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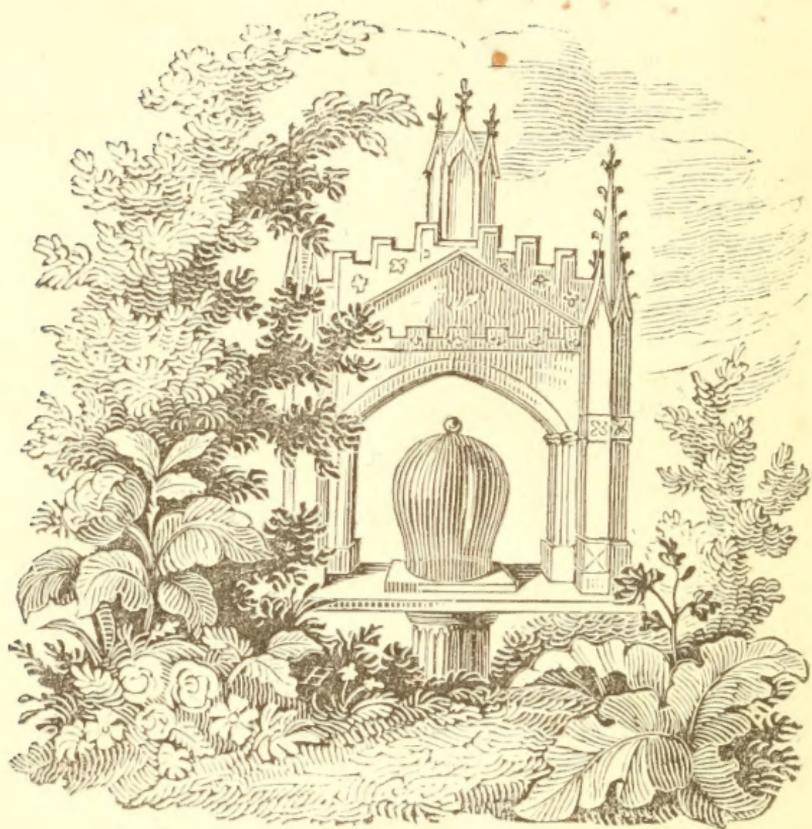
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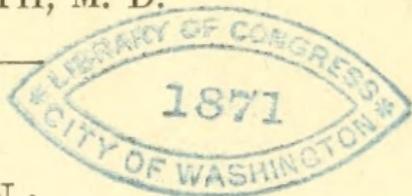
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AN
E S S A Y
ON THE
PRACTICABILITY OF CULTIVATING THE
H O N E Y B E E,
IN
MARITIME TOWNS AND CITIES,
AS A SOURCE OF
DOMESTIC ECONOMY AND PROFIT.

12
BY
JEROME V. C. SMITH, M. D.



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PREFACE.

THE following Essay had its origin in consequence of giving a discourse the past winter, on the economy of the Honey Bee, at the Athenæum lecture room, before the Society for the Diffusion of Useful Knowledge. Many practical observations and interesting physiological facts might have been added, which are purposely withheld, for the present, with a hope that further experience may give them more intrinsic value.

This little work is not designed to interfere with those publications on the Honey Bee already before the public; nor is it supposed, even by the writer, to possess very high claims to patronage. Dr. Thacher's treatise is the best which has been published in this country, and when revised, and republished, as speedily anticipated by the author, may be considered the first manual of the kind, as respects utility, in the United States.

The object of the Essay will be understood by reading the book.

Quarantine Ground, Port of Boston, April, 1831.

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THE
CULTIVATION OF BEES

IN LARGE TOWNS AND CITIES.

It was the opinion of Huish, a distinguished English writer on Bees, in 1817, that within the circumference of ten miles of London, ample provision might be found for the support of ten thousand hives.

The same remark is applicable to Boston, New York, Philadelphia, Albany, &c., and yet, there is not, probably, five hundred swarms in the immediate vicinity of all these cities. An opinion is prevalent that nothing exists in a paved town, from which this industrious insect could select even enough for the support of its own domicile: this is an error, which one object of this essay is to correct, and thus prepare the way for a source of domestic economy, even in the country almost entirely neglected, and in maritime towns never attended to at all, because it is wholly unknown.

When the fact is understood, that bees go much greater distances in search of their appropriate materials, than is generally supposed, it will, at least, be one testimony in favor of housing them in town, as they bring from a distance, to their master's door, the sweets of distant districts.

Several mistaken writers agree in remarking, that in foraging, bees rarely go more than a mile or a mile and a half from home; this, my own experience proves to be otherwise. On an island in Boston harbor is a hive of bees, in a flourishing condition, whose range cannot be less than three and four miles, in order to procure their full store. The island on which they are located has but few flowers at any time, and on the whole, presents, to the apiarian, a forbidding aspect. Notwithstanding these discouraging circumstances, the quantity of honey, from season to season, has been unexpectedly large, and must, therefore, have been procured from neighboring islands as well as the main land. The nearest island, is one mile: on another, about one mile and a half distant, honey bees have been observed, in great plenty, when the white clover is in blossom. Indeed, a farmer informed me that he had repeatedly seen them arrive and depart for the island on which they so unexpectedly thrive. Hull, a small town, is at the distance of two miles, and Quincy about four,—from each of which places, judging from the numbers of returning bees, over

the broad expanse of water, heavily laden with farina and honey, their burthens must have been brought.

This relation at least shows that when obliged, by necessity, bees travel to considerable distances, —and also proves, that in cities, provided there were no flowerets for them to visit, they would go in search of them in the environs. But all cities have gardens, and some of them are of such extent, in Boston, particularly, that, unaided by the millions of flowers, flourishing under every window, or springing up on the borders of the beautiful common, in my opinion, they would sustain, alone, a large number of hives. Again, there are an immense number of trees, in all cities, by the public walks, and in the grounds of all valuable estates, and in sufficient abundance too, to sustain, without cultivated gardens, hives enough to supply a portion of the population with a moderate quantity of honey.

But when the trees exhaling sweet dews, the shrubbery, the flower gardens and the thousands of flower pots, yielding a rich perfume, are taken into consideration, it must be evident, that the paved city offers no objections to the successful and profitable cultivation of the honey-bee. If any demonstration is required, it need only be said that I have repeatedly exhibited a glass hive, containing

over one hundred pounds, which was made in the heart of Boston, in a few summer weeks.

Were it only for the gratification arising from the inspection of such a wonder-working insect, the man of leisure would be amply compensated for the attention he might bestow on a hive, as a curiosity, had he no higher motive. Their untiring industry would constantly admonish the indolent, that by "*industry we thrive*," and perhaps, prompt some to make exertion, if in nothing else, in raising bees,—as there is always a prospect of gain, independent of their own personal labor.

Again, in large commercial towns, there are men of overgrown fortunes, who, on retiring from the active business of life, with the expectation of enjoying the remnant of their days, find themselves unexpectedly disappointed in every attempt to be happy: the secret of their misery is this,—an idle man is always miserable. To such gentlemen, I would strongly urge the culture of the bee.—If they were not fond of the product, give it to the poor:—if they were not philosophers, they would insensibly, as apiarians, find themselves studying the great volume of nature, whose fair page has never before arrested their attention;—and if any one should have the misfortune to be a skeptic or even tinctured with infidelity, his contemplations, on the habits and economy of the little honey-bee, would, at once, settle all his doubts.

Another inducement for engaging in the cultivation of bees, in cities, arises from the consideration of the fact, that an ample return is speedily made for any moderate expenditure of money, in a most excellent, wholesome kind of food, at a rate, so much below an ordinary market price, as to make it an object, even with the rich.

To the middling classes of cities,—the truly laborious, who might, and who can attend to the raising of honey, without at all interfering with their ordinary business, this would, in the end, were it not a source of profit, be, at least, an easy mode of procuring a luxury. I am perfectly convinced that the laboring man can supply his family with rich, pure virgin honey, through the year, at less than one cent a pound, after he has sold enough to pay the first cost of his apiary. Honey is a substitute for butter, in some parts of oriental countries; and in this, were it afforded at a rate so moderate, that the poor,—that peculiar class of poor indigenious to cities, could afford to purchase, it would be a wholesome, useful substitute for butter, a part of the time, and at all seasons, prove a very valuable article in household economy. And lastly, if there were ever a surplus, in any family, it would have a ready sale.

By some sad misapprehension, there is an impression abroad, that a profitable cultivation of bees, can only be undertaken in the country. One

would suppose, in travelling through New England, that they were wholly unknown, in a great proportion of the large farming towns. Occasionally the eye discovers a miserable, poverty-stricken bee-shed, nailed to the gloomy side of some old barn,—tolerated, it would seem, by the farmer, as an hereditary appendage to his land, but he is apparently unconscious of the bee's renowned character for patient, profitable labor, even in the service of an unfeeling master. It matters not, whether the flowers from which the bee sips its honey, be at the foot of the hive, or in a neighboring village; wherever they thrive best, there the bee wends its way, with unfailing success. Wild bees, whose home is a hollow limb, in the thickest of the forest, remote from cultivated fields, fill up, in process of time, the whole cylinder of a tree. The accomplishment of this task, the more surprising, when it is recollected that few or no flowers are growing near, evidences the exceedingly persevering character of the creature under consideration. Enough has been said, though more arguments are still in reservation, when required, to convince those who may still have doubts, of the practicability of raising honey in great abundance, in the very heart of our principal cities.*

* To the overseers of Houses of Industry, and particularly the select men of country towns, I would urge the establishment of an apiary, which might be exceedingly productive, under the careful management of the aged and infirm inmates of such establishments.

Let it be remembered, that wherever the bee may be placed, provided its liberty is unrestrained, whether in the dense, wild forest, the cultivated field, or in the thickly inhabited town, regardless of surrounding circumstances, it pursues, with unwearied toil, its characteristic routine of service for the common good, and fills its granary in the calm of summer, against the vicissitudes incident to the changes of seasons.

Method of beginning an Apiary in town.

In the vicinity of Boston, hives, of the ordinary kind, without regard to the quantity of honey they may contain, or the number of bees constituting the swarm, are sold for eight, nine and ten dollars. The price, with some, appears to be regulated by the size of the wooden box, containing the bees. This, however, is bad for the buyer, as the tremendous box may contain only a sickly, impoverished, half starved community, which, instead of supplying the purchaser's wants, or answering his expectations, will be a source of anxiety and vexation. I have been imposed upon in this way, myself, and therefore caution others against a similar imposition. A board hive, some fifteen or eighteen inches square, by six in depth, independent of the top and floor-board, containing bees that appear lively, pour out in active abundance, when irritated, and weigh-

ing in the whole, from thirty-five to forty pounds, promises very well.

The reader must understand, that this weight has reference to the early spring. It shows that enough of the old stock of honey remains, to sustain the inmates till the foraging season commences. Six, ten, and at farthest, twenty pounds of honey will feed a large swarm through the winter. The consumption of honey depends, in the first place, on the size of the swarm, and in the second, on the temperature of the weather. Several experiments, corroborated by the testimony of writers, shows that there are from 12,000 to 20,000 working bees, or females, and from 1,500 to 2,000 drones, or males, in a thrifty hive: the number, after all, depending of course, on the magnitude of the box in which they are contained. Dr. Bevan, a late writer on the bee, makes a similar estimate. Hives, purchased to begin a town establishment, will be found ill-shapen, rough, unfinished and inconvenient, but it is best to tolerate one of them one year, for the sake of the new swarms the following season, when the parent hive may be dispensed with, and the new bees lodged in such habitations as will answer the end in view. If, however, the purchaser is adroit and fearless, he may at once drive his bees into a hive, of that peculiar construction hereafter to be described, from which

he can, with impunity, take for his table, the proceeds of their labors.

Sometimes the attempt, by an unskilful operator, to shift a swarm from an old to a new hive, produces such excitement and disorder, that they either at once abandon the new habitation, or become so discouraged and weakened as to be wholly unprofitable the first year.

The proper time for moving hives from the country to the town, or from one village to another, is early in the spring,—though, through all the winter months, when the bees are in that peculiar condition bordering on torpidity, which prevents them from resenting unusual commotion, the best opportunities are presented. If necessary, in consequence of sudden fires in the vicinity, they can be moved in the heat of summer to other localities, if the precaution is taken to draw a sheet or close sack over the hive, in such a manner that none can escape. This observation is worth remembering, as circumstances, very frequently, perhaps, may compel the owner to move, unexpectedly, his hives at a moment's warning. A canvass case, made with reference to contingencies, would be particularly serviceable. If one bee makes its exit, others soon contrive to follow, and nothing can withstand their combined attacks, when maddened to desperation. Should any of them get between the hive and sack, no danger will ensue, as they become

quiet as soon the hive is at rest. Proper care should be had to a free ventilation while moving, as they cannot survive long without pure, fresh air.

Another excellent plan of moving hives safely, from the country, or from place to place in the dooryard, consists in having trunk handles screwed to the sides, with which they can be safely carried by two men, without the least motion that would disturb the bees.* In case the hive is set in a broad clothes-basket, great precaution is necessary, or it will be upset. In a spring carriage, carefully driven, bees may be conveyed long journies over the country. Such handles are so serviceable, in the course of managing an apiary, that no hive should be without them. Instead of closing the door-way, when moving hives, with a block, it should only be covered with coarse gauze or wire cloth, that a free circulation be not impeded. The heat of a middling sized hive, if closed, is such, that the bees cannot live but a few hours. All insects are proportioned to the magnitude of their lodges,

* Families in cities are frequently changing their residences.—but this is no objection to keeping bees, as they may be moved at evening to any other part of the town, where, on the following morning they will begin the labors of the day as though no change of place had been effected. In France, hives are carried over the country on spring carriages, for pasturage. Through the day, the waggon is at rest, but moves onward from place to place in the night. The same thing is done in Egypt, where immense numbers of swarms are kept in boats, which are floated in the night, up the river Nile,—resting in the day-time.

have a peculiar and striking developement of the respiratory organs : on this depends their surprising strength, and power of flying through the air, whilst sustaining a body, equal in weight to their own. Beside, the exhalation from their bodies, is copious, forming drops of fluid in autumn and spring, coursing down the sides to the floor. If the highways between the layers of comb are obstructed, as is sometimes the case, with multitudes of inactive bees, the fluid mixes and dilutes the honey, and sweeps off whole phalanxes of bees by drowning.

