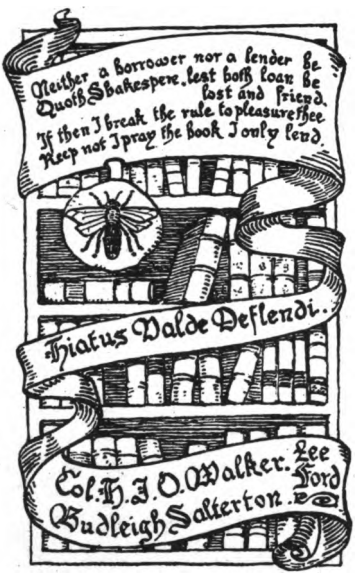
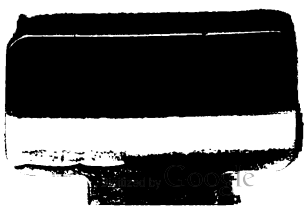

Neither a borrower nor a lender be
Quoth Shakespere. least both loan be
lost and friend.
If then I break the rule to pleasure thee
Keep not I pray the book I only lend.
Hiatus Valde Deflendi.
Col. H. J. O. Walker. Lee
Budleigh Salterton. Ford



HINTS ON THE

HISTORY AND MANAGEMENT

OF THE

HONEY BEE;

BEING THE SUBSTANCE OF TWO LECTURES

READ BEFORE THE MEMBERS OF THE HEREFORD LITERARY, PHILOSOPHICAL, AND ANTIQUARIAN INSTITUTION, IN THE WINTER OF 1850—51,

BY

EDWARD BEVAN, M.D.

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MDCCCLI.

This Lecture elicited so much approbation as to induce the Author to have a few copies printed, for the amusement and instruction of those who may feel an interest in the subject.

HISTORY AND MANAGEMENT

OF THE

HONEY BEE.

Dr. BEVAN (the author of a well-known and admirable manual for apiarians) took as the theme of his paper the

HISTORY OF THE HONEY-BEE.

The learned gentleman began by saying,—Mr. President, Ladies, and Gentlemen—You have before you a very old man, but a very young lecturer; so young that this is the first time in my life that I ever was induced to address a public assembly. Nor might I have summoned courage enough to do so now, but for the very powerful appeal which was made to us all by our worthy President in his inaugural address, wherein, after the manner of the immortal Nelson, he admonished us that every member of this Society is expected to do his duty—that is to say, that individual attainments should be thrown into a common stock, from which each might draw, and to which each might contribute, with reciprocal benefit. In obedience to this admonition, and in furtherance of its laudable object, I now proceed to throw in my mite of information.—The subject to which I have the honor and the pleasure to bespeak your attention this evening is the history and management of that indefatigable little insect the honey bee. But it is a subject on which I hardly know how to

address such an assembly, owing to the various degrees of information which must needs be distributed among you. Some of you I imagine to have a very limited acquaintance with bees, for the majority of those with whom I have conversed in other places respecting them have had their whole knowledge comprised in being simply aware that they can sting and gather honey. To such of my auditors, if any such there be, it would seem right that I should commence with the A B C of the subject, even at the risk of proving tiresome to those who are more extensively informed; and some there are here present, I have no doubt, who know as much about the matter as I do, perhaps more. From such I can only bespeak indulgence. Of all the various members of the insect race, there is none which so abounds with useful lessons, or is more fraught with wonder, than the honey bee. From the earliest ages it is found to have occupied the thoughts and the pens of the philosopher, the poet, and the moralist; and whether we consider its instincts, or its contributions to our comfort and convenience, there is scarcely one that can compete with it. In testimony of the early notice which it attracted, we have the evidence of Holy Writ, from which it may fairly be inferrred that honey must have been one of man's earliest luxuries; and considering the extent of Solomon's knowledge of natural history, I find it difficult to believe that the bee was not one of the creatures which he had in his mind when writing the 30th chapter of Proverbs, in which he says, "there are four things that are little upon the earth, but exceeding wise," viz., ants, *conies*, locusts, and spiders. Unaided by an acquaintance with the Hebrew language, I had hoped to ascertain from some competent Hebrew scholar that the word which was translated conies or rabbits might prove to be an error of some Jewish scribe, and that the word ought to have been translated bees—that, in fact, Solomon meant to designate four insects, not three insects and a rabbit; for the rabbit is not very little, nor a builder of houses in the rocks, neither is it, so far as I know, celebrated for any especial wisdom, whereas the bee not only answers to all these conditions, but has ever stood pre-eminent among insects. The notion which I had formed upon this subject was still farther strengthened by finding that the word which had been translated conies in the generally-received version of the Scriptures was not so rendered in every version of them. This, at any rate, betokened some degree of uncertainty upon the subject, even among the translators of Scripture. In this my difficulty I referred to two eminent Hebrew

