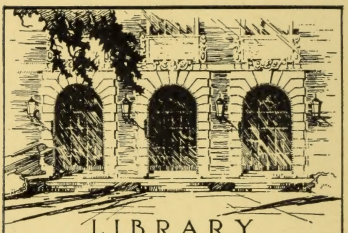

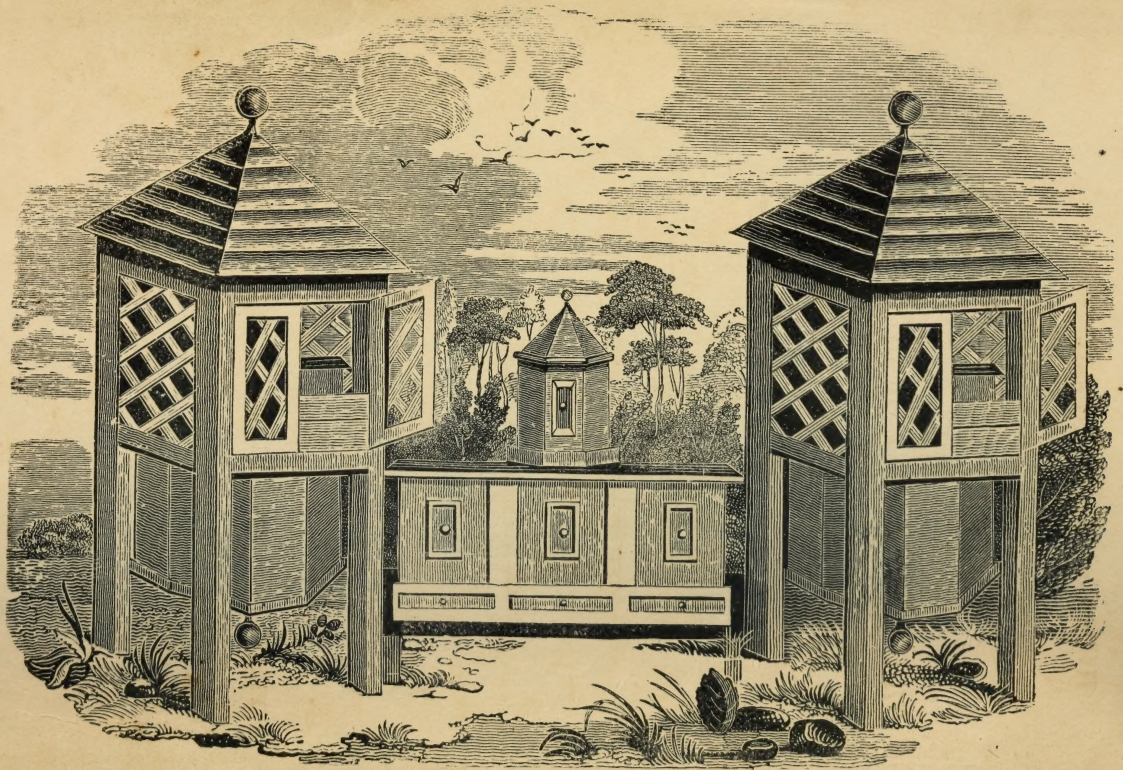

Principio sedes Apibus statiosque patendi

HUMANITY TO HONEY-BEES:

OR,

PRACTICAL DIRECTIONS

FOR

THE MANAGEMENT OF HONEY-BEES

UPON AN IMPROVED AND HUMANE PLAN,

BY WHICH THE

LIVES OF BEES MAY BE PRESERVED, AND ABUNDANCE OF HONEY

OF A SUPERIOR QUALITY MAY BE OBTAINED.

BY THOMAS NUTT.

—— Vos non vobis mellificatis Apes:
Sic ——————————
VIRGIL.

SECOND EDITION.

WISBECH:
PRINTED BY H. AND J. LEACH, FOR THE AUTHOR,
OF WHOM IT MAY BE HAD AT MOULTON-CHAPEL,
OR AT 131, HIGH HOLBORN, LONDON.
SOLD ALSO BY LONGMAN AND CO. PATERNOSTER-ROW, LONDON.
Price Ten Shillings.

1834.

ENTERED AT STATIONERS' HALL.

Also may be had on application to my agent, Mr. G. Neighbour, 131, High Holborn, near Southampton Street, London, honey taken on the principles here specified, with hives stocked with bees, or unstocked. All letters must be post paid to the author.

ENTERED AT STATIONERS' HALL.

DEDICATION,

BY PERMISSION,

TO HER MOST GRACIOUS MAJESTY,

QUEEN ADELAIDE.

MAY IT PLEASE YOUR MAJESTY,

To pen a dedication skilfully is generally the most difficult part of an Author's task; but a dedication to ROYALTY is so delicate a matter, that I almost tremble for the success of my undertaking—tremble lest

I should fail to express myself dutifully, gratefully, properly; though I am not without hope that your Majesty's goodness will graciously extend to the Author that degree of indulgence of which he is sensible he stands so much in need, especially as nothing unbecoming a dutiful subject to write, or improper for a gracions Sovereign to read, is intended to be here expressed.

As, however, every colony of Bees, whereever domiciled, whether in a box, or in a cottage-hive, in the roof of a house, or in the trunk of a hollow-tree, is under an admirable government, the presiding head and Sovereign of which is a QUEEN,—as no colony of Bees, deprived of its QUEEN, ever prospers, or long survives such loss,—as this insect government, or government of insects,

exhibits to man the most perfect pattern of devoted attachment, and of true allegiance on the part of the subject Bees to their Sovereign, and of industry, ingenuity, prosperity, and apparently of general happiness in their well-ordered state,—and as these most curious and valuable little creatures have hitherto been most cruelly treated—have been, and still are, annually sacrificed by millions, for the sake of their *sweet* treasure; I do feel a pleasure, and think there is a sort of analogical propriety, in dedicating to your Gracious Majesty this work, the leading feature of which is—Humanity to Honey-Bees. Under your Majesty's fostering and influential Patronage, I cannot but anticipate that this object will be essentially promoted, and that the management of Bees, in this country at least,

will not hereafter reflect disgrace upon their owners.

In this pleasing hope, I humbly beg to subscribe myself,

YOUR MAJESTY's

most dutiful

and

most grateful

Subject and Servant,

THOMAS NUTT.

Moulton-Chapel, Lincolnshire,
Nov. 27th, 1832.

PREFACE.

Could I disarm criticism as easily as I can deprive Bees of their power to sting, this would be the proper place to do so; though I am doubtful whether it would be well-judged in me, or to my advantage, to stay the critics' pen. But, possessing no such talismanic power, I shall adventure my little book into the world, without any attempt to conciliate the critics' good-will, or to provoke their animosity, conscious that from *fair* criticism I have nothing to fear. That I shall be attacked by those apiarians who are wedded to their own theories and systems, however faulty, is no more than I expect: of them, I trust, I have nowhere spoken disparagingly; towards none of them do I entertain unkindly feelings—far otherwise. Their number, I am led to believe, is not formidable; and as

gentlemen, and fellow-labourers in the same work of humanity, their more extensive learning will hardly be brought to bear against me with rancour and violence. Should any one of them, or of any other class of writers, so far degrade himself, I shall have the advantage of the following preliminary observation, viz. that one set of my collateral-boxes, placed in a favourable situation, and *duly and properly attended to*, for one season only, will outweigh all the learning and arguments that can be adduced against my Bee-practice,—will be proof positive, visible, tangible, that there is in my pretensions something more than empty boast. Luckily for me, there are plenty of those proofs to be met with in the country, and there are some—several, not far from town; they are at Blackheath, at Kensington, at Clapham, and at other places. As hundreds of the Nobility and Gentry of this country will recollect, there was one of these incontrovertible proofs of the truth of what I am stating, exhibited for several weeks at the National Repository last autumn, where it was seen, examined, admired, and, I may without any exaggeration add, *universally approved*. Practice, which has resulted from more than ten years' experience in the management of an

apiary, and from innumerable experiments, carried on, and a hundred times repeated, during that period, is what I ground the utility of my discoveries upon. To theory I lay no claim. Born and brought up in the fens of Lincolnshire, where I have spent the greater part of my life amidst difficulties, misfortunes, and hardships, of which I will not here complain, though I am still smarting under the effects of some of them, my pretensions to learning are but small: for, though sent to the respectable Grammar School at Horncastle in my boyhood, my education was not extended beyond writing, arithmetic, and merchants' accompts. As soon as it was thought that I had acquired a competent knowledge of these useful branches of education, it was my lot to be bound apprentice to learn the trades and mysteries of grocer, draper, and tallow-chandler. Whilst endeavouring to gain an honest livelihood as a grocer and draper, at Moulton-Chapel, in 1822, I was afflicted with a severe illness, which, after long-protracted suffering, left me as helpless as a child, the natural use and strength of my limbs being gone; and, though supported by and tottering between my crutches, it was a long time before I was able

to crawl into my garden. Fatigued and exhausted with the exercise of journeying the length of a garden-walk of no great extent, it was my custom to rest my wearied limbs upon a bench placed near my Bees. Seated on that bench, I used to while away the lingering hours as best I could, ruminating now on this subject, now on that, just as my fancy chanced to fix. Among other things my Bees one day caught my attention: I watched their busy movements,—their activity pleased me,—their humming noise long-listened to became music to my ears, and I often fancied that I heard it afterwards when I was away from them. In short, I became fond of them and of their company, and visited them as often as the weather and my feebleness would permit. When kept from them a day or two, I felt uneasy, and less comfortable than when I could get to them. The swarming season arrived; and with it ideas took possession of my mind which had not until then possessed it:—I conceived that swarming was an act more of necessity than of choice,—that as such it was an evil; but how to provide a remedy for it—how to prevent it—was a problem that then puzzled me. I studied it for a long time, and to very little purpose.

The old-fashioned method of eking did not by any means satisfy my mind; it might answer the purpose for one season, but how to proceed the next did not appear. Then the time for taking honey was approaching: to get at that treasure without destroying my little friends that had collected it, and that had, moreover, so often soothed me in my sorrow and my sufferings, was another problem that long engaged my mind. After some years' unremitted attention to my Bees, for I had formed a sort of attachment to them during the first stage of my convalescence, which never left me, an accident aided my studies by directing my attention to the effects of ventilation, as will be found related in the body of this work, and I began to make experiments, which being repeated, varied, improved, and then gone through again, have gradually led to the development of my improved mode of Bee-management, attempted to be explained in the following pages.

At the time I have been speaking of, I had not read one single book on Bees; nor had I then one in my possession. Whatever my practice may be, it has resulted from my own unaided experience and discoveries. To books I am not indebted for any part of it: nay, had

I begun to attempt to improve the system of Bee-management by books, I verily believe, I never should have improved it at all, nor have made one useful discovery. *The Bees themselves have been my instructors.* After I had so far succeeded as to have from my apiary glasses and boxes of honey of a superior quality, to exhibit at the National Repository, where, with grateful thanks to the Managers of that Institution for their kindness to me, I was encouraged to persevere, Bee-books in profusion were presented to me, some of them by friends with names, some by friends whose names I have yet to learn. I have read them all: but nowhere find, in any of them, clear, practical directions, how honey of the very purest quality, and in more considerable quantity than by any of the plans heretofore proposed, may be taken from Bees, without recourse to any suffocation whatever, or any other violent means;—how all the Bees may be preserved uninjured;—and how swarming may be prevented. These are the grand features in my plan; and minute directions for the accomplishment of these most desirable objects are laid down in this book.

I by no means maintain that my system of Bee-management is incapable of improvement;

but I do think that the principles upon which it is founded *are right*,—that the foundation is here properly laid,—and that every apiarian, who may hereafter conform to, or improve upon, my practice, will be instrumental in contributing a part towards raising the superstructure—namely—an asylum or sanctuary for Honey-Bees.

I cannot close this preface without acknowledging myself to be under the greatest obligations to the Rev. T. Clark, of Gedney-Hill. But for his assistance the following work would not have made its appearance in its present form; if indeed it had appeared at all. He has revised, corrected, connected, and arranged the materials of which it is composed; and he has, moreover, gratuitously added much that is original and valuable from his own rich stores of knowledge. To him I am indebted for the selection of the Latin mottos. As an apiarian he is one of my most improved and skilful pupils, and bids fair to become an ornament to the science of Bee-management. As a mechanic he is ingenious enough to make his own Bee-boxes, and has actually made some of the very best I have yet seen. To his knowledge of mechanics it is owing that the description and explanation

of each of the different boxes, of all the other parts of my Bee-machinery, and of my observatory-hive, in particular, are more detailed, clearer, and more intelligible than they would have been in my hands. As a scholar there are passages in the following work that afford no mean specimen of his abilities. I have only to regret that the reward for the pains he has taken with it must be my thanks—that it is not in my power to remunerate him for his kind labours more substantially than by this public acknowledgement of the obligations I am under, and of my sense of the debt of gratitude that is due to him.

PREFACE TO THE SECOND EDITION.

"OUT OF PRINT," though a somewhat laconic, might be a not inappropriate preface to this second edition, and of itself a quaint apology for its appearance. *Out of print* is certainly exhilarating news to the author anxious for the success of a work inculcating a new system of Bee-management, in which not only is his reputation as an apiarian involved and evolved, but, it may be, the very means of his subsistence are *bound up* in it; the oftener therefore he hears the bibliopolist expression—*out of print*—the more animating and welcome it becomes; because its reiteration can hardly fail to be considered by him an indication that the demand for his book continues.—that his system is progressing,—or, at any rate, that either curiosity respecting it, or some higher

and more laudable motive, is still existent in the public mind. Thus cheered on, thus, as it were, *encored*, it has become his duty to the public no less than to himself to proceed forthwith to the publication of a new edition.

Previously, however, to stating what alterations, emendations, &c. have been introduced in order to render the work, as far as I am yet able to render it, worthy a continuance of public patronage, I consider it to be my duty to record my grateful thanks for the success and encouragement I have already received.

To the scientific and literary press, and to the several gentlemen of scientific attainments connected therewith, who, by their influence and kind professional assistance, and promptitude in the furtherance of my interest, have greatly contributed to my success, my best thanks are due, *and are hereby respectfully tendered*: amongst these I have sincere pleasure in particularizing Dr. Birbeck—the talented President of the London Mechanics' Institution,—Dr. Hancock—Fellow of the Medico-Botanical Society—a veteran of high and esteemed attainments,—and Mr. Booth—the popular Lecturer on Chemistry—a young man of first-rate abilities.