Localities for Bees in Cities.

Without endeavoring to combat the vulgar prejudice in favor of giving a south or south-western aspect to the bee-house, it is sufficient to remark, that actual experience warrants me in saying that the point of compass towards which the entrance to the hive is turned, is not of the least possible consequence. In a city, where dwellings are huddled together, and where spacious front or back yards cannot be afforded, it would be impossible always to give the same aspect to the hive ; fortunately, therefore, their success does not depend on this circumstance : it has been well ascertained, that wherever breathing animals can exist, the bee may flourish, whether fronting the south or north. If a yard is small, but at the same time dry, that is enough ; if, however, there are high brick walls, and a con-

usual dampness at the bottom, the place may be considered unfavorable.

When preparing something for the bees, it should be erected under a tree, if there is one in any part of the enclosure, as it answers the two-fold purpose of being a delightful shade in summer, and a resting place for the new swarms, whenever they take flight from the parent stock. In yards where there are neither trees nor shrubbery, the cultivator should take the precaution to transplant something, if it be nothing but sun-flowers, which have a speedy growth; otherwise, the young broods, as they make their exit, finding nothing prominent on which to rest the soles of their feet, are apt to rise high in the air, and then take a horizontal flight of several miles before they alight. Being young and unaccustomed to the wing, they are readily induced to cluster on the limb of a bush or tree, if within any moderate distance of the old hive.

Probably the garret of a house, were it equally convenient, would be the best of all places in a city, for bees.* With so much room before them,

* The following was originally printed in the *Farmer's Register*, and reprinted in the *New England Farmer*, in this issue of the 1st February number.

* A few years since, a farmer removed from this county to one of the northern counties of the state of Ohio; his removal was in the winter, and he took with his other moveables, a hive of bees, and at the end of his journey he located in an old log

and a few small orifices, through which they might get into the open air, they never would swarm, till the whole garret was completely stored with comb, an event by no means likely to happen.

Hives placed on the high, flat roof of a shed, suitably shaded by a temporary roof of boards, to protect them from the scorching rays of the sun, are always thrifty and healthful. This is owing, probably, to the purity of the atmosphere, at a distance from the ground. The bee is an orderly, systematic insect, exclusively devoted to its own

house, and for the want of a better place he put his swarm of bees into the garret, where they remained till spring.

Among the many cares of a remove into the wilderness, he forgot his bees, and neglected to place them out of doors, as is the custom; but with the return of spring, and the opening of the wild flowers of the wilderness, they did not forget their duty, but 'gathered honey every day from every opening flower,' until the hive was full to overflowing. They found abundant passage between the logs of the house. When the hive was full, instead of swarming and going off, they merely removed a few feet from the old hive, attached themselves to a log in the same room, and went to work; others attached themselves to the mouth of the hive, and continued their operations in open view in this manner, for several years. When the family wanted honey, they went into the room and broke off what comb they required, without molestation. Having abundant room in the garret, they never left it in swarms. It is probable that the room was nearly dark, but of this I am not informed. From this circumstance, the inhabitants when they build their houses, finish off a small tight room, in the garret, or other convenient part of the house, exclusively for the bees, with timbers or braces on which they can situate the comb, having a tight door to the room, over which mice, &c. and I understand they are not molested by the bee-moth or miller. I could much enlarge upon this subject, but time does not permit, and it is quite sufficient for a practical man to improve the hint."

personal concerns; it is therefore the more important to give it a station where it will be the least liable to interruptions. In the yard, the remotest corner would be the most proper spot, at a distance from the pump, if there be one, so that in passing to and fro, the bees would not feel particularly annoyed. When a hive is kept in a state of alarm, by the tormenting ingenuity of mischievous boys, the time in which they would be ranging over the city in search of honey, will be lost in defending their premises. Every yard, if it is but ten feet square, has a corner in which a hive may stand safely, and at a sufficient distance, not to be any interruption to the family: neither would the family, in a short time, be any interruption to them. However, where there is any repugnance to introducing such a belligerent power into a very small enclosure, on account of small children, it would by all means be advisable to set the hive either on a shed or in the garret of the house,—the latter, decidedly the best bee-house that could be constructed.

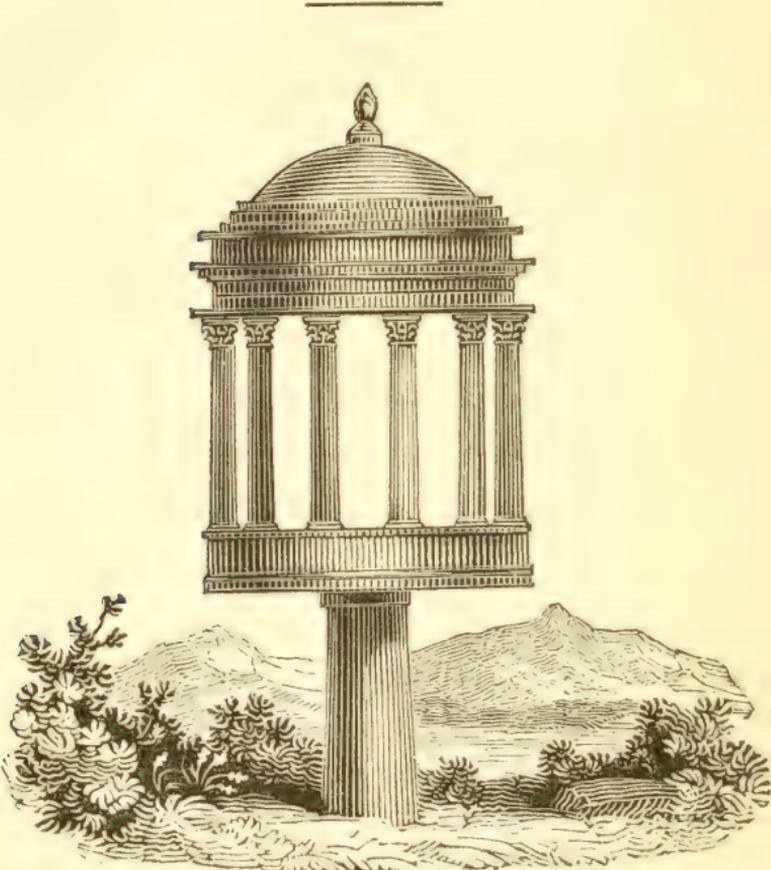
Most of the preceding remarks, relative to the locality of an apiary, have reference to such tenements as are in the occupancy of the poorest classes of citizens, but who possess the appetites of the wealthy. Farmers, in the country, construct very simple hovels for the protection of their hives, often a mere board, reaching from the ground to the top

rail of a fence. Almost the only object seems to be to prevent the heat of the sun from melting down the flakes of comb. Simple as this contrivance is, it is much better than nothing, yet altogether unsuitable. If water gets through the seams, the honey will not only become diluted, but be washed away.

When the hive or the bee-house is poorly built, of shaky boards, or with open joints, the bees are obliged to bestow so much labor in mending up their crazy dwelling, that much valuable time is actually lost to the owner, as the same time, had he done his duty, at first, would have been spent in the more pleasant employment of collecting honey-dew. Any person having ingenuity enough to use a handsaw and hammer, could erect a very comfortable weather-house, in the course of an hour.

Gentlemen, on the other hand, owning pleasant estates, who are not under the necessity of changing their habitations, and who are desirous of combining taste with permanent improvements, should have edifices for their hives, corresponding to the appearance of their own dwellings. The apiary under such circumstances, should be particularly ornamental, combining the advantages of being an interesting object, constructed, also, to gratify the eye, in watching those delicate operations in the interior of a glass hive, which have so much astonished philosophers, from the first records of civilized man, down to the present period.

Plan and Elevation of an Ornamental Bee-house, in the form of a
prostyle temple, for glass hives.



Various models have been exhibited, for these edifices, denominated prostyle temples,—having an elegant, well proportioned dome, supported on several neatly wrought pillars. When such a building is made to accommodate only one hive, its diameter on the floor should be not far from four feet, by four or four and a half in height. This should be well framed, particularly if a glass hive, yet to be described, is ever to be placed in it. Cross trees, on the under side, fitted to the top of a cedar post, well and firmly set in the ground, will sustain it against the force of driving storms.

The object in elevating the temple, on a single column, is this, viz.: if it were simply placed on the ground, thousands of insects, spiders, moths and noxious worms, attracted by the delicious odour of the new made honey, would eventually storm the hive, and take possession of the premises. The elevation of about three feet, is convenient for purposes of examination: in the next place, creeping vines, rose bushes and other ornamental shrubs can be so planted round the base, that the floor of the temple will have the poetical appearance of actually resting on a bed of flowers.

Swarming.

Such is the order of things, in the economy of the honey-bee, that in the commencement of summer, there is thrown off from the parent hive, one,

two, three, and sometimes four swarms or independent families of young ones, who immediately, after being housed, commence operations for themselves, or if not molested or secured by artificial management, seek out a secure retreat in hollow trees, fissures of rocks or in the obscure corners of decaying buildings. In anticipation, therefore, of this event, the apiarian should have several new hives on hand,—the construction of which, as will be noticed in the sequel, is of immense importance. The sure, indeed, almost unfailing precursors of swarming, are these, viz.: for several days, there is an unusual commotion in the hive: the bees cluster on the lighting board, in front of the entrance, in masses, oftentimes the size of a quart measure, and at night-fall, retire again within, as usual. On the following, or second morning, if the weather is clear,—if the sky is cloudless, the confusion increases to a prodigious degree, and suddenly, a surprising column of bees hurry in one simultaneous movement towards the door, rising in the air, equally suddenly, and within a very few minutes, present the novel spectacle of thousands of bees all on the wing, flying in whirls,—so that the mass resembles, in outline, a globe of some thirty or forty feet in diameter. During this ejection of the children from the parental roof, all business of the ordinary kind, appears to be suspended. The old bees dart to and fro, in a most

angry manner, driving the young from the hive, if they attempt returning, when the weather offers no obstructions to the success of the flight, and forcing them further and further from the place of their birth. The young brood continue thus whirling over, or very near the old hive, till all their associates have been assembled in the ring, when, with an unexpected start, to the spectator, the whole body, unless at the very moment arrested, are lost without redemption. This, indeed, is the trying moment for the apiarian; if he is successful in obliging them to light, they can be at once housed in a new hive,—which is no sooner accomplished than good order, even in the new swarm, immediately ensues. The mass begins to climb up the walls, and stragglers constantly arriving, join their lately agitated clansmen.

New hives need no other preparatory fixing, than to be clean and tight,—so that light and rain cannot penetrate them. From the middle of May, in this section of the country, to the middle of July, new swarms are given off: this, however, very much depends on the good or bad condition of the stock hive, which has been wintered over.

A good hive, and such a one as can be relied upon, contains, on an average, from 12 to 20,000 working bees, which are females; and from 1,500 to 2,000 drones, or male bees. Early swarms may be anticipated, if there has been a plenty of honey

to sustain the bees through the winter: on the contrary, if the laborers are few, and they have become debilitated by famine, a late swarm only need be looked for, if one appears at all. Bees very frequently supply their losses, after a severe calamity, by incorporating the young ones into their feeble ranks. Two swarms, for a general rule, may be expected from a hive of the first description. Usually bees swarm from about ten to half past eleven o'clock in the morning, and only in fair weather.

Sudden showers of rain will arrest their design at once, even if the whole swarm are getting on the wing. A knowledge of this fact has been seized upon by cultivators, to collect them from the air, in order to cover them with a hive.

For this purpose, a large pewter syringe, perforated at the distal extremity, with many holes, like the top of a pepper box, is an admirable instrument for controlling their erratic movements. By throwing water into the air pretty freely, and if necessary, an assistant should be plying a second one, when the swarm are disposed to be refractory, their wings are wet, and the bees instinctively endeavor to escape the impending danger, by settling down into a solid mass on some prominent or projecting body near by, as the limb of a tree, the top of a post, the corner of the house, brake of a pump, or the back of a chair. When they have fairly lighted, if

they attempt a second flight before the hive is in readiness, the engine must play a few times more, and, indeed, as often as circumstances seem to require, till the process of living has been fully completed.

Another method, often successfully practised by apiarians, consists in throwing up sand, freely into the air. Whether the bees are induced to light, in consequence of the injuries they are receiving from the stony particles, or in consequence of fright or a presentiment of an approaching storm, has not been determined. It is decidedly most philosophical to resort to the water, which, always, if properly managed, is sufficient to control their movements, just as may be desired. By the wetting, they sustain no permanent injury, whereas, by the sand or gravel, they are liable to be both maimed and killed. The vulgar notion that it is necessary to ring bells, rattle tin pans, or blow horns, is based on the supposition that the bee has an ear organized like a man's, and that through this highly developed sense, its mind—its reasoning powers are to be operated upon through the influence of fear! If they could recognize the hoarse vibrations of many domestic utensils brought into requisition at some country farm houses, in swarming time, there is no doubt they would be frightened! Nothing can be more absurd than

this procedure, which does no more towards housing the bee, than it does towards staying the tides.

Bees have been known, after having risen in their characteristic manner, to settle, almost instantaneously on the head of a person. This circumstance, however, rarely happens, when there are any bushes or projecting points from surrounding buildings. When such an accident does occur, let the individual be instructed to remain firmly in the spot, without moving his limbs more than may be absolutely necessary, till some one reaches a lighted pipe or cigar, for him to smoke. The odour of smoking tobacco is so intolerably offensive, that they are actually obliged to rise immediately or die of suffocation. As the outer circles rise, to keep from the influence of the narcotic vapour of the pipe, they settle, without much preliminary ceremony, on the nearest projecting body, let it be what it may. This is the time for securing them within a hive.