scholars for enlightenment. They at once decided that, if the word had been rendered bees, it would have been mistranslated. Still they could neither of them affirm conies to be the correct translation. Having thus unsuccessfully endeavoured to vindicate the wisdom of Solomon, I must leave the matter in the state of uncertainty in which I found it, still claiming, however, for my favourite insect that high position which it will, I am sure, be found richly to deserve, not only as a model of industry, sagacity, and loyalty, but as affording, under good management, an interesting and rational amusement to the man of leisure, as well as a source of profit to the humble cottager, wherever located, for, so universally accommodating is the bee in its habits, that under the fostering care of man it has been found to flourish in every clime to which it has been introduced. Since the period to which I have just referred, viz., between three and four thousand years ago, the bee seems never to have ceased to occupy attention more or less, and through the observations of a succession of naturalists, which their pens have recorded, books enough have been written on apiarian matters to form a goodly library in themselves. I have adverted to the profit which may be derived from a judicious management of bees: I will relate to you an anecdote in illustration of it, which I could wish may be generally circulated among our rural population, not excepting even our rural clergy; for even in this land of Goshen I fear there are but too many of our working clergy to whom the anecdote may be well worthy of attention. A good old French bishop, in paying his annual visit to his clergy, was very much afflicted by the representations they made of their extreme poverty, which indeed the appearance of their houses and families corroborated. Whilst he was deploring the sad state of things which had reduced them to such a condition, he arrived at the house of a curate who, living amongst a poorer set of parishioners than any he had yet visited, would, he feared, be in a still more woful plight than the others. Contrary, however, to his expectations, he found appearances very much improved. Everything about the house wore the aspect of comfort and plenty. The good bishop was amazed. "How is this, my friend," said he, "you are the first pastor I have met with a cheerful face and a plentiful board! Have you any income independent of your cure?" "Yes, sir," said the curate, "I have: my family would starve on the pittance I receive from the poor people that I instruct. If you will walk with me into the garden, I will show you the *stock* that yields me such ex-

cellent interest." On going to the garden, he showed the bishop a long range of bee-hives. "There," said he, "is the bank from which I draw an annual dividend, and it is one that never stops payment." His harvest of honey enabled him to reduce materially his consumption of sugar, and also to send a considerable quantity to market; of the coarser portions he made a tolerable substitute for malt liquor, and the sale of his wax nearly paid his shoemaker's bill! Ever since this memorable visit, when any of the clergy complained to the bishop of poverty, he would say to them "Keep bees! keep bees!" So say I.

I shall now proceed to call your attention to the several members which form the bee community, and to some points in their wonderful economy. Every family of bees, when fully constituted, comprises a queen, several thousands of labourers, and several hundreds of drones. It is usual for naturalists, in giving an account of these insects, to commence with the Queen; but I, though a very loyal subject, shall give precedence to the labouring population, as constituting by far the most numerous portion of the family, and as being the most continuously and actively employed. These are the bees on which Dr. Watts so beautifully fixed the attention of childhood, as "the little busy bees." They are emphatically called the working bees, and most properly, for they are true workers, employing nearly the whole of their time in fine weather in the collection and storing of provisions: much of it is also devoted to the construction of the waxen cells, in which their stores are deposited and the young bees reared. To each of these offices it has been generally considered that certain bees are duly appointed, and that thus the business of the hive is, by a regular division of labour, judiciously carried on. Shakspere seems to have had a glimpse of this regular mode of proceeding in the bee-hive, for he speaks of bees being creatures that teach the art of order to a peopled kingdom, of their having officers of sorts, some of them as building roofs of gold, while others make boot upon the summer's velvet buds. The whole of his description is very beautiful, and, so far as I have quoted from him, I believe correct; the rest is mere poetical fancy. By some it has been conceived that there is an original difference in the bees, according to the duties they are destined to fulfil; but it appears more probable that all are born with equal capabilities, and that whatever difference may be observable in adult bees arises from causes connected with their occupations. To these it is

that the poets and moralists have applied the terms, the busy bee, the industrious bee, the provident bee, the skilful bee; and most truly do they deserve every one of those titles.

