silent stars. The months had gone by full of labor, of care, of self-denial, but most rich in experiences, precious to me especially in their lessons of labor and independence. A glad feeling of gratitude welled from my heart to Him whose laws made flowers and bees, and through whose mysterious leadings I had come to this happy work. Surely from Him had come benedictions upon my blessed bees.

I sat under the tree or walked among the hives until twelve o'clock. Before going to my room I looked again at my thermometer. It stood at 29 F. Already the delicate frost was forming its crystals all over the country. I went to bed with a feeling of release from absorbing care. The five months just passed had been given to constant and laborious attention to the bees. Now the crisis of my work was passed. It only remained to store the honey

in combs for market, and to prepare my little friends for the winter.

Next morning I was out at five o'clock. The frost lay thick and white on field and wood.

XI.

MORE COMB-HONEY.

THOUGH the frost had cut off the most of the flowers, and honey gathering had nearly ceased, the weather for a month longer would be mostly clear and warm. The nights would often be cool, there would now and then be a stormy day, but on the whole it would be warm enough for the bees to work well in storing honey in the comb. I at once extracted all that was in the supers, and obtained sixty-one pounds per hive,—6,017 pounds from the ninety-seven hives. This made the whole full harvest amount to 11,564 pounds. The white clover had all been put in comb before fall harvest. Of the linn harvest there was yet in the barrels 2,893 pounds, in all 14,457 pounds, now to be stored in combs.

On examination I found that the combs in the lower stories, except the two end ones, were about two-thirds full of brood. To have this large amount of brood coming forward at this season was what I especially desired, for the young bees were the ones

that would have strength to live over winter, and would gather the pollen and early honey, and nurse the growing brood in the spring. But as the lower stories were so full of brood there was not honey enough stored in them to feed the bees during the winter, and also the brood that would be started in the spring, before any honey could be gathered. I calculated that it would take about twenty pounds per hive to supply them, and set aside this amount, 1,940 pounds, from the buckwheat honey. This left 12,517 pounds to be stored in boxes for market.

The boxes were ready, and were at once put on. Two tiers, enough to contain eighty pounds of comb-honey were put on each hive. Then the feeding went on rapidly. It is generally an injury, both to bees and honey, for bees to fly much in search of stores after frosts have killed the flowers. The bees themselves are worked out in their eager search. And as they find scarcely any good honey, they often gather quantities of juice from grapes, from decaying apples, and from cider mills. They will collect, too, the sweet excretions of many species of plant lice, that are often found in myriads on certain kinds of trees. These unhealthy juices they store in the hive, and then in cold weather they consume this bad food, and being unable to fly out and void their feces, they contract dysentery or "bee-cholera," and often perish in great numbers

from this cause alone. By keeping my bees in the hive, during the early fall days, at work building comb and filling it with honey, they would be saved from collecting this poisonous food, and from its fatal consequences in the winter. So I fed them all they would take, and fed them in the morning, so as to keep them from flying out.

In nine days the boxes were full and the honey sealed. They were taken off and stored in the shop. To thirty-one swarms I had fed only linn honey; to the others buckwheat. I found that all boxes came off in good condition. They were full of honey, and every cell was sealed, so that there was no leaking. After removing the first set of boxes, the bees were given a vacation of five days. I feared that too great an amount of honey, quickly fed to them, might overwork them, and make them lazy. If nothing were fed them for five days they would, it seemed probable, return to work with avidity.

I had now fed to the hives 8,730 pounds. This left 3,787 pounds—not quite enough to get forty pounds of comb-honey from each of eighty-four hives. But there were one hundred and thirty pounds of honey from apple blossoms still on hand, and I could spare enough from that which had been set aside for the bees, to insure the filling of the boxes. So I put on each of eighty-four hives, boxes for forty pounds, as soon as the "vacation"

was over, and fed again rapidly. The eager and obedient bees responded at once. They worked most industriously, and in eight days more every box was filled. The weather was a little cool, and they did not seal it so readily as at first, but two days later it was sealed. The year's harvest was stored in combs.

From maples and apple blossoms the yield had been 2,100 pounds. After swarming time 3,880 pounds of white clover and linn had been put in combs, and now again of linn 2,480 pounds. Of buckwheat, and other fall flowers, the yield was 8,640 pounds. The product of the year was 17,100 pounds of comb-honey, as beautiful as one could wish to see.[15]

XII.

PREPARING FOR WINTER.

My studies in the literature of bee-keeping had taught me that wintering was a rock upon which the business had often foundered. The bee-keeper has had fair success in securing honey; his increase of swarms has been sufficient; he goes into winter quarters with a large number of stocks, and has great expectations for the next year. But these expectations are doomed to bitter disappointment. His bees die during the winter and spring. Even his largest swarms dwindle down to a handful, or entirely disappear. From his two or three score stocks, in apparently good condition in the fall, he will have in the spring scarcely a half dozen weak and dispirited ones. He throws up bee-keeping in disgust.

It was long thought that this state of things could not be helped. Success depended entirely upon "luck." Bees wintered well or ill without any particular cause for the one or the other. Not seldom the good farmer still puts his bees into box hives,

sets them out where grass and weeds soon almost stop up the entrances, allows them to swarm so much as to weaken every stock, and then to go into winter quarters with insufficient and inferior stores. They nearly all die in wintering. Then he complains of his "poor luck." But of course there was and is no *luck* about it. It was foreordained from the foundation of the world that bees so kept should die in winter. Suppose a cow were kept in an open yard during the snows and zero blasts of December, with only a hundred pounds of hay for the month, would she not be dead long before the month was past? Would any body say her death was due to "poor luck?" Would not everybody condemn her owner as a foolish and inhuman man? If fifty cows were tied in a small unventilated stable, fed only a meagre amount of spoiled hay each day, and allowed to wallow for months in their own filth, many of them would surely die before spring, and if any survived, they would be but walking skeletons. Horses, cows, pigs and sheep keep in fat and healthy condition through the winter, when their keepers obey the laws that control the lives of the animals. These laws demand that the animals shall have good food, good shelter and good ventilation. If these conditions are not complied with, the animals will die, or come out sickly in the spring, yet nobody says they die because of the owner's "bad

luck," but because of his folly in not taking good care of them. Bees will live through the winter, and come out healthy in the spring, if we give them the conditions natural to the bee, if we obey the laws of bee life.

From all I could learn on the subject by reading and reflection, it seemed that successful wintering depended on certain conditions, which were entirely under my control.

1. The hives, when winter comes on, should be well stocked with young bees. If brood rearing ceases early in the fall, so that only old bees are in the hive when winter begins, they will naturally die before spring, even if they have good stores, good ventilation and a proper temperature.

2. The hive should have from twenty-five to thirty pounds of healthy sealed honey. If the stores consist largely of juice from grapes and apples, or of the excretions of plant-lice, the bees will surely contract disease, and will die a miserable death. Be sure that they have good sealed honey, or if this is impossible, feed them good sugar syrup in time, so that they can seal it in the combs before cold weather.

3. Often the moisture from the breath of the bees condenses on the sides of the hives, and on the combs, and freezes, so that in cold weather the bees will be almost encased in ice, and in warm weather

will have damp, moldy, unhealthy combs. If there is put over the combs, on the frames, a porous absorbent covering, this will take up the moisture as it arises from the bees, and give the hive sufficient ventilation.

4. Many people suppose that bees freeze up in the winter; that after cold weather comes they may remain frozen for weeks, or, it may be, months. This is a mistake. Bees that live through the winter do not freeze. A frozen bee is as effectually dead as a frozen human being. As cold weather comes on the bees gather in a compact mass in the centre of the hive. Their honey supplies them with food. This food is the fuel that feeds the little vital fire in each of them. By their being in a dense cluster this heat is kept from radiating, and thus the mass of bees is kept above freezing temperature, however cold may be the winter, even in northern latitudes. The wise bee-keeper can do much to help his little friends in their battle against winter. He can give them good, close hives; can surround these hives with non-conducting material, and so aid in confining the heat generated by the bees; and can put the hives into a suitable store-house, or cellar, where he can keep the temperature constantly at about forty degrees. Bees so cared for will winter perfectly, and come out in the spring healthy, active, strong. As they will keep rearing

a small amount of brood all winter, they will probably come out stronger in the spring than they were in the fall.