To J. C. Loudon—the erudite editor of the Gardeners' Magazine,—to E. J. Robertson, Esq.—the able and ingenious editor of the Mechanics' Magazine,—to Richard Newcomb —the editor and publisher of the Stamford Mercury,—and to the several editors of the Metropolitan and Provincial Press, who have made favourable mention of my labours, my public thanks are justly due,—and particularly to the editor of the Cambridge Quarterly Review, for a highly commendatory notice of my work, evidently written by a practical apiarian, and with competent knowledge of his subject, which appeared in No. 3 of that Review, published in March 1834. Also to my long-tried, worthy *Friend*—George Neighbour—it is gratifying to me to have this opportunity of offering my sincere thanks for his valuable services in my behalf;—and to the conductors of those excellent and useful institutions—the National Gallery of Practical Science, Adelaide Street,—and the Museum of National Manufactures, Leicester Square, London, I gratefully acknowledge myself to be under no slight obligations for the advantageous opportunities which I have there possessed of extending the knowledge of my

system, and of exhibiting, year after year, to thousands of visitors, the products of my apiary.

With the view of making "The Humane Management of Honey-Bees" more interesting, the dialogue, which formed the introductory chapter in the first edition, has been withdrawn, and in its place have been substituted some valuable remarks of Dr. Birbeck, Dr. Hancock, and Mr. Booth, respecting Bees, honey, wax, &c. of course *the first chapter is new;* as is chapter X. giving an account of the apiary of the Most Noble the Marquess of Blandford, at Delabere Park, which can hardly fail of being interesting to every reader: it is principally from the able pen of Mr. Booth. Chapter XVIII. on Apiarian Societies, is new also. And, besides these three entire chapters, not short paragraphs merely, but whole pages of new matter have been introduced interspersedly by my most respected friend—the Rev. T. Clark, of Gedney-Hill, who has revised, corrected, and re-arranged the whole; and who has not only bestowed much time and pains upon the improvement of my work, but in the kindest and most disinterested manner has, in superintending this and the former edition through

the press, actually travelled upwards of *eight hundred* miles. The friendly performer of services so generous, so laborious, and so perseveringly attended to, without any stipulation for fee or reward, merits from me, and has from me, every expression of my gratitude, and, were it in my power, should have *one expression more*.

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MANAGEMENT OF BEES.

CHAPTER I.

INTRODUCTORY MATTERS.

The object of the generality of persons who keep Bees, is—profit: and that profit might be indefinitely augmented were Bees properly managed, and their lives preserved—were the still extensively-practised, cruel, and destructive system superseded by a conservative one. Some few there may be in the higher ranks of life, who cultivate bees from motives of curiosity—for the gratification of witnessing and examining the formation and progress of their ingenious and most beautiful works, and with a view to study the instinct, habits, propensities, peculiarities, or, in one word, the

nature of these wonderful, little insects, in order to improve their condition, and to gain additional knowledge respecting their natural history, hitherto, it must be confessed, enveloped in much uncertainty, and very imperfectly understood. To this class of Bee-masters and *Bee-friends* the system of management to be explained in the following pages, will, it is hoped, unfold discoveries and impart facilities and improvements hitherto unknown in apiarian science. And they, whose sole object in keeping Bees is *profit*, may derive incalculable advantage from conforming to the mode of management, and strictly attending to the *practical directions* hereinafter to be detailed: because as their profits are expected to arise principally from honey and wax, it evidently must be for their interest to know *how* to obtain those valuable Bee-productions in their purest state and in the greatest quantity. The quantity obtained in a good honey-year (viz. 1826) from a well-stocked and exceedingly prosperous colony—still in existence, and still flourishing, (i. e. in 1834) was so considerable, and so far beyond anything ever realized from a common straw-hive colony, that my statements respecting it have been doubted by some, and totally

discredited by others, unacquainted with my (I trust I may say) *improved* system of Bee-management. With respect to the purity of the honey taken according to my plan, and the general properties and medical virtues, and, of course, *value of honey when pure*, I have much pleasure in being enabled to submit to the reader the opinions of my scientific friends—Dr. Birkbeck, Mr. Abraham Booth, Lecturer on Chemistry, and Dr. Hancock; because their opinions may safely be considered as unimpeachable authority on this subject, viz. the uses and medical virtues of *pure honey*.

In some observations on the effect of the temperature of Bee-hives on the quality of honey, published in a scientific journal, Mr. Booth observes—"notwithstanding the adequate justice which has been done to Mr. Nutt's improved and admirable system of Bee-management, there is one point which does not appear to have elicited much attention—the superiority in quality both of the honey and the wax. It does not appear to me that the whole of this superiority consists in freedom from extraneous animal or vegetable matters, a point of very great importance, however, as

its dietetic purposes are concerned; but that it greatly depends upon the modified degree of temperature at which the Bees effect their labours, and which is insufficient to produce any chemical changes in the constitution of these substances; whereas under the old system, the continued high temperature of the hive is sufficient to induce those changes which impart the colour that so materially deteriorates the quality as well as the value of the products. *From Mr. Nutt's hives we obtain pure honey, as it is actually secreted by the Bee,* which cannot be ensured by any other mode of management."

To my very intelligent friend and patron, Dr. Birkbeck, whose uniform liberality and kindness, from the infancy of my pursuits, I have reason to appreciate, I am indebted for introducing this subject in a Lecture* at the London Institution, Moorfields, on the application of the oxy-hydrogen light to illustrate the economy and structure of the insect world. In the course of his observations, on referring to the tongue of the Bee, the learned Doctor made copious allusions to my system, and the advantages which would in his view result

* Delivered April 23d 1834.

from its general extension. He observed that "so small is the supply that we derive from the labours of Bees in this country, that the production of wax does not even more than equal its consumption in the simple article of lip-salve. Under this improved system, we may however hope that the advantages of Bee-management may be more generally diffused throughout the kingdom,—that Bee-hives will be multiplied, and that the choicest flowers of the field and forest will no longer 'waste their sweetness in the desert air.' In a dietetic point of view, it is of great importance that a saccharine, secreted by one of the most beautiful processes of nature, should be substituted for one produced by the most imperfect and complicated process of art, whilst the more salutary properties of the former would recommend it as far more eligible for use. He could not but hope that in this view the system would soon receive that extension in practice to which its merits fitted it."*

* Dr. Birkbeck related the following instance of the power of recognition possessed by Bees to myself and Mr. Booth, which I cannot suffer to pass unnoticed. When a boy, he was accustomed to cover his hand with honey, and go to the front of one of the hives in his father's garden. His hand was soon covered by the Bees, banquetting on the proffered sweets, and

Some very important observations on honey, in a medical point of view, are those which were contained in a paper written by my very learned and valued friend, Dr. Hancock, and read before the Medico-Botanical Society at their sitting November 26th 1833.*

An abstract of this important paper† I shall communicate for the information of my readers.

"The great objects which recommend Mr. Nutt's plan, consist in the great improvement in quality and augmentation of honey produced, and that without destroying the Bees—a discovery equally creditable to Mr. Nutt, as a man of benevolent mind, and to his industry and indefatigable research.

"The cultivation of Honey-bees is of remote antiquity. The Bee was regarded as the emblem of royalty with the ancient Egyptians, and Bees have been held in the highest esteem

the whole of it was speedily removed. The Bees appeared to recognize the learned Doctor ever afterwards when he appeared in the garden, his hand being always surrounded by them in expectation of there finding their accustomed boon.

* For a copy of the first edition of this work, with specimens of honey, &c. the author received the thanks of the Society; and he has since been honoured with a diploma, which constitutes him a corresponding member thereof.

† An abstract of the paper was published in the Lancet and several other journals.

by all nations, whether barbarous or civilized; yet the united experience of ancients and moderns has never hitherto led to the happy results, which, by a connected series of experiments, patient research, and logical induction, have in twelve years been achieved by Mr. Nutt. In the course of his observation he saw, not only that the destruction of the Bees was barbarous in the extreme, but that this cruelty was equally subversive of the crops of honey; his inquiries were hence directed to find how this destructive system could be exchanged for a conservative one. In this he has completely succeeded, and by preserving the Bees has been enabled to increase their produce many-fold, and that too, in a far more salutary and improved quality. It is equal even to the samples usually obtained from young hives called virgin honey, which is scarce, dear, and seldom to be had genuine.

"Owing to the want of knowledge on the subject, the consequent impurities, and the great price of foreign honey, together with the adulterations practised, the use of this valuable article has been nearly abandoned in this country, whether as an article of the materia medica or of domestic economy; and for the

reasons just stated, the preparations of honey have even been expunged from the Edinburgh Pharmacopeia. From the recent improvement, however, by the gentleman just mentioned, we have reason to hope its use will be restored in a condition vastly improved, and that at a great reduction in price, the facilities of production being greatly enhanced, and such as to render it in time available to all classes of society.

"Pure honey was justly considered by the ancients to possess the most valuable balsamic and pectoral properties—as a lenitive, ecoprotic, and detergent; and it is well known to dissolve viscid phlegm and promote expectoration. As a medium for other remedies, it is in its pure state far superior to sirups, as being less liable to run into the acetous fermentation. It appears that honey procured on Mr. Nutt's plan is not excelled by the finest and most costly samples from the continent, as that of Minorca, Narbonne, or Montpelier. The various impurities and extraneous matter usually contained in honey, cause it in many cases to produce griping pains, or uneasy sensations in the stomach and bowels; this however has no such effect, unless it be taken to an imprudent extent.

"Pure honey, though in its ultimate elements similar to refined sugar, yet differs considerably in its physiological effects on the body, being a *lenitive, aperient* or gentle laxative, and hence incomparably more beneficial in costive habits. It has in a dietetic or medicinal point of view been recommended in gravel or calculous complaints; of this however I have no knowledge, but its utility in asthma I have experienced in my own person as well as in others;—as also as an efficacious remedy in hooping cough, taken with antimonial wine, camphor, and opium. For sedentary persons and those troubled with constipation of the bowels, there is no dietetic or medicinal substance so useful as pure honey, whether taken in drink or with bread and butter, &c. It is well known as a detergent of foul sores, and I have often found it to succeed in healing deep-seated sinuous or fistulous ulcers, and thus to obviate the necessity of surgical operations.

"In South America and amongst the Spaniards, honey is considered as one of the best detergents for sloughing sores and foul ulcerations; so it was formerly in Europe. Its uses in a surgical point of view have in this country long been lost sight of. Its detergent power

is such, that it was formerly denominated a *vegetable soap*, as we may see in the older writers. It is still made the basis of *cosmetics*, and this empirical practice goes to prove its efficacy—to those at least who have experienced its effects in cleansing and healing sinuous ulcers, its stimulating property producing withal the sanitary adhesive inflammation. A species of wine made from honey, called metheglin and mead—the *mulsum* of the ancients—was formerly much in use in this country, and most deservedly so from its pleasant taste and salutary properties. By the perfection of honey, this may now be obtained no doubt of equal excellence here, and a rich mellifluous species of wine of the most wholesome kind will be acquired, and open a new source of national industry.

"It has been said, that where the air is clear and hot, honey is better than where it is variable and cold, and this seems to have served as an apology for the inferiority of much of the honey contained in this country. It is a position, which I am persuaded is not well founded; for the honey in hot climates, notwithstanding the fragrance of the flowers, is mostly inferior to the commonest samples

produced here. This inferiority, however, may be entirely owing to the difference in the Bees—for I speak here of the wild or native honey—and it is probable that the *apis mellifica* might, in South America, on Mr. Nutt's plan, produce the best of honey, and in very great abundance, because it would there work all the year, and the product therefore would be greatly increased.

"I have seen honey taken in the forests of South America from several different species of Bees; they were always destitute of a sting, although entomologists consider it as one of the generic characters of *apis*. It is also singular that their wax is always *black*, or dark brown, although the pollen of the flowers, which is said to give colour, is equally yellow as in this country. Bees obtain honey from most kinds of flowers, but appear in general to prefer the labiati or lip flowers, as those of sage, marjoram, mint, thyme, lavender, &c.

"Mr. Nutt, in the course of his observation, has noticed the curious fact, that the nectar or honey obtained from different plants is carefully deposited by the Bees in separate cells, or at least that the nectar from different *genera* of plants is kept distinct.

It appears indeed, that the produce of the flowers is classed by them, and arranged with a precision not inferior to that of the most accurate botanist. What but a hand Divine could guide these little insects thus to mock the boasted power of human reason! This consideration too, coupled with our own interests, should operate as a powerful argument in favour of Mr. Nutt's new conservative system of management, and against the reckless destruction of the Bees. Mr. Nutt has already been patronised by the Royal Family and several of the nobility, and no doubt his plan will be adopted by all persons of intelligence, who engage in this pursuit, whether for profit or the most rational amusement."

When I first entered into my apiarian pursuits, I felt convinced of the great and profitable extent to which they might be carried; and of this I have been all along since confirmed as success has crowned my efforts. If I could demonstrate—and I have repeatedly demonstrated—how much honey might be increased in quantity, its superior quality also struck me as a point of no less importance; and in this I am now most satisfactorily confirmed by the sanction of those scientific

friends whose valuable opinions have been above quoted. With alacrity and pleasure I will therefore proceed, without further introduction, to give a description of my Bee-boxes, and other hives, and of all my Bee-machinery, —and directions for the proper construction of them,—and also for the proper ordering and management of Bees in them.

CHAPTER II.

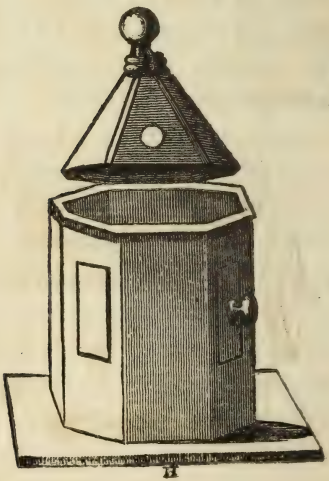
BEE-BOXES AND MANAGEMENT OF BEES IN THEM.