I hope the senior members of this assembly will bear with me while I address a few words to the younger portion of my auditors. I shall do so in the form of a letter which I once addressed to a young lady with a present of honey. I should premise, though, that she was a *very* young lady, lest you should conceive that I am about to read to you one of my old love-letters. It ran thus:—

"My dear young friend,—I dare say you have heard it said that things are great or small by comparison; this true saying is highly applicable on the present occasion. To you the accompanying pot of honey may seem to be a small pittance: to the industrious little insects by whom it was harvested it would have seemed to be a large treasure. By you, I dare say, it could be very comfortably disposed of at *half-a-dozen meals:* it would serve to maintain a hundred bees for *twice as many months!* Think how many flowers a bee must have visited to collect it, the trouble she must have had in constructing combs to receive it, how many journeys she must have made to import it, the pains she must afterwards have taken to secure it from being injured by exposure to the air, as well as from the depredations of wasps, moths, and other plunderers. I do not call your attention to these things for the purpose of enhancing or magnifying my little present in your eyes, but because they form a few among the many wonders of creation, with which we are so familiar that we are apt to pass them by without being duly impressed by them. How few are there, for instance, who, when partaking of their daily food, ever think of the numerous heads and hands that have been occupied in producing it, their anxious thoughts and laborious toils—to use a homely expression, that consider how the bread comes into their mouths! But I have said enough, I trust, to set you a thinking, to call into exercise that best gift of God to man, his reasoning faculty, and feel confident that you will not be addressed in vain by your very sincere friend." (Applause.)

I have told you that the working bees form the most numerous portion of the community; indeed for eight months of the year they and the queen constitute the whole; and in the height of the season every family numbers from twelve to twenty thousand, or more, but in

winter they become very much diminished, owing to the natural shortness of their lives, which only extend to from six to eight months. The bees that are so rapidly bred in spring, as to render swarming or additional room necessary, finish their career about the commencement of winter: on those alone that are bred in smaller numbers, in autumn, devolves the business of the hive till the following spring, in the course of which they also become defunct. Hence the very great disproportion observable in the number of all such families at different seasons of the year.

I shall now advert to a few of the most interesting parts in the anatomy of the bee. In common with other insects, it has been divided into the head, the trunk, and the abdomen, or hinder part. The head is furnished with two eyes, two antennæ, or horns, as they are sometimes called, two feelers, and a proboscis, this latter comprising an intricate apparatus of which I shall speak presently. To the trunk are attached a double pair of gauze-like wings and six legs, the thighs of the hinder pair being each furnished with a small cavity fringed with hair, which serves as a basket for the conveyance of food for the young, &c. The hinder part contains the bowels, the honey-bag, the venom-bag, &c., and at its extremity a concealed sting, to which, as also to the proboscis, I have now to bespeak your attention, on account of their peculiar structure and uses. The proboscis has attached to it a very long tongue; it is also provided with several joints; by both these contrivances it is rendered capable of every variety of motion, and of probing to the very bottom of most flowers when searching for honey. And here we may pause to contemplate the very admirable contrivance by which this long implement, the tongue, which would otherwise have proved highly incommodious, is preserved from injury. The joints of which I have spoken enable it to fold itself up when at rest, and the desired protection is still further accomplished by means of a double sheath, in which the tongue, when unemployed, is always enclosed. There is much to excite our admiration in the manner in which the bees collect whatever they are in need of. Their first occupation in the earliest days of spring, as soon as breeding commences, is to collect the fertilising dust of flowers, known by the name of pollen or farina, and, as soon as they afford it, to procure honey from them; the latter chiefly for themselves, the former chiefly for their nurslings. I have often seen them, after rolling upon the anther-dust of the flowers, which their fine hairs enable them to retain upon

their bodies, return home thus enveloped, having the appearance of a different kind of bee. This coating of pollen they brush off with their downy legs, or their companions do it for them, and apply it to the general purposes of the hive. Their ordinary mode of proceeding is to collect it into little heaps or pellets, and to transport it upon their thighs to their companions in the hive. That which is not wanted for present use is kneaded down with a little honey and stored in the cells, in which state it is called bee-bread.

The bees collect also another substance called propolis, of a resinous nature. This is collected from certain trees, to fasten the combs to the roof of the hives, to varnish and strengthen the cell-work, and to stop up the crannies of the hive. This substance is used as soon as collected, while it is soft, none of it being stored, for its collectors are well aware that in a short time it would become so hard as to lose its ductility.

In the generality of seasons the bees obtain their principal stores of honey from the flowers of the fields, but they also, in some seasons, collect it much more abundantly from the leaves of several sorts of trees, on which it is deposited in the form of honey-dew, a very sweet substance which, having been sucked from the aforesaid leaves by an insect called the aphis or tree-louse, passes through its body nearly unchanged, covers those leaves which are beneath, and thus affords a delicious repast to bees, butterflies, and other insects. The bees collect this food by means of the long tongue which I have described to you, and which acts as a sort of brush, so that bees may be said rather to lap their food than to suck it. By the repeated action of this brush-like contrivance, they gradually conduct the sweet juices into their mouths, from whence they pass into their honey-bag, and when this is filled, they carry home the cargo, regurgitate it, and deposit it in those cells which, either by themselves or their companions, have been previously prepared to receive it. They are then quickly in the fields again in quest of a fresh supply. Thus, throughout the spring, summer, and autumn, whenever the weather is favourable, and even in unfavourable weather, if they are much in want of food or other materials, to use the language of the poet, the bees are to be seen,

"Gathering honey from every opening flower."