In the act of swarming, the manager should be cool and collected. Any useless exertion, exciting the rapid circulation of the blood, increases in the same ratio the exhalations from the surface of the body, always unpleasant to the honey-bee. The perspiration of the human body is particularly offensive to the minute organs of the bee. As the perspirable matter is different in different persons,

it at once explains the reasons why they have such strongly marked antipathies to certain individuals. Indeed, this manifestation of dislike towards some persons, is so remarkable, as to give the unconscious offenders the strongest prejudices against this interesting architect. I have noticed several seamen, in passing the apiary, as they were on the way to my office, stop for a moment, to watch their proceedings. Almost instantaneously, the bees would pursue some two or three, out of half a dozen, with unrelenting fury, stinging whenever they could get a hit at any part of their bodies: the others, perhaps, might stand viewing them, and, indeed, look into the hive, by raising it, without being even noticed by those, which had been raging after their companions.

Should it so happen that a swarm fixes on the limb of a high tree, too large to be sawed off, and lowered conveniently to the ground with ropes, the hive should be slung in the noose of a rope, thrown over a still higher limb, which is a pully,—the lower end of the rope being in the hand of some one at the foot. By pulling or slacking, the empty hive may be thus carried within a few inches of the consolidated bees. When every thing is ready, a man in the tree, having a broom or brush made fast to the extremity of a long pole, gently brushes them off, by masses, into the elevated receptacle. Under such circumstances, the bees may be han-

dled with the bare hands, with impunity. The moment the mass has been swept in, the person holding the rope, slacks it, gradually lowering the hive to the ground, where a table is in readiness to receive the hive when inverted. Although the bees may appear to be almost as numerous out, as inside, shortly after it has been set on the table, they become less noisy and more composed. Perhaps many handfulls may cluster on the outside, as though determined not to take up their abode within. If brushed away repeatedly, they finally accept your proposition, and enter the door towards evening. Any refractory conduct may be overruled by the syringe and cold water.

The ingenuity of the cultivator of bees will be frequently called into requisition, in the course of the swarming season. No arbitrary rules can be given which may be implicitly relied upon. Much of the success depends on the calm, fearless manner of the manager of these operations. The experience of one year will suggest various processes and improvements, some of them, perhaps at variance with these remarks, but if they promise utility, let them have the preference.

Transferring Bees from one Hive to another.

The only advantage accruing from this operation, consists in locating the bees in a house, either

more spacious, and convenient to themselves, or in having them in a condition to be inspected, or to obtain their honey.

In moving a swarm from an old hive, where they have constructed comb, great caution is necessary. Any one, having a tolerable acquaintance with their general character, may safely undertake the business. If, for instance, a swarm is badly lodged in an old, leaky, decaying box, it is desirable to transfer it to an improved one, or at least, to a hive less under the annoying influence of noxious insects: the best method is to lift off, suddenly, the top board or roof of the old box, if of the common fashion; if on the other hand, it is constructed of straw, let the top or apex of the hay-stack shaped hive, be quickly sliced off with a broad sharp knife. At the same moment, clap the other hive directly over the opening.

Evening is decidedly the best time to perform the operation, from the latter part of March, till about the middle of April. Later than this, would be to the certain destruction of the eggs, which are in the state of rapid growth.

Previously to placing the new hive, as directed, the cross rods should be passed through two or three flakes of comb, well filled with honey. The sticks give the pieces support, in the middle of the hive, besides exposing all sides to the bees. As

soon as they enter, the comb thus suspended, appears the first object of their regard.

Every thing, then, being in perfect readiness, let a dish be set near the lighting board or threshold, filled with burning leather, old shoes, bits of oakum or saw dust, it matters not which, and the smoke blown in at the orifice, by a pair of hand bellows. A very gradual introduction of smoke is all that is required, as the bees, as soon as they perceive the existence of the smoke, for the preservation of their lives, creep very quickly towards the upper part of the hive. Finding no obstruction to farther progress, they finally soon arrive where they are desired: a slingle, or what is better, a sheet of tin, now slid between the two hives, prevents their return to their original abode. Whenever, as nearly as can be ascertained, a majority have entered the new hive, the old one may be taken away, and the new one set down on a table. By plying the smoke freely, the tenacious adherents to the old hive will be forced to leave, and soon join their persecuted fellows.

Sometimes, from inexperience or want of tact on the part of the operator, considerable numbers are suffocated: but this is unnecessary and even cruel. With a few puffs of smoke from a pipe, a person accustomed to bees could drive a whole apiary before him. When the bees have surveyed

the interior, and in fact, the exterior also, of their new habitation, without manifesting regret for their loss, they begin with alacrity to put the hive in the proper condition.

If the hive be constructed of two boxes, one set directly over the other, or as is sometimes practised, the hive is made up of a series of boxes, either the bottom, or any intermediate one can be removed, by the same course.

Bees, like all insects, breathe through minute holes in the sides of their bodies; if the air, of which they consume a great quantity in a little time, is wanting in vitality, or is loaded with poisonous vapours, they die in a few minutes. When hives, in autumn, are suffocated with sulphur, the bees are all killed by inhaling it, while burning.

I shall devote the remainder of this chapter to giving directions for housing bees in glass hives, for the purpose of inspection, with reference to studying their habits, their labors and their government.

Having had considerable experience in managing them in glass globes, I can with confidence recommend the following plan.

Over a common wooden hive, having a broad surface at the top, through which a hole about one inch in diameter has been made, turn a glass globe of any dimensions. Over this globe, which should

be made of pure flint glass, have a carefully adjusted case or box, of wood, that will exclude all light. Through the sides of this case, have several doors, neatly fitted and hung with hinges. From the top of the globe, on the inside, there should be a perpendicular rod, with cross bars, at suitable distances, to attach the future comb. In blowing the globe, a hole in the centre should be made, through which the end of the rod may come, on the upper side, to be keyed. Nearly three inches from this centre, there should be another opening, like the mouth of a pinna, perhaps one inch in diameter. The object of this second orifice, is, in the first place to serve as a ventilating window, allowing a circulation of air through the hive; and secondly, for the purpose of introducing smoke, brushes, paint, &c. in the course of a series of philosophical experiments. A globe holding from ten to fifteen quarts, will answer very well, though I have one, that holds almost a bushel of grain. The size should be proportioned to the magnitude and thrift of the swarm which is set apart for philosophical purposes.

I have, for the last four years, since inventing this contrivance, been able to witness the process of constructing the cells, depositing the honey, feeding the young, setting the guards, and the like interesting operations. Before I hit on this particular plan of a hive, the bees often died for want of air; the heat was so great as to completely

destroy the eggs before the worm was perfected;—and moreover, the bees were never willing to go into it, unless compelled by a severe course of discipline. Notwithstanding what writers and farmers may say to the contrary, the bees will not plaster over the glass in such a manner as to destroy the observer's view of the interior. Hives constructed with perpendicular or inclined flat walls of pane glass, are in danger of being besmeared with propolis; but globes, close and careful observation warrants me in saying, are rarely, if ever, covered by the bees, even if the light is admitted an hour or two at a time, daily, through the honey harvest.

Ordinarily, in a good season, such globes as have been described, will be filled, if too many experiments are not instituted, in five, and from that to seven weeks. When the season of observation has passed, and the bees are no longer travelling abroad, but give indications of making preparations for winter, if it is an object to preserve the globe, with its splendid waxen city, for exhibition, draw a small wire between the edge of the glass and wooden hive, to cut the comb from its connexion with the top board of the bottom hive, turn it bottom upward in a basket of hay, that it may not be broken, and wait for the bees to fly into the original hive. So simple and easy is this, in the cool of an

October morning, that smoke, in self defence, is wholly unnecessary.

In the wooden box there is usually honey enough to sustain the bees till the next working season. The evidence of the fact, is that the globe is full. If, however, there are any doubts on that point, let the box be raised a little, to be inspected. The following year, another globe may be placed over the same box, and thus the hive will not only, in the end, prove very productive, but gratify the most zealous entomologist with a bird's eye view of the interior. A hive, under such circumstances, rarely throws off new swarms.

Upon the same principle, a quart or pint tumbler can be turned over an inch hole in the top of almost any hive, secured from the light, to answer the demands of the family. Every few days the tumbler will be filled, and another should be substituted in its place: in this way, continually alternating, a constant supply of delicious, fresh made honey, may be secured for the use of the table.

It is best, notwithstanding the above remarks, on a simple mode of securing the almost daily products of the apiary, to have both hive and bee-house of the best construction.

In town, where the apiary is located in a fine, airy yard, the exterior should exhibit, as before remarked, a proper degree of taste as well as convenience.

Mode of constituting a profitable family hive.

Under some circumstances, there is more advantage to be realized in keeping but one hive, if it be of suitable magnitude, than in attempting the culture of half a dozen. Bees may be kept from swarming, just as long as they have any spare room in which new cells may be constructed. Such is their instinctive economy, that young bees on coming into existence, begin to labor, and are not ejected from the parental roof, but are assimilated to the old stock, from time to time, as long as the want of more laborers is indicated.

The greater the number of active laborers, as in all other social communities, the greater and more certain is the product in a given time. As a general course, in cities, I am inclined to the opinion, that one hive, to a moderately sized family, is enough. First, because it will occupy less room in a yard, perhaps already too small for health; and, in the next place, there is no danger of losing swarms of young bees, as none, if managed as they can be, will ever desire to leave. Give the bees but room enough, and their numbers will go on increasing to a truly surprising degree; they will never swarm, to diminish the strength of the hive, but, on the contrary, by such continual additions of new hands, will astonish and gratify the inexperienced apiarian with their accumulating riches.

Of all the contrivances which the prolific ingenuity of our countrymen has presented the public, for both comfortably housing and getting the honey, as it is made, without detriment to the bees, the hive recently constructed by the distinguished and venerable Dr. James Thatcher, of Plymouth, has the decided superiority over all others.

The Thatcher hive is completely calculated for this continual increase of bees, and is therefore the only one which is worth using in town, under such circumstances as have been defined: a moderate swarm, in three years, in one of these valuable hives, so well adapted to their increasing condition and the requirements of a family, will become exceedingly formidable. I have a hive, at this time, which has never swarmed. Dr. Thatcher, who examined it the last autumn, considered it the largest he had ever seen: indeed, he doubted whether there was a more populous hive in the commonwealth. This swarm, judging from what I saw from day to day, must have collected about two pounds of honey, every pleasant day, for a long time.

At the close of this essay, a particular description of Dr. Thatcher's invention will be given, and I beg here to express a hope that it will eventually be in exclusive use in the United States. The Charlieshope hive, the invention of that philosophical and ingenious lady, Mrs. Mary Griffith, of New Jersey, a model of which was forwarded to the

Horticultural Society, though meriting attention, falls far below the other, in point of value. A description of it, however, will also be given.

For a large country apiary, Mrs. Griffith's hive possesses some trifling advantages over Dr. Thatcher's, and those regard the ventilation, principally, of the bees in the heat of summer. Those hives hawked about by pedlars, and quack farmers, as patents, have no claims to respectful notice. To buy them is actually foolishly wasting money. The more simple the hive, the more perfect, and therefore the more deserving.

But after all that I have written, thus far, on the character of the hive, I think more highly of the garret of a house, in which the bees are permitted to enjoy their unrestrained liberty, than all the contrivances in the world beside.

The Bee-Moth.

Great lamentations are heard about the bee-moth, (*Phalæna (linea) cereæna*), a small grey miller, whose devastations in the New England States have been described as absolutely frightful. That it does torment the bees, there is no question; but that all the damage accruing to them, attributed to it, are really chargeable to its account, admits of some doubt. Attracted both by the odour of the honey, and an instinctive desire of depositing its eggs in a spot where the forth-coming worm may

find a sufficiency of appropriate food, the moth runs the hazard of its own life, in running the gauntlet to get into the hive. The hatching of the moth's egg is effected by the heat of the hive, in the same manner and nearly in the same time that is required for maturing the eggs of the bee. As soon as the grub makes its exit from its enclosure, the tunics of the egg, it begins to gnaw its way forward, regardless of all opposition,—taking in its track, honey, comb, the larvæ of bees, and the bodies of those that happen to get within reach of its strong mandibles. Subsequently to this voracious commencement, it secures itself in a thick, soft case, of its own elaboration, where, out of the reach of stings, it is changed ultimately, to the winged insect, capable, like its progenitor, of continuing the species.

Disorder and disaffection soon shows itself amongst the laborers; the destruction of property, collected with so much care, rouses them to the highest pitch of revenge. Effort after effort is made, *en masse*, to expel the intruding foe; but if they are unsuccessful, which is sometimes the case, obviously discouraged, the swarm either gradually dwindle to insignificance, or unanimously resolve to seek, in a body, a new and more desirable residence.*

* A gentleman of this city who has made himself very familiar with the natural history of the honey-bee, S. Elliot Green, Esq.

Many interesting facts, corroborative of these remarks, are recorded in various agricultural publications. Such has been the destruction, we are credibly informed, of honey-bees, in the interior of Massachusetts, New Hampshire, and Connecticut, that farmers have become heartily discouraged in their attempts at cultivation, and, lamentably, appear almost to have abandoned them entirely. A very simple plan, and sometimes it is eminently successful, consists in placing a burning lamp in a pail, near the apiary. I have been quite successful in taking prisoners by this device, in the early part of the evening. A keg, because it is smaller at the top, by reason of the incurvation of the staves, having, in the mean time, but one head, is the best trap. Some fresh honey or if not readily obtained, even molasses, spread over the bottom, is the bait. All insects are particularly charmed by a bright light; and none of them more than the bee-moth. As soon as they discover the light, they fly towards it. Another sense, which is probably strongly developed, smell, is gratified by the odour of food; and hence they have a double inducement to enter into the trap, where the blaze of the lamp on their thin spread wings gives them a finishing blow, and

informs me that in an apiary in which he formerly took a deep interest, he prevented the depredations of the moth, to a considerable extent, by frequently changing the floor board of the hive. He sometimes inserted two or three clean planed boards in one season.

tumbles them into the bottom. With a little management, thousands may be caught in a very little time.