Bearing these principles in mind, I prepared for winter. First the hives were looked over, and two of the combs, having no brood, and the smallest amount of honey, were taken out. In nearly every case they were the end combs in front and rear. The feeders were then brought into use again. This time they were hung in the lower stories, in the rear end. In each of the ten combs left in the hive, there was some honey in the top part, about two pounds to a comb, on an average. I fed to each hive twelve pounds of honey, which the bees quickly put in the combs, and capped a few days later. The feeders were taken out as soon as the feeding was done, and a close division board put in. Then two narrow strips of board, one-half inch thick, were laid one-half inch apart, lengthwise, of the hives on top of the frames. The duck covers, which had been used during the summer, were left off, and the thick comforts, made by quilting woolen carpet between common muslin, were put on. This gave to every hive a warm absorbent cover. Immediately under the cover, between the two strips of board, there was the clear half-inch passage, from end to end of the hive. As this passage was at the top of the hive, where the warm air collects, it would

give the bees safe and easy access to every comb, even in the coldest weather. Then, putting on the lids of the hives, they were in readiness to take to the cellar as soon as the cold weather of the last of November should come.

Attention was then given to the cellar. This had always been dry, and safe from frost. The experience of the past winter proved that bees could be wintered in it safely. Shelves were put up so that rows of hives could be set so as to come one foot under the floor above. By putting them so high above the cellar bottom they were kept from what ever damp unhealthy air there might be near the bottom. The shelves were supported by standards resting on the cellar bottom. It would have been much easier to have sustained the shelves by hanging them from the sleepers of the floor above, but if sustained in this way every footstep on the floor would have communicated a slight jar to the hives, and so the bees would have been constantly disturbed. By having the shelves sustained by supports resting on the cellar floor, this danger of jarring, and consequent agitation of the bees, was avoided. The shelves were so arranged that when the hives should be put in, I could have instant access to every one of them.

The windows of the cellar were darkened by tacking old carpet upon the sash, both inside and out.

This also served to protect them sufficiently against frost in all ordinary weather. Some bundles of straw were prepared for piling outside against extreme cold weather. The windows were on hinges, so as to open readily. In warm winter weather they could be thrown open at night to ventilate the cellar, and to cool it down to about thirty-eight degrees. A ventilating flue was put in at each side also, in case they should be needed in extreme cold weather. These flues were simply square wood pipes put at the top of the cellar walls just under the upper floor, going through the walls, and turning up at a right angle. They could be opened and shut instantly. The inner doorway to the cellar was from the kitchen. By keeping this doorway open in extreme cold weather, there would be some circulation of air between cellar and kitchen, and in this way the cellar be somewhat warmed by heat from the kitchen stove.

The 18th of November the weather became cold. The thermometer sunk to twenty-five. It was clear and dry. Making a hand-barrow large enough to carry two hives at a time, Will and I carried them in, and ranged them in order on the shelves. Every hive was numbered, and its stand in the orchard had the same number, so that in carrying them out no confusion need be made by placing hives on wrong stands. It is not the intention of this record

to enter upon the work of my second year, but I will say here that the bees wintered most excellently. Not a hive was lost. All came out bright and strong. The hives had mainly young bees in the fall; they had plenty of pure honey; they were kept at an equable temperature of about forty degrees; they had pure dry air. With such conditions bees will always winter well. Not because of "good luck," but because it is the law of nature.

XIII.

MARKETING.

After the hives and the cellar were prepared for winter, attention was turned to marketing the honey. For several weeks I had been sending out letters of inquiry as to best methods of sending to market, best markets, best commission merchants, etc. From all I could learn it seemed that a crop of honey as large as mine, and put up in such beautiful shape, would find the best market in New York. Moreover, I intended to be a large producer of honey in future years, and it was wise to begin at once to establish a reputation in the largest market, as a producer of a most superior article. It was decided that the honey should be sent to New York.

The only means of sending it was by rail. I feared that the jar on the railroads might break some of the combs, and my beautiful honey might reach market in a mussy mess. I learned, by reading, that large crops of honey were sent safely by rail from California to New York. If it went safely

from California, then surely it ought to go safely from Michigan. I searched all the journals for hints as to packing. I sent letters to the prominent commission merchants in several of the large cities, asking how the honey they received was packed. I wrote, also, to some large honey producers, East and West, asking how they packed honey for transportation on the cars. From these different sources of information I obtained hints that enabled me to perfect a plan for packing the boxes of honey in crates, and then packing the crates in a car, in such a way that all would go safely over so great a distance. First, crates were to be made. I took my accurate measurements and made a crate, by hand, of the right size to contain sixteen of my honey boxes. Then this crate was taken to the mill at Howard, and materials ordered to be cut out for 450 crates. This material, all nicely cut out ready for nailing, cost me twenty-six cents per crate. Into the front and rear sides of each crate a long narrow pane of glass, running two-thirds the length of the crate, was fitted. This glass, cut to size, cost me seven cents per crate. Will and I made them in the shop at home, on the bright days during the last of October, after all the farm work was done, and every arrangement had been perfected for wintering the bees. The work was light, clean, pleasant. We had both acquired

sufficient skill to work with some rapidity, and could each make thirty crates a day, without working hard.

When the crates were done, preparations were made for packing them in the cars in such a way that the honey would not be injured by jarring. A quantity of strong, durable sacking was procured, cut into proper sizes, sewed up into large bags, or cushion-ticks, and filled with oat straw. Then, with a large, long needle, such as upholsterers use, I "tied" them so that they looked like long narrow mattresses. When done they were six feet in length, as wide as the crates were long, and fully eight inches thick. There were a good many of them, and they made a formidable pile, stacked on the barn floor after they were filled. My neighbors had become somewhat more cautious in their criticisms, since the amount of my honey harvest had been noised around; but one of them could not help saying that "That John Allen is a singular feller. First he made quilts for all his bees, and now I do believe he's goin' to put'em to sleep for the winter, in straw beds. He's got a couple of wagon loads of beds in the barn, and he jest keeps his mouth shet as tight's a drum about 'em. Guess he'll be a knittin' stockin's for 'em next."

Only one item now remained before I could begin packing the honey in the crates. I wanted to

make my honey advertise my business as widely as possible. To this end it would be wise to put a neat label on every box of honey, and on every crate, so that wherever boxes and crates were seen, they would state the producer's name and location. I classified the honey into four grades, and named the grades "Apple Blossoms," "White Clover," "Linn," and "Fall Flowers." These names designated, as accurately as any I could think of, the exact sources whence the honey was gathered, and they were attractive names, that would call up, in the minds of all, visions of the beautiful country in the time of apple bloom,—

> "One boundless blush, one white-empurpled shower
> Of mingled blossoms;"—

of the starry carpet of green and white which in June the clover spreads over hills and valleys; of the honey-dripping lindens, from among whose blooming branches the eager bees send down a soothing murmur, that lulls one like the perfume of the lotus; and of the wild forest nooks, and lonely swamps, and brambly hill-sides that assume such gorgeous hues when golden-rod, and asters, and coreopsis fling out their brilliant banners in August and September.

A good name for my place would also help to advertise my business. To state the kind of honey, the name of the producer, and his location on every

box and crate would soon make the grades of honey and my name and place familiar, and so would secure me a ready market at good prices. To hit upon a good name for my apiary was not so easy as it had been to give suitable names to the grades of honey. The name must be short, and suggestive of the business, and yet not so strongly suggestive as to be in bad taste. "Maplegrove," "Lindenwald," "Linnswick," "Clovernook," "Cloverfield," all these were good, sufficiently suggestive, yet not too much so. I called a family council to choose from among these the name of our home. To use a good Quaker phrase, the spirit moved us to agree upon "Linnswick." Then I went to Howard and procured properly printed labels for boxes and crates.