The quantity which they collect in this way is often surprising, considering how small a portion is imported on

each excursion. I have just stated that, with the exception of those seasons when honey-dews abound, the principal resources of the bees are the flowers of the fields, chiefly those of the white clover,—a plant which is found upon most pasture lands, but none are more luxuriantly clothed with it than the meadows of this county. Hence the excellent pasturage they afford for sheep as well as for bees; thus corroborating a very ancient opinion, that the finest honey is collected in districts which yield the finest wool and the finest wheat; these productions comprehending two of the five w's for which Herefordshire has been long so justly celebrated, viz., wheat, wool, wood, water, and women! How worthy the latter are of this pre-eminence I have abundant evidence around me!

Having explained to you the mechanism and functions of the proboscis, I now proceed to describe those of the sting, which are no less worthy of admiration for the perfection with which that organ is formed, and by which it accomplishes its various purposes. It consists of a couple of darts, enclosed in a sheath; but the darts and sheath are so very minute that the separate parts are not distinguishable by the naked eye. That part called the sheath, though appearing to be a single tube, is divided into several portions, each of which is capable of being received by the one above it, like the pieces of a telescope, so that it can be lengthened or shortened at pleasure. The beauty and utility of this latter part of its organisation will be still more evident when I come to speak of the Queen. In some other insects this apparatus serves not only the purpose of a sting, but also that of a saw or a gimlet, to pierce a passage through wood or other materials. When the insect stings, the sheath is the first part that penetrates the skin, but it is instantly followed by the darts, not simultaneously, but first one and then the other, and with the rapidity of lightning; by which means, as each dart is provided with a barb, it can lay firmer hold, and penetrate deeper into the flesh. When at its full depth, a poisonous liquor, which is always ready prepared at its root in the venom bag, is forced down the sheath into the wound, causing that sharp pain, inflammation, and swelling which *usually* ensue. I say *usually* ensue, for in some peculiar habits, as I have known, in several instances, no apparent inconvenience is produced by a sting, not even so much as would be caused by the prick of a needle; owing to the exquisitely superior fineness of the former. I once had an opportunity of having this confirmed in a remarkable manner by a respectable

Kentish farmer, who put it to the test upon one of his female servants. She was boasting one day of her flesh being poison proof, and saying she did not mind the sting of a bee or a wasp—not she, for they never did her any damage, and that she should not mind letting any one inflict any number of stings upon her at a penny a piece! Her incredulous master accepted the challenge, and "Verily," said he, "I took six penny worth of stinging out of her, without causing her to flinch in the least, or apparently to suffer the very slightest uneasiness, or any subsequent inconvenience!" This, however, is an impunity which very few are endowed with, for in general the pain inflicted by a sting is very severe, not only at the moment, but, where timely remedies have not been applied, of considerable duration, ending often in much tumour and inflammation, and in some instances, where the stings have been numerous, fatal consequences have ensued. Whenever an attack is made by a bee, the person aimed at should walk quietly away to the nearest bush or other shelter. If he start or suffer himself to be ruffled, he is much more likely to be stung; and even if he were stung, in such a comparatively quiescent state, so much the smaller would be the injury received, a calm deportment enabling the bee to withdraw the sting by her own efforts, by clenching the barbs round its shafts, these forming the only obstacles to its withdrawal. If it be left behind in the wound, the best treatment is quickly to extract it with a pair of tweezers, and in any case to apply promptly a little spirit of hartshorn, or any other alkaline liquor that will penetrate the wound; the venom inserted, being evidently an acid, is neutralised by an alkali, and rendered comparatively harmless; but everything depends upon its prompt application. From what I have stated to be the most effectual remedy for the sting of a bee, it may be inferred that those who are stung with impunity are very good tempered, for if they had any sourness in their composition they would have no such exemption from suffering when stung! Considering, therefore, how very important good temper is to connubial felicity, may it not be prudent for persons prior to betrothment to submit each other to the test of the bee's sting, when perhaps the amount of good temper possessed might be ascertained by the extent of the suffering inflicted? Should such a test be found upon trial to be depended upon, what persevering efforts would it not infallibly induce in the cultivation of good temper, and to what an incalculable degree would it contribute to the promotion of social harmony! And how delightful it

would be to find that, in addition to their well known importance in other respects, we had made of the hivites a virtuous nation.