Another method which I have practised successfully is this, viz.: set a long neck bottle, having a little honey on the bottom, under the floor of the beehouse, and another, perhaps on the roof. When once inside, it is exceedingly difficult for them to make their escape. Drawing a piece of gauze, or making a wire door, on hinges, over the aperture to the hive, which is closed over night, is another very good scheme. But this must be opened very early in the morning, as the bees begin to forage by the earliest dawn. The gate most effectually keeps the moth from getting within, though the bees, thus confined, exhibit much restlessness and impatience during the time they are imprisoned within their own castle.

My ingenious friend, Dr. Thatcher, to whom the agriculturist is under peculiar obligations, says that by placing shallow vessels, containing sweetened water, to a pint of which is one gill of vinegar, the moths are intoxicated, fall into the pit and are drowned by hundreds. These are the principal means, yet discovered, of subduing the moth: perhaps all of them, on trial, would be found valuable, where there was reason for apprehending much damage from their nocturnal visitations. During the day-time, they are lying secreted in crevices, but as

soon as the evening shade comes on, they are on the wing, carrying, if not apprehended, death and destruction to the bees.

To extract Honey from the Comb, in quantities.

Place all the comb, bruised and broken, as it may be, containing very often dead bees, larvæ, &c. in a good sized hair sieve. Let it be suspended by cords from the ceiling, as the most convenient mode, and an earthen vessel set to receive the honey as it gradually drips through the sieve. The process may be hastened considerably by having it near a hot fire, which makes the contents of the cells much more fluid. When the jars are sufficiently filled, set them in a cool apartment. The honey *grains*, as it is termed, in a few weeks assuming the appearance of butter partially melted. Age gives it more character; it hardens very considerably, so that it may be placed in slices on the table, having a rich yellowish hue. For family use, this is a common, very good and certain process.

To prepare Wax, after taking out the Honey.

In a kettle of boiling water, throw all the comb taken from the strainer. Continue boiling till it is dissolved, then strain the whole, water as well as wax, through a coarse linen cloth, into another vessel of boiling water. In this way, all impurities will be detected; the wax, therefore, becomes per-

fectly pure. If suffered to cool in the second vessel, it will rise to the surface of the water, in a solid cake. To every fifteen pounds of honey, in cells, there is nearly half a pound of wax.

Method of managing Stock Bees in Winter.

During the season of rest, from the first of October to the first or middle of April, the quantity of honey consumed by such a hive as has been spoken of, as worth keeping, varies according to the average temperature of the weather, from ten to twenty pounds. It is better that the bees should have too much than too little in store. They are very economical in the expenditure of food, and therefore there is no risk in trusting them with well stocked granaries.* All hives should have the

* On the 21st of March, 1831, in company with Mr. J. S. C. Greene, we examined a hive of bees that had, probably, died for want of proper ventilation. There were two thousand two hundred bees. A common flint tumbler, contained one thousand, weighing six ounces and a half. It was obvious they did not die of starvation, as there was a good supply of beautiful honey, which, together with the comb, weighed twenty-two pounds. Allowing one half pound of cell comb, for holding every fifteen pounds of honey, the quantity was easily ascertained. Taking this in connection with that which was taken from them in the autumn, and, at the same time, admitting that five hundred bees were lost by high autumnal winds, storms, and early frosts, the whole colony consisted, originally, of thirty-two hundred bees, which, in eight weeks, or thereabouts, collected the wax, constructed the cells, and made over one hundred pounds of honey, in a garden on Pemberton's Hill, nearly in the centre of Boston! It should be remarked, that a bee answering the general description of the queen, as it relates to external appearance, was found in a cluster of dead ones. Not a drone was discovered, nor a young bee in any stage of

weight marked on the back, which will enable the manager to judge pretty accurately of the quantity of honey and wax on hand. Taking five pounds as the standard weight of the bees, and a half pound of wax to every fifteen pounds of honey, almost the exact quantity of honey can thus be ascertained. My rule has invariably been, to let the bees remain in winter, wherever they have stood through the summer; all attempts on my part, to prepare them for the inclemencies of approaching cold, were invariably anticipated, and seasonably attended to by the bees themselves.

Feeling peculiar commiseration for a swarm, two years since, whose bleak locality, I feared, would be the certain destruction of the hive before spring, they were placed in the lobby of an adjacent building, for comfort. In the month of March, discovering that thousands of them were dead, on the floor, and that the bees were sickly, they were carried back to their old stand in the open air, at the summit of a high, exposed hill, where they were perfectly restored to health, in about twelve days. If they are housed in winter, the torpidity which seems to be constitutionally requisite, both for the future health of the bee, and the saving of its honey, is obviated, and indisposition, in consequence of constantly feeding, without exercise, is the invariable result. The colder they are, the better: I am fully persuaded that bees, in their hive, cannot be

frozen to death. Animation may be suspended several weeks or months, with impunity,—vitality may merely appertain to organized matter; but, when the genial warmth of spring comes gently on, the little spark of life is again rekindled into vigorous flame.

By looking under the hive occasionally, it can be ascertained whether there is danger of famine; if so, spread fluid honey on old pieces of comb, which must be laid on blocks, within the hive, in order to expose all sides for the bees to feed. Loaf sugar syrup is a very tolerable substitute for honey, when that cannot be easily procured. When old honey is used for feed, which is chrystalized, it should be diluted with half its weight of water, otherwise the bees cannot digest it. I once fed my bees with half a pint of sugar water, which they not needing for immediate use, packed carefully away in empty cells, against a time of need. To my surprise, in about five days, on a pleasant April morning, the bees were actively employed bringing out white grains of something, resembling sand. My curiosity being excited, I tasted of it, when lo! I recognized the sugar. The fact was, the water in which the sugar was held in solution, evaporated, by the heat of the hive,* or else the bees drank it

* Illustrative of the fact, that the quantity of heat generated in the hive by the bees themselves is entirely beyond what any one, unacquainted with their history, would expect, I introduce

up—and the sugar chrystalized at the bottom. They discovering this metamorphosis, finding that the

the accompanying extract from that valuable hebdomadal, the New England Farmer. I regret that Mr. Beard has not given us his theory upon the subject, as I have none of my own.

“I had on the 16th day of last January a swarm of bees *which melted down*, so that one third of the honey ran out, and half the swarm was drowned in the honey. The weight was forty-eight pounds, honey and bees, and the hive was thirteen inches by eighteen. The thermometer stood about ten degrees below freezing, and the hive was out in the open air, exposed to the weather. The entrance to the hive was lightly fastened up to keep the bees from coming out on the snow. They had been fastened up one day, when the event happened. It was first discovered by the honey’s running out and falling on another hive, which stood underneath; and on opening the hive the steam ascended from it, as it would from a boiling pot; and the bees made all possible speed to leave the hive, but were so immersed in the honey that they could not fly, and a great many were lost on the snow. I soon stopped them up, and bored some holes in the bottom of the hive to give them air, and let the honey run off. But there had so many bees fallen down, that they clogged up the holes. I then took up the bottom board, and put the bees into a box six inches deep, so as to see what state they were in. A good deal of the dry comb in the hive fell down, and it has been so melted that it is now in many crooked shapes. I have since carried the hive to Brighton, and while removing it (which happened to be during a snow storm) I noticed that as fast as the snow fell, it melted on the hive by the heat of the bees within, although it was a very cold day.

I have some other *hot natured bees*, so hot as to melt the snow away from the hive two inches, but not so hot as to melt down the honey-comb. I wish to publish this, for to me the above occurrence is unaccountable. It is a thing which has never happened to a swarm of bees in my possession before.

I should consider it a great favor if some one would, through the medium of your paper, state the probable causes of this great heat, proceeding from bees, and how they have the power of creating it, so as to melt their comb, at any time they please. I have myself conjectured the cause, but should like that some one older than I am in the management of bees, should inform the public the cause of this new phenomenon.

EBENEZER BEARD.”

sugar was of no service to them, mustered their forces to carry it out of the hive at once. For the sake of witnessing their discretion and ingenuity, I made several repetitions of this interesting exhibition.

To Bleach Yellow Wax.

To make bees' wax perfectly white, whilst it is liquid on the surface of boiling water, dip in sheets of paper, tin, or shavings, which will come out, coated with a thin sheet of wax. These are to be exposed to the direct rays of the sun, day after day, on the roof of a house, or in broad earthen pans, till it becomes of a pearly whiteness. When this part of the process is finished, throw all the articles loaded with wax into a kettle of boiling water again, to disengage it, and afterwards run it into moulds for use.

Method of relieving the Pain, on being Stung.

Instantaneously, after being pricked by the sting, the pain in the part where the puncture is made, is almost intolerable. First, search for the sting, usually left in the wound, and carefully draw it out. A pellet of moistened clay, laid over the spot, gives relief as soon as almost anything that can be prescribed. Cold water, plentifully supplied by a sponge, mitigates the intensity of suffering considerably. But above all, an ammoniacal prepara-

tion, known in families by the name of spirits of hartshorn, is superior to all other remedies. A vial of this, therefore, should always be kept by those who, from their exposure, are liable to be frequently stung. Washing the part a few moments, overcomes both the pain and the inflammation.

Method of supplying Bees with Fresh Water.

If there is no place in the yard in which water remains exposed, as for instance, in a trough or a shallow tub, some provision of the kind must be made. Bees, in the building season, require fresh water very frequently ; for this purpose, the architects will sometimes fly to the accustomed watering place, and then return and resume their masonry again. The bee softens the wax with its own saliva, and finally varnishes over the surface of all the cells, inside and out, with this secretion, laid on by its long brush-like tongue : this explains the necessity for drinking so often, to sustain the secretions necessary to the completion of its habitation. If a watering place is not expressly provided, so that the bees can drink without endangering their safety, wherever they are placed, they immediately seek one, which they rarely forsake for a new one, even if it is within a few feet of the hive. Bees like to stand on pebbles when drinking ; it would therefore be well to drop a handful into the trough

from which it is intended they shall habitually obtain their drink.

I have made many experiments to induce bees to drink at the mouth of the hive, from a shallow table plate, but they were never disposed to comply with my wishes, choosing to fly over twenty rods to a particular drain, under a tree, which conveyed away the waste water of a pump.

Method of Marking particular Bees, in and out of the hive, in order to ascertain their specific employments.

Place some honey in a saucer, having sticks or straws laid over it for the bees to stand on, in front of the hive: they very soon light on the sticks, and commence taking up the honey with their trunks. Whilst they are quietly engaged, with a delicate camel's hair pencil, mark the bee on the chest, between the wings, with any water color which may be most easily seen. Different individuals require different colors, according to their supposed employments: otherwise, if all were of one tint, they could not be designated in the hive. These remarks, of course, have exclusive reference to glass hives.

Through the ventilator, or vial-like orifice of the globe, before described, insert the pencil, at the end of a long, slender rod, to the spot where any par-

ticular bee is engaged, and mark it as in the other case. By this plan, the observer may recognize the bees, when or wherever they may be subsequently found. I believe this to be the only successful mode of studying their character, habits, and employments. The sentinels at the door can be marked in the same manner, and afterward noticed in some other course of industry, showing most clearly and convincingly, that strict order is maintained in the hive by systematic energy and the division of labor.

Whilst speaking of marking, it recalls to mind the very many happy hours I have passed over a glass hive, in watching the progress of various operations which were disclosed to me in the ordinary course of their never-tiring industry. I am free to confess that an ample return, in this way, has been made for all my toil, vexations, and expenditures ;—and I can conscientiously recommend the raising of bees, to a thinking man, as one of the most certain, unexceptionable, and genuine sources of enjoyment. We are at this moment almost as ignorant of the true generative process of bees, as in the age of Pliny : a vast, unexplored field is presented to the philosophic entomologist, where he can yet discover, if he cannot always explain. He can add new facts to those already accumulated, and he can moreover assist in the expurgation of that host of falsehood which has been palmed upon

the world as truth; as it regards, for example, the flight of queens, for impregnation; the alteration of workers into prolific layers of eggs, or the despotism and unexampled majesty of a puny insect. The more I witness of their economy, with my own eyes, the more thoroughly I am convinced of the imposition that has been a long while practised on *reading* philosophers, by those marvellous bee-mongers who have so much astonished the age by their discoveries.

Anatomy of the Honey Bee.

Like larger animals, they are anatomically considered under the three following divisions, viz.: *head, trunk, and extremities.*

The internal structure of the head cannot be investigated, but that it is exceedingly complicated, there can be no doubt. In the *trunk*, the second portion of the body, being the mass between the head and abdomen, is lodged the minute organs of motion belonging to the legs, wings, and parts of the secretory and vital apparatus. Within the abdomen, constituted of six hoops, sliding within each other, like the tubes of an object glass, are contained the procreative organs; the respiratory tubes; the intestines; and the beautiful but complicated machinery of the sting.