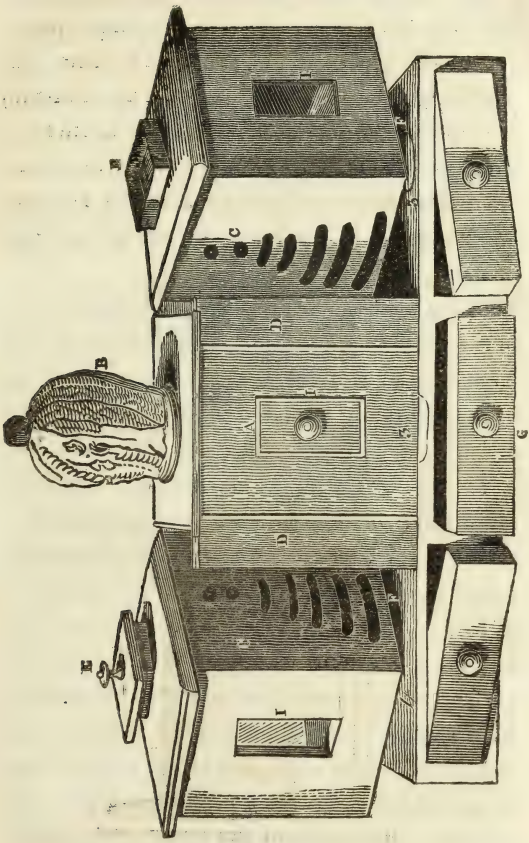
THE schemes and contrivances, and ways and means, to which apiarians have had recourse, in order to deprive Bees of their honey, without at the same time destroying their lives, have been various, and some of them ingenious; but hitherto not one of them has been crowned with the desired success. The leaf-hives of Dunbar and of Huber—Huish's hive with cross-bars,—the piling of hive upon hive, or box upon box, (called storifying), and several other contrivances, have all had this great object in view,—have all had their patrons and admirers,—have all had fair trials,—but have, notwithstanding, all failed of fully accomplishing it.

Whether my inventions may merit and may

meet with a similar or with a better fate, it is not for me to predict,—time will show. I feel warranted, however, in asserting of my COLLATERAL BOX-HIVE, which I am now about to explain,—of my INVERTED HIVE, and of my OBSERVATORY HIVE, of which in their proper places minute descriptions will be given,—I feel, I say, warranted in asserting that these—my inventions—possess such conveniences and accommodations both for Bees and Bee-masters, that the pure treasure stored in them by those industrious, little insects may at any time be abstracted from them, not only without destroying the Bees, but without injuring them in the least, or even incommoding their labours by the operation;—that they afford accommodations to the Bees which greatly accelerate the progress of their labours in the summer-season;—and that the Bees never leave them in disgust, as it were, as they not unfrequently *do leave* other hives, after being deprived of their stores; but, as if nothing had happened to them, continue day by day to accumulate fresh treasures, the quantity of which has astonished the beholders, and not only the quantity, but the quality also.

That my boxes do not admit of improvement is more than I assert; but having worked them most successfully for many years, and knowing that several other persons, following my directions, have succeeded with them as well as myself, and far beyond their most sanguine expectations, I do flatter myself that the principle of managing Bees after my plan is right.

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The plates here presented to my readers exhibit a set of my collateral Bee-boxes open, and every compartment exposed to view, especially to the view and for the examination of experienced workmen. I make use of the word *experienced*, because the better the boxes are made, the more certain will the apiarian be of success in the management of his Bees in them.

There has been some difference of opinion as to the most suitable dimensions for Bee-boxes. I approve of and recommend those which are from eleven to twelve inches square inside, and nine or ten inches deep in the clear.

The best wood for them is by some said to be red cedar; the chief grounds of preference of which wood are—its effects in keeping moths out of the boxes, and its being a bad conductor of heat. But of whatever kind of wood Bee-boxes are made, it should be well seasoned, perfectly sound, and free from what carpenters term *shakes*. Good, sound, red deal answers the purpose very well, and is the sort of wood of which most of my boxes have been made hitherto. The sides of the boxes, particularly the front sides, should be at the least an inch and a half in thickness; for the ends, top,

and back-part, good deal one inch thick is sufficiently substantial; the ends, that form the interior divisions and openings, must be of half-inch stuff, well dressed off, so that, when the boxes and the dividing tins are closed, that is, when they are all placed together, the two adjoining ends should not exceed five-eighths of an inch in thickness. These communication-ends, the bars of which should be exactly parallel with each other, form a communication, or a division, as the case may require, which is very important to the Bees, and by which the said boxes can be immediately divided without injuring any part of the combs, or deluging the Bees with the liquid honey, which so frequently annoys them, by extracting their sweets from the piled or storified boxes.

This is not the only advantage my boxes possess: the receptacles or frame-work for the ventilators, which appear upon each of the end-boxes,—the one with the cover off, the other with it on—must be four inches square, with a perforated, flat tin of nearly the same size, and in the middle of that tin must be a round hole, to correspond with the hole through the top of the box, and in the centre of the frame-work just mentioned, an inch in diameter,

to admit the perforated, cylinder, tin ventilator, nine inches long. This flat tin must have a smooth piece of wood well-made to fit it closely, and to cover the frame-work just mentioned, so as to carry the wet off it, then placing this cover over the square, perforated tin, your box will be secure from the action of wind and rain. The perforated cylinder serves both for a ventilator, and also for a secure and convenient receptacle for a thermometer, at any time when it is necessary to ascertain the temperature of the box into which the cylinder is inserted. Within this frame-work, and so that the perforated, flat tin already described may completely cover them, at each corner make a hole with a three-eighths centre-bit through the top of the box. These four small holes materially assist the ventilation, and are, in fact, an essential part of it.

We next come to the long floor, on which the three square Bee-boxes, (A. C. C.), which constitute *a set*, stand collaterally. This floor is the strong top of a long, shallow box, made for the express purpose of supporting the three Bee-boxes, and must, of course, be superficially of such dimensions as those boxes, when placed collaterally, require; or, if the

Bee-boxes project the eighth part of an inch over the ends and back of this floor-box, so much the better; because in that case the rain or wet, that may at any time fall upon them, will drain off completely. For ornament, as much as for use, this floor is made to project about two inches in front; but this projection must be sloped, or made an inclined plane, so as to carry off the wet from the front of the boxes. To the centre of this projecting front, and on a plane with the edge of the part cut away for the entrance of the Bees into the pavilion, is attached the alighting board, which consists of a piece of planed board, six inches by three, having the two outward corners rounded off a little. The passage from this alighting-board into the pavilion, (not seen in the plate, it being at the centre of the side not shown) is cut, not out of the edge of the box, *but out of the floor-board,* and should be not less than four inches in length, and about half an inch in depth; or so as to make a clear half-inch-way under the edge of the box for the Bee-passage. I recommend this as preferable to a cut in the edge of the box,—because, being upon an inclined plane, if at any time the wet should be driven into

the pavilion by a stormy wind, it would soon drain out, and the floor become dry; whereas, if the entrance-passage be cut out of the box, the rain that may, and at times will, be drifted in, will be kept in, and the floor be wet for days, and perhaps for weeks, and be very detrimental to the Bees. In depth the floor-box, measured from outside to outside, should be four inches, so that, if made of three-fourths inch deal, there may be left for the depth of the box-part full two inches and a half. Internally it is divided into three equal compartments, being one for each Bee-box: admission to these compartments, or under-boxes, is by the drawer and drawer-fronts, or blocks, which will be described presently.

The bottom, or open edge of each of the boxes, (A. C. C.) should be well planed, and made so even and square that they will sit closely and firmly upon the aforesaid floor, and be as air-tight as a good workman can make them, or, technically expressed, *be a dead fit* all round. In the floor-board are made three small openings, i. e. one near the back of each box. These openings are of a semi-lunar shape, (though any other shape would do as well) the straight side of which should

not exceed three inches in length, and will be most convenient if made parallel with the back-edge of the box, and about an inch from it. They are covered by perforated, or by close tin-slides, as the circumstances of your apiary may require. The drawer (G.) the front of which appears under the middle box, is of great importance, because it affords one of the greatest accommodations to the Bees in the boxes. In this drawer is placed, if necessity require it, a tin made to fit it, and in that tin, another thin frame covered with book-muslin, or other fine strainer, which floats on the liquid deposited for the sustenance of the Bees. Here, then, you have a feeder, containing the prepared sweet, in the immediate vicinity of the mother-hive, and without admitting the cold or the robbers to annoy the Bees. When you close the drawer thus prepared with Bee-food, you must draw out the tin placed over the semi-lunar aperture, which will open to the Bees a way to their food in the drawer beneath. The heat of the hive follows the Bees into the feeding apartment, which soon becomes the temperature of their native hive. Here the Bees banquet on the proffered boon in the utmost security, and in

the temperature of their native domicile. Under such favourable circumstances it is an idle excuse, not to say—a want of humanity, to suffer your Bees to die for want of attention to proper feeding.

I now come to notice the use of the block-fronts on each side of the feeding-drawer, marked G. These two block-fronts answer many good purposes, and furnish the apiarian with several practical advantages: first, in the facility they afford of adding numbers to the establishment, as occasion may require, which is done without the least inconvenience or trouble to the apiarian, and without the least resentment from the native Bees; second, in affording to the Bees a place of egress when you are about to take from them one of the end-boxes; third, in the effectual and beautiful guard they furnish against robbers: for instead of the solid block, seen in the plate, a safety-block (of which a description will be given presently) may be substituted, which is so contrived that ten thousand Bees can with ease leave their prison and their sweets in the possession of the humane apiarian, without the possible chance of a single intruder forcing its entrance to rob the magazine or to annoy

the apiarian. Perhaps this is the most pleasing part, and the most happy convenience attached to the boxes. Its origin was this: Whilst explaining to some scientific gentlemen at the National Repository the method to be pursued in the management of Bees in a set of collateral-boxes,—and, in particular, the manner of taking off a box of honey, it was objected—that, on removing the block-front and withdrawing the tin that opens a communication into the box above, though a passage would thereby be opened for the imprisoned Bees to get away, it would at the same time afford an opening and an opportunity—nay, be a sort of invitation for the Bees of other hives,—for strange Bees and robbers to get in, annoy, and destroy the native Bees, then subdued by having been imprisoned, and to plunder and carry away their treasures.

This objection, to persons unskilled in Bee-matters, may, I grant, appear to be plausible—nay, reasonable: but every *practical apiarian*, who has taken off two or three end-boxes of honey, knows very well that there is not the least danger to be apprehended from robbers or marauders during the short time that the liberated, native Bees are hurrying away as

fast as they can get. I have never witnessed any thing like an attempt to besiege and rob a box so situated. Were, however, the communication to be left open for any considerable time after the Bees have departed, I have no doubt that, if not discovered by Bees belonging to other hives, it (the vacated box) would be re-entered by its own Bees, and by them be soon entirely emptied of its honey. Nothing, however, but down-right carelessness on the part of the operator will ever subject a box of honey to a visitation of this description. But, notwithstanding the conviction in *my* mind that the above-stated objection is *in fact* groundless, I set my wits to work to answer it in a way more satisfactory to the highly respectable persons who raised it, and, if by any means I could, to obviate it entirely. It did not cost me much mental labour to invent —*a safety-block*,—nor does it require much manual labour to make one.

A safety-block must be made to fit the place of the common block, and may be cut out of a piece of half-inch deal board, having one side planed off so as to leave the bottom-edge less than one-fourth of an inch in thickness; then with a three-eighths-inch centre-bit cut

as near the lower, that is—the thin edge, as you can, a row of holes. Ten holes in a length of six inches will allow a convenient space between each hole. Next, over each of these small holes, suspend a piece of talc, cut of a proper size for the purpose, by a thread of silk, and make that thread fast round a tiny brass nail above. The talc, which is a mineral substance as transparent as glass, and much lighter, and on that account much better than glass, thus suspended over each hole, is easily lifted and passed by Bees from within, but is heavy enough to fall again as soon as a Bee has made its exit, and forms an effectual bar or block against the entrance of Bees from the outside. A block of this description may be had for a trifling expense, and is recommended to all such inexperienced and timid—timid because inexperienced—apiarians, as are apprehensive of being annoyed by intruders when they are taking off a box of honey. Though this safety-block rather impedes the escape of the Bees, it has nevertheless a pretty appearance when it is neatly made,—and it is amusing enough to see the beautiful, little creatures pushing open first one little trap-door and then another, popping out their heads,

and then winging their flight to the entrance of the pavilion. After all, though it certainly is a complete *safety-block*, and was invented to obviate a groundless objection, it is more an article of curiosity than of real usefulness.

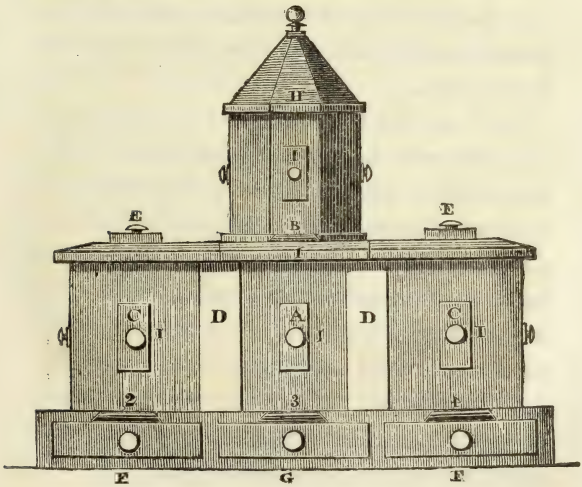
Lastly, I have to notice the security which the under-box or frame gives to the stability of the three upper boxes,—the firmness with which it supports them,—and the dry and comfortable way in which the Bees by it are enabled to discharge their dead, and other superfluities of the colony, without their being exposed to the cold atmosphere of an autumn or a spring morning.

The octagon-box, marked H, is a covering for the bell-glass, marked B, which is placed on the middle box, or seat of nature. It matters not of what shape this covering is, because any covering over the glass will answer the same purpose, provided the under-board of it is wide enough to cover the divisional openings, and to throw off the wet. I choose an octagon because of the neatness of its appearance.

In endeavouring to recommend these Bee-boxes as worthy of general adoption, in order to succeed in my object, it is undoubtedly

necessary that the parts and construction of them, and of every thing pertaining to them, be fully explained and clearly understood: I therefore proceed to give another view of them.

In the former plate they are exhibited as open, or detatched and apart from each other: in the following one they are represented as closed and standing together, as when stocked with Bees, and in full operation in an apiary: in both it is the back of the boxes that is presented. With the exception of the alighting-board, the front is quite plain, being without window-shutters in the boxes, and without drawer and block-fronts in the under-board.