Then packing was begun. First upon one side of each box was neatly pasted a label, setting forth that it contained white-clover honey, or whatever kind, made by Italian bees, in Linnswick Apiary, near Howard City, Michigan; John Allen, proprietor. Sixteen of these boxes were then packed in a crate, just filling it, and showing the beautiful honey through the glass in the sides, the lid was screwed on, and then a large label having the same statement was put on each end. As fast as ready the crates were piled on the barn floor ready for loading on the wagons, to be taken to Howard.

It was all to be packed in a single car, hence it would be best to take it all to Howard at one trip. I engaged nine of the neighbors to come with their large wagons, taking special pains to hire those who had had most to say of my youthful folly, and of my new-fangled notions about bees. The teams were on hand at five o'clock in the morning, and loading up was begun. Now came the first use for the mysterious "straw beds," which had given so much concern to some of the neighbors. Two of these were laid side by side against the front end of the wagon-box, with their ends running up against the end of the box until the edge of the ticks reached the top of the box, against which they were nailed. Then others were laid on the bottom of the box, and fastened against the sides, so as to make a thick straw cushion all around. Then the first crates were placed snugly against the cushioned front end, resting of course on the cushions on the bottom. In this way the honey was protected from sudden jars on the road to Howard. So wagon after wagon was filled, until in each there was more than seventeen hundred pounds of honey. A number of cushions, not needed for protecting the crates in the wagons, were placed on top of the loads, to be used first in preparing the car for receiving the honey.

The men had been bidden to come without their breakfasts, and now all went into the rough but pleasant kitchen of our large log-house, where my mother had used her skill in preparing a most savory breakfast. As we ate, not a few questions were asked me about bees and honey, and my methods of managing. Believing that any attempt on their part to keep bees would surely result in failure, from their not informing themselves thoroughly as to methods, and not attending carefully to the bees, I allowed them to mystify themselves with the belief that I had some profound secrets to which my success was due. Of course I did not tell them so. Indeed, I denied it strongly. But my denial only made them assert it more positively. The capacity of the average man for humbugging himself is simply amazing. Those good men believe to this day, that I have some powerful charms for managing bees. They will, perhaps, read this book out of curiosity, to know what young Allen says, and will smile with a superior look and say, "Allen has written a book, but then, you know, he has not told his secrets." If I were to charge them fifty dollars each, for some utterly useless "charm" or "secret," they would pay it willingly, and think it cheap.

After breakfast I mounted my wagon and started off, at the head of the procession of ten teams.

Those heavily-laden lumber wagons, each driven by a brown-fisted farmer, were for me a triumphal cavalcade. They were the irrefutable witness, to the whole neighborhood, that "Allen's queer notions" about bees had produced very substantial results. Before noon we reached Howard. The station-agent had engaged to have a car ready, and we drove to it at once. I had brought hammer and nails from home. Straw cushions were held against the forward end of the car so that they just came down to the floor, and nailed in that position. It took but a moment to cushion the whole end. Then a cushion was put against each side so that they just touched the end ones, and others laid across from side to side on the bottom of the car. Then a tier of crates was piled on these bottom cushions, with their ends snuggly pushed against the cushioned end of the car. As fast as a wagon was emptied its cushions were used on the sides and bottom of the car. I packed every crate in the car myself. I had thought out my system of packing, and was determined it should succeed if care could command success. A farmer, near Howard, had been engaged to have on hand a load of oat-straw. This was made into small bundles and closely thrust into every vacant place, every corner and crevice, so that, when the last crate was placed, my year's harvest was closely cushioned in straw all around. I could see no reason for its not reaching New York in safety.

It was four o'clock when the work was done. The agent locked the car. In a few minutes the freight-train left, and I saw the harvest into which had gone so much of thought and labor from myself, so much of labor and instinct from my friends, the bees, recede from the station towards the far-distant market in the great city. Soon the train passed from sight around a curve. I started for home at a somewhat rapid gait, the line of empty wagons making a noisy but merry rattling over the hard road. Mother had engaged to have supper for us at half-past six. Before that hour we were on hand. A meal had been prepared to which the hungry farmers devoted themselves with silent assiduity for a quarter of an hour. Then each received his pay, three dollars and a half, and went home.

It had been a hard day's work. For me a day of suppressed but intense excitement. When the men were gone I sat down in the easy chair before the great fire-place in mother's room. Will and Lucy soon joined me, and mother came in when she had attended to the evening work. Something of my deep interest had communicated itself to them. They said nothing of the honey nor of the summer's work, but I knew that their thoughts often went with mine to the laden car in the east-bound train, and that with me they not unfrequently dwelt upon our work in the future. We played some games.

The apples, and nuts, and cider were brought in. Will read to us the essay on "Success," from Emerson's *Society and Solitude* which had come a few days before. Mother sang some cheerful ballads, the first time since father's death that she had given us the sweet old songs. When I rose to go up-stairs, her "good night, my son," was sympathetic with a tone of courage.

XIV.

DEBIT AND CREDIT.

The next morning I sat down at my desk and began to make out the balance sheet. Some time would elapse before I could receive returns from New York, but all other accounts could be arranged, and when the returns for the honey came, they could be readily entered, and the results of the year's work quickly known.

The accounts were first to be arranged in two classes. Into the first class must be put everything which had been consumed in the work of the year, everything which might be called current expenses. Into the second class was to be put all expenditures which were properly considered a permanent investment in the business. The accounts had been carefully kept, and the work of arranging them was easy.

As the work had grown quite unexpectedly on my hands, large expenses had been incurred, in the hurry of the season, of which no minute record has been made in the foregoing pages: honey-

boxes, more frames and hives, and barrels, nails, paint, duck, packing-crates, straw cushions, etc., etc. The team had been used on various trips after bees, lumber, hives, and barrels, going to Howard on business, drawing honey to the station. I found the team had been used in the service of the bees sixteen full days. My own labor in connection with the team, will be considered in another item. For team I made an entry of two dollars per day. For teams to draw honey to the station I had paid $31.50. My own labor I valued at the rate I could have received for teaching. The previous winter I had received $40 per month and board. Board in my neighborhood among farmers was worth $10 per month, making my wages $50 per month. I knew that I could have got this sum for teaching even in summer, by going to the larger villages in the southern part of the state. For seven months my time had been given mainly to the bees, Will had given some labor to them, but this was offset by labor which I had done on the farm from time to time, when not needed among the bees.

A large item of current expenses was the honey-boxes, of which 6900 had been bought. They would be sold with the honey. But the packing crates, and the straw cushions would be returned, and could be used in coming years, hence they must

be considered an investment. The expense account was finally arranged as follows:

6900 honey boxes, at $3.50 per 100	$241.50
Expressage on same	4.50
Labor of my own team	32.00
Labor of teams drawing honey	31.50
Labor of self, 7m. at $50 per m.	350.00
34 bushels of buckwheat	42.50
7,000 labels for boxes	35.00
1,500 labels for crates	6.00
Straw for packing in car	3.00
Stationery and Postage	2.00
	$748.00

All other items were properly put in the investment account, for all were on hand in the shape of tools, materials, hives, or bees. This account stood thus:

Sundries, (p. 42)	$358.89
Fence, (p. 46)	39.98
Sundries, (p. 51)	16.95
Expressage on Italians	3.00
800 frames, at $5.00 per 100	40.00
100 feeders, at 30c.	30.00
2 tin pails, at 90c.	1.80
Expressage on frames and feeders	3.25
18 barrels, at $1.25	22.50
18 honey gates, at 50c.	9.00
Material for 50 hives, at 38c.	19.00
200 tin rabbets, at 1½c.	3.00
3 gallons paint at $2.00	6.00
Oil, turpentine, putty,	1.40
5 yards duck, at 20c.	1.00
Paint brush	.35

Nails, ...	$ 1.15
Cloth, for straw cushions	19.40
Sewing same	2.00
450 packing crates, at 33c.	148.50
Sugar, for feeding in the Spring . .	8.64
The 17 hives of bees left by my father .	85.00
	$830.81

At the end of two weeks a letter came from the commission merchants.