*Parts which can be distinctly seen under the
Microscope.*

A bee's proboscis is probably constructed as wonderfully as an elephant's trunk, as it has as much flexibility and freedom of motion. It is made up of a centre tongue and four outside strips surrounding it in the form of a case, having a joint in the middle like the socket joint of a surveyor's compass, allowing it to be carried in any direction. This appears like a brush, when the bees are using it in finishing the cells. The upper jaws, termed *mandibles*, armed with fine teeth, open horizontally; they are really powerful, considering the size of the insect's body, and are constantly used, as pincers, a vice, or as a rasp, as circumstances may require, in all their minute architectural labors. No appendage of an insect's body appears of so much importance as their antennæ, long hair-like appendages of the head, made up of a chain of jointed tubes, having free motion in all directions. Drones, (the males,) have thirteen, and the females only twelve of these articulations. By these, the bee probably transmits the vibration of bodies to its own,—they being in fact, the organs of hearing. Feelers, termed *palpi*, four in number, from the jaws, also subserve some mysterious function, which is not yet fully understood.

Wings of bees are beautifully organized, being a

delicate tissue, stretched over a frame work of tubes, through which the air circulates freely, by reason of their communication with the spiracula, or breathing holes, on the sides of the insect. Under the microscope, the wing is an interesting object. The muscles by which they are so rapidly moved, cannot be seen; their existence, however, cannot be questioned. It is owing entirely to the peculiar development of the respiratory organs, that insects exhibit such prodigious strength, and are able, also, to sustain, for a long time on the wing, a weight greater than themselves.

Bees have six legs, articulated much like the elbows of a man; in the hind legs, that portion which is equivalent to the thigh, is hollowed or scooped out into the shape of a trough, termed basket,—the margin of which is bordered by long, stiff bristles, acting like springs, to press in and downward, whatever is placed there. In these the bee packs its little balls of farina, which are to be carried home to the hive. This is done by the jaws and middle pair of legs, used as monkeys use their hands. Two hooks, on each foot, with points in opposite directions, can be readily seen with an ordinary magnifier. By these they suspend themselves, or drag their enemies out of the hive, as the case may be. When walking on glass or other polished surface, or, directly overhead, the central part of the foot either acts like an air pump, or by

the adhesiveness of their saliva, by which the feet appear to be frequently moistened. That appendix to the hooks, spoken of by some entomologists, as coiled up, only to be used on certain inclined surfaces, I have never seen.

Although the sting, on general examination, appears like a fine, slender pointed needle, there is a horny scabbard, containing two long, sharp, sliding stings, side by side, bearded on their edges, which are thrust beyond the sheath. A sack of poison is placed near the tip of the tail, having a duct leading to the pipe containing the stings. As these are withdrawn, in the act of stinging, the poison is injected into the puncture. When the individual stung, permits the bee to withdraw the sting leisurely, it does it so carefully as to tear the barbs, like fish hooks, through the flesh, without damage; but, ordinarily, both the bee and the individual are so much excited, that in the hurry of withdrawal, the barbs hold so tenaciously, that in the muscular effort to draw it instantly, it is torn from the body: the death of the bee necessarily follows.

Eyes. Nothing of the internal structure of the eye can be examined by the common microscope, but the perforated cover, or eyelid, which protects that minute organ, strongly resembling the top of a pepper box, can be examined. The eyes are immovable in the bee; though quite protuberant, there is only one lens, having, however, as many

polished faces, as there are windows to correspond in the eyelid. Their eyes, therefore, receive light from every point, on some one of the many faces, without obliging the creature to change its position:—in effect, one lens, standing as it does between the light and the optic nerve, is equivalent to having a distinct lens to each orifice. Dr. Bevan, the latest writer of merit, in England, on the bee, gives it as his opinion that its eyesight is less perfect than its other senses. He quotes Wiedman, who remarked that he had seen bees travel up and down in front of the hive, on their return from the field, in search of the door, and be obliged to fly off at a little distance, making another tack, and thus hit the portal. My own observations corroborate this statement, as it respects the use of their eyes, at least, in a bright light. Their eyes are undoubtedly constructed for seeing distinctly and minutely, exactly before the jaws, so that the masonry of the cells is done by a critical eye; and, furthermore, they probably see better in the dark than in the light; and hence they close all avenues to light in the hive.

At the root of the tongue, is an opening for the passage of collected honey, from the mouth into the honey-bag, neatly closed by a valve, something like the epiglottis in the throat of a man. The power of regurgitation is a very remarkable faculty; as the honey is brought up through the gullet, it is mixed

with secretions from the bee's own system, poured out into the common canal as it moves along. Probably both the quality and quantity is effected by this process.

Huish, in an extract from M. Ducovedic, who maintains that bees void their excrements by the mouth, makes very sensible observations upon the structure of the abdomen of the bee. How any man in his senses, and particularly an anatomist, could conjure up such a theory, that any insect was destitute of an intestinal tube, is really wonderful. Such an extraordinary departure from the common laws of nature, in the organization of animated beings, were the Frenchman's declaration true, would certainly lead one to believe the second part of his assertion, that whatever goes into the *mouth, comes back the same way, converted into honey!* Gentlemen devoted to entomological studies, will be able to inspect, under a solar microscope, even the convolutions and termination of the intestine.

Physiology of the Bee.

From Bevan's excellent treatise, published in 1827, I have selected the following interesting physiological memoranda.

The Poison of Bees.

“The poison of bees, as also that of wasps, is a transparent fluid: applied to the tongue, it imparts

a sweet taste, which is succeeded by a hot acrid one. It gives a slight, red tinge, as has been already hinted, to litmus paper, and hence the Abbe Fontana has concluded that an acid enters into its composition; but in a very small proportion. The venom is so extremely active, that he conjectures a grain in weight, would kill a pigeon in a few seconds. It is this fluid which causes inflammation consequent upon being stung. A puncture from a needle that was charged with it, would produce precisely the same effects. These effects are very different in different persons; for whilst a single sting will produce alarming symptoms in one individual, another may receive numerous punctures without sustaining pain or inflammation in any considerable degree; sometimes without suffering either. The activity of the venom varies according to the season of the year; a sting received in winter, produces much less inconvenience, than one inflicted in summer; the pain and inflammation are neither so intense nor of such long continuance. This may arise from there being a more copious secretion of venom in summer than in winter; for during the former season, if a bee inflict several wounds with its sting, the pain and inflammation become progressively less at each consecutive puncture: after three or four punctures, it is rendered incapable of producing more inconvenience than the point of a sharp needle. If a bee be provoked to dart its sting against glass,

so as to eject its venom upon it, and the glass thus charged be placed upon a double microscope, oblong pointed crystals will become visible; these may at first be seen floating in the venom, and gradually shooting into crystals as the fluid part evaporates."

The Anger of Bees.

"I have already treated of the disposition of bees to use their stings, when irritated, either by direct interference with them, or by the approach of persons to whom they have an antipathy.* Virgil has, in strong terms, noticed their irascibility;—'When once provoked,' says he, 'they set no bounds to their anger, but

Deem life itself to vengeance well resign'd,
Die on the wound, and leave their stings behind.'

"*Fatal consequences* occurring from their wounds, are not often heard of, though such, I believe, have occasionally happened.† Messrs. Kirby and Spence relate an instance of a violent fever being produced

* By *antipathy*, as expressed by Bevan, it simply means, as before remarked in this essay, that the perspirable matter of some individuals is so offensive to bees, that they sting them to drive away the nuisance.

† A man in the town of Hopkinton, Massachusetts, a few years since, was stung on the wing of the nose by a single bee, which produced violent spasms and death, in a few hours. The sting probably punctured a twig of the facial nerve. I was stung on the nose, whilst feeding my bees, which at once produced an almost insupportable pain in the shoulder. A fine cutaneous nerve, in this case, was also pricked. Scarcely a year passes that accounts are not published of the death of horses or cattle, by the overpowering stings of bees.

by the injury they inflicted, and in which the person's recovery was for some time doubtful. Mungo Park also mentions, in his *Travels*, an instance of severe annoyance from them, and states that he lost several asses in Africa, owing to their being attacked by bees. Mr. Talbot, in his *Five Years' Residence in the Canadas*, states, that during the summer of 1820, the Rev. Ralph Leeming, having sent a fine horse to grass at a neighboring farmer's, who kept about twenty stocks of bees, the animal got upon the lawn where the hives were placed, and by accident overturned one of them, the bees of which, attacked him with great virulence. The horse, rearing and kicking from agony, overthrew another hive. Having thus doubled the number of his assailants, his sufferings brought him to the ground, and in less than five minutes from the commencement of the attack, the poor animal was literally stung to death.

“The anger is not confined to man and other large animals; it is sometimes vented upon their own kind, not only in single combat, but in conflicts of organized masses. Cases of the former kind, every observer must have noticed; and of the latter, several cases have been related by Reaumur, Thorley, Knight and others. The engagements witnessed by Thorley, lasted more than two days, and originated in a swarm's attempting to take possession of an already occupied hive. Remarkable

battles of this kind have also been related by other writers." "Whenever the angry excitation is diffused through the whole community, a great accession of heat is produced in the hive. Notwithstanding bees are occasionally animated by a most vindictive spirit, against what they regard as a public enemy, they are not found to display any peculiar hostility in the revenge of a private injury. This is a fact which has been noticed both by Mr. Hunter and Mr. Knight. The former observes also, that bees *never* sting but in the neighborhood of their property, unless hurt; that they never contend with each other for honey, unless it be placed within the boundary of their own right,—but that what they have collected, they defend. The indisposition of bees to attack or be angry at a distance, has been confirmed by Mr. Knight, who says, that though the most irritable of animals near home, he has seen them suffer themselves to be patiently robbed of their loads by other bees, and that he has witnessed this in the same bee three times in succession."

"He says likewise, that if the wasps in a nest have their communication cut off from those that are abroad, the latter, on their return, will not make any attack; but that if one escape from the interior, it evinces a very different temper, and is ready to sacrifice its life to avenge the injury. This Mr.

Knight discovered when a boy, and he has no doubt but that if a similar proceeding were adopted towards bees, they would observe the same conduct."

Language of Bees.

"All creatures that live in society, seem to possess the power of communicating intelligence to one another. 'Brutes,' says Mr. Knight, 'have language to express sentiments of love, of fear, and of anger; yet they seem unable to transmit any impression they have received from external objects. But the language of bees is more extensive: if not a language of ideas, it is something very similar.' This faculty has been very remarkably illustrated by Huber, in his treatise on ants; and the bee exhibits many strong evidences of it. Huber clearly shows that the communications of ants are made through the medium of their antennæ; he has also proved very satisfactorily, that these organs serve the same purpose in bees. Bees receive some kinds of intelligence through the medium of certain sounds, as has been stated in another place. *The antennæ*, in addition to the uses already ascribed to them, may serve to *inform the bees of the state of the atmosphere, and enable them to discern the approach of a change in the weather.*"

"The suddenness and rapidity of their flight towards the apiary, often afford a hint to the ob-

server of their proceedings, that a storm is at hand, of which he received no intimations from any other quarter. 'That bees,' says Dr. Evans, 'can foresee bad weather, is a fact beyond denial; though we know not through the medium of what sense that faculty is exerted. We are often surprised to find, even with a promising appearance of the sky, their labors suddenly cease, and that not a bee stirs out; or, on the contrary, that those which are abroad, hurry home in such crowds, that the door is too small for their admission. But on strictly examining the heavens, we discern some small and distant clouds, which, insensibly collecting, soon after descend in rain.' The doctor likewise says, that an observant friend of his, foretells with confidence that rain will fall in the course of a few hours, when he finds, on a clear summer's morning, that his garden is wholly deserted by his neighbor's bees. In this, he enjoys an advantage over their real owner, the flowers near the apiary being crowded, as usual, by these wary foragers. 'If,' says Mr. Kirby, 'they wander far from home, and do not return till late in the evening, it is a prognostic to be depended upon, that the following day will be fine: but if they remain near their habitations, and are seen frequently going and returning,—although no indications of wet should be discernible, clouds will soon rise and rain come on.'

“Ants are also observed to be excellently gifted

in this respect: though they daily bring out their larvæ to the sun, they are never overtaken by sudden showers."

"It is the opinion of Mr. Knight, that bees are not only capable of communicating intelligence to the members of their own family, but that a friendly intercourse sometimes takes place between neighboring colonies; the cases which he has related in support of this opinion, however, can hardly be said to bear him out in it; for in each of them, after the intercourse had continued for a few days, it terminated in violent hostility." "Such instances, though not of frequent occurrence, have been occasionally noticed by others."

Sleep of Bees.

"It is reasonable to suppose that every part of animated nature needs occasional intervals of repose. That this is the case with the bee, seems evident, from the almost motionless quietude of the workers, which often occurs for fifteen or twenty minutes together, each bee inserting its head and thorax into a cell, where it might be mistaken for dead, were it not for the dilatation of the segments of its abdomen. The drones, while reposing, do not enter the cells, but cluster in the combs, and sometimes remain without stirring a limb, for eighteen or twenty hours."

"Huber says that he has seen twenty workers,

even in the middle of the day, when apparently wearied with exertion, insert half their bodies into the empty cells, and remain there, as if taking a nap, for half an hour or longer ; at night they regularly muster, in a sleep-like silence."

The sun declining, through the murky air,
Home to their hives, the vagrant bands repair,
There in soft slumber, close their willing eyes,
And hush'd in silence, the whole nation lies.

Murphy's Vaniere.

Longevity of Bees.

"The several members of a hive have very different periods of existence. The general law among insects is, that both male and female shall perish soon after sexual union ; a few days or weeks at furthest, according to the time, probably, that the female occupies in maturing and depositing her eggs. By retarding sexual union, the lives of some insects may be very much prolonged ;—even ephemera have been kept alive by this means for seven or eight days. Annual plants, if prevented from seeding, may be rendered biennial. The ancients were very deficient in knowledge upon this subject. Virgil fixes the term of a bee's existence at seven years, having probably copied from Aristotle ; though Aristotle says that bees who live to extreme old age, may reach to nine or ten years. Columella and Pliny have been supposed to regard their exist-

ence as extending to ten years; though the language of the former applies to the existence of the community, and not to individual bees: and provided the hive be never changed, nor the combs renewed, it is not likely that any one family should have its existence prolonged beyond that period; as the accumulation of silken pellicles with which the breeding cells are successively lined, would render them unfit for use in a very few years. In addition to the diminution of the cells by this succession of silken linings, they are also diminished further by the excrement of the larvæ, which is never cleaned out, but confined behind each lining: both together, therefore, soon render the cell unfit for use as brood cells. Mr. Hunter found three of these layers deposited in a single season, and counted upwards in the cells of the old comb; which, upon an average of three a year, would correspond with the period fixed by the ancients; though this observation by no means proves that the hive upon which it was made, or any other, might not have had a much more protracted existence. Mr. Espinasse tells us that he once took a hive which had stood fourteen years, having found it had become weak: it had, nevertheless, sent off a swarm the year previous. There is an instance or two on record, of one family having continued in the same hive for thirty years.