I have now to introduce to your notice another highly interesting and important member of the bee community—one that is generally considered to rank above all the rest, and hence the following couplet has been applied to her:—

> "First of the throng, and foremost of the whole
> One stands confest the sovereign and the soul."

She is usually designated by the name of queen; and as she suffers no rival near her throne, she may be regarded as an absolute queen. She varies considerably in her appearance from the working bees, still more so in her functions. She is both larger and longer than the workers; their relative proportions are very fairly given in the plate upon the table; from which you will perceive that, though the queen's body is longer than that of a worker, her wings are about the same length, so that they fall considerably short of covering her body. Her movements are more slow and graceful than those of the workers. The under parts of her body are of a copper colour, so likewise are her thighs, but they are not furnished with baskets; for she has never occasion for any, being always waited upon by the workers. The sting of the working bee is quite strait; that of the queen is somewhat curved; and the tube which encloses it, besides its utility, as a sheath for the sting, affords a passage for the eggs which she lays; and, by its telescopic construction, she is able so to extend it as to deposit her eggs at the very bottom of the brood cells; and this object is still further facilitated by the tapering form of her hinder part. These eggs, at the height of the season, she deposits at the rate of 200 a-day, and thus becomes the fertile mother of many thousands annually, consisting of workers, drones, and a few scions of royalty. So fast indeed does her progeny increase at this season as to render it necessary that their numbers should be diminished either by the issue of swarms, or by affording the family additional room. I have now a few words to offer on the remaining members of the family of bees,—those which have been denominated by Shakspere as "the lazy yawning drones." These are the gentlemen of the hive; and truly do they deserve that name, for they do no work, and never venture abroad but in fine weather, when they can enjoy the sunshine and philander with the royal ladies. They are nearly the same length as the queen, but more bulky, and very clumsily formed, and they are

not armed with a sting. Superficially regarded, it would seem as if they came into the world merely to consume the produce of others' industry. They must not be hastily condemned, however, for not being gifted with the organs necessary either to collect or to convey food; they ought not to be reproached on that score, and as we know some of their uses, we may fairly give them credit for others.

Having in the former portion of my lecture referred to the very early period at which the attention of man was drawn to the honey-bee; to the profit which may be derived from a judicious culture of that valuable insect; to the various members of which a family of bees consists; to their very great powers of increase; and to the very curious and wonderful contrivances exhibited in their anatomical structure; I now proceed to detail to you one of the most curious and astonishing facts which their marvellous history affords, viz., the power they possess of supplying the place of a lost queen. When such a misfortune befals them, provided there be any eggs in the worker-cells, or even grubs that are not more than three days old, they immediately break down three worker-cells, destroy two of the eggs or grubs, as the case may be, surround the third with the walls of a cell peculiarly appropriate for raising queens, and by administering to the inmate a particular food called royal jelly, they are enabled to raise up a bee possessing every attribute of royalty, which, but for the peculiar diet and the large royal cradle with which itwas supplied, would have turned out simply a working bee. A knowledge of this power in the bee has long been familiar to a few foreigners, though for a time discredited in this country. In consequence of this discovery, apiarians have been enabled to increase their stocks of bees by means of what has been called artificial swarming. Should there be no suitable egg or grub in the hive from which to replace a lost sovereign, so heavily is the calamity felt, that she is mourned over with so fervent and sincere a regret that it would seem as if a disaster had befallen them of so dire a nature as to threaten the dissolution of the community, and, *for a time*, no successor that could be presented to them would be acceptable. Still this exhibition of grief is not of long continuance; for though within the first twenty-four or thirty hours they are so inconsolable as not only to reject, but even to sacrifice, any other queen that might be presented for their acceptance, yet, after the expiration of the period I have named, their sorrow becomes mitigated, so that, on

being presented with a stranger queen, she is no longer treated as a stranger, but even cordially received, and joyfully admitted to the honors of sovereignty. If the family have neither a queen presented to them, nor eggs, nor grubs of a suitable age, they either pine gradually away or join some other establishment, transferring their allegiance to the sovereign thereof, and rewarding their new associates for their hospitality by an importation of the stores of the deserted hive. Before I take leave of the all-important lady I have been describing, I will just refer to the time the eggs which she respectively lays require for their full development as perfect bees. The egg of the working bee is hatched in about four days, when it becomes a grub, in which state it is fed for about five days more, according to the temperature of the season; when it has increased so as to fill the cell, it is covered in by its nurses with a waxen lid. It now spins round itself a silken web, called a cocoon, in which it is occupied for about thirty-six hours. After this its various members become gradually developed, till, on the 21st day from the laying of the egg, it comes forth a winged insect. As respects the embryo queen, in her case every stage of the progression is shortened, and she is ready to emerge as a full-grown queen upon the sixteenth day. The progression of the drone is the slowest, four-and-twenty days being occupied before he arrives at maturity. In the respective periods of their adult existence, there is a still greater relative difference than in that of their embryo state. I have told you already that the length of life allotted to the working bee does not extend beyond six or eight months; that of the drone seldom exceeds four months, whilst the queen's life is usually extended to three or four years. It has been a question to what distance bees will fly when exploring the fields, and it has been ascertained that the usual extent of their flight from home is about a mile and a half; but if within that range they do not find what they seek for, they have been known to exceed more than double that distance.