NEW YORK, *November 13th*, 18—

JOHN ALLEN, ESQ.,

Dear Sir,

Your consignment of honey just received in good order. We have seldom received so large a quantity from one grower in such good shape. We shall be able in a few days to return you the highest market price.

Truly Yours,

BARTON & GREY.

Three days later came another letter.

NEW YORK, *November 16th*, 18—

JOHN ALLEN, ESQ.,

Dear Sir,

Herewith we inclose to you draft on the Park Bank for $3,744.52, in full for honey sold, as follows:

2520 lbs.	"Apple Blossoms,"	at 19c.	$ 478.80
3504 "	"White Clover,"	at 24c.	840.96
4128 "	"Linn,"	at 24c.	990.72
10368 "	"Fall Flowers,"	at 18c.	1866.24
			4176.72
Less freight, drayage and commission,			432.20
			$3,744.52

Your honey took the highest price. You will observe that the boxes were weighed and sold with the honey, which increased the weight of each box one-half a pound. We have this day shipped to you the cushion-ticks, emptied of straw, as per order. The empty crates will be returned soon. We hope to receive your consignments in future. Truly Yours,

BARTON & GREY.

Subtracting the current expenses from the gross returns gave me a net cash income of $2,966.52. The investment in the business was $830.81, hence I had a clear cash gain of 360 *per cent.* on the investment. But in addition to this cash income there was a large gain from increase and improvement of stock. I had begun the season with thirty-seven swarms, including the one Italian. Estimating the seventeen swarms, left by my father, at $5.00 a swarm, these thirty-seven were worth, before being put into the new hives in the spring, $191. I had improved these bees by the introduction of Italian queens, and by transferring to better hives and frames, so that the thirty-six original black stocks were now pure Italians, and in a most excellent hive. I had added, also, sixty stocks of pure Italians to my number. These Italians of my rearing were perfectly pure. No better bees were ever bred. Italian bees no better than mine, and in hives inferior to mine, were then selling at $15 per swarm. In order to be on the safe side I estimated the improvement in the thirty-six original stocks at

$5.00 each,—$180 in all. The sixty new stocks I put at $10 each,—$600. This made a gain in stock of $780. Adding the cash gain to this makes the whole gain $3776.72. There was to show for this, either cash on hand, or bees worth more than their estimated value. Dividing this whole gain by the amount of the investment gave a gain of 454 *per cent.* on the investment. Prof. Cook had said the gain was often 500 *per cent.*, and I had read similar accounts in the journals. My gain gave me satisfaction, even if it was smaller than some reported.

XV.

CONSIDERATIONS.

In looking over this record of my first year's work it will be best for all to keep in mind certain facts, that have an important bearing upon the success attained.

1. I learned the theory of bee-keeping as thoroughly as a most earnest student could learn it from books and bee-journals. Nothing, of any real value, that had been printed on the subject of modern bee-keeping, was neglected. Then I picked out some of the most successful bee-keepers, and carefully studied every item that had come from them in regard to their work. I studied their method until I became imbued with their spirit. Thus I learned how they operated, and was able to begin my own work with a carefully considered system, based on the practice of intelligent men who had made bee-keeping a success.

2. The theory thus learned I applied to practice, not in the spirit of slavish copying, but with constant observation, and a readiness to adapt myself

and my practice to the emergencies of the case. Having a thorough knowledge of the structure and instincts of the bee, I had a rational basis for judgments as to the probabilities of success or failure from any methods of work.

3. I was constantly among the bees. One of the neighbors said he "guessed that John Allen jest slept with the bees, for he always saw him around the hives the last thing at night, and the first thing in the morning." I was always working among the bees, or observing them. Observing I found just as profitable as working, for it led to the best methods of work.

4. Early in the season I obtained young, strong, prolific queens. When honey was coming in these queens would lay rapidly. When no honey was coming in the hives were fed enough to keep the queens laying. By moving combs apart, about every second day in the early part of the season, and inserting an empty comb in the center, I gave the queens abundance of empty cells, in which to deposit eggs, in the central and warmest parts of the hives.

5. The use of the extractor early in the season also kept the cells empty so that the queen had plenty of room to do her best. Thus when the second stories were put on, nearly every comb in the lower stories was full of brood. Hence, as the

bees had little chance to store honey in the lower stories, they began at once to work in the second stories. Then as the brood hatched in the lower stories the queens could just about keep the cells, so made vacant, supplied with eggs. In this way I reared an immense number of bees. A queen laying from 2,000 to 3,000 eggs a day soon has a very large number of workers.

6. By having the young queens, by using the extractor, and by putting on the second stories at the right time, I kept the bees from swarming, hence every colony was in the strongest and best condition for work when the honey season came.

7. By the frequent use of the extractor, during a flow of honey, the bees were stimulated to the greatest efforts. Finding all their stores taken from them they redoubled their industry in order to make good their loss. Thus a large quantity of honey was obtained.

8. By feeding this extracted honey back to the bees, during times when no honey could be gathered, I kept them employed in storing it in comb, in such shape as to secure the highest market price. By extracting frequently, when honey could be gathered, I secured a large number of pounds. By feeding this honey back to the bees at times when otherwise they must have been idle, I obtained this honey in nice comb, in good shape for market.

9. By the system of nucleus-swarming not one of the *hives* was without a laying queen for more than two days, except the two which were used for rearing queen-cells. It was only when introducing Italian Queens to black stocks, that any hive was without a queen even for two days. Only two hives were needed for rearing queen-cells. When just ready to hatch, these cells were given to nuclei. Here they hatched. As soon as they were fertilized and began to lay, the nuclei were rapidly built up by help of brood and bees from the strong hives. In this way there was neither hive nor nucleus that was without a laying queen any longer than was absolutely necessary.

10. The location of my apiary was most excellent. The willows, soft maples, sugar maples, and apples, gave good early pasturage. The profusion of white clover, linn, buckwheat and other fall-flowers, gave the bees a chance to revel in a wilderness of sweets, in summer and fall.

11. The weather, for the whole season was good for gathering honey. Cold, rainy days in the spring often make the harvest from apple blossoms almost nothing; too much rain or too much drouth injures the flow from white clover; sometimes, for what reason is unknown, the linn secretes scarcely any honey; various circumstances often make the fall harvest exceedingly light. But my first year was one calculated to give delight to every bee-keeper.

If these eleven considerations are borne in mind, my first year's work will be seen to have been no more successful than might be expected. I had simply been able to take advantage of the conditions of success provided by nature.

As this book may fall into the hands of some who will become interested in the subject, and desire to keep bees, either on a small or a large scale, it is, perhaps, best to call their attention to some further considerations.

12. Those who have not examined the subject have no conception of the difference between keeping bees in the old box-hives and keeping them in moveable comb-hives, and by aid of the honey-extractor, artificial queen-rearing, and nucleus-swarming. It is as great a difference as that between making cloth by the old process of hand-carding, hand-spinning, and hand-weaving, and making it by help of all the modern machinery.

13. To keep bees by the new methods requires intelligence and energy. Only intelligent men and women can learn the structure and instincts of the bee, and then wisely adapt the management to the structure and instincts. It requires energy, for only by energetic industry can the bee-keeper be perfectly prepared to reap the harvest of honey when it comes; only by energetic industry can he prepare his bees for winter, and winter them without loss.

With this intelligence and industry the bee-keeper has an occupation as pleasant, as certain, and as profitable as almost any business that can be named.