“One of these is mentioned by Reaumur, another

by Mouffet. Thorley speaks of a colony having occupied the same domicil for one hundred and ten years. The spot chosen was under the leads of the study of Ludovicus Vives, in Oxford: the original swarm settled there in 1520, and kept possession till 1630. Query:—may not the bees, when the combs become very old, and the cells much diminished in size, remove them and construct fresh ones? To those who may wish for their own satisfaction to examine the linings of a brood cell, I would observe, that Mr. Hunter's mode of proceeding was, to soak the cell in water, till the linings were swelled, when he had no difficulty in separating and counting them: he found them separate most readily at the bottom, on account of the inclosed excrement.

“To common observers it might appear, that the lives of the bees were coeval with the foundation of the colony, presuming upon all the young bees leaving the parent stock in swarms. But I have already stated that all swarms consist of a mixture of young and old bees; the difference between them is very distinguishable; those of the present year being brown, plump, and clothed with light hairs, whilst the old ones have red hairs, notched and ragged wings, and are paler and more shrunk in their bodies. The cases which I have related, and others of a similar kind, have led to the erroneous opinion that bees are a long lived race. But

this, as Dr. Evans has observed, is just as wise as if a stranger, contemplating a populous city, and personally unacquainted with its inhabitants, should, on paying it a second visit, many years afterwards, and finding it equally populous, imagine that it was peopled by the same individuals, not one of whom might then be alive. "Such strangers are we to the honeyed hive, where, however quickly its generations may have passed away, the same face is presented to the beholder."

"The race and realm from age to age remain,
And time but lengthens, with new links, the chain."

"The usual term of the male's existence, is two or three months only: I say the usual term, for his life is always cut off by violence, when no peculiar circumstances arise to render his existence any longer useful. Such circumstances having arisen, (as has heretofore been observed,) he may be kept alive a much longer period, for a year at least, but how much longer has not as yet been ascertained. Messrs. Kirby and Spence, in like manner, seem to think it not improbable, that when the workers (*females*) become too old to be useful to the community, they are either killed or expelled the society. Reaumur also throws out a hint to the same purpose. The length of a working bee's life has not yet been ascertained: but the general opinion is that it is short lived. Butler says that 'the bee is but little more than a year's bird'; and

some think the period of their existence shorter still. 'The bees of the present year,' says Butler, 'will retain their vigor and youthful appearance till (Gemini) about the 21st of May in the following year, when they begin to decline, and from (Cancer to Leo) June 21st to August 21st, the ground in front of the apiary may be seen strewed with them, some dead, some dying, and a few alive, but incapable of rising again, and by (Libra) 22d September, scarcely an old bee will be left.'"

In closing this small treatise, undertaken with the hope of inducing some interest in the community in favor of a more general attention to a species of domestic economy most strangely neglected, I shall make no apology for appending in this place, a recent correspondence between Dr. Thacher, Mrs. Griffith, and myself, which had its origin in an interrogatory note, addressed to me by the doctor. Some time in January last, the following letters were published in the *New England Farmer*, under the editorial management of Thomas G. Fessenden, Esq. to whom a preparatory note was addressed by the doctor.

THOMAS G. FESSENDEN, ESQ.

DEAR SIR,—Among the whole tribe of insects, no one has, from remote antiquity, arrested the attention of naturalists and philosophical investiga-

tors with deeper interest than the *honey bee*. It will, nevertheless, be conceded that we are yet deficient in our knowledge, in many points, of their true character and peculiar system of economy, nor can our inquiries be fully satisfied, till we can learn to distinguish the precise line between mind and matter, or intelligence and unerring instinct. Having devoted a portion of my latter years to this recondite but pleasing subject, I have found a gratifying resource in a correspondence with intelligent apiarians, distinguished for both theoretical and practical knowledge.

Presuming that the following correspondence will prove interesting, or at least amusing to many of your readers, I present it for insertion in your very valuable vehicle of intelligence, and subscribe myself, very respectfully,

Your obedient servant,

JAMES THACHER.

TO DR. THACHER.

Quarantine Ground, Port of Boston, Aug. 3d, 1830.

DEAR SIR,—By the promptitude of our friend, ROBERT TREAT PAINE, ESQ. who is destined to be the American Astronomer, your note of the 28th July, came to hand yesterday. I am wondering how he could abstract himself long enough from the society of the stars, to interest you with a history of my apiary.

By the nature of your inquiries, I am fearful you suppose me much better acquainted with the natural history of the bee, than I really am, and more philosophical in my investigations, than in the sequel, I may deserve credit for.

Placed, as I am, on a small island, Quarantine, excluded by the nature of hospital duties from all appreciable society, I have actually been obliged to seek rational enjoyment and happiness, in the contemplation of the structure and habits of every insect and creeping thing that happens to make its appearance: the moment my interest was excited, I found that it would never do to depend on such precarious supplies. Believing there was much more to be known of the bee than has been discovered; and, withal, hoping for a supply of *subjects*, I purchased a hive, in Dorchester, in the spring of 1827, at the price of eight dollars. The hive was a pine box, about nine inches deep and fourteen or fifteen inches square. Through the top of this box, was an aperture, perhaps two inches in diameter, over which a second box, precisely like the first, only smaller by several inches, was placed. The servant who went for them said that the lower box, with its contents, weighed forty pounds,—and, therefore, was pronounced by the seller, an excellent hive. In truth I suspect it was a small kingdom, thinly inhabited, suffering from the evils of an exhausted treasury.

Perhaps you may grow weary of this detailed history of one hive ; but in giving you the whole matter at once, there will be no danger of being surfeited by a future repetition of the same story. After being placed on the head of a barrel, in the course of two days they commenced operations by searching all the miserable little flowers that had appeared. It was so apparent that they could not procure food enough, that a piece of old comb was filled with honey, on both sides, and laid in the lower box, between their empty combs and the floor. The attention of the island keeper, who was in the habit of frequently looking at them, by raising the box, was soon excited by observing that the bees had raised the horizontal bit of comb, to an inclined plane, by building a column of wax under one end of it, so that they were enabled with ease, to get at the honey, which, by the way, was old and adhesive, in all the cells on the under side. A larger piece of old comb, charged, with reference to their mechanical skill in raising a great weight, to such a comparative height, was now placed inside, and elevated on a column, as in the first instance, before we were aware of their readiness to commence the undertaking. Whether they took portions of their own empty comb, or pared the foreign piece, to construct the prop, we were not critical to determine. Flowers were now beginning to appear in the garden, where

the hive was conveyed one evening, to a temporary house, about thirty rods from their first locality, on the island. By accident it was discovered, that, instead of returning to the hive, after the labors of the ensuing day, they were clustering together, towards nightfall, on a tuft of grass, nearly on the spot where the barrel stood. We roused them, repeatedly, vainly hoping they would go to the hive, but the effort was unavailing, as they would join the nucleus in a very few minutes. On viewing the live, there appeared to be a respectable number there;—the guard were on their posts, at the entrance;—and on the whole, the usual order and discipline appeared uninterrupted. Where was the queen at this crisis? Was she at the hive, or on the grass:—or had a royal princess escaped from confinement, and were a part of the subjects following her destiny? Fearing a total loss of those on the grass, and soon too, as a heavy mist was falling, the island keeper took a large earthen vessel from the hospital, and waiting till they were comparatively quiet, took them up by handfuls into the pot, and poured them into their domicile. He was stung in only one place, by pressing one betwixt his arm and sleeve. No extraordinary commotion resulted from carrying back the fugitives, nor was there any subsequent excitement or turmoil, within or without, that was extraordinary.

Several times, a heavy piece of comb, charged

with honey, was laid over the hole, which communicated with the upper box, and as readily moved or raised, that it might be searched, as when placed entirely within their habitation.

On the 15th of June, I placed over the aperture, a glass hive, shaped much like an inflated bladder, capable of holding nearly three pecks of grain. It was blown of pure flint glass, very clear and thick. Indeed, it resembles a balloon, more than anything else. Near the top, is a ventilator, like the mouth of a phial, in which a cork is sometimes kept. Suspended from the centre, is an ash rod, three quarters of an inch square, reaching within six inches of the hole, through which the bees pass from the old box. On this, are three cross bars, reaching laterally, within two inches of the glass walls. The globe is not set flat on the top of the old hive: on the contrary, it stands on several little blocks, half an inch high, so that the bees can pass and repass freely, under the edge of the glass, in various directions, towards the walls of the wooden, tight, iron-bound case, which encloses the glass. In the sides of the latter, are doors, through which, at leisure, I can inspect the bees, at all their working points. Standing within a little building, in one corner of the door-yard, which, from the circumstance of having a dome, an arched door-way, and a few pillars, is denominated the *temple of industry*, I have made

such observations, from time to time, as are now presented you.

1. *Of the Industry of the Bee.*—‘ Many hands,’ says the proverb, ‘ make light work :’ this is true in relation to a hive of bees. When my hive, in 1827, had about three thousand,—very little progress was made ; some old comb was repaired, but a very little constructed. They were constantly endeavoring to rear the young—feeding them with all the honey they could procure. Having been presented with some Havana honey, of bad quality, they were fed with it plentifully. Such a seasonable supply enabled them to rear a supply of laborers. In the spring of 1828, although almost destitute of honey, they commenced a small mound of comb, at the side of the hole, on the upper side, within the glass bell. The question at once arose in my mind, whether there were a class of bees, that were architects exclusively ; as it was certain, the season before, no building was done ; but since the addition of new members to the sovereignty, new comb was being constructed, though there was no necessity for it, as there were, to all appearance, empty cells enough to store all the honey that might be collected during the season. I marked those bees, on the head, with a brush, dipped in whitewash, as they were sticking the little pellets of wax together, on the borders of the new comb. By long, and sometimes tiresome observation, I found those ma-

sons kept on the foundation, day after day, and that they labored only a very small part of the time. It would seem that they were sometimes waiting for mortar; and at others, when it was deposited by carriers, close to where it was required, they were in no hurry to use it. Apparently examining the work, two bees would accidentally meet, and were they not interrupted by any order from a superior, would dress each other's limbs, wings, feelers, &c., precisely as cattle in a field will lick each other's head and ears. This is very common: I have seen them dress each other in this way, a whole hour; and I have also seen them quit, instantly, as though commanded, and resume their work. The honey gatherers seem at times to skulk about the hive, as though they were unwilling to go abroad; sometimes, a numerous body of them, wandering over the cells, are suddenly driven out, and the front of the hive presents a very sudden activity. I am induced to suppose they want urging, and perhaps punishment, at times, to complete their task. How is it, that we see an apparently healthy bee dragged out of the hive, dead, occasionally? Are they put to death for refractory conduct?

2. *Government.*—Notwithstanding an extraordinary attention to the construction of the glass, *which magnifies the bees considerably* where it is most convex, I never have discovered the least clue to the mode of government. A peculiar noise,

like the singing of a cricket, is sometimes heard, deep in the centre of the hive, but there are no indications of particular attention, on the part of the bee. Is this made by the Queen? On the whole, I have concluded that it must be by a young one, freeing itself from the cell, and trying its wings. That there is a peculiar discipline, is beyond all manner of doubt. Certain it is, those that gather honey, after they have deposited, are not allowed to taste it. On a rainy day, when all were at home, I often observed them travelling over the pots, looking at one, feeling the depth of another, &c., but the moment they thrust their proboscis towards the honey, as though they were about tasting it, they are oftener driven away, by an invisible something, before succeeding, than otherwise. There are watchmen everywhere, and this I infer from marking them:—finding them a long time near one spot, unengaged, and occasionally sipping the honey fearlessly, as they go their rounds. In the warm season, there has always been a sentry, but more commonly four, at the entrance of the hive. Their heads are inward, while their wings, in the most rapid motion, seem to imply that those inside know they are securely guarded, as long as the humming continues. When they have been forced from their position, many make their appearance; and I have seen them run over the whole front, as though anxious to ascertain the difficulty. As the

cold weather approaches, the guard disappears, as insects and other enemies, attracted by the odor of the honey, are no longer feared. I think the government generally, and certainly all special commands, are first made and propagated by the appropriate officers, by striking the horny tip of the tail on the hive or comb—so that a tremor, differently modified, gives a general as well as instantaneous information, which every bee not only perfectly understands, but quietly obeys.

3. *Contrivance*.—A very large spider got within the glass bell, just as the mound had been commenced. The bees left their work to pursue the common enemy, but did not overtake him, as he succeeded in climbing up the glass much better than they. Having made, *en masse*, a thousand attempts, but falling back before reaching the intruder, they turned their attention to raising a pillar by which they might reach him. In two days the column, of small diameter, was six inches high, so that they could step to the bar, before mentioned, suspended from the centre. Mounting this in astonishing numbers, he was forced to take to the glass again. Being within two inches, though losing their foot-hold and falling to the bottom, constantly, their progress was such as to alarm the spider exceedingly. I watched the approaching conflict with intense interest; when lo! the spider eased himself down on a cord, of his own manufac-

turing, just as the bees were on the point of seizing him. Thus, securely suspended midway, betwixt the central pillar and the side of the glass, on a single thread, perhaps a foot in length, I was obliged to leave him. On the following day, the spider still kept at the end of the rope, though the bees were trying by a variety of schemes to get at him. I wondered they did not fly at him, as there was room enough to use their wings. To my regret, in the course of that day, the spider was missing, and probably despatched in torture.