In this plate the engraver has made the floor-box to extend beyond the ends of the C. C. boxes; but, as has already been observed, and for the reason before given, it is better that the floor-box be made so that those (C. C.) boxes project a little over the ends and also over the back of the floor.

EXPLANATION OF THE REFERENCES TO THE DIFFERENT PARTS OF A SET OF COLLATERAL-BOXES.

A. is the pavilion, or middle-box, which may be most easily stocked by a swarm of Bees, just as a cottage-hive is stocked.

B. is the bell-glass in the first plate,—in the second, it only points to the place where the glass stands.

C. C. are the collateral, or two end-boxes.

D. D. are neat mouldings, about three inches wide, made of three-fourths-inch deal, and are so fastened to the middle-box in front, (i. e. the side not here shown) as well as at the back, that an inch and a half of each may project beyond each corner of that box, and form a cover and protection for the edges of the dividing-tins, and also for the four seams, or joints, necessarily made by placing the end-boxes against the middle one.

E. E. are the frame-work and covers of the ventilation and thermometer.

F. F. are the block-fronts
G. is the feeding-drawer } already described.
H. is the octagon-cover

I. I. I. are the window-shutters, five inches by four, or larger or smaller, as fancy may direct: these shutters open as so many little doors by means of small brass-joints, and are kept fast, when closed, by a brass-button set on the box.

1, 2, 3, 4, are so many tin slides, to cut off, or to open, as the case may require, the communications between the pavilion and the bell-glass, between the pavilion and the feeding-drawer, and between the end-boxes and their under-boxes.

For a Bee-passage between the pavilion and the bell-glass, is cut, in the centre of the top of the pavilion, a circular hole, an inch in diameter, and from the edge of that circular hole are cut four or six passages, just wide enough to allow the Bees space to pass and re-pass. These lineal cuts must of course terminate within the circumference of the circle formed by the edge of the bell-glass that is placed over them.

Perhaps it may be said,—in fact, it has been said—that these boxes are in reality nothing more than a common cottage-hive. Be it so: but it is an *improved* cottage-hive, made convenient by being divisible, and by having its parts well arranged. The middle-box, or department, marked A, is, however, square, and not round, like the common straw-hive. But beyond this one box the comparison cannot easily be carried; the common straw-hive possesses no such conveniences and accommodations as those afforded both to Bees and Bee-masters by the end-boxes of my hive.

In the middle-box the Bees are to be first placed: in it first they skilfully construct their beautiful combs,—and, under the prerogative of one sovereign—the mother of the hive—carry on their curious works, and display their astonishing, architectural ingenuity. In this box the regina of the colony, surrounded by her industrious, happy, humming subjects, carries on the propagation of her species,—deposits in the cells prepared for the purpose by the other Bees, thousands upon thousands of her eggs, though she deposits no more than one egg in a cell at one time: these eggs are hatched and nursed up into a numerous progeny

by the other inhabitants of the hive. It is at this time, viz. when hundreds of young Bees are daily coming into existence, that my collateral boxes are of the utmost importance to the Bees domiciled in them: for when the young larvæ are perfected upon the cottage plan, a swarm is the necessary consequence. The Queen, with thousands of her Bee-subjects, leaves the colony, and seeks another place in which to carry on her astonishing labours. But as swarming may, by proper precaution and attention to my mode of management, generally be prevented, it is manifestly a good thing to do so; for the time necessarily required to establish another colony, even supposing the cottager succeeds in saving the swarm, would otherwise be employed in collecting the pure sweets, and in enriching the old hive. Here, then, is one of the advantages of my plan, viz. *the prevention of swarming*. When symptoms of swarming begin to present themselves, and which may be known by an unusual noise in the hive or box (for it is of Bees in boxes that I am now treating), and by the appearance of more than common activity among the Bees; when these symptoms are apparent, then the Bee-master may conclude

that more space is required. At this period, therefore, he should draw out the sliding-tin, marked 1, from under the bell-glass, which simple operation will immediately open to the Bees a new room—a palace—which they will adorn, and fill with their sweets as pure as the crystal stream. But if by mistake the manager should draw up either of the collateral-slides, which divide the end-boxes from the pavilion, the Bees in that case will refuse to go up into the glass, and will commence their works in the collateral-box opened to them, in preference to the elevated glass; so well aware are these matchless insects of the inconvenience attending the carrying of their treasures into an upper room, when a more convenient store-house is to be had in a lower one. The natural movements of Bees have demonstrated to me this fact by more than a thousand trials: year after year I have made this experiment to my entire satisfaction. The natural movements of the Bees also suggested to me the idea of the utility of ventilation, and that by its influence their works might be both divided and purified; and that a place of safety might still be preserved for the Queen in the pavilion. She wants a certain

situation in which to carry on the work of propagating her species. Like the fowls of the air, she will not, if she can avoid it, propagate her young whilst under the observation and influence of man: she, therefore, prefers the middle-box for her work of propagation; as well on account of its privacy, as because the ventilation of the end-boxes so cools their temperature, that they are not the situation nature requires to bring the young larvæ to perfection; yet they can be kept at such a temperature as to make them desirable store-rooms for the Bees' treasures. By this mode of management we prevent the necessity of swarming; and behold the grandest chemists in the world, and stores after stores of their pure treasure, unadulterated by the necessary gathering of immense quantities of farina for the young larvæ, which we see in the piling system, as well as in the common cottage-hive; but this is all carried into the immediate vicinity of the seat of nature, the place where it is wanted.

When the glass is nearly filled, which in a good season will be in a very short space of time, the Bees will again want accommodation. Previously, however, to drawing up the

tin-slide to enlarge their crowded house, the manager should take off the empty end-box he intends to open to them, and smear or dress the inside of it with a little liquid honey. Thus prepared, he must return the box to its proper situation, and then withdraw the sliding-tin between it and the pavilion, or middle-box, and thereby enlarge the Bees' dominion, by opening an end-box to them, which will produce the greatest harmony in the hive. The Bees will immediately commence their operations in this new apartment. This simple operation, *done at a proper time*, effectually prevents swarming; and by it the Queen gains a vast addition to her dominions, and consequently additional space for the population of her enlarged domicile. There is now no want of store-house room, nor of employment, for our indefatigable labourers. And while the subjects are employed in collecting, and manufacturing (if I may so say) their various materials, the regina is engaged in carrying on the great, first principle of nature—the propagation of her species. This she does in the department (A.) re-filling with her eggs the cells which have been vacated by the young larvæ. When, however, her next new progeny are about

to be brought into life, the Bee-master must draw out the other tin-slide, and thereby open a communication to the other empty apartment, and so make a further addition to the Queen's realm; which the new, and even veteran labourers, will presently occupy, and set about improving and enriching their again enlarged commonwealth. No sooner have the Bees finished their operations in the several compartments of their box-hive, which may be ascertained by looking through the little windows at the back and ends of the boxes, than the Bee-master gently puts in the tin-slide (l.) lifts up the lid of the octagon-box or cover (H.) and takes off the bell-glass, filled with the purest and most perfect honey. Before, however, he endeavours to take away the glass, it is necessary that he should cut through between the bell-glass and the box, with a fine wire, in order that the tin may the more easily slide under the full glass of honey; when this is done, he may take off the full glass and replace it with an empty one. He must then draw out the tin-slide (l.) and so on for ever.

The operation of taking off a glass, or a box, of honey, may be best performed in the middle of a fine, sunny day; and in taking

off a glass, the operator, having put in the tin-slide (1.) as already directed, should wait a few minutes, to see whether the Bees made prisoners in the glass manifest any symptoms of uneasiness; because, if they do not, it may be concluded that the Queen-bee is amongst them; and in that case it is advisable to withdraw the slide (1.) and to re-commence the operation another day. But if, as it generally happens, the prisoners in the glass should run about in confusion and restlessness, and manifest signs of great uneasiness, *then* the operator may conclude that all is right, and, having taken off the octagon-cover, may envelope the glass in a silk handkerchief, or dark cloth, so as to exclude the light, remove it with a steady hand, and place it on one side, or so that the Bees may have egress from it, in some shady place, ten or fifteen yards from the boxes, and the Bees that were imprisoned in it will in a few minutes effect their escape, and return with eagerness to the pavilion and their comrades.

And what may be done with B, may also be done with either of the C. C. boxes, as occasion requires. It may not, however, be amiss to be more explanatory of the mode of

taking away the treasures of the Bees in the side-boxes. It will be necessary to examine minutely the state of your boxes, particularly when the whole of your colony is full of the Bees' works. When the tin is put down to divide an end-box from the mother-hive, you, no doubt, make many prisoners; to prevent which, the night before separating an end-box from a middle one, lay open the ventilator, which will not only lower the heat of the box, but will admit the atmospheric air, which naturally causes the Bees to leave that apartment, and to draw themselves into the middle box—their native climate; when this is done, you may put down the tin-slide (D.) as already directed, and let your Bees remain fifteen or twenty minutes in total darkness: then open the windows of the box you are about to take off, and if the Queen-bee is not within that box, the Bees that are in it will show a great desire to be liberated from their disagreeable confinement, by running about in the most hurried, agitated, and restless manner. But should the Queen-bee be there, you will then find the Bees show no desire to leave her;—the commotion will appear in the middle-box. Under such circumstances, which sometimes

happen, you must act with caution; for were you to open the egress from the box, that is, the block (F.) and tin-slide (2. or 4. as the case may be) to permit their departure, very shortly would the whole of the working Bees join their sovereign in the box you intended to take; and this would be a great disappointment and complete puzzle to the Bee-master, not thoroughly acquainted with the moves of, or proper mode of managing, his valuable hive. To me such an occurrence would be a repetition only of a demonstration of facts—of pleasures unspeakable, in beholding the grand works of nature, the noble influence of her majesty—the Queen of the Bees.

When, however, you do find the Queen in the box you are about to take off, is it not easy to draw the tin-slide up again? Certainly it is easy to draw up the dividing-tin. Do so, then, and that done, the Queen-bee will readily embrace the opportunity of leaving the place of her confinement; and then, having put down the dividing-tin, you will presently be in a situation to accomplish your object. You will soon see the Bees running to and fro upon the windows in the box you are about to take off, and when you thus find them anxious to leave

your box of honey, close the windows, and you have then only to open an egress by withdrawing the tin, No. 2. or 4. as your box may require; the Bees finding an aperture, with light to direct their departure, will immediately embrace the opportunity of regaining their liberty, will fly away from their prison, and join their fellow-labourers at the entrance of the mother-hive. In a few minutes you will be in possession of a box of honey, and all your Bees will be in safety and harmonizing with their beloved parent—the Queen of the hive. Take from them the box your humanity entitles you to, minding that the tin-slide is safe to the middle-box. You will then empty the full box, and return it empty to its former place; then draw up your tin, and you again enlarge their domicil, having gained a rich reward for your operation, at the expense of their labour. A child of twelve years of age may be taught to do this without the least danger; there need no Bee-dresses,—there needs no fumigation of any sort. It is a natural movement for the welfare of these worthies, that prevents their swarming, and at once secures to the sovereign Queen of Bees her rightful throne. Reader, this declaration

is founded on facts,—on the practical experience of many years. And that you may adopt this principle and mode of managing Honey-Bees, that is, of taking from them their superabundance of treasure, and preserving your Bees uninjured, and, if you can contrive it, improve upon the instructions here given you, and upon the example here set you, is my hearty wish, for my country's welfare, and for the welfare of my admired, nay, my *beloved* BEES.

Should it, however, so happen, as it sometimes may, owing to a variety of causes, such, for instance, as the negligence, or unskilfulness, or unavoidable absence of the Bee-master at a critical time, or from any other cause, should it, I say, so happen that the pavilion, or middle-box, should swarm, take such swarm into one of the end-boxes, prepared for such an event, by merely making an entrance to it, at or as near as possible to the corner farthest from the entrance into the middle-box; and before this new entrance fix a small alighting board. The swarm will thus become a family of itself, and as much a stock pro tempore, as if it were placed on a separate stand, provided the dividing-tin, which separates the middle-

box from that in which the swarm is put, be carefully adjusted, and made perfectly tight and secure, so that a Bee cannot pass from one box to the other. To this material point the apiarian will necessarily attend when he first removes the end-box in order to put the swarm into it. In the evening place the box containing the swarm on its floor, just where and as it was before it was taken off. Let the Bees thus managed work two or three weeks, or as the nature of the season may require,—I mean—until the end-box appears to be pretty well filled with combs. Then close up the exterior entrance of the collateral-box containing the swarm of Bees, and draw out the sliding-tin which hitherto has separated the two families or colonies, and the Bees will unite, and become one family. The apiarian will likewise witness with pleasure the effect of ventilation in the hive; for as soon as the Bees have deposed one of the Queens, and the end-box has been cooled by means of the cylinder-ventilator, he will discover that the combs will be presently emptied of every material necessary for the support of the young larvæ; so that the combs, that had been so recently constructed for a seat of

nature, soon become receptacles for pure honey, and the numerous Bees become the subjects of one sovereign in the middle-box.

This is a neat method of re-uniting a swarm to its parent-stock; and the operation is so easy that the most unpractised apiarian may perform it without subjecting himself to the slightest danger of being stung by the Bees. It can however only be practised with Bees in boxes. Another and a more prompt method of returning a swarm to its parent-stock, and which is practicable with swarms from cottage-hives, as well as with those from boxes, is the following.

After the swarm has been taken in the usual way into an empty box, or into a straw-hive, and suffered to settle and cluster therein for an hour or two, gently and with a steady hand take the box or hive, and, having a tub of clean water placed ready and conveniently for the purpose, with a sudden jerk dislodge the Bees from the box or hive and immerse them in the water. Let them remain therein two or three minutes: then drain it off through a sieve, or other strainer, and spread the now harmless Bees—harmless, because apparently half-drowned, upon a dry towel or table-cloth,

and search for and *secure the Queen.* This done, and which may very easily be done, place a board or two in a slanting direction from the entrance of the parent-hive to the ground; upon this lay the cloth on which are your immersed Bees, and spread them thinly over it, in order that they may the sooner become dry; and, as they become dry, you will with pleasure see them return to their native-hive, which they will be permitted to enter without the slightest opposition from the Bees already therein.

By this operation not only are the immersed Bees cooled, but their re-union with those already in the hive cools them also, and considerably lowers the temperature of the whole stock. With a late swarm from any sort of hive, as well as with an accidental swarm from boxes, this is a good method to be adopted; and, if the apiarian possess sufficient coolness and dexterity to perform it cleverly, it is a practice I would recommend whenever it is advisable to return a swarm to its native-hive. When a swarm has thus been returned to a cottage-hive an eke should be added forthwith.