14. Bee-keeping is a business which can be developed to a very large extent indeed. It may be made a great industry like grain-growing and stock-raising. There are but few neighborhoods in the whole country where bees enough are kept to gather the honey which the flowers of field, forest, orchard, and swamp now produce. Prof. Cook, of the Michigan Agricultural College, says that at a low estimate each township in the State of Michigan could produce every year honey worth $1,000. Extending this calculation over the whole country makes the honey-producing capacities of the Union more than $23,500,000 a year. I know that there are now not a few bee-keepers, who have from 50 to 200 hives, who realize not less than a thousand dollars a year from their bees. These men work with intelligence and energy. Let similar intelligence and energy be given to the business, by a dozen men in every township in the Union, and the honey product would be immense, giving profitable work to large numbers, and a healthful, delicious, and beautiful article of food to the whole world.[16]

15. The losses from wintering, from the bee-moth, and from disease, have, hitherto, served to make the business very uncertain. This uncertainty is fast

disappearing. In my own experience I have found no trouble. Wintering bees safely, depends upon conditions which the bee-keeper can easily secure. There is no more difficulty or danger in wintering a hive of bees than in wintering a cow. Know the conditions upon which the life of the bee depends, then comply with those conditions. This is the whole secret. These conditions can be known, and can be complied with. They are now known and complied with by not a few intelligent bee-keepers. Those who have seen dozens of weak swarms of bees, in the old box-hives, devastated by the moth, suppose that the moth is a formidable enemy. Again my own experience enables me to say, positively, that the moth need not be feared. Give the bees plain hives that have no lurking-places for moths and grubs, keep the hives strong in bees, and they will defend themselves. This is the experience of all intelligent bee-keepers. Disease among bees has been, in some cases, a great scourge. But remedies have been discovered, so that if disease appears it can be controlled. Prudence and energy can usually prevent disease from appearing.

16. "But the stings, how about the stings? They are what we fear most." Well, until you learn "how to do it" you will get stung somewhat. It is the ordeal of initiation to the fraternity of successful bee-keepers. If one begins carefully, always

knows what he wants to do, has everything prepared to do what he wants, and then works cautiously so as not to irritate the bees, he will get stung very little. In a very short time he will have no fear of stings at all, and will get stung very seldom.

17. Bee-keepers will always be of two classes. First, there will be those who will keep a few swarms for pleasure and profit, but whose main business is something else. There are very large numbers of men and women, in country, village, or city, who could keep a few swarms of bees, and who could derive from the care of them health, recreation, and a small profit. Let such get a book on bee-culture that is up with the times, subscribe for a good journal devoted to bee-culture, get a swarm of bees, and go to work. They will find the health and pleasure that always come from an avocation that takes the mind from the regular work, and they will get enough profit to pay them for their time.

18. The second class of bee-keepers will be those who make it their principal or only business, who follow it for a livelihood. There are not a few who already do this, and the number is increasing every year. There is at present no branch of rural industry that offers better chances for success to the intelligent, energetic man or woman. Begin slowly, learn the business, advance surely. Soon a healthful and delightful business can be built up, which

will give a fair income. There will be some who will go into the business largely, as I have done. There are now, in different parts of the country, many men who number their hives by the hundred, a few who number them by the thousand. To follow the business with success, in this way, demands the same business qualities that command success in other callings.[17]

19. Every person who begins bee-keeping must not expect as great success as I had the first year. There are very few who will study the business as I did; there are very few who will care for their bees as attentively as I did; there are very few who can secure locations as favorable as mine; it is not always that the season is as good as was my first year. That, when the conditions are as favorable, a success as great as mine can always be achieved, I am thoroughly convinced. In the notes to this volume I have given the testimony of others who corroborate my experience.

20. Possibly I may, in future, give some account of my subsequent work, which will show even a larger success. I will only say here that by supplying the bees with continuous pasturage, from early in the spring until frost in the fall, a very large yield of honey may be received. Let the bee-keeper secure a location where the natural pasturage is good, then let him cultivate, on a somewhat extensive

scale, plants which will bloom in the times when natural pasturage fails, *keep every hive very strong in bees*, and he may receive from ten to twenty pounds of honey per day from each hive, for several months in succession.

21. In spite of my warning there will be some who will rush into bee-keeping, expecting to get rich in a year or two, without much hard work. It was so with fruit-growing. People became wild, and expected to make a fortune in a short time from an acre or two of strawberries. Of course they were disappointed. So every person, who expects to get rich quickly by keeping a few bees, will fail. Money can be made only by thorough acquaintance with the business, and by careful, persistent work from year to year. But, in spite of what I say, some will get bitten by beginning bee-keeping without due preparation, and with false expectations. When you do get bitten, please to remember that "I told you so."

Now my record of the first year's work among my bees is done. To write this account has been a happy task, for in so doing I have lived over again those first absorbing months, when every operation was new, and every success was a joyful surprise and a stimulus to greater effort. Looking at the pleasure the bees have brought me; looking at the growth of character which has come from the lesson

of industry and independence learned in attending to their needs; looking at the books, and travels, and means of culture which they secured for my mother, my sister, my brother, and myself; looking at the works, of which my father had only distant dreams, which I have wrought through their help, they have surely been "THE BLESSED BEES."

NOTES.

1. PROFITS OF BEE-KEEPING.—(Page 24.) "With a small number of hives I have realized $35 per hive."—*J. M. Stephenson, Crawford Co., Penn., in American Bee Journal, Vol. xiii., p.* 14.

Prof. A. J. Cook, of the Michigan Agricultural College, Lansing, reports in 1876 a net profit of $24 05 per hive.—*American Bee Journal, Vol. xiii., p.* 18.

"This business, compared with other agricultural pursuits, with me at least, stands the test pretty well; it has given me this year an income of $1,000 (after paying for lumber and glass) for my labor on forty stocks of bees."—*J. P. Moore, Binghampton, N. Y., in American Bee Journal, Vol. xiii., p.* 61.

"We know by past experience that, when well managed, they hardly ever pay less than 100 *per cent.*, and often as much as 500 *per cent.*"—*Dr. Botts, Barren Co., Ky., in American Bee Journal, Vol. xiii., p.* 411.

Mrs. L. B. Baker, of Lansing, Mich., reports that her first year in keeping bees she had two swarms which gave her a profit of $103 15 or $51 56 per swarm. The next year, 1875, she made a profit of $59 85 per hive. In 1876 her profit was $19 05 per hive.—*Bee-keepers' Magazine, Vol. v., p.* 90.

2. INCREASE OF BEES.—(Page 29.) Under the most favorable conditions bees will increase in numbers very rapidly. Usually, bee-keepers prefer to increase their stocks somewhat slowly, for slow increase of stocks gives a larger amount of surplus honey.

C. F. Greening, Grand Meadow, Minn., reports that in 1877 he had three swarms that multiplied in one year to nineteen.—*American Bee Journal, Vol. xiii., p.* 300.

S. G. Rose, Bluff City, Ill., says he had six swarms in one year from one hive of Italians, and took also 84 pounds of honey.—*American Bee Journal, Vol. xiii., p.* 304.

J. M. Glenn, Jefferson Co., Tenn., in the summer of 1877, increased one swarm of Italians to nine swarms, and took also 210 pounds of honey.—*American Bee Journal, Vol. xiii., p.* 341.

C. M. Joslin, M. D., Saginaw Co., Mich., reports that in the spring of 1876 he had two swarms of Italians in the Quinby hive. During that summer he increased these to thirty-four swarms. *American Bee Journal, Vol. xiii., p.* 100.

J. S. Marble, Chanute, Kansas, reports that in 1876 he increased one swarm to thirteen, and took also 450 pounds of honey. He fed, early in the season, 88 pounds of sugar to promote breeding. *Gleanings in Bee-Culture, Vol. iv., p.* 293.

3. AMOUNT OF HONEY PER HIVE.—(Page 29.) J. E. Pleasants, Los Angelos Co., Cal., says, "Last spring I had forty-five swarms, and increased to one hundred, besides getting 10,000 pounds of extracted honey."—This gives 222 pounds per hive.—*American Bee Journal, Vol. xiii., p.* 101.

A. A. Baldwin, Sandusky, N. Y., reports, "My best Italian stock gave one swarm on May 28th, and from the two I had 175 pounds of box honey. The best Italian stock that I kept from increasing gave 150 pounds of box honey."—*American Bee Journal, Vol. xiii., p.* 420.

G. M. Doolittle reports an average of 158 pounds of box honey per hive, and an average of 446 pounds of extracted honey per hive.—*Gleanings in Bee-Culture, Vol. v., p.* 263.