Turning an arch of wax like an oven over an enemy, and removing the offender, whenever dead, is resorted to occasionally.

4. *Disgorging Honey.*—It is generally admitted, I believe, that the bee swallows the honey, and that it is disgorged into the pot, by some kind of effort. Probably by being mixed with the peculiar secretion of the organ, the quality, if not the quantity of the honey is changed. In fact, this must be the case, as direct experiment shows, by feeding a hive on West India honey. A single bee, might carry from the mouth to the interior two or three teaspoonfuls in a day. Three large coffee saucers have been repeatedly conveyed into the hive in six hours. This very day, (August 3,) by way of ascertaining a point, a tumbler of honey spread on a plate, was taken in two hours by only a small part of the whole swarm.

The contrivance by which the process of disgorging is effected is so simple, and withal so admirable, that it must interest the students of nature. Independent of muscular action, a complete collapse of the sack, takes place—by a pressure, beginning at the fundus, and gradually propagated towards the œsophagus or swallow: this is accomplished by a series of air bags, of irregular shapes, surrounding the reservoir. When the bee desires to deposit the honey, by elevating the wings, and commencing a vermicular motion, that is, a to and fro working of the rings of the body, the air enters the spiracula, distends the air cells, and thus effectually forces the reservoir. I have drawings of those air bags on a scale of two feet, that their shape might be seen and their function understood.

5. *Food.*—My experience leads me to suppose that the bee can extract honey from almost any flower with impunity. An abundance of stramonium grows on this island, which it would be a task to destroy, and on which they undoubtedly feed. I am not conscious that the quality of the honey is injured in the least; all my attempts to feed them on buckwheat flowers have failed: perhaps the salt spray injures the blossoms for their use. Catnip blossoms they delight in: currant blossoms and the flower of a large kind of bean, called by the gardener, English coffee or Windsor bean, are sought for with avidity. From the dandelion they

collect, at this place, the principal part of the material for comb. From the cedar posts, they seem to procure something, of material consequence. The sunflower probably yields a quantity of the yellow dust with which we see them load their thighs. Being rather coarse, they do not seek it, if other flowers abound.

Were I a farmer, I should certainly cultivate a field of catnip solely for the bees, fully believing it gives off in a warm summer, a good deal of saccharine matter, besides imparting a delightful flavor to that with which it is mixed.

6. *The Queen*.—I am in doubt what to say of the queen: perhaps I may have been deceived in supposing her before me; and on the other hand she might have gone in state, without my knowledge. Notwithstanding all that writers say of the queen, I am beginning to be skeptical; in fact, I am much disposed to question the existence of such a ruler. My hive must have exhibited her were she among her subjects. Were it not absolutely rude towards those learned entomologists who have gained such distinction in the world, by unfolding the political condition of the bee hive, I should say the queen was an imaginary despot. I am unwilling at present, to communicate my theory, lest it should be incorrect.*

* That a bee is found in hives, differing in magnitude from other bees, though not invariably, I do not question; but I can-

7. *The Young.*—From a series of examinations, I am led to suppose that an egg is deposited in every cell of honey, throughout the hive; how or why it begins to increase in size, excepting it be by the increased temperature of the air, I will not pretend to say. That the temperature varies, is well known: in some of the coldest days in March and April last, the mercury would rise to summer heat. It is soon known, when the maggot requires material attention. About the last of June, such broad sheets of comb, having a maggot, just discernible, at the bottom, were so conspicuous, that I used to importune gentlemen to witness the process of feeding them. The bee extended its proboscis quite deep, till, as nearly as could be ascertained, the brush, charged probably with its appropriate nourishment, touched its mouth. A slight motion, observable in the worm, was taken to be the evidence of its feeding. The cells, too, were kept most perfectly clean; we judged they were fed about once in twenty-four hours. By the 25th of

not admit that this individual, or any other, possesses such extraordinary power as we have been taught by entomologists. Most of the testimony in favor of this bee's supreme, maternal, dictatorial authority, rests on the assertion of Huber, a man who was *perfectly blind*. The warm imagination of his wife, enabled her to see from time to time, just as he conceived things were in theory! Let any man read Huber attentively, and he will have a wavering faith. Next to that remarkable treatise, his son's book on *Ants*, an unquestionable *Sindbad-sailor* production, rather disposes one to suspect that this wonderful *luc* discovery, is a family characteristic.

July, past, they were generally full grown, and by degrees, emerged from their birth-place to mingle with the others.

8. *Drones*.—I scarcely know what answer to give to your question relative to the drones. I have never witnessed a general massacre: those cruel executions, where two or three are forced from the hives at a time, and stung till they die, have been noticed repeatedly. How do you explain the following account?—Just as the young ones had arrived to a size, that completely filled the cell, they were killed by hundreds. Perhaps a gill, large, white and plump, with folded wings, were drawn out on the lighting board, in one night, last week. This morning, I discovered about thirty more, and perhaps a pint may have been dropped in the vicinity. Just as they had attained a growth which required the unceasing care of their nurses, they have been slain without mercy. Are these young drones? I have fancied they were.

9. *The Moth*.—About two hours before your letter was brought, while examining the mouth of the hive, a bee moth lighted on the edge of a plate, where the bees had been feeding. It was chased one side repeatedly, but not taking the hint, a bee finally seized it by the head and fell with it to the ground. It was stung repeatedly; but when the bee left it, though alive, it appeared

badly injured. A little servant girl standing by, wondering, I suppose, how the conflict could interest me, killed the moth with a stone. An empty long neck bottle, with a little honey at the bottom, placed close to the hive, at night, when the bees are within door, is a capital trap. Though bottles full may be so taken, their number seems undiminished. I am inclined to suspect the odor of the honey collects them, and that they cannot injure the bee in any other way than by stealing his goods, or occasionally dropping an egg in a honey cell. Uncommonly large worms are sometimes dragged out, dead,—which we have supposed to be the moth, killed as soon as its true character is developed.

My hive is now very large, and perfectly full, having never swarmed—whenever they exhibit indications of it, I propose to insert another box, to give them room. In this way, I hope to have a formidable hive. It has been thought that it now contains upwards of two hundred pounds of honey, and so packed with beautiful flakes of pure, white comb, intersected by roads and paths, that every one, unacquainted with the peculiar, instinctive habits of the bee, views it as a great curiosity. The additional convenience now contemplated, is a glass floor, to enable me to look upward, with a light at the top; I hope for some insight into their out-of-sight economy.

Without reference to theories, or, indeed the facts of writers, I have given you the results of my personal observations.

Very respectfully and obediently, yours,

JEROME V. C. SMITH.

TO J. V. C. SMITH, M. D.

Plymouth, Dec. 30, 1830.

DEAR SIR,—The perusal of your interesting observations has afforded me the greatest degree of satisfaction, and for which I beg you will accept of my respectful acknowledgments. The subject of bees has for several years occupied a considerable share of my attention; but for want of a glass hive and a microscope I have been unable to make any particular theoretical discovery, or any new observations respecting their internal economy. I am indeed greatly disappointed, and surprised to learn that with your excellent hive you have not had the pleasure of recognising the queen; such negative evidence however will not shake the general faith so firmly established in her majesty's existence and sovereign dominion. Your queen was undoubtedly in her dignified retirement in the interior of the original hive, while her subjects were in the exercise of their functions in the glass hive.

Some polite ladies have complimented me with the suggestion that the bee fraternity ought to erect a monument of wax to my memory; but I

will cheerfully resign my claim to that honor in favor of your superior merit. I am exceedingly gratified with the history of your 'philosophical apiary,' and hope you will continue to pursue your investigations until you add to our common stock some important improvement in the history and character of our favorite little insects. Your expedient of marking the bees, has, it seems, satisfied you that there is a class which are employed as architects exclusively. But still it may be inquired whether they are preferred, as we prefer the most skilful artists, because they are enabled, by superior ingenuity or by long experience, to execute the work in a manner more advantageous than their compeers in common? I have no idea that insects are endowed with the faculty of improving by experience, or deviating from the routine prescribed for them by their Creator. In regard to your observation that bees are sometimes remiss in their labors, or that coercion is resorted to for the purpose of exciting to industry, it is highly probable that capital punishments are inflicted, and that the dead bodies you have seen thrust out of the hive occasionally are those of the executed criminals. I regret that you were deprived of the pleasure of witnessing the exit of the spider that so audaciously intruded himself into your hive. It may appear strange that bees do not on such occasions make use of their wings which enable them to

dart upon an object with great rapidity. But in the art of war it is prudent to attack an enemy by *regular approaches*, and thus acted the bees towards the spider's fortress. Are then these little insect bodies inspired by a soul, or can matter think? Surely your account of bees elevating pieces of comb by building pillars under them, and their artful conduct towards the spider, similar to the human warrior, are precisely analogous to human intelligence.

I cannot concede to your position that an 'egg is deposited in every cell of honey throughout the hive.' There appears full evidence on examination, and all authorities agree, that specific cells are assigned for the reception of honey, and for the eggs which produce the young brood. But, my friend, you must no longer be skeptical as to the existence of a ruling queen.

I am yours in all sincerity,

JAMES THACHER.

DOCTOR THACHER having presented Doctor SMITH's letter to Mrs. MARY GRIFFITH, of Charlieshope, New Jersey, was favored with the following observations from that accomplished lady.

DR. THACHER.

DEAR SIR,—Many are the fables about bees, but the fact of the existence of the one denom-

inated queen bee is a reality. If anything can be relied on as a certainty in the history of this curious insect—the bee—it is that there is never more than one female in the hive, excepting when a new swarm goes from the hive. One other fact I must mention, which is, that *bees do not sting one another*. Their mode of warfare is to gnaw or bite each other under the wings. This they do either when engaged in a regular battle in the air, which sometimes occurs, or when they act on the defensive at the door of their hives. I never saw one bee sting another, but I have known them to thrust out their sting when in the agonies of death by smothering; their sting, thus thrown out in madness, will sometimes lodge in the body of another bee, but I am sure that they do not inflict wounds with their sting. By gnawing their enemy under the wing, they disable him from fighting and from entering the hive. They destroy all the drones in this way. I have seen two and three bees at a time gnawing under the wings of one drone; hundreds of drones may be seen crawling on the ground unable to fly; of course they soon perish. I shall send you by the first opportunity a queen bee, and will send one to your friend Dr. SMITH also, as I have four of them in good preservation.

[MRS. GRIFFITH'S second letter.]

TO DR. THACHER.

DEAR SIR,—You tell me to answer your questions at my leisure ; nothing but very pressing business, which I cannot plead at present, ought to prevent me from replying to your letter immediately. It would not be becoming in me, to show less zeal in a pursuit which is as interesting to me as to you. The four queen bees were obtained, when dead, from four smothered swarms. If any of your neighbors smother their bees, you can gather up all the dead bodies carefully, and spread them out on a large table, and on close search you will find the queen ; she is the largest and lightest colored bee in the swarm, with shorter wings and proboscis than the rest. She can never be mistaken in summer for a drone, for he is a larger, heavy made, thick insect, even darker than a working bee, with wings covering its whole body ; and she cannot be taken for a drone in *winter*, for not a *single* drone escapes the general massacre of August and September. Many are the swarms that I have examined, but I never yet saw a drone after September. They are not suffered to live an instant after the vivification of the last deposition of eggs, and they only make their appearance in the spring, at the precise time when they are wanted to hatch the newly laid eggs. You say that I have suggested a new idea respecting the mode of warfare among bees, and you add

that if my suggestions be true, what becomes of HUBER's testimony to the contrary?*

My dear sir, how frequently must you have seen theory after theory crumble away, and others of dissimilar character occupy their place. In medicine—you are a medical man—from *Hippocrates* down to our Dr. RUSH, who was the last system-monger, how has each theory prevailed for a time! Huber was undoubtedly an honest man, but he was nearly blind, and when we know how much depends on clear vision, we cannot, or rather ought not, to receive all that he says as correct truth. It is true that his secretary, FRANCIS BURMEN, acted for him, but it would indeed be marvellous if this assistant were as deeply interested, of as strict integrity, and as well qualified by genius and talent to investigate so minute, perplexing and difficult a history as HUBER was himself. No stain therefore should rest on the fame of a naturalist so deserving of our respect and admiration. AS TO FRANCIS BURMEN,

* Huber asserts, that being desirous of witnessing the scene of carnage, he placed six hives on a glass table, and placed himself and assistant beneath it. On the 4th of July, the working bees actually massacred the males in the whole six hives, at the same hour and with the same peculiarities. The glass table was covered with bees full of animation, which flew on the drones, seized them by the antennæ, the wings and limbs, and after having dragged them about, they killed the unfortunate victims by repeated stings directed between the rings of the belly. The moment that their formidable weapon touched them, was the last of their existence; they stretched themselves out and expired.