Before I further explain the nature of my collateral Bee-boxes, I shall briefly express my

desire that my readers will attend particularly to the discovery of the effects of ventilation. I have been asked—"Of what use is ventilation in the domicil of Bees?" I answer—one of its uses has already been described, and much more of its use, I may say, of its necessity, in the humane management of Bees will be told presently. Many treatises on the management of these valuable insects have appeared, but in none of them do I find any allusion to this important point—important in my practice at least, and essentially necessary in it. Therefore—

> To works of Nature join the works of man,
> To show, by art improved, what Nature can.
> Nature's great efforts can no further tend,
> Here fix'd her pillars, all her labours end.
>
> DRYDEN.

Perhaps the divided labour of the Honey-Bees was anticipated by the author of these lines: but, be that as it might, I, in my turn, will ask—How can we preserve the Bees uninjured, divide their works, and take away their superabundant treasure, without the influence of ventilation? I think it is impossible. A lesson, a true lesson from nature, has demonstrated this fact to me, and twelve years' constant labour and attention to this important

subject have put into operation my plans for the welfare of that wonderful insect—the sovereign Queen of Bees. Well might Dr. Bevan say—

> First of the throng, and foremost of the whole,
> One stands confess'd the sovereign and the soul.

Curious facts respecting this extraordinary creature are before me, which have been ascertained and proved by means of my observatory-hive. This hive is unknown in any work hitherto published on the interesting subject of Bee-management: and with reference to it I may observe—that when a new principle is discovered by studying nature, such principle will seldom fail to produce effects beneficial in proportion to its being understood and skilfully applied. So simple and so rational (if I may so say) is my observatory-hive, that it cannot but be approved, when it is once understood, by the followers of my apiarian practice. Be my humble theory what it may, it hath truth for its foundation; and by perseverance and industry I flatter myself I shall materially improve, if not bring to perfection, the cultivation and management of Honey-Bees, merely by pointing out *how* the produce of their labour may be divided, *how* a part thereof may be taken away, a

sufficiency be left for the sustenance of the stock, and *how* their lives may be preserved notwithstanding.

Much has been said against the probable results of this practice: but facts are stubborn things; and luckily for me and my mode of Bee-management, I have an abundance of the most incontrovertible facts to adduce, which will, I think and hope, convince all those who have heretofore entertained doubts upon the subject.

The first movement in my apiarian practice commences with the pavilion of nature. This pavilion, which is equivalent to a cottage-hive, is the subject of my present observations and explanation.

I say, then,—disturb not this hive—this pavilion of nature: weaken not its population; but support its influence, and extend to it those accommodations which no practice, except my own, has yet put into operation, or made any adequate provision for. This humane practice partakes not of the driving, nor of the fumigating, nor of the robbing system. It is a liberal principle of Bee-cultivation founded on humanity. And it is by such practice that we must succeed, if we hope to be benefited by the culture of Honey-Bees.

CHAPTER III.

VENTILATION.

To ascertain the degree of heat in a colony of Bees, and to regulate it by means of ventilation, as circumstances may require, recourse must be had to the use of the thermometer, as will be explained presently. But here I would ask my worthy Bee-keepers, whether, in the course of their experience, they have at any time beheld a honey-comb suspended beneath the pedestal of any of their hives—a circumstance that not unfrequently occurs under old stools? The beautiful appearance of a comb suspended in such a situation is, as it were, the very finger of Providence, pointing out the effects of ventilation, and teaching us by an example the necessity there is for it in a crowded, busy hive. Behold the purity of such a comb; examine the cause of that

purity, and you will find that it is owing—solely and undoubtedly owing—to the powerful influence of VENTILATION.

An occurrence of this description, I mean—the discovery of a beautiful comb suspended, as just described, having excited my curiosity and my admiration, led me to inquire into the cause of it, and to study to discover, if by any means I could, why my skilful, little Bees should have constructed their combs in such a situation. My observations soon satisfied me that one of these two causes, viz. either a want of room in the hive,—or a disagreeable and oppressive heat in it,—or, most probably, a combination of these two causes, had rendered it necessary for them, if they continued working at all, to carry on their work in that singular manner. My next step was to endeavour to prove the truth of my reasonings and conclusions, in which, I flatter myself, I have fully succeeded, after no inconsiderable labour, and many contrivances to accommodate the Bees with additional room, as they have had occasion for it, and after repeated experiments to keep such room, when added, at a temperature agreeable to them by means of ventilation. In short, my

COLLATERAL-BOXES and VENTILATION are the results of my studies and experiments on this point of apiarian science.

There are few persons, who are managers of Honey-Bees under the old hive system, who, if they have not seen a comb constructed and suspended in the manner just described, have not, however, beheld these little creatures, when oppressed with the internal heat of their crowded domicil, and straitened for want of room in it, unhappily clustering and hanging at the door, or from and under the floor-board of their hive, in a ball frequently as large as a man's head, and sometimes covering all the front part of it, for sixteen or twenty days together; and this, be it remarked, at the season of the year which is the most profitable for their labours in the fields and among the flowers. During this distress of the Bees in, or belonging to, such a hive, their labours are of necessity suspended,—their gathering of honey ceases,—ceases too at the very time that that saccharine substance is most plentifully secreted by the vegetable world. And—why? Because they want an enlargement of their domicil,—an extension of the dominion, or (if it may be so termed) of the territory of the

Queen; by which enlargement swarming is superseded, and the Royal Insect relieved from the necessity of abdicating her throne, retains it, continues and extends the propagation of her species, and of course increases the busy labours of her innumerable subjects. *This accommodation is provided for Bees in my collateral-boxes.*

Ancient as well as modern Bee-keepers have frequently adopted the plan of eking, that is—placing three or four rounds of a straw hive (called an eke) under their hives. This method of enlarging a hive does in many instances prevent swarming during that one season. Notwithstanding, from all that I can see in it, it tends only to put off the evil day, and to accumulate greater numbers of Bees for destruction the following year. This is certain, because on minute examination of the pavilion of nature, we find an increase of wealth, as well as an increase of numbers in the state; but there is no provision or contrivance in the common hive for dividing the wealthy produce of the labours of those numbers: eking will not do it,—eking enlarges the hive, and that is all it does; consequently to get at their honey, the necessity for destroying

the Bees follows, and the suffocating fumes of brimstone at length bring these worthies to the ground—to the deadly pit in which they are first suffocated, then buried, and are, alas, no more! a few minutes close the existence of thousands that had laboured for their ungrateful masters; and their once happy domicil becomes a scene of murder, of plunder, and of devastation, which is a disgrace to Bee-masters, and ought by all means to be discountenanced and discontinued. Assuredly Bees are given to us by the gracious Giver of all good things for a better purpose than that of being destroyed by thousands and by millions. Are we not instructed by the sacred writings to go to the Bee and to the ant, and learn wisdom? We are not told, neither are we warranted, by this language, to go and destroy them and their works,—to disobey the commands of their, no less than of our Maker, who has given Bees to us for our edification and comfort, and not wantonly to commit a species of murder, in order to procure their delicious treasure. Nor is there the slightest necessity for destroying Bees in this cruel manner, when an act of humanity will obtain for us their purest honey, and secure to us their lives for future and

profitable labour. Surely, then, an act of humanity to Bees cannot be displeasing to any one, especially when we are taught by the beneficial results of our experience, that their lives *may be preserved,* and their labours for us thereby continued.

Apiarian reader, take this subject into thy serious consideration: in the busy hive behold the curious works of God's creatures—the Bees: misuse not, then, the works of his hands; but improve upon this lesson from nature: and for a moment pause before thou lightest the deadly match,—before thou appliest it with murderous intent to the congregated thousands in thy hive.

It's he who feels no rev'rence for God's sacred name,
That lights the sulphur up to cause the dreadful flame:
Alas! I think, viewing the monster's busy hand
Taking the dreadful match, I see a murderer stand.

These insects' indefatigable labours alone should humanize our feelings for them, and induce us to spare their lives, for the rich treasures which they first collect, and then unresistingly yield up to us when operated upon by the healthy influence of ventilation.

Why should we lay the axe to the root of the tree that produces such good fruit? Rather

let us gather from its pure branches, and let the root live. Examine the nature and effects of my Bee-machinery, and you will discover its utility and its value in the management of Bees. By the proper application of that machinery you may instantaneously divide the treasures of the Bees, even in the most vigorous part of their gathering season, without the least danger to the operator, and frequently without the destruction of a single Bee. Is not this, then, a rational and humane practice? I trust it wants only to be properly understood in order to be universally adopted.

Again: Does not she that is a kind mother know the wants and desires of her children? Take the lovely offspring from its mother's care and protection, and imprison it before her eyes, and will she not impatiently cry aloud for its release and restoration to liberty? and will not the child's screams show its affection for its fond parent? and when its liberty is restored, does not consolation quickly follow? The lost child being once more under its mother's care, both mother and child are happy. Similar facts are exemplified by the mother of the hive, who loves her multitudinous offspring, and lives in harmony and

affection with them. She evidently dislikes a separation from her subjects, who seem to be, and doubtless are, most devotedly attached to her. And when, on taking off a glass or a box, they are divided only for a few minutes, we witness their sorrow, and hear their lamentations in the hive,—the Queen-mother calling for her children, anxious on their part to be released; and as soon as an opportunity is afforded them of effecting their escape, they embrace it,—the moment they feel their liberty, they gladly take advantage of it, and return to the pavilion in multitudes, so that in a short time tranquillity is restored, and peace and happiness are again enjoyed by the previously unhappy mother of the hive,—her subjects crowd round her, and the place that had lately been their prison soon becomes their palace, and a magazine for future treasure, which the humane apiarian will again be entitled to.

Much has been said on the piling or storifying mode of managing Bees; and I admit that there are advantages in it which we do not meet with in the cottage-hive system. It is, notwithstanding, imperfect in the design,—it is founded in error,—in practice it is liable

to many difficulties,—and it is particularly disadvantageous to the labours of these valuable insects, as will be more fully shown when I come to state my objections to it.

We have only to study the nature and habits of Bees, and to watch particularly the desires of these indefatigable creatures. They alone will teach us the lesson. But follow them through their movements during a summer's day, and you will behold them, as it were, pitifully asking for the assistance of man, according to the varying state of the thermometer.

CHAPTER IV.

THERMOMETER.

As I have been frequently asked to explain the utility of ventilation in a hive or colony of Bees, so have I as frequently been asked, sometimes with civility and politeness, sometimes jeeringly and in contempt,—"What has the thermometer to do with Bees?" I answer —We shall see presently; and I trust, see enough to convince the veriest sceptic on the subject, that the thermometer is an instrument that is indispensably necessary in the management of Bees according to my plan. Such inquirers might as reasonably ask what the mainspring of a watch has to do with the movements of that machine? Without the mainspring the watch would not work at all; and without the thermometer we cannot ascertain with any degree of accuracy the interior

temperature of the hive; the knowledge of which temperature is of the utmost consequence in the humane management of Honey-Bees. The thermometer is the safest, if not the sole guide to a scientific knowledge of their state and works. To ventilate an apiary or colony of Bees, when their interior temperature is under 60 degrees, would be ruinous to them,—because contrary to the prosperous progress of their natural labours. From upwards of fifteen hundred observations in the summer of 1825, I am fully satisfied on this point. Their nature is to keep up at least that, and sometimes a much higher, degree of temperature by their indefatigable labours; and as the temperature of the hive rises, so does it invigorate and encourage an increase of population, as well as an increase of their treasured sweets. As the hive fills, so will the thermometer rise to 120 and even to 130 degrees, before these worthies will by over-heat be forced to leave their wealthy home. When the thermometer is at the above height, these wealthy colonists will have arrived at the highest state of perfection,—wealthy indeed, every store-house being filled nearly to suffocation with their abundant treasures, and they, as it were, petitioning the

observer of their too-limited store-house for a fresh room. Thus circumstanced then give them a fresh room,—accommodate them with such a store-house as either of my collateral-boxes will and is intended to afford them. *Force them not to swarm:* an emigration from a prosperous colony of half its population cannot fail of being very disadvantageous, both to those that emigrate, who must necessarily be poor, and to those that remain, be they ever so industrious, or ever so wealthy.

When you discover your thermometer rising rapidly, and, instead of standing, as it generally does in a well-stocked colony, at about 80 degrees, rising in a few hours to 90, and perhaps to 96, or even to 100, you may conclude that ventilation is *then* highly necessary. The more you ventilate, when their temperature gets to this oppressive and dangerous height, the more you benefit the Bees labouring under it; for when they find a comfortable temperature within, they enjoy it, and will proceed to fill every vacant comb.

Nature has provided the Queen of Bees with the power of multiplying her species, and of providing against any casualty which in so numerous a state may frequently happen.

That all-seeing eye that neither slumbers nor sleeps, but constantly superintends alike the affairs of insects and of men, has, doubtless, long beheld the shameful neglect of man, which is the main cause of the distress of the hive, and which *forces* it to swarm. Let man, then, remedy the distress and mischief which he occasions, *by preventing it.* It is the Queen-Bee that emigrates; were she not to lead, none would lead; nor would any follow were another than the Queen to lead, to seek and to settle in some place more congenial to them than an over-heated, over-stocked, though rich hive. She well knows she cannot live in a state subjected to a suffocating heat, amidst an overgrown population. So she leaves the royal cradle, impregnated with the royal larva, and withdraws from the hive, reluctantly, one may suppose, though accompanied by thousands of her subjects. The Queen-Bee leads the swarm to seek a place of comfort, and to establish another home, where not one cell nor drop of honey exists.

To establish the truth of these assertions, and to prove the utility of ventilation and of the thermometer, in regulating the degree of ventilation in the management of Bees, I will

now give my reader an account of some interesting experiments that I made in 1826, and then add a few extracts from my thermometrical journal of that summer, which in fact guided me in those experiments, for without the assistance of my thermometer I could not have made them; from which, taken together, it will, I think, be sufficiently evident that ventilation and the thermometer are highly necessary,—are alike important,—in short, are *indispensable* in the humane management of Honey-bees.