4. MOVABLE-COMB HIVE.—(Page 35.) The movable-comb bee-hive was invented by the Rev. L. L. Langstroth, about the year 1850. It was patented, but the patent expired a few years since. Mr. Langstroth, now in honored old age, lives at Oxford, Ohio. His invention was the first and most important step in the science of modern bee-culture. Without it artificial queen-rearing, nucleus swarming, and using the honey extractor would all be impossible. The movable-comb hive is, in essentials, simply a box with a lid, like a common cheap trunk, provided the trunk had a hole made in one end or side, near the bottom, for an entrance for the bees. The lid, or cover, of the hive is, usually, not hinged. Inside this box, near the top, is a rabbet on each side, or on each end, if the frames are to hang lengthwise. Frames about an inch in width are made so as to be about one-half inch smaller than the inside dimension of the box or hive. The top bar of a frame is longer than the bottom bar, so that its ends rest in the rabbets, and the frame hangs down in the box. The hive is filled with these frames hanging side by side, about one and a half inches from the centre of one frame to the centre of the next. In these frames the bees build their combs. By proper care on the part of the bee-keeper, the bees can be led to build their combs straight and true, just filling the frames. Then, to

examine the condition of a hive, the bee-keeper has only to lift off the lid, remove a light quilt that is spread on top of the frames, and lift one frame, or all the frames, from the hive. In this way he may always know, in a few minutes, the exact condition of any hive. He has perfect control of the hives in all respects. He can remove or introduce queens; can take out frames of brood or honey, or put in frames of brood or honey from other hives: can lift out the frames, set them in an extractor, throw the honey out, and return the frames to be filled again. Every year brings a wider and fuller recognition from intelligent bee-keepers, of the great value of Mr. Lang troth's invention. As the science of bee-culture developes to the magnitude it will undoubtedly attain, Mr. Langstroth will be honored among the great inventors of this age.

The standard Langstroth frame is $9\frac{1}{8}$ inches deep by $17\frac{5}{8}$ inches long, the top bar projecting $\frac{3}{8}$ of an inch at each end, in order to rest in the rabbets. There are several other frames and hives, all constructed on the same principle, so far as movable frames are concerned, and differing only in the dimensions of the frame. The Quinby frame is $11\frac{1}{2}$ by $18\frac{1}{2}$ inches; the Adair, $11\frac{1}{2}$ by $13\frac{3}{4}$ inches; the American, 12 by 12 inches; and the Gallup, $11\frac{1}{2}$ by $11\frac{1}{2}$ inches. These include all the frames that have been used to any large extent, but many bee-keepers have made frames and hives of different dimensions to suit their own fancy.

These various frames have eager partizans. From the reports of success by different bee-keepers, it appears that any one of the frames in the hands of an intelligent manager, will give success. Probably a much larger number of the standard Langstroth are used than of any other. No bee-keeper has reported so large an average profit in a single season, from an equal number of swarms, as Mr. Doolittle, of Borodino, N. Y., who uses the Gallup frame.

5. THE GALLUP FRAME.—(Page 35.) I have never seen any reason to regret adopting the Gallup frame. In my experience with it no frame could have done better. Though it is not used by a large number of bee-keepers, yet those who do use it are generally intelligent and successful. In an article in the *American Bee Journal, Vol. XIII., p. 227*, written by C. Clute, of Keokuk, Iowa, I find that Prof. Cook is quoted as saying, "I prefer the Gallup frame for these reasons: (1) It can be used for nuclei, and save making small ones on purpose for this. (2) It can be made more compact (in the hive) and so save heat in fall and spring. (3) It is easy to handle. (4) It does not trouble by comb falling out. I have tried all sizes, and find this best."

6. THE ITALIAN BEES.—(Page 40.) "The so-called Italian bee has been cultivated from time immemorial in the northern portions of Italy, and some adjourning districts, and differs from the common honey-bee only by its pecular color and workings. In the workers the first three upper segments of the abdomen are of a bright orange color, though the lower margin of the third segment is black. While young, this coloring is brighter, and becomes darker as they increase in age; but under all circumstances it remains sufficiently marked to enable the observer to distinguish the two kinds at a glance. Still more conspicuous is the difference between the Italian and the common queen. The Italian queen has not only the orange color segments in common with the workers, but the yellow predominates, also, in all the other segments. The drones differ from the common drones, in having the first three segments bordered with orange, and in having orange-colored spots besides. * * * Though the Italian bee was so long and so extensively known, it escaped the notice of German apiarians, who little anticipated how important it would prove to be for the settlement of controversies which had long been maintained among them. Capt. Baldenstein, of Cour, in the Grisons, first called attention to this bee in 1848, as peculiarly adapted to determine the question as to the origin of drone-eggs, and as furthermore of great practical value in bee-culture." He subsequently introduced them into Switzerland, and though he did not succeed in breeding pure stock from them, he arrived at important results. In 1853 the famous Dzierzon, one of the great fathers of modern bee-culture, received a hive of Italians as a gift from Madame de Prollius, of Mira, near Venice. He succeeded in breeding pure stock from them. By his efforts, and by those of Count Baldenstein, the attention of bee-keepers in Germany, and in other countries of Europe, was called to the merits of this bee, and it has now been very widely introduced.—*Rev. George Klein, in American Bee Journal, Vol. I., p.* 16.

Italian bees were introduced into the United States about the year 1850. I think the first successful importation was by S. B. Parsons, of Flushing, Long Island. They are now found in nearly all parts of our country, though in many localities the common black bee still predominates. There are now several dealers who receive regular invoices of Italian queens every summer, direct from Italy, and supply them to their customers in all sections. Pure imported queens can now be bought as low as $4.00 each.

An experienced bee-keeper sums up the merits of Italians, as compared with black bees, as follows: (1) They possess longer tongues and can gather from flowers which are useless to the black bee. (2) They are more active, and with the same opportunities will col-

lect a good deal more honey. (3) They work earlier and later. (4) They are far better to protect their hives against robber bees. (5) They are almost proof against the ravages of the larvæ of the bee moth. (6) The queens are decidedly more prolific. (7) Brood-rearing commences earlier in the season. (8) The queen is more readily found, which is a great advantage. (9) The bees are more disposed to adhere to the comb while the combs are being handled. (10) They are far less apt to rob other hives. (11) And in my estimation a sufficient ground for preference, did it stand alone, the bees are far more amiable. * * * I have kept these two races side by side for years, I have studied them most carefully, and I know that none of the above eleven points of excellence are too strongly stated. The black bees are superior in one, and in perhaps two respects. They certainly will go into boxes more readily to make box-honey; and I have some reason to think they are more hardy, yet many claim that the Italians are superior in point of hardiness." —*Prof. A. J. Cook in his "Manual of the Apiary."*

7. BEGINNING.—(Page 42.) Any person desiring to begin bee-keeping ought, in the first place, to get a book on bee-culture that is thoroughly up with the times. Having carefully studied his book, he should, if possible, visit an apiary in the hands of a skillful bee-keeper, and witness the methods of management. This is not always possible, and though desirable, is by no means necessary. Then in April or the first part of May, let him buy a swarm of black bees in a common box hive; procure a movable frame hive, of the pattern he may have decided upon, and, as soon as fruit trees are in bloom, transfer the bees to this. He can usually buy black bees in box-hives much cheaper than he can get Italians in a movable frame hive, but if the latter are quite low in his neighborhood he may as well buy a hive of them in good condition, for beginning. Let him carefully study his book; subscribe for, and study, one or more of the magazines devoted to bee-culture; observe his bees; learn thoroughly the whole economy of the bee-hive, the office of the queen, the drones, and the workers. He should acquaint himself with all the modern appliances in bee-culture, and all the modern methods of management. He should know how and when to extract, how and when to get comb-honey, how and when to make new swarms, how to winter without loss. He can apply his knowledge step by step in the management of his one hive. In the course of a year, if he studies carefully, he can make himself quite familiar with the whole subject, and can then guide all his future work intelligently from the stand-point of practical knowledge.