Having now presented you with a sketch of the history and physiology of the bee itself, I shall proceed to notice that miracle of insect architectural skill, a honey-comb, without which any lecture on its artificers would be very incomplete. A honey-comb is universally allowed to be one of the most striking achievements of insect industry, and a most admirable specimen of insect architecture. Every comb in a hive is composed of two ranges of cells backed against each other, and each cell is constructed

with the strictest mathematical correctness. According as they are designed for the cradles of working bees or of drones, they vary somewhat in dimensions, but in each size the strictest uniformity is preserved. For storing honey both sizes are constructed and used indiscriminately; but for whatever purposes intended, one or other of those two sizes is invariably adhered to, and they are so contrived as to make them contain the greatest possible quantity in the smallest possible space, and with the smallest possible quantity of materials. Specimens of drone as well as of worker-cells, full and empty, are upon the table. On observing the full ones, it will be perceived that every cell is sealed over, so as to prevent the external air from having access to the honey; and this may serve as a hint to those who wish to preserve their honey in as pure a state as possible, that it should from first to last be as little exposed as possible to the external air. The cells are all of them of an hexagonal shape, that having been found by some of the profoundest geometrical scholars to be the one which most perfectly accomplishes the results which I have specified. What an astonishing coincidence is this! Several celebrated mathematicians occupy themselves in solving an intricate problem, and, after the exercise of the highest ingenuity and the deepest thought, find their conclusions made manifest in the operations of the bee! Not only are the cells thus curiously constructed with the strictest regard to the economy of space and materials, but so as to afford the utmost available degree of strength, for though the cells are formed in double rows, back to back, you will perceive, on examining the specimens before you, that no two cells are directly opposed to each other, but that every separate cell is fortified by having the walls of three others running across the bottom of it, and all three meeting in its centre! Such wonderful specimens of constructive skill in the bee, as well as in some other members of the insect race, might well have excited the astonishment of Solomon and have called forth the apostrophes of David, and have led him to exclaim, when contemplating them, "Marvellous are thy works, O God! in wisdom hast thou made them all!"

I have given you a description of the curiously-constructed cells which constitute a honey-comb, and have told you what steps the bees take when they have to supply the loss of a queen. This gave me occasion to advert to one of the modes in which they prepare a royal cell. In such an emergency the usual mode of proceeding is de-

parted from, the royal cradle being built round the egg or grub, and therefore having its site wherever that egg or grub may happen to be, *not*, therefore, upon the edge of a comb; whilst in the regular course of nature the royal cell is constructed, not where the egg *has* been laid, but where it is proposed that it *shall* be laid, and in that case always *upon* the edge of a comb, its dimensions increasing progressively, as the royal insect increases in size, and requires increased accommodation. This proceeding always commences a short time previous to the intended issue of a swarm. The wood-cut on the table will give a tolerable notion of the relative appearance of every description of cell, and in every state. At the top of the comb may be seen cells filled with honey and sealed over with *flattish* waxen lids (specimens of which are afforded by the plate of stored honey-comb); somewhat lower down are cells containing brood in an advanced state, sealed over with *convex* lids; lower still are represented open cells, containing grubs in every state of progression, the whole being encompassed by open cells, ready to be occupied either with honey or brood, as may be required. There is also a specimen of a full-sized royal cell upon the table, in the state which precedes a queen's emergence from it; and likewise a half-finished cell of the same description. In the formation of the common cells, you will be struck with the lightness of their structure, the wax expended upon them being employed with the strictest regard to economy, not a grain more being used than is barely necessary; whilst in fashioning the royal cradle, economy of materials would seem to be the last thing thought of. This has been so well expressed by an accomplished apiarian friend, the late Dr. Evans, of Shrewsbury, that I cannot forbear quoting his very words:—

> "No more with wary thriftiness imprest,
> They grace with lavish pomp their royal guest;
> Nor heed the wasted wax nor rifted cell,
> To bid with fretted round th' imperial palace swell."

You will perceive that the walls of these regal edifices, instead of being like those of the other cells, as thin as paper, to compare great things with small, are as substantial as the walls of a palace, the very title conferred upon them by Dr. Evans.