On the 26th of June 1826, I suffered a colony of Bees to swarm, in order to prove the truth of the foregoing statements. It was a very fine colony: the thermometer had been standing at 110 for six days previously, in one of the collateral end-boxes; on the eighth day it rose suddenly to 120. I was then forcing my Bees to leave their home; I could have lowered their temperature, and by so doing, I could have retained my worthies in their native boxes: but I was then about to prove a fact of the greatest moment to apiarians. On the ninth day, at half-past twelve o'clock, the finest swarm I ever beheld towered above my head, and literally darkened the atmosphere in the front of my apiary. After remaining about

five minutes in the open air, the Queen perched herself upon a tree in my garden, where she was exposed to the rays of a scorching sun; but her loyal subjects quickly surrounded her, and screened her from its influence. I immediately did what I could to assist my grand prize, by hanging a sheet before it, to ward off the intense heat of the sun. I allowed the Bees to hang in this situation until the evening. During the absence of the swarm from the colony, my full employment was to watch the parent-stock, in order that I might, in the evening, return the Bees of this beautiful swarm to their native hive, which they had been forced to leave. Curiosity and a desire to solve a doubtful problem, for the good of future apiarians, led me to act as already related, at the expense of much inconvenience to the Bees. The remaining Honey-Bees continued labouring during the remainder of the day; and in the evening of that same day, the thermometer was standing at 90 degrees in the old stock; so that the absence of the swarm had lowered the temperature of the pavilion 30 degrees, and I was quite sure I could reduce it in the collateral end-box to that of the exterior atmosphere, which, after the sun had gone down, was only 65.

To effect this, I resolved at once to take off a fine top-glass filled with honey. I did so: its weight was fourteen pounds. This operation reduced the interior heat of the colony to 75. But looking at my grand swarm, and intent as I was upon re-uniting it to the parent-stock, I thought it impossible for the vacant space conveniently to hold all the Bees. I had one, and only one, alternative left,—and that was to take from my colony a collateral-box. I therefore took it; and a most beautiful box it was: its weight was fifty pounds. I immediately placed an empty box in the situation the full one had occupied. I then drew from the side of the pavilion the dividing tin-slide, and the whole of the colony was shortly at the desired temperature of 65, that being the exterior heat of the evening. I was now fully convinced of the propriety of returning the swarm. I commenced operations for accomplishing that object at ten o'clock in the evening, by constructing a temporary stage near the mouth of the parent-stock. I then procured a white sheet, and laid it upon the table or temporary stage, and in a moment struck the swarm from the hive into which the Bees had been taken from the bough in the evening. My next difficulty was to imprison

the sovereign of the swarm; but with a little labour I succeeded in discovering her, and made her my captive. No sooner was she my prisoner than the Bees seemed to be acquainted with her absence. But so near were they placed to the mouth of the parent-stock that they soon caught the odour of the hive, and in the space of about fifteen minutes the whole swarm, save only her majesty, were under the roof of their parent-home. The following morning increased my anxiety about the welfare of my stock. Fearful lest my curious anticipations should meet with a disappointment, at sun-rise in the morning I released from her imprisonment the captive Queen. I placed her on the front-board, near the entrance of her hive, to ascertain, if possible, whether there was within the state one greater than herself. But no visible sign of such being the case presented itself. The influence of the cheery sun soon caused her to move her majestic body to the entrance of her native domicil, where she was met, surrounded, and no doubt welcomed, by thousands of her subjects, who soon conducted her into the hive, and, it may be presumed, re-instated her on the throne, which a few hours before

she had been compelled to abdicate. The Bees afterwards sallied forth with extraordinary alacrity and regularity, and, beyond my most sanguine expectations, filled a large glass with honey in the short space of six days. That glass of honey was exhibited at the National Repository, with a model of my apiary, and was much admired by many of the members and visitors of that noble institution.

I have now to remark, that during the nine days after the swarm had been returned to the parent-stock, the thermometer continued rising until it reached the temperature of 90 within the collateral-box; and on the tenth day, at five o'clock in the morning, I witnessed the grand secret,—I viewed with unutterable delight the extraordinary fact I had been endeavouring to ascertain,—viz.—*two royal nymphs laid prostrate on the alighting-board*, near the exterior entrance of the hive. This circumstance alone convinced me that no more swarming was necessary. I have further to notice, that on the third day afterwards the Bees commenced their destruction of the drones,—which was a satisfactory proof that I had gained my point. That colony has never swarmed since the period I thus first

satisfactorily established the utility of ventilation. And on minutely attending to the extraordinary movements of this my favourite colony, it was not uncommon to notice the most infant appearance of the royal brood lying upon the front-board of the pavilion. So that I am well satisfied that the royal larva is always in existence in the hive, independently of the reigning Queen. Let me not be misunderstood; I do not mean by this expression to assert—that the royal larva exists in the hive without the instrumentality or agency of the reigning Queen;—far from it; for no common Bees can make a sovereign Bee without the egg from the royal body: what I do mean is—that the royal larva is always in existence in a colony of Bees, notwithstanding the existence and presence of a reigning Queen—that the Queen is there, and that the royal larva is there at the same time. In this the wisdom of Providence is manifest; for Nature has *thus* provided that the royal cradle should contain the royal brood, that in case any accident, misfortune, casualty, or necessity, should occasion the absence of the reigning Queen, another may be brought forth. This larva in reserve, as it were, is protected and

reared by the inhabitants with the utmost care, nay, in the absence of the Queen, it is almost worshipped, until it becomes sufficiently matured to take the office and fulfil the duties of its royal predecessor; of course it then reigns supreme,—it is then Queen absolute. On this point I not only coincide in opinion with Thorley, but have seen enough in the course of my experience among Bees to confirm the truth of what I have now stated. As, however, the further discussion of this nice point belongs to the natural history of the Bee rather than to the explanation and inculcation of my practical mode of Bee-management, I refrain from saying more upon it, lest by so doing I should inadvertently excite criticism and controversy. I therefore proceed with my proper subject.

The following thermometrical observations are from the journal before mentioned. The first column gives the day of the month,—the second shows the hour of the day when the thermometer was examined,—and the third is its height at those several times in the colony of Bees upon which my experiments were so successfully made.

1826. April	Hour	Ther.
1	8	35
—	12	46
2	8	38
—	12	43
3	8	32
—	12	37
4	12	37
5		37
6		37
7		37
8	8	40
—	12	45
9	8	46
10	12	58
11	6	46
—	10	58
12	9	52
—	1	64
13	12	64
14		64
15		64
16		64
17		64
18	8	54
19	12	60
20		56
21	12	58
22		50
23		52
24		60
25		65
26		70
27		74

At this state of the Thermometer it is highly necessary to remove your Bees to their summer stand. A great decrease of wealth in the hive will appear daily under this temperature; and feeding should be resorted to until it rise to 50: and if *moderate feeding* be continued until the interior temperature reach 55, it will materially strengthen and invigorate your Bees. And as the thermometer continues to rise, you will find your hive improve. It will soon be in a good state for the spring. Considerable improvements in the combs, and immense gathering of farina, appear to occupy the Bees at this time.

The enemies of Bees are numerous and active in this month. As much as possible guard against their attacks, and be careful to defend your Bees against them. At all times keep their floor-boards clean; and

April	Hour	Ther.
28		68
29		74
30		70
May		
1	5	42
—	9	58
—	12	70
2	5	41
—	8	48
—	12	60
3	5	43
—	12	56
4	7	51
5	7	52
—	4	52
6	7	46
—	1	63
7	5	42
8	12	60
9	1	78
10	12	58
11	12	54
12	12	62
13	12	72
14	12	70
—	1	75
15	5	43
—	12	70
—	2	74
16	12	70

now withdraw the dead Bees, if there should appear to be any lying on the floor-boards or other stands. This will save the live Bees much labour, and may be done very easily.

Swarming may be expected in this month if the hives be rich and the season favourable. To prevent which enlarge your hives, by adding three or four rounds, i. e. an eke, to the bottom of each of them.

If you have the collateral-box hives, you need only draw up the tin-slides, or one of them, as occasion may require. By this means you enlarge the Bees' domicil, without admitting the atmospheric air. This move so pleases these indefatigable creatures, that you will behold at once the utility and humanity of this mode of management.

Should the weather be seasonable, the boxes will now be filled rapidly, and the thermometer

May	Hour	Ther.
17	12	68
18	8	58
19	8	50
—	12	70
20	8	58
—	12	60
21	8	54
—	12	62
—	2	58
22	8	54
—	12	62
—	2	58
23	7	50
—	12	62
—	2	70
24	7	50
—	12	68
—	2	72
25	5	60
—	8	62
—	11	64
—	12	70
—	3	71
26	7	58
—	10	74
—	1	80
—	4	73
27	6	61
—	10	74
—	12	84
—	2	82
—	4	80
—	5	70
28	6	60

will rise quickly. At this period ventilation will demonstrate what has hitherto been a secret of nature;—viz. many young sovereigns in various states of perfection will be seen daily cast out of the hives: and the waxen cells will be extended to the remotest corners of their domicil.

Riches are now rapidly accumulated: and the glasses filled with the purest sweets. Small glasses may be taken off from the inverted hives, if the weather prove fine.

Mem.—A glass of honey, weighing 12 lbs. and a collateral box, weighing 42 lbs. taken.

After taking the above treasure from the collateral-hive, and placing an empty glass and an empty box in the places of those taken off, the interior temperature was reduced to 60 degrees, while the atmosphere was 56 at twelve o'clock at night.

May	Hour	Ther.
28	12	68
—	2	68
—	3	70
—	8	61
29	5	60
—	10	64
—	1	76
—	7	66
—	9	64
30	6	60
—	8	64
—	9	74
—	12	78
31	6	61
—	12	74
—	2	78
—	4	76
June		
1	7	62
—	12	76
2	6	62
—	12	78
—	5	76
3	6	60
—	12	76
—	5	74
4	6	60
—	12	74
—	3	78
5	6	54
—	12	68
6	6	58
—	12	66
—	3	62

The pure honey taken was about one fourth of the weight of the hive, and it will be observed that the heat shows a decrease in the temperature of one fourth.

June	Hour	Ther.
7	6	54
—	2	62
—	4	64
8	6	52
—	12	56
—	4	52
9	7	54
—	12	74
—	2	80

Mem.—A collateral-box of honey, weighing 56 lbs. and a glass on the 10th, weighing 14½ lbs. taken.

June	Hour	Ther.
10	6	60
—	12	74
—	3	72
11	6	60
—	12	70
—	3	76
—	4	78
—	9	70
12	6	64
—	12	74
—	2	82
13	6	60
—	10	82
—	12	90
14	6	64
—	12	84
—	2	88
—	4	86
15	7	66
—	10	70
—	3	88
—	6	80
17	12	70
—	3	88
—	9	68
18	6	66
—	12	70
—	2	76
19	6	60
—	12	70
—	5	66
20	8	60
—	12	70
—	3	76

Mem. — A collateral-box, weighing 60 lbs. and another, weighing 52 lbs. taken.

June	Hour	Ther.
21	7	60
—	12	70
—	3	72
22	9	70
—	12	70
—	3	65
23	6	70
—	12	75
—	3	82
—	6	76
24	7	66
—	8	82
—	3	90
25	6	70
—	10	90
—	12	94
26	7	86

June	Hour	Ther.
26	11	94
—	5	91
—	9	86
27	7	84
—	9	90
—	1	96
28	6	88
—	12	94
—	11	90
29	6	86
—	12	94
—	2	96
—	7	91
30	5	90
—	12	96
—	4	84

July	Hour	Ther.
1	6	94
—	12	96
—	4	94
—	7	94
2	6	94
—	12	96
—	6	94
—	10	94
3	6	94
—	12	96
—	6	94
—	10	90
4	6	92
—	12	94
—	6	90
5	6	90
—	12	92
—	6	90
7	6	90
—	12	92
—	6	92
—	10	92
8	7	92
—	12	92
—	6	90
—	11	90
9	6	88
—	12	92
—	3	82
—	10	80
10	6	78
—	12	80
—	6	82
11	6	80

If the pasturage for Bees begin to fail in your neighbourhood at this time, it is advisable, if it be practicable, to remove your colonies to a better and a more profitable situation. You will be richly rewarded for this attention to the prosperity of your apiary.

July	Hour	Ther.
11	12	84
—	6	86
—	10	90
12	6	86
—	12	80
—	6	76
—	10	74
13	6	74
—	12	76
—	6	76
14	6	76
—	12	78
—	6	76
15	6	74
—	12	76
—	6	78
16	6	78
—	12	86
—	6	88

July	Hour	Ther.
16	10	80
17	6	78
—	10	78
—	12	80
18	6	76
—	12	80
—	6	78
—	10	76
19	6	76
—	12	80
—	6	74
—	10	74
20	6	68
—	12	70
—	6	70
—	10	70
21	6	66
—	12	68
—	4	64

Summary of memorandums of the several deprivations or takings of honey from one set of boxes this season:

May 27.	Glass and box..	54 lbs.
June 9.	Box.....	56 ..
—— 10.	Glass	14½ ..
—— 12.	Box.....	60 ..
—— 13.	Ditto.....	52 ..
Collateral-box.....		60 ..
		296½ lbs.

Did I deem it necessary, I could, from the letters of a variety of highly respectable correspondents, show that the mode of managing Bees in the way, and upon the principles, now explained, has been adopted, and *has succeeded* even beyond the most sanguine expectations of many of my worthy friends and patrons; but I will content myself at present with giving the two following letters, which I have just received from a gentleman in this neighbourhood, whose very name, to all who have any knowledge of or acquaintance with him, will be a sufficient guarantee that his statements are facts. Besides, his letters are a condensed, and I must say—clever

epitome of my practical directions for the management of Bees in my boxes, and may be useful on that account; and moreover, I have, as will be seen presently, his unsolicited authority to make them public, and therefore run no risk of being called to order for so doing.

"Gedney-Hill, 13th July, 1832.

"Dear Sir,

"You will, I am persuaded, excuse me for troubling you with the information that I yesterday took off a fine glass of honey from one of my Bee-colonies. I went to work secundum artem, that is, in one word, *scientifically*, or in four words, *according to your directions;* and I have the satisfaction, nay more,—I have the pleasure to add that I succeeded—I had almost said *completely*, but I must qualify that expression by saying, that *I succeeded all but completely;* for one luckless Bee had the misfortune to be caught between the edges of the dividing-tin and the glass, and to be crushed to death in consequence. Excepting that accident, I believe that not one Bee was injured, nor lost. They left the glass, as soon as I gave them the opportunity

of leaving it, in the most peaceable manner; in a subdued and plaintive tone they hummed round me,—settled upon me,—crept over me in all directions,—but not one of them stung me; in short, they returned to their home without manifesting the slightest symptoms of resentment, and in less than half an hour from the commencement of the operation, *there was not a single Bee left in the glass.* In my eye it is a very handsome glass of honey; it weighs exactly 13 lbs. and it has not one brood-cell in it. I intend to close it up,—to label it,—and to keep it, at least until I get another as handsome. It is a *rich* curiosity to exhibit to one's friends, especially to those who have never seen such a thing.