8. THE QUINBY SMOKER.—(Page 49.) The Quinby Smoker is a small bellows about four inches wide at the bottom, and eight inches high. At one side there is attached to the bellows a pointed tin tube considerably longer than the bellows itself. Into the lower part of this tube, fuel, such as a roll of dry cotton rags or small pieces of dry rotten wood is put. The fuel being ignited, the bellows is held in the right hand, and a stream of smoke directed through the pointed tube upon the bees. The smoke can be blown in at the entrance of a hive, or, if opening a hive, it can be blown upon the tops of the frames and down among the combs and bees. The smoker is a very valuable implement in bee-keeping.

9. BEES IN A HIVE.—(Page 58.) In every perfect swarm of bees there is one queen, a number of drones, and a large number of workers. The queen is the only perfect female in the swarm. She is larger than the workers, and longer and more slender than the drones. She is the mother of the whole hive, laying all the eggs that are produced in the hive. The manner in which bees rear a queen is mentioned in the chapter on Italianizing, and also the way in which she is fertilized. After fertilization she is in condition to lay both drone and worker eggs. If from any cause a queen is prevented for some time from issuing from the hive to meet the drone, she will often begin to lay without having been fertilized. In this case all the eggs she lays will produce drones, or male bees. It is an astonishing but well established fact, that the egg which produces the male bee is not fertilized In case a queen has met a drone, and has become properly fertilized, the spermatic fluid is contained in a small sac. When a fertile queen lays eggs in worker cells, these eggs as they pass the mouth of this sac, are in some way fertilized, or impregnated. All impregnated eggs, if hatched and grown in worker cells, produce worker bees: if hatched in queen cells, or if the young larvæ are put in queen cells before they are three days old, and are fed on royal food, the young bees develop into queens. All eggs deposited by a fertilized queen in drone cells, are unimpregnated. This has been proven by the most careful research by the most eminent microscopists. The queen seems to have the power of preventing these eggs from coming in contact with the spermatic fluid. Such unfertilized eggs, laid by a fertile queen, develop into drones or male bees.

The drones are larger than the workers, and more robust than the queen, though not so long. Their sole office is to fertilize the queen. They perform no other work in the economy of the hive. When the queen is once fertilized the drones are of no further use, except more queens are to be raised for swarms that are to issue, or to be made by the nucleus system. When not specially needed drones are a posi-

tive disadvantage, for they consume quite a quantity of honey. The drones are always killed off by the workers on the approach of cold weather in the fall. Not unfrequently a drouth in the honey harvest will impel the economical little workers to kill off, even in mid-summer, their useless "male protectors,"—an instance of "Womens' Rights," which I commend to the attention of all reformers. A skillful bee-keeper, with his bees in movable comb-hives, can almost entirely control the number of drones. Under all ordinary circumstances he can keep the brood chamber of hives almost free from comb containing drone cells, in which case he will, of course, have very few drones raised. He knows when, by his system of management, drones will be needed, and can put frames of drone comb into the centre of his best hives, and so secure the rearing of drones from the best queens in his apiary, in time for the young queens who will need their services.

The eggs deposited by a fertilized queen in worker cells are impregnated, and develop into worker bees. The workers are imperfectly developed females. All the work of the hive is done by them. They build comb, collect pollen and honey, take care of the queen, nurse the growing brood, protect the hives from robber bees, and keep it clean. Should the queen die or be taken from them, they will, if they have worker eggs or worker larvæ not more than three days old, raise a new queen in the manner described in the chapter on Italianizing. If they lose the queen at a time when they have neither eggs nor larvæ the fate of the hive is sealed. Despair settles upon it. The bees hang around in dejected idleness. If when in this despairing mood some worker eggs or young larvæ are given them, the bees soon acquire an entirely different appearance. They seem joyfully to recognize that now there is a chance for life. They construct queen cells, nurse the young queens, and in due time will have another mother.

Bees usually construct several queen cells at the same time, nurse the young queens, and at the proper time seal them up in cells to undergo the final transformation into perfect insects. If the bees intend to swarm, at some time before the first of the young queen bees has hatched, on a fair day the old queen issues from the hive and a part of the bees follow her in great apparent tumult. Usually the queen alights on a shrub or tree near the hive, and all the bees who followed her cluster around her. Here they remain from one to several hours, when, unless previously hived by the bee-keeper, they fly off to the woods, or to such other place as they may have chosen for their future home. When the first queen hatches from the cells prepared before the swarm issued, this young queen, unless prevented by the workers, will proceed at once to destroy all the other young queens

in their cells. This new queen then becomes the queen of the hive. If, however, the workers expect to swarm again soon, they surround the young queen and prevent her from destroying the unhatched queens. In this case this young queen will, in a day or two, issue with a swarm, and leave the hive to be ruled by the next queen that hatches. It occasionally happens that three or four swarms issue from a hive in the course of a few days. The inexperienced bee-keeper often thinks that this is very desirable, because he is increasing the number of his swarms rapidly, but in fact, it is a great disadvantage, for the new swarms will be small and weak, and the old one will have very few bees left. Neither the new ones nor the old one will be in condition to store any surplus honey, possibly they will not gather enough to winter them. A large number of bee-keepers so manage as not to have any natural swarms issue. If they allow any natural swarms at all, they destroy or remove all queen cells but one, as soon as the first swarm has issued. Usually it is the best to practice artificial swarming, by the nucleus system.

10. NUMBER OF QUEEN CELLS.—(Page 74.) Usually a swarm of bees grows only from five to ten queen cells. But by treating the combs as mentioned in the chapter on Italianizing, they may be led to start a very large number of cells at once, and to nurse and seal up the queen larvæ. Mr. A. F. Moon editor of the *Bee World*, a magazine formerly published at Rome, Ga., but now suspended, says, that he can, by a system of management similiar to the one I pursued, lead a hive to build at once from fifty to two hundred queen cells, and to nurse the young queens to maturity. Where many queens are needed, it is usually an advantage to have them grown in as few hives as possible.—*Bee World, Vol. III., p.* 337.

11. THE HONEY EXTRACTOR.—(Page 83.) This is a machine for throwing honey from the combs, so that they can be returned to the hives to be refilled with honey. The frames of comb are set into the machine, and revolved with sufficient rapidity to enable the centrifugal force to throw the honey from the cells. The bees are thus stimulated to greater activity, the brood combs are emptied of honey, and so the queen has plenty of cells in which to deposit eggs, and the labor and expense of building new comb are saved. It is estimated that every pound of comb costs from fifteen to twenty-five pounds of honey. Extractors are made of different sizes and shapes; but the principle is the same in all. It is very generally used by the best bee-keepers in Europe and America.

12. YIELD FROM LINN.—(Page 97.) This was an average of a little less than twelve pounds a day for six days. The weather was

good, the linn was very abundant, and the hives were very strong in bees. Under these conditions a much larger yield per day, than mine, is often obtained.

R. R. Murphy, Garden Plain, Ill., writes: "I have a swarm of bees on the scales that was fifteen pounds heavier this morning at six o'clock than at the same time yesterday."—*American Bee Journal, Vol. xiii., p.* 240.

G. M. Doolittle, Borodino, N. Y., reports that the largest yield from his best swarm was sixty-six pounds in three days, or an average of twenty-two pounds a day.—*Gleanings in Bee-Culture, Vol. v., p.* 263.

13. (Page 103.) A hive of bees without a queen will continue working with spirit, if they have the eggs or larvæ from which to grow a queen. But if they build comb when having no queen it is drone comb. A hive with a queen a year or more old has, under any circumstances, a strong determination to build some drone comb, and if honey is coming in rapidly, and new combs are needed for storing, it will often build a large amount of drone comb. A hive with a young queen, grown during the season, builds worker comb almost entirely. The skillful bee-keeper takes advantage of this fact to get his combs, for the brood chambers of his hives, built in hives having young queens, and thus he avoids having much drone comb.

14. (Page 107.) If the cost of growing bees to make new swarms is so great, some may ask, why grow them at all, why not buy bees in box hives, as I did in the Spring?