The source from which wax is produced, though it had been imperfectly glanced at by one or two old apiarians, was not determined satisfactorily till within the last sixty or seventy years, it having been almost universally ima-

gined that the substance which the bees import upon their thighs, viz., farina, formed its chief constituent; whereas it is now clearly ascertained that farina does not enter at all into the composition of wax, but that it is imported solely as food for embryo bees, and that wax is a secretion from between the scales, on the under parts of the bee's body, from which it is thrown off in thin layers. The little creatures, when wax is needed, distend their stomachs with honey and remain in a quiescent state for about twenty-four hours, within which time the honey becomes changed in its nature, and oozes out between the scales in thin flakes ready for use. These the little artists remove with their hind legs, carry them forward to their mouths, and then mincing them up with a frothy liquor till the mass becomes glutinous, reduce it to a state which admits of its being easily moulded into honey-combs or any other form.

I have now endeavoured to fix your attention upon several of the wonderful proceedings of the bee—proceedings which are generally regarded as the result of instinct, though some of them would almost incline us to award to it the same attribute that has been applied to a creature of much greater magnitude, and to speak of the half-reasoning bee as well as of the half-reasoning elephant. Indeed the enlightened Boyle, when contemplating the various wonders of nature, has declared his astonishment to have been more excited by the mite than by the elephant, and that his admiration dwelt not so much upon the clocks as upon the watches of creation. In support of what I have felt disposed to designate as a half-reasoning power, many very striking illustrations might be adduced. I shall on this occasion confine myself to one, in addition to those I have already detailed to you; and I do so the rather as it occurred to an old friend of mine, who ended his days in this city. I allude to the Rev. Richd. Walond, one of the former Treasurers of our Cathedral, and Rector of Weston-under-Penyard. As he was inspecting one of his bee-boxes one day towards the end of October, he perceived that a centre comb loaded with honey had become separated from its attachments, and was leaning against another comb, so as to prevent the passage of the bees between them. This accident excited great activity in the colony, but its precise nature could not be ascertained at the time. At the end of a few days, the weather being cold, and the bees clustered closely together, Mr. Walond observed through the window of the box that they had constructed two horizontal bars between the combs al-

luded to, and had removed so much of the honey and wax from the top of each as to allow a free passage to a bee. In about ten days the bees had effected an uninterrupted thoroughfare; the detached comb at its upper part had been secured by a strong barrier, and fastened to the window. This being accomplished, the horizontal pillars, first constructed, being of no further use, were demolished. Had such expedients been had recourse to by human beings, they would have been regarded as affording evidence of a continued chain of reasoning, for the most intelligent architect could not have more judiciously propped up a tottering fabric till it could be effectually secured.

Let me now bespeak your attention to the practical management of bees, and I shall precede my observations thereon by addressing a few words to you upon the subject of swarming, though in all probability it is a proceeding familiar to most of you. I have already stated that in the winter and the early spring the queen and the working bees constitute the whole family; but in April and May, in mild weather much earlier, so great a number of eggs is deposited, chiefly worker-eggs, but some portion also of drone-eggs, as, when hatched and brought to maturity, to encumber the hive so much by their numbers and the overpowering heat they produce, unless additional room be afforded them, as to cause the emigration of a large portion of the family. In this case, one division issues from the hive, accompanied by the old queen, leaving the other division in the parent hive. These latter transfer their allegiance to a new queen, one or more being always either ripe or in embryo, some days prior to the swarm's issuing. The same stock will occasionally throw off several swarms in the season, each successive swarm being always accompanied by the princess royal. In general all the younger princesses are kept imprisoned in their cells, till all further intention to swarm is given up, when those that are not required the queen regnant is allowed to destroy, which her jealousy is ever prompting her to do, whether they be required or not, and which nothing but the sedulous guard kept over them by the workers could prevent. If two or more of these royal ladies should happen to be at liberty at the same time, there is always a contest, which continues till fatal to all but one. A swarm consists of a queen, several thousands of working bees of all ages, generally also of a few hundreds of drones. When all things are prepared for their issuing forth, storing themselves, for instance, with honey sufficient for a few