"On the other side, I send you a fortnight's register of the heights and variations of a thermometer, placed in the colony from which I have taken the glass, and also, of one placed in the shade, and apart from all Bees; from which register you will know, in a moment, whether I have managed my Bees properly. I am willing to flatter myself that I have, and that you will say I have been very attentive indeed.

1832. July	Hour	Ther. in the Colony	Ther. in the Shade	1832. July	Hour	Ther. in the Colony	Ther. in the Shade
1	11	86	66	5	9	88	64
..	6	88	66	6	8	88	64
2	6	90	65	..	2	88	65
..	10	92	66	..	9	88	64
..	1	92	66	7	8	89	64
..	9	86	65	..	9	88	64
3	8	88	65	8	9	86	64
..	1	87	65	..	9	86	64
..	3	89	65	9	7	90	64
..	5	87	64	..	2	89	65
..	9	88	64	..	8	88	66
4	4	88	64	10	8	88	66
..	10	83	64	..	2	89	66
..	12	86	65	11	9	88	66
..	5	90	65	..	2	89	66
..	9	86	64	12	9	90	65
5	7	89	64	..	1	94	66
..	10	88	64	..	9	89	68
..	1	90	65	13	8	89	66
..	5	89	65	..	5	90	66

"In addition to this I could, time and space permitting, tell you from what point the wind blew on each of these days, when it came full in front of my boxes, and when it came upon them in any other direction, when it was high, and when it was otherwise, on what days the Bees were able to get abroad, and also when they were kept at home by rain, or by any

other cause. From these observations of the wind and weather, and particularly from the manner in which the wind is directed towards, or into the ventilators in the boxes, in conjunction with the movements of the Bees, I think I can account pretty satisfactorily for what may appear, at first sight, to be a little contradictory, viz. for the rising of the thermometer in the boxes sometimes when it was falling in the shade; and vice versâ, for its sometimes rising in the shade when it was falling in the boxes. But instead of writing you a dissertation on these subjects, or on any of them, I choose rather to put you into possession of the whole of my Bee-practice, by submitting to your notice a copy, or as nearly as I can make it a copy, of a letter I took the liberty of addressing to the Editor of 'The Voice of Humanity,' in October last, after the appearance in No. V. of that publication, of a respresentation and *imperfect* explanation of your boxes. I was encouraged to write that letter by the following announcement in an article in that No.—'A due regard of rational humanity towards the Bee, though but an insect, we shall feel a pleasure in promoting in the future as well as the present

pages of our publication. This subject has, moreover, a very strong claim, inasmuch as it also exemplifies the grand principle upon which The Voice of Humanity is founded—the true *prevention of cruelty* to animals, by substituting a practical, an *improved system*, in the place of one which is defective; this, in reference to the present subject, &c. *is true prevention of cruelty*, not only to units, but to thousands and tens of thousands of animals.' Notwithstanding this very *rational* announcement, and the prompt acknowledgment of the receipt of my letter, it did not appear in either of the next two numbers, nor am I aware that it is in the last, but I have not yet seen the last No. of that publication, therefore must not be positive. But this is not all: in No. 6, the conductors of that work express 'sincere pleasure' in inserting an article which, they say, 'forms an admirable addition to that on Mr. Nutt's Bee-hive;' and that 'the plan which it developes, in addition to its humanity, has the recommendation of being more simple and practicable than even the excellent improvements of Mr. Nutt.' Now what do you suppose this *admirable* addition to your Bee-hive,—this plan recommended on

account of its *humanity*, as well as on other accounts—is? It is no other than that most cruel and destructive one of depriving Bees of their honey *and of every thing else*, by 'driving them out of a full hive into an empty one, so early in the season as to afford the Bees sufficient time to provide themselves with another stock of winter food before the bad weather begins.' Very considerate this, certainly! but who can tell how soon the bad weather may begin? Of all the methods ever resorted to of getting their honey from Bees, this, in my humble opinion, is the most cruel and *inhuman:* suffocating the Bees and destroying them at once is far preferable to this (I had hoped) exploded mode of robbing them. If practised, it will, however, soon cure itself: but is it not a strange practice for 'The Voice of Humanity' to revive? Either the utterers of that sweet Voice are unacquainted with the humane management of Bees upon your plan, or they are unaware of the mischievous and destructive consequences attendant on the driving mode of deprivation, or they have little claim to the title they bear on the score of their humanity to Bees. I believe the former to be the case with them:

and therefore, in addition to the reason already given for troubling you herewith, and in order to set them right on this *vital* subject, I give you full power to do what you please with these letters. If they will be of any use to you in your projected publication, give them a place in it, and welcome: only do not garble them, *give them entire, if you give them at all.* I am decidedly opposed to the driving scheme; and I as decidedly approve of yours, which is, if properly attended to, at once simple, practicable, profitable, admirable, and *truly humane.*

Accept me, Dear Sir,
Yours very truly,
THOMAS CLARK."

"Mr. Editor,

"Since the publication of the last No. of 'The Voice of Humanity,' in which you treated your readers with some interesting particulars explanatory of the construction and different parts of Mr. Nutt's Bee-boxes, and also of the mode of managing the Bees in them, so far at least as regards the taking away a box when stored with the delicious sweet (i. e. with honey), it has been

suggested to me, that a plain, simple history of a colony of Bees in my possession, and managed according to Mr. Nutt's excellent plan, may not be altogether unacceptable to the general readers and friends of 'The Voice of Humanity,' and may be even *a treat* to amateur apiarians, who may be unacquainted with the merits of Mr. Nutt's plan; or who, if partially acquainted therewith, may have their doubts as to its practicability, or, at least, as to its advantages, i. e. superiority over other plans. As far, then, as 'The Voice of Humanity' can make them (the merits of Mr. Nutt's plan) known, I trust it will be as music to that Voice to publish the following facts.

"Having had a complete set of Mr. Nutt's boxes presented to me, I, though comparatively a novice in apiarian science, and not at that time particularly attached to it, could not, in compliment to the donor, do less than endeavour to work them, that was—get them stocked. That was done with a swarm on the 18th of May 1830; and the middle-box, or pavilion of nature, as Mr. Nutt calls it, into which the said swarm was taken just in the same way it would have been if put into a

common straw-hive, was conveyed a distance of nearly four miles and placed in my garden in the evening of the same day. The next day being fine, I observed that the Bees were very busy constructing comb, and had, within twenty-four hours of their being domiciled in their new abode, actually made a progress in that most curious work that astonished me: they were passing and re-passing, and literally all alive; many were visibly loaded with materials for their ingenious work. My curiosity was excited, and so much was I pleased with my multitudinous labourers that I visited them daily, and many times in the course of each day, when the weather was favourable for their getting abroad. Their combs were rapidly advanced; but to my great mortification they very soon obstructed my view of their interior works, by bringing a fine comb quite over the only little window at the back of the pavilion, at the distance of about half an inch from the glass. I was not, however, without the means of ascertaining that they were filling the pavilion with their treasures, and consequently that they would soon be in want of more room. I, therefore, at the end of a fortnight admitted them into the large bell-glass by withdrawing

the slide, which, when closed, cuts off the communication between the pavilion and the said glass. They (the Bees) immediately reconnoitred it, as it were, and examined it round and round, and presently took possession of it in great numbers; and in the course of the second day afterwards I could perceive that they began to continue their work upwards from and upon the combs in the box. Here I was again inexpressibly gratified by daily observing the progress of their beautiful work, and by the busy thousands in perpetual motion. When they had about half-filled the glass, and before I was aware that there was any occasion for their admission into either of the collateral-boxes, they suddenly threw off a swarm. That event I attribute partly to my own inexperience in apiarian matters, and partly—principally to the want of a thermometer by which to ascertain and regulate the temperature of the crowded pavilion, so as to keep the Bees *at the working, and below the swarming point of heat*. Mr. Nutt assures me that a barn would not contain a colony of Bees if its temperature were raised above a certain degree. What that precise degree of heat is I leave to Mr. Nutt to determine and explain:

at present it is enough to state that I am convinced it is possible, nay, quite easy, to keep Bees at work, and to prevent their swarming, by giving them plenty of room, and by proper ventilation. After my Bees had thrown off the swarm, as abovementioned, the work in the glass progressed but slowly, indeed it was for some time almost deserted, owing, I presume, to the room made in the pavilion by the absence of the thousands that had left it: for, whenever the weather was such that they could get abroad, they were always busy. The season, however, it is well-known, was so wet as to be very unfavourable for Bees:—the summer of 1830 was not by any means what is called a Bee-year; and early in the autumn I could see that, instead of adding to their store, they were under the necessity of living upon it. They were, however, abundantly provided for the winter, and lived through it almost to a Bee. In the spring of this year (1831) they appeared to be strong and in excellent condition. As early as the middle of May they had replenished the emptied combs in the glass, and, it may be presumed, in the pavilion too. In the first week of June, the glass was completely filled

in the most beautiful manner. I therefore opened the communication to one of the end or collateral-boxes, and two or three days afterwards, viz. on the 10th of June, I took off the glass and replaced it with another. So rapidly did those industrious little insects proceed with their work, that in about six weeks they completely filled the end-box. I then opened the way to the empty box at the other end of the pavilion: and a few days afterwards had the full box taken off by Mr. Nutt himself (who happened to call upon me, and who handsomely volunteered his services on the occasion), without any stifling of any sort—without the destruction, or the loss, of—scarcely a Bee,—as nearly in the manner described in your last No. as circumstances would permit; for the Queen-Bee being in the box taken off made it necessary for Mr. Nutt to vary the operation a little;—not a person was stung, though ladies, very timid ladies, and children too, were among the admiring lookers on; only, in returning the Queen-Bee, found in the box, to the pavilion, I myself was stung, owing to my over-anxiety to see how she would be received by the Bees in the pavilion. Her majesty's presence

in that box (the box taken off) at that time might probably have puzzled me; but to Mr. Nutt it presented no difficulty; and to witness his operation was to me a most instructive lesson, and would have delighted any friend of humanity. It was performed in the middle of a fine day. That box contained, as nearly as we could estimate, about 35 lbs. of honey, incomparably purer and finer than any I ever saw, except from Mr. Nutt's boxes. The glass beforementioned contained 12 lbs. —so that I have this year taken *forty-seven pounds* of the very finest honey from one stock of Bees;—I have all my Bees alive—and they are at this time abundantly provided for the ensuing winter; nay, without impoverishing them, I believe, I might take 6 or 8 lbs. more; but I have already had enough; and, if my Bees have more than enough for their winter's consumption, they will not waste it;—it will be found next year.

"The preservation of the Bees unhurt, uninjured, very many of them undisturbed at all,—the quantity of honey that may be had,—and the very superior quality of that honey, are advantages of Mr. Nutt's mode of Bee-management, over the barbarous, stifling system,

that cannot fail to recommend it to the adoption of every friend of humanity,—to every lover of the delicious sweet,—and to every apiarian who has nothing beyond self-interest in view.

"One word more, and I have done. There are, I observe with pleasure, persons of considerable influence among your subscribers, and probably there may be persons of still greater influence among your readers. To such I would most respectfully suggest the propriety of doing something to reward Mr. Nutt for the services he has already rendered the Honey-Bee and the cause of humanity. I—an obscure, country clergyman, know not how to set about procuring it; but a *premium was never more richly deserved.*

"Though longer than I intended, when I sat down to write, I hope you will find no difficulty in giving the foregoing communication a place in your pages; and, in this hope, I beg to subscribe myself,

Your humble servant,

THOMAS CLARK.

"Gedney-Hill, near Wisbech,
October 20th, 1831."

CHAPTER V.

ON DRIVING BEES.

As my reverend correspondent has introduced the subject of *driving* Bees from their full hive into an empty one, in order that they may be deprived of their honey and wax, and has animadverted upon that practice with some severity, I will take the opportunity of here stating my objections to it.

Mr. Huish, in his treatise on Bees, has twice described the manner in which "*driving a hive*" may be performed; but nowhere, that I can find, has he once recommended it. In a note (in page 24) he says—that "by *driving a hive* may be understood the act of obliging the Bees to leave their own domicil, and take refuge in another. This is performed by placing the full hive under an empty one, (or he might have said, by placing an empty hive

upon the full one inverted) and by gently tapping the lower hive the Bees will ascend into the upper, and the lower one then remains vacant for experiments, or the purpose of deprivation." He afterwards (in page 252) gives a more detailed account of the manner of performing this operation; and having done so, he presently observes that "by the driving of the Bees a number is unavoidably killed." I do not find that Mr. Huish himself practises it further than for the purpose of making experiments; and that, having made those experiments, he returns the driven Bees to their hives and to their treasures in them. In short, he describes it to his readers because they may wish to be acquainted with it, and not because he approves of it. I mention this because I consider Mr. Huish to be respectable authority on such a subject.