Under some circumstances it is more economical to buy bees than it is to raise them. That is, the skillful bee-keeper, by keeping his bees at work gathering honey and storing it in combs for market, can make more money than he can by allowing them to rear brood for making new swarms. But my course was best for me under the circumstances, as will be seen from the following facts:

a. There were no bees near me which could have been purchased. To have gone some distance would have been an expense and trouble for transportation.

b. Bees bought must have been transferred to the hive I was using. This transferring would have made a large amount of extra work.

c. I could have bought only black bees, and those probably with old and feeble queens. These would have been of little service to me that first year, for I could not, at that late period in the season, have built them up into vigorous condition for collecting the fall

harvest. To have bought black bees would have introduced a large number of black drones into my apiary, and so have made it impossible for me to raise pure Italians.

d. By my plan I secured young, vigorous Italian queens, purely fertilized, and pure Italian workers, ready to begin work at once in collecting the fall harvest.

e. Hence my new swarms gathered honey enough in a short time to pay for themselves several times over. Considering the amount of honey they gathered for me, I had no reason to complain of their cost. I, however, made a serious mistake in having my apple blossoms honey stored in comb, and thus being compelled to use the nice clover honey for feeding the bees. The apple blossoms honey would have been just as good for the bees, and by feeding it instead of the white clover I should have saved the difference between its value and that of the white clover,—five cents a pound, quite a large sum in the aggregate.

15. (Page 121.) My yield of comb honey was large. So great a quantity per hive could have been secured only by extracting frequently during a flow of honey, and then feeding back to the bees when the flow ceased, so as to keep them at work storing in comb, when otherwise they would have been idle.

G. M. Doolittle, of Borodino, N. Y., reports a yield of 566 pounds of extracted honey from one hive in one year.—*Bee-Keepers' Magazine, Vol. v., p.* 234.

If he had fed this back to the bees to be stored in combs, allowing that there would have been a loss of one-ninth in weight in so doing, he would have had 503 pounds of comb honey for the yield of this hive. Mr. Doolittle sold his white comb honey for twenty cents a pound, and the dark honey for less; an average of fifteen cents a pound for both white and dark will be a low estimate. This gives an income of $75 45 from one hive in one year, not to mention the increase in stock, and Mr. Doolittle about doubled his stock the same year. If such success can be achieved often, it will make bee-keeping a most important industry.

16. BEE-KEEPING AS A BUSINESS.—(Page 151.) According to the *New York Sun*, Mr. J. S. Harbison, of San Diego Co., Cal., took to the New York market in the fall of 1876, 200,000 pounds of honey, the product of his hives for that year. Mr. Harbison then had in San Diego Co. 3,000 swarms of bees, located in six different places.—*Gleanings, Vol. iv., p.* 298.

Adam Grimm, of Jefferson, Wis., had at one time 1400 swarms, from the annual product of which he received a large income. He

was a most enthusiastic and industrious bee-keeper. He died in 1876, leaving a fortune which was the result of his work in bee-culture.—*Gleanings, Vol. iv., p.* 303.

Hiram Roop, Carson City, Mich., says: "My report for 1876 does not compare well with my others. My honey sales for this season amount to $1,088 05, clear from expense. Sales of bees, $433 05. Total, $1,521 10. I shall try to winter 190 good swarms."—*Gleanings, Vol. V., p.* 309.

G. M. Doolittle, Borodino, N. Y., reports that in 1877 he worked sixty-seven swarms for surplus honey. From these he secured 11,177 pounds of comb and extracted honey. He adds, "In conclusion we would say that with a practical apiarist bee-keeping is a paying business, even at the present prices of honey, we having cleared nearly $6,000 from our bees, free of all expense, within the last five years, with an average of about fifty stocks in the spring of each year."—*Bee-Keepers' Magazine, Vol. v., p.* 235.

Captain Hetherington, of Cherry Valley, N. Y., is reported to have more than 1,000 swarms. The newspapers say that he makes bee-keeping a paying business.

17. THE NATIONAL BEE-KEEPERS' ASSOCIATION.—(Page 154.) There are many state, district and county associations of bee-keepers. There is also a National Association, which held its last meeting at the Cooper Institute, New York City, October 16th, 1877. At this meeting many important papers were read, and much valuable discussion was drawn out. Rev. J. W. Shearer was appointed to prepare an address to the public, "setting forth some of the principal improvements made in bee-culture, and giving a few hints concerning its general character and usefulness." The address, as adopted, is as follows:

FACTS FOR THE PUBLIC.

The National Bee-Keepers' Convention, in session in New York, October 16th to 19th, 1877, aware of the general lack of information concerning improved methods of apiculture and its products, respectfully submit the following statement of facts for general information concerning a large source of personal and national revenue, in preserving the honey which God has caused to flow so abundantly in the vast and varied flora of our country:

1. It is now only a few years since the introduction of *movable-comb hives* has opened up a new era in bee-keeping, and placed it on the basis of a successful business pursuit. Such hives, adapted to climate, furnish every facility for intelligent management of bees, by

regulating swarming, guarding against moths, and manipulating both bees and comb.

2. The invention of the *extractor*, or honey slinger, a machine which empties the honey from the combs by centrifugal force, without injury, so that the combs may be returned to the bees, marks another great step in apiculture. Thus virgin honey, free from foreign admixture, is obtained, having the flavor of the flower from which it is drawn.

3. The further invention of *artificial comb-foundation*, made of pure wax, first successfully used to a large extent this season, completes the requisites for placing bee-keeping on the basis of a great industry in our country. Bees receive this artificial comb-foundation with readiness as receptacles both for honey and brood.

4. Simultaneous with the first and all of these improvements, the introduction of *Italian bees*, and of improved methods of rearing queens, and of transporting and introducing them to colonies, has greatly improved the value of the honey gatherers, both, because of the superiority of the Italian bee, and the introduction of new blood. New blood prevents the danger from in-and-in breeding.

5. The great drawback to apiculture is the *sting* of the bee. Danger from this source is now largely overcome by the simple appliances used for the protection of the person, and for subduing the bees. The most vicious colony may be subdued in a very few minutes.

6. To consumers of honey, a few facts are necessary in this article, to preserve them from imposition. Nice white comb speaks for itself, and is generally admired; but the price many lovers of honey cannot afford. It makes a beautiful dish for the table, but is no better than *extracted* honey. All comb is wax, and wax in the stomach is perfectly indigestible. Extracted honey is the pure liquid honey as it is taken from the combs by the honey slinger, free from any foreign admixture. It is entirely different from what is known in the market as *strained* honey. Consumers help to impose upon themselves by the false idea that pure honey will not granulate. They desire ungranulated honey, and dealers will attempt to supply the demand. Almost all pure honey will granulate when exposed for some time to light and cold. The granulated state is a fine evidence of pure honey. Much of the jar honey heretofore sold in the markets, and recommended not to granulate, is a very inferior article, composed largely of glucose or some inferior substance. Granulated honey can be reduced to its liquid state in a few moments by placing the jar in warm water. When thus liquified it so remains for some time before again crystalizing. Consumers may be sure of

a good wholesome article by purchasing granulated honey and reducing it.

7. To producers. By full use of all improvements in bee-keeping, the honey crops of America may be almost indefinitely increased and become a great source of national revenue. None need fear over-production. The home demand and consumption are largely increased whenever people learn to know the superiority of such honey. Dealers in New York have already commenced a large export trade, and they tell us that their only difficulty is in procuring honey in the proper shape and quantity to supply the growing demand. Trade demands that honey be put up in nice attractive packages, and in small parcels or jars, so as to be readily handled by grocers and consumers. Honey was for centuries the principal sweet known, and is one of the most healthful of all. Improvement in refining sugar has within the last two or three centuries led to its general adoption. Why may not also new improvements in apiculture restore it to its true place as a general favorite, which was lost by bad management and the consequent corresponding limited supply?"

We believe that improvements in bee-keeping as compared with old methods, are not less than those seen in railroads and steamboats, as compared with former modes of travel.—*The Bee-Keepers' Magazine*, 1877, *p.* 270.

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