days' consumption, and, according to the opinion of some apiarians (myself among the rest), having made choice of a future residence, there arises great commotion in the hive, and those bees that have, by previous concert, decided upon emigrating, sally forth through the entrance of the hive in a rapid and tumultuous manner, and with so loud a buzz as to be audible at some distance. After hovering rather diffusely for some minutes in the air, they gradually congregate and settle round their queen, usually upon a tree or bush, from which, as soon as they have become tolerably quiet, they are shaken into a hive held beneath them; the hive is then instantly inverted, and placed on a table covered with a cloth upon which two sticks have been laid to prop up the hive sufficiently to allow a free passage for the bees. The whole is then well sheltered from the sun by green boughs or some other protection. If the hive prove agreeable to the bees, they soon recover from the commotion, and as soon as they have become tolerably quiet, they should be carried to the place where they are intended to remain permanently, from whence they will soon begin to roam the fields in search of materials to furnish their new home. It is customary among the cottagers to make a noise when bees are swarming, generally by striking a frying-pan smartly with a large key. This they do from a notion that it will charm the bees down, but the experience of all intelligent apiarians has proved this to be a useless practice. While furnishing their hive with combs the great bulk of the bees suspend themselves from its roof, in a cluster, consisting of a succession of semicircular festoons, one within the other, and they keep up such a degree of warmth as to render their waxen materials soft enough to be easily moulded. To enable themselves to form this cluster, they cling to each other by their claws, the fore feet of one bee hanging upon the hind legs of the one above it. This clustering prevents their earliest proceedings from being witnessed in hives of the usual form. This, however, is a difficulty which ingenious apiarians have found means to overcome, by the use of a unicomb or mirror hive, one of which I shall be well pleased to show any lady or gentleman who may feel inclined to see the construction of it, and the facilities it affords for observation.

I shall now put you in possession of what I conceive to be the simplest, cheapest, and most profitable mode of managing bees. There are two prominent systems in use directed to these objects, each based upon the importance of giving room to the bees, and diminishing thereby their

disposition to swarm. By one of these systems we are directed to place the hives or boxes side by side (the collateral system); the other system advocates the piling of the boxes one upon another (the storifying system), affording in both cases a free communication between the boxes whenever required. I have tried both systems myself, and have taken considerable pains to ascertain the success of others, who have also given both an ample trial. The result has been to give me a decided opinion in favour of storifying, and indeed many of my acquaintances, who had originally been induced to adopt the collateral plan, have wholly abandoned it for that of storifying. Whichever of these modes be had recourse to, it has been found that the bees have a regular habit of constructing their combs at uniform distances from each other; but they have also another habit, when they are untutored, viz., that of building them irregularly, insomuch that their position is frequently curvilinear, and sometimes they are even placed at right angles with each other. This proceeding forms a great impediment to the manipulation of wax and honey. It is an impediment, however, which the mere cottager pays little regard to, and blunders through it. But to the scientific apiarian it is indispensably necessary to avoid these various incurvations. To accomplish this desirable object, every box or bee-hive should be furnished with movable wooden bars, upon each of which, or at any rate upon every other bar, pieces of worker-comb should be fixed, to serve as a guide to the bees, prior to their introduction to a swarm. This, you will perceive, has been attended to in the hive and boxes before you. And it will be found that the bees, if they have their guide-combs correctly and securely fixed, will invariably accept them as the foundations of their future structures; by which means several important objects will be accomplished. In the first place, the facility of taking the stored honey will be very much increased. In the next place, if the bees are not wealthy enough to spare a whole box full of honey, you can without difficulty take from them what they *can* spare. And thirdly, if in your apiary there should be any families *very* unequal in wealth, provided the boxes and bars are reciprocally adapted to each other, one or more bars can be removed from a weak hive and exchanged for the same number of loaded bars from a strong one, thus giving needful support to one or more families without injury to any. In the performance of these operations, the use of a little tobacco smoke is required to paralyse the bees so far as to prevent them from being intrusive.

But I will now endeavour to illustrate what I have stated to you, by having recourse to the boxes upon the table. I will suppose a swarm to have been introduced to one of them, and that the box and bees have been placed where they are to remain permanently. If your object be to collect pure honey, and to prevent swarming, as soon as you have ascertained that the box is about three-parts full of combs, another box should be placed either under or over the first, and a communication opened between them; if the season promise well, the family may be supered, if not nadired. In some remarkable seasons even a third box may be required; but this will rarely happen during the first year of a family's establishment. Indeed, during the first year honey should generally be rather sparingly taken. In future years, with good seasons, from thirty to forty pounds may be taken from each family; in highly favourable seasons, in a good locality, much more.

I have now brought this lecture to a close. My chief difficulty in the composition of it has arisen from the exuberance of my materials, which it was not easy to compress into the form of a lecture. You will, of course, infer, therefore, that much has been left untold, for which I must beg to refer you to those works which have been written professedly on the subject.

So I here take leave of my brief history of the honey-bee—that wonderful, that useful insect, which, though not possessed of the advantages with which man is gifted, having neither religion nor reason for its guide, affords nevertheless an example to man of the most perfect order, the most unremitting industry, the greatest harmony, and the most undeviating attention to the welfare of all. (Applause.)

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