Now, were there nothing in a hive but Bees and honey, driving them into an empty hive (were it as easy in practice as it seems to be upon paper, though I presume it is not) in order to rob them of their all, would be a most arbitrary and unjust method of treating them: but, besides Bees and honey, there are other substances in a prosperous hive which ought

not to be disturbed. There are the future inhabitants of the colony in every stage of existence, from the egg to the perfect Bee, and these in a driven hive are all totally destroyed —eggs, larvæ, nymphs, in one word, *the brood*, in whatever state, is all destroyed, when the Bees are driven from it and not suffered to return. And is it not an unnatural operation that thus destroys many thousands of lives in embryo, over and above the "*number unavoidably killed*" thereby? as painful must it be for the Queen—the mother of the colony, and to all the other Bees, to be *forcibly expelled* from a hive and home of plenty and prosperity, as it is for an industrious man and his thriving family to be rudely ejected from a comfortable house and home, without the least notice of, or preparation for, so calamitous an event, and forced by lawless marauders to take shelter in an empty house, and left there destitute, to subsist as best they can, or to starve, as probably they may, their spirits being cast down by the violent deprivations and desperate robbery they have experienced, and it may be, the winds, and the weather, and the elements of heaven, are warring, as it were, against them at the same time. And, comparatively

speaking, is it not so with *driven* Bees? They are turned topsy-turvy, and in that strange, unnatural position their fears are operated upon, or excited, by unusual, and to them, no doubt, terrible sounds made by even "gently tapping" their inverted hive—their house turned upside down. Though no advocate for suffocating Bees, but the contrary—a decided opponent to it, I agree in opinion with my correspondent that suffocation at once is preferable to the very reprehensible practice of "driving a hive," inasmuch as an instantaneous death is preferable to a lingering and unnatural one by starvation, which, whatever may befal the driven Bees, is the hard, untimely fate of the brood and young larvæ of a hive when the Queen and commoners are driven from them into a new and empty domicil. They leave, because they are forced to leave behind them, and to perish, thousands of the young brood in a state of helplessness. Their mother and their nurses are driven into banishment and pauperism, while her offspring are doomed to perish for the want of their aid and support. If driving be practised early in the season, that is in June or July, all the brood then in the driven hive must inevitably perish; if later,

it is hardly to be expected that the surviving Bees will or can prosper. Can the Bee-master for a moment think that when Bees are so driven from their old hive, they will work in their new one, as if they had swarmed voluntarily and then been put into it: it is some considerable time before Bees thus treated will work vigorously; and during that time of lingering and irresolution the honey-season fast declines,—the Bees' difficulties multiply,—and they become paupers at a time they should be rich. Nine times out of ten the hive so treated perishes by famine, and like the young brood, dies the worst of deaths,—the whole hive becomes a melancholy wreck, and is absolutely sacrificed to the mistaken notions of the speculating, or experiment-making proprietor. It is a practice of which *I disapprove altogether:* and I am surprised that any one could so far misunderstand the principles and nature of my practice as to recommend the driving of Bees out of a full hive into an empty one as an admirable addition to my Bee-hive—that is—to my Bee-boxes. I have the satisfaction, however, to state that in the management of Bees in my boxes *no driving is necessary, nor even*

possible: by them *driving* and *suffocation* are both superseded, and rendered as useless to operators as they have long been destructive to Bees,—and, I cannot but say—disgraceful to apiarians. What I have already said (in page 48) I will here repeat with as much emphasis as I am able, because that passage comprehends the very essence of my directions relative to the management of Bees in the middle-box,—and because those directions are utterly incompatible with *driving*. "I say, then, DISTURB NOT THIS HIVE—THIS PAVILION OF NATURE: WEAKEN NOT ITS POPULATION; BUT SUPPORT ITS INFLUENCE, AND EXTEND TO IT THOSE ACCOMMODATIONS WHICH NO PRACTICE, EXCEPT MY OWN, HAS YET PUT INTO OPERATION, OR MADE ANY ADEQUATE PROVISION FOR.

"This humane practice partakes not of the *driving*, nor of the *fumigating*, nor of the *robbing* system. It is *a liberal principle* of Bee-cultivation, founded on *humanity*. And it is by such practice that we must succeed, if we hope to be benefited in the culture of Honey-Bees."

CHAPTER VI.

INVERTED-HIVE.

MANY useful discoveries have been made by accident;—and to some of the greatest and grandest of those discoveries even philosophers and men of science have been led by accidents apparently the most trifling and insignificant.

To the playful tricks of some little children that astonishing and most scientific instrument —the telescope, it is said, owes its origin; and it is said also that that great and good man— Sir Isaac Newton was led to investigate the laws of gravitation by accidentally observing an apple topple to the ground from the twig that had borne it. One of the sweetest of our poets, however, informs us—that

> All Nature is but Art, unknown to thee,
> All Chance, Direction, which thou canst not see.

If, therefore, a beautifully delicate honey-comb

suspended from the stool of a hive first led me to discover the utility of ventilation in a colony of Bees, though there may be nothing very surprising, there is, I trust,—nay, I am convinced, and therefore I assert—there is something very useful in it: and if an accident of another description induced me to endeavour to turn it to advantage, there is nothing to be greatly wondered at. So, however, it happened; and here follows the account of it.

On rising early one morning in July 1827, and walking into my apiary, as my custom then was, and still is, I discovered that some malicious wretch had been there before me, and had overturned a fine colony of Bees. The reader may judge how much my indignation was aroused by that dastardly act of outrage against my unoffending Bees. My feelings of vexation soon, however, subsided into those of pity for my poor Bees; and fortunately for them, no less than for me, their overturned domicil, which consisted of a hive eked or enlarged by a square box upon which I had placed it some weeks previously, was so shaded from or towards the east by a thick fence, that the rays of the sun had not reached it;—this compound-hive, and the

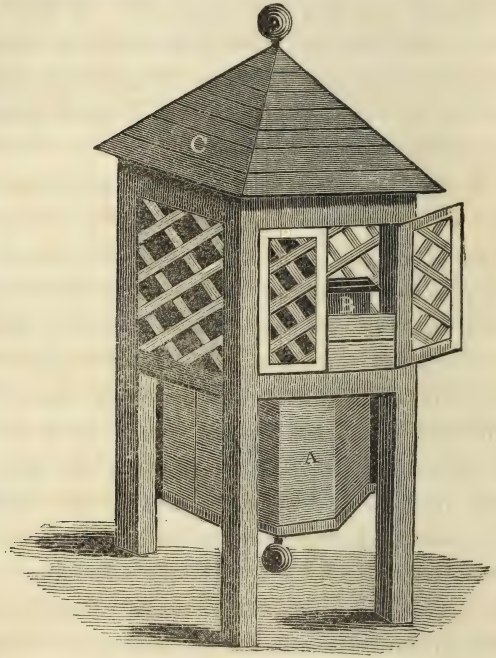
countless thousands that were clustering around it, were prostrate in the shade. I viewed my distressed Bees for a considerable time, and studied and planned what I might best do to relieve them, and, if possibly I could, rescue them from the deplorable situation into which they had been thrown. At length I determined to reverse the whole, which I effected by first carefully drawing the box as closely as I was able to the edge of the hive, and then placing the hive upon its crown, so that, in fact, the whole domicil was inverted. I shaded, protected, shored-up, and supported the Bees, their exposed works, and their hive, in the best way I could, and afterwards reluctantly left them for the day, being under the necessity of going from home a distance of almost twenty miles, viz. to Wisbech. On my return in the evening I could discern evident proofs of the willingness of the Bees to repair the sore injury they had sustained; and on the third day afterwards I was highly pleased to witness the progress their united efforts had made to rescue their dilapidated habitation from the ruin that had threatened it and them too, and which, I confess, I had anticipated. I was particularly attentive to their movements. I

assisted them by every means I could devise. They gradually surmounted all the difficulties to which they had been exposed. In short, they prospered; and from that malicious trick of some miscreant or other I first caught the idea of an *inverted-hive,* which I have since studied and greatly improved.

Every Bee-master will have had opportunities of observing—that this curious, I may say—intelligent, little insect—the Bee, is ever alive to the most ready methods of extricating itself from difficulties, and of bettering the condition of the state, whenever accident or misfortune has placed it in jeopardy: and, I will add—that the timely assistance of the Bee-master will frequently save a stock from that ruin, or at least from that trouble and inconvenience, which apparently trivial circumstances, such for instance as uncleanliness, excessive heat in summer, intense severity of winter, too contracted an entrance at one season, a too extended and open one at another, or wet lodged on and retained by the floor-board, may, and very often do occasion.

The subjoined cut is a representation of an INVERTED-HIVE fixed in its frame, trellissed, roofed, completely fitted up, and

just as it appears when placed in an apiary and stocked with Bees.



EXPLANATION OF AN INVERTED-HIVE.

A. is a stout octagon-box, in which is to be placed an *inverted cottage-hive* containing the Bees. Its diameter within the wood, I mean its *clear diameter,* is seventeen inches, and its

depth, or rather its height, is fifteen or sixteen inches, or just sufficient to reach to, and be level with, the edge of the inverted cottage-hive, when placed within it: in fact, the octagon-box (A.) is a strong case or cover for the inverted-hive; and, if made an inch or two deeper than the hive to be placed in it, it is an easy matter to pack the bottom, so that the edge of the hive and the top-edge of the octagon-box (A.) may be exactly on a level. Fitted and fastened to this is a top or floor, made of three-fourths-inch deal, which top should sit closely upon the edge of the hive all round. The centre of this top is cut out circularly to within an inch and a half of the inner circumference or edge of the hive upon and over which it is placed. Upon this floor is a box, made of inch or inch-and-quarter deal, seventeen inches square within, and four inches deep. This I call the ventilation-box, because through two of its opposite sides are introduced horizontally two cylinder ventilating-tubes, made of tin, thickly perforated, and in all respects similar to those described in page 20. The top of this box is the floor upon which nine glasses are placed for the reception of honey, namely—a large bell-glass

in the centre, and eight smaller ones around it. By a *large* bell-glass I mean—one capable of containing twelve or fourteen pounds of honey, and by *smaller* ones—such as will hold about four pounds. The Bees of an inverted hive in a good situation will work well in glasses of these sizes, and soon fill some or all of them: but, if in an unfavourable situation, lesser glasses, down to one-half the abovementioned sizes, will be more suitable. Situation, season, and strength of the stock,—strength, I mean, as respects the number of Bees, must, after all, guide the apiarian in this matter. The floor abovementioned should be made of three-fourths-inch deal. Of course proper apertures must be cut through this floor under each of the glasses to admit the Bees into them from the box beneath. Around and over the glasses is placed another neat box or case, made like the ventilation-box, upon which it rests or stands. The lid of this box is made to open and shut. It is represented in the foregoing cut as opened at B. an inch or two, and may be so retained at pleasure by a proper weight attached to a cord passed over a pulley fixed in the inside of the roof (C.) and fastened to the edge of the lid above B. The depth of

the box or cover for the glasses must of course be regulated according to their different sizes. The alighting-board is on the front-side, directly opposite to the latticed doors, and on a level with the upper-side of the first floor; so that the entrance for the Bees must be cut through the lower edge of the ventilation-box; and is made there most conveniently for them to pass either into the inverted pavilion below, or into the glasses above such entrance, as their inclinations may direct.

The octagon-cover placed upon the pavilion-hive, as represented in the view of the closed boxes (in page 29) if *inverted,* would be a tolerably good model of part A. of the inverted-hive.

I advise that every part be well made—the floors and the boxes particularly so; and that the whole exterior be well painted too, previously to being exposed to the sun and to the weather. This advice has reference to all my boxes and hives, collateral as well as inverted.

The stocking of this hive may be effected in the following manner. Having made choice of a good, healthy, well-stocked, cottage-hive, you may, at any time between the beginning of March and the end of October, *carefully*

invert and place it in the octagon below the ventilation-box, that is, in the apartment (A.) then fasten the floor with four short screws to the top of the octagon, taking especial care that this floor sits upon the edge of the inverted-hive all round. It will be necessary to keep the Bees from annoying you whilst adjusting this floor and the other parts of the hive, by putting a sheet of tin over the open circular space in the floor; by which tin every Bee may be kept in the hive below. When the boxes, ventilators, glasses, and all things, are duly adjusted, the dividing-tin may be withdrawn; and the operation of stocking will be then completed.

Another method of accomplishing the same object, i.e. of stocking an inverted hive, is this:

Take the floor that is to rest upon, and be fastened to, the top of the octagon A. and that is to rest also upon the hive when inverted, and with a sheet of tin cover and securely close the circular space made by cutting out its centre: then invert it, that is—let the tinned side be undermost, and place upon this floor, thus prepared, the hive you intend to be inverted. Return it to, and suffer it to occupy, its usual place in your apiary; and *there* for

two or three weeks let it work; in which time the Bees will have fastened the hive to their new board with propolis. Then, early in the morning, or late in the evening, when all the Bees are in the hive, make up the entrance, and, having two doors made in opposite panels or sides of the octagon (A.) ten inches by six, or sufficiently commodious for the admission of your hands, *steadily invert* your hive and prepared board upon which it has been standing, and, without sundering from the hive the board that will now be at its top, *carefully* place them in the octagon; which, with the help of an assistant, and by the facility afforded by the two little doors in the panels of the octagon for staying and properly supporting and adjusting the hive and its attached floor, may be performed without the escape of a single Bee. As soon as this, which is properly the inversion of the hive, is completed, proceed with the ventilation-box, glasses, &c. as before directed; and, lastly, be careful to liberate the Bees by withdrawing the tin that has kept them prisoners since the entrance was closed. In inverting a hive by this method an expert apiarian need not confine the Bees five minutes.

The Bees will commence their labour by filling the square box between the pavilion and the glasses; they will then extend their beautiful combs into the glasses above. The appearance of their most curious works in this stage of their labour is highly interesting —nay, gratifying, to the apiarian observer; and, moreover, proves the extraordinary influence and utility of ventilation in the domicil, or, rather let me say, in the store-house apartment of Bees; for in the pavilion, or breeding and nursing apartment, it is seldom wanted.

The method of taking off the glasses, whether large ones or small ones, when stored with honey, is in every respect the same as that of which a particular account has been already given, (in pages 37 and 38): to that account, therefore, I beg to refer the reader, instead of here repeating it.

CHAPTER VII.

OBSERVATORY-HIVE.

HAVING now given such a description and explanation of my *collateral box-hives*, and of my *inverted-hive*, as will, by referring to the plates or cuts that accompany them, make both of those hives, and every thing pertaining to them, to be clearly understood; I proceed to explain, in the next place, my OBSERVATORY-HIVE. With the help of the subjoined representative figures or cuts, I hope to succeed in my endeavour to make the reader thoroughly acquainted with every part of it, novel, though it be, and, as far as I know, unlike any hive hitherto invented. At first sight it may probably appear to be a piece of complicate machinery, but upon examination it will be found to be otherwise—I may say—simple and easy. A little curiosity and a

little patient attention are all the requisites that I entreat my apiarian friends to bring with them to the studying of this *grand hive.* I call it *grand,* not because it is my own invention, but because it is admirably adapted for advancing, and perhaps for perfecting, our knowledge of the habits and economy of Honey-Bees.

With the variation of one short word, the following passage from Evans' delightful poem on Bees is so applicable to my observatory-hive that I am tempted to adopt it as a motto.

> By this bless'd hive our ravish'd eyes behold
> The singing masons build their roofs of gold;
> And mingling multitudes perplex the view,
> Yet all in order apt their tasks pursue;
> Still happier they, whose favour'd ken hath seen
> Pace slow and silent round, the state's fair Queen.