I would not accuse him of wilful misrepresentation ; he only reported to Huber what he thought he saw. He had some knowledge of the ‘doctrine of consequences.’ Bees have stings ; when annoyed by an animal, they sting it ; consequently when enraged by one another, they revenge themselves by inflicting a mortal wound with their stings ; so reasoned FRANCIS BURMEN and a host of others. This admitted of further proof, if the shadow of a doubt ever passed over their minds, by the circumstance of the curving of the body of the bee when engaged in fight. The fact is, when we consider the length and weight of the lower part of the body compared with the upper part, we shall perceive that this curve is unavoidable ; it is a natural contraction of muscles, and it occurs whenever the mind is agitated. I have an excellent microscope, and from long practice I can manage it adroitly ; but on the closest examination, I have never yet seen a hole in the dead body of a vanquished bee. If bees sting one another, why do they not sting the drones ? I have sat for hours during their massacre, for the purpose of ascertaining this fact ; but although my eye was within two feet of the platform, I am certain that *no sting ever was protruded*. It was really an arduous task to kill a large drone. It sometimes required two or three bees to disable him. The drones have no sting, there was no fear therefore of their acting offensively, and their death would

only occupy a moment of time, by means of a sting. Even when a battle takes place in the air, the bees never use their sting. I have, when upwards of 20,000 of the slain have laid on the ground, seen as many as a dozen bees attached to each other by means of their stings, and during the agonies of death, by smothering, I have frequently seen the bees with disrupted entrails in consequence of their inability to extract their sting. But in both these cases the natural instinct of the insect was gone. In the first case these few, when they were brought down to the ground by their adversary, and were maddened by rage and pain, were no longer under the control of their instinct. It is what is understood by running a muck, using a deadly instrument indiscriminately without any preconcerted, or definite plan. And in the case of smothered bees, I have more frequently seen their stings attached to the lumps of melted brimstone and earth than to one another. I wish I could satisfy myself equally well as to the use of the farina or bee-bread; for the bee-bread, you know, is nothing more than layers of little pellets, well packed down in the cells by the bees. These pellets are put in the cells exactly as they are taken from the flowers, showing when the cell is opened all the different shades of yellow which the pellets exhibited on the thighs of the bees, and only acquiring that uniformity of color, and bitter, acrid, offensive taste by heat and age. I am as ig-

norant at this moment for what purpose this bee-bread is brought into the hive, as I was when I first commenced the investigation. The *maggots* are not fed with it, *that* is certain; and it is quite as certain that it does not enter into the composition of wax. The nearest *guess* that I can make towards the truth is, that it is the principal ingredient of propolis, or bee-glue, which you know is distinct in its nature and properties from wax.*

As to wax, I consider it as a secretion. I have had no means of ascertaining whether it be voluntarily raised from the stomach, or from any other viscus or organ. Wherever it may be elaborated, its first appearance as *wax*, is from the mouth. If

* I readily concede to the position of Mrs. G., that farina or bee-bread is not designed as food for the young brood, nor is it an ingredient in the composition of wax, as formerly supposed. But that it *is* of important use in their economy is unquestionable; it is undoubtedly eaten by the bees, and it has been asserted by some writer, that a hive of bees, however amply supplied with honey, cannot subsist through the winter without a store of bee-bread. It is apparent to every observer, that these insects are employed from the latter part of March, to late in October, in collecting pollen as well as honey, and storing it in their hives to a very considerable amount. One writer has asserted that there has been found in a single hive the extraordinary quantity of one hundred pounds.† From this fact it may be concluded that farina is not intended for the formation of propolis, of which a few ounces will suffice all the purposes of a hive; farina moreover possesses no agglutinant property, which is essential in the formation of bee-glue.

It may be noticed, as proof that bees eat bee-bread, that, in the spring, especially, numerous yellow spots are observed on the floor-board and about the hive, having the appearance of farina evacuated by the bees. J. T.

† Mease's edition of Willich's Encyclopedia, article Bee-bread.

Dr. SMITH have any cause to value my opinions, he can soon satisfy himself of this truth. For although he cannot gain much *consecutive* knowledge by watching the operations of the bees through a glass hive, these insects being very impatient of such inspection, yet for a second or two he can see enough to convince him that wax is a visceral secretion, and not an exudation from the pores of the body, as some authors imagine. I would not hurt Dr. SMITH's feelings, by showing what little knowledge I possess when it goes to prove him in error. But of what use is my experience, or any experience, if it is not to benefit others? The very mistakes that he has made, show so much minute attention, and his remarks are so sensible, that I foresee you will find in him an able coadjutor. It will not pain him, I am sure, to be told that he has started wrong. When a glass door is suddenly opened, the glare of light surprises the bees; they become confused and run about without any apparent object. I must except those who are employed in building comb, they are generally less affected by external interruption than the other workers. Those bees, too, which come in loaded with pellets of bee-bread, will generally move forward and deposit their load, but there is soon a general disturbance, and many false conclusions must be drawn from their mode of proceeding.

What Dr. SMITH says of dressing or cleaning

one another is true ; when a bee comes in 'travel-soiled,' one or more bees immediately surround him, relieve him of his pellet or honey, and then nibble at him as it were from head to tail, and when they release him, he is as fresh and vigorous as ever. What the Doctor suggests about punishments is true enough. The bees which he has seen dragged out, apparently in full health, were intruders, or they were disabled in some way or other. If a bee droop on his return from an excursion, and is not invigorated after being ministered to, he is immediately destroyed. They do not allow a crippled or sick bee to remain an *instant* in the hive ; there cannot be an idler among them ; even those who are apparently idle at the entrance, or on the side of the hive, have some part of the policy assigned them. The noises which are made by the rapid motion of their wings is for some purpose ; certainly ; when the motion of the wings occurs at the door of the hive, it is to serve as ventilation.

I am yours, very respectfully,

M. GRIFFITH.

BEES.

The Editor of the Windsor, Vt. Chronicle, after copying Dr. Smith's article on bees from a late New England Farmer, has added the following remarks :

Dr. Smith doubts the existence of the queen bee. Now we have never *heard* a bee promulgating laws

or appointing subordinate officers, &c. but we have seen what may perhaps be worth telling of.

There was an empty hive at the north end of the bee house, intended for the next swarm. From the hive next south, a swarm had issued, and after flying about for a while, returned. The reason assigned by the owner was, that the queen was unable to fly. A day or two after, the swarm came out again and soon began to return as before. It occurred to us, that possibly her majesty, in attempting to fly, might have fallen to the ground. Stepping in front of the hive, we saw, six or eight feet from its mouth, some twenty bees, flying about near a tuft of grass; and on drawing nearer we saw perched upon a blade of grass, a bee, about as long as a drone, but much more slender,—the back of a brighter black, and the legs reddish,—evidently neither a drone nor a working bee. A stick being presented to this singular insect, she crept upon it, and was carried upon it to the mouth of the empty hive before mentioned. A few bees had alighted at its mouth. These immediately followed her into the hive. Some of them soon returned, and ran, evidently as fast as they were able, to the old hive, the stool and front of which were covered with the returning swarm. Having arrived among these, the messengers, for such they appeared to be, would occasionally stop, and shake themselves violently, swinging or rather

rocking themselves from right to left and the contrary, as they are sometimes seen to do at and about the time of swarming. This motion was invariably followed by a general scampering of the surrounding bees to the hive. Some of these messengers entered the old hive, where their operations were out of sight; but their entrance was soon followed by the pouring out of multitudes, who made their way with all possible speed to the new hive. In a few moments the odd looking bee, picked up on the grass, was surrounded with a respectable swarm, all was quiet, the usual labors of bees commenced, and in the end, a good summer's work of honey-making was done.—This, and having seen a number of bees of the same appearance, but never more than one in a hive, is all we know by our own eyes, about a *queen* among bees.

Having now completed the design in view when this manuscript was commenced, I cannot leave it without remarking, that my heresy in relation to the queen bee, has been a prolific source of vexation to me; and yet, in no instance have I positively denied her existence, though I believe no department of natural history was ever more

shackled with inexcusable errors. A course of experiments of the most satisfactory and convincing kind, are now in progress, the results of which will be published as soon as I have brought them to a close. I wish also, in this place, to acknowledge my indebtedness to Mrs. Griffith of New Jersey, for a bee, forwarded to Boston through the post-office, which she assures me, not in words, but in the exhibition of the insect itself, is a *queen*.

APPENDIX.



DR. THACHER'S HIVE.

Fig. 1.

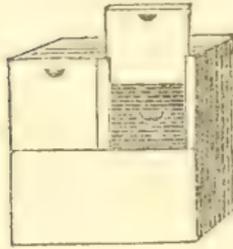


Fig. 1. This is a view in outline of a very valuable hive. The box is to be from one foot to twenty inches square. A back view, as presented in the above diagram, shows that there is a horizontal floor passing through the middle, dividing it into two equal apartments. In the lower, are cross bars for suspending the comb, as common to all hives. In the upper room, are two drawers, side by side, as represented, just filling the whole space. Through the bottom of these drawers, are small orifices, corresponding with two others through the horizontal flooring. Thus, it will be clearly understood, when the drawers are entirely in, the holes will correspond, so that the bees can run freely from the lower to the upper

apartments or drawers. At the outside extremity of the drawers, (the one in sight,) a pane of glass is grooved in, through which it can be ascertained what state of forwardness the deposition of honey is in. Outside of that, on a line with the box, is a slide door, represented, on the left side, as raised up, the object of which is to close it, for the exclusion of light. When the drawer is drawn out, a slip of tin is slid over the lower opening, to keep the bees below. First one drawer, then the other may be taken out, alternating, according to circumstances.

Fig. 2.

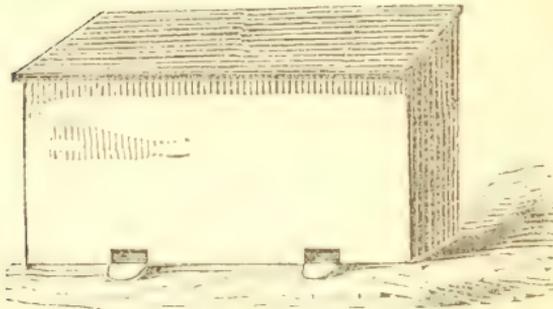


Fig. 2. This is a front view of the doctor's bee-house, —being made large enough to hold two hives, as will be noticed by the two lighting boards: no particular description is necessary, as its shape can be recognized. The door-way in the house should exactly correspond with the door-way of the hive, which is put in at the back side.

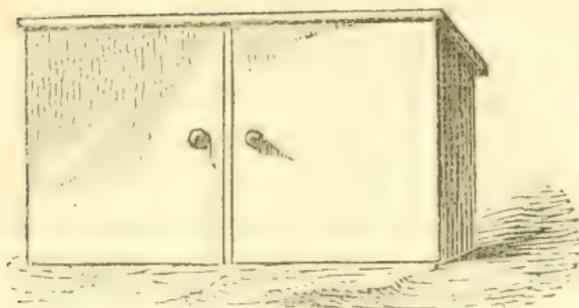
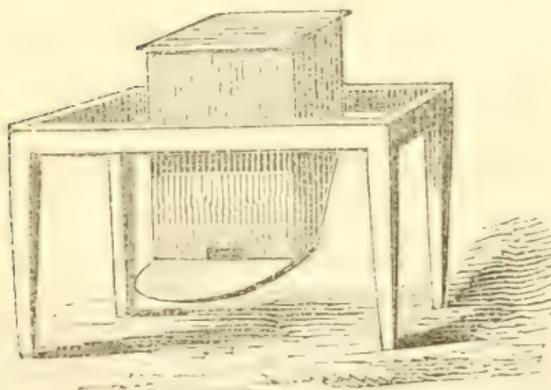
Fig. 3.

Fig. 3. The back view of the same house presents folding doors, which open for receiving and removing the hives. Trunk handles, on the ends are very important in carrying the whole from place to place.

MRS. GRIFFITH'S HIVE.



This is Mrs. Griffith's invention. A frame work, like the skeleton of a table, receives a hive, shaped

like the drawing. The floor, seen to project in front for a lighting board, is hung on the back side by hinges, and held up in place, by hooks. If the hooks are off duty, the floor, of course, falls down. From the floor, up to the frame, there is one large, wedged shaped room: at this level is a horizontal floor, perforated by several small holes. The top of the hive, that part which is seen projecting above the frame, is a cap, to be taken off.

In the lower apartment, the kitchen of the hive, the bees do their principal work, but pass upward through the little holes, into the cap, when there is no more room below. Cups, tumblers, &c. turned over these orifices, will be filled with honey, precisely as the drawers are filled in the Thacher hive. The advantages then, contemplated in this hive, are the additional ones of ventilation, by dropping the floor in hot weather, and at the same time being enabled to take the honey.

I am free to say that the more I examine this hive, the better I like it.*

Description of the Frontispiece.

This is a gothic edifice which has a beautiful appearance in a yard or grove, when neatly made. As remarked in the text, it should stand on a single pillar. Its

* Since making a free remark on the structure of hives, page 41, I have been informed that Mr. E. Beard, of Brighton, whose preparations for the successful culture of the bee, deserves the commendation and encouragement of the community, has offered a patent hive, of his own invention, that meets the approbation of experienced apiarians. I have not yet been so fortunate as to see it, but am disposed to believe what is said of it.

dimensions, being constructed for holding only one hive, and that a glass one, (represented in this instance with the case off,) are as follows, viz: Breadth of the floor, four feet six inches; height of the walls, between floors, four feet ten inches. The breadth of the arches, four in number, between the towers, four also in number, must depend on the taste of the architect. A curtain, on pulleys, like a common window curtain, is to be suspended at each arch, in order to close up the hive in stormy weather, or when the bees are inspected, in order to guard the observers.

Description of the Bee-house on page 24.

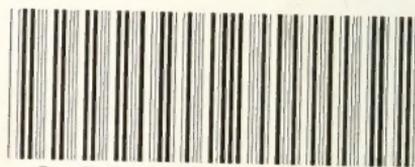
This is a plan of an ornamental bee-house. The proportions, when made by a skilful workman, are very fine indeed. Its diameter, (being round,) should be four feet six inches; height of the pillars, four feet eight inches, by six inches diameter, at the base. The dome is easily made of sheet lead, over rough boards; the pillar on which it stands, should be about three feet out of the ground.

For the most perfect and beautiful specimen of an ornamental Bee-house, in the form of a prostyle temple, either in Boston or its vicinity, I can with confidence refer gen-

temen to one erected at the country seat of Charles Tappan, Esq. at Brookline. The dome, covered with sheet lead, is supported on eight pillars. It was made by Mr. Benjamin Turner, an ingenious workman in Harvard Place, opposite the Old South Church, Boston.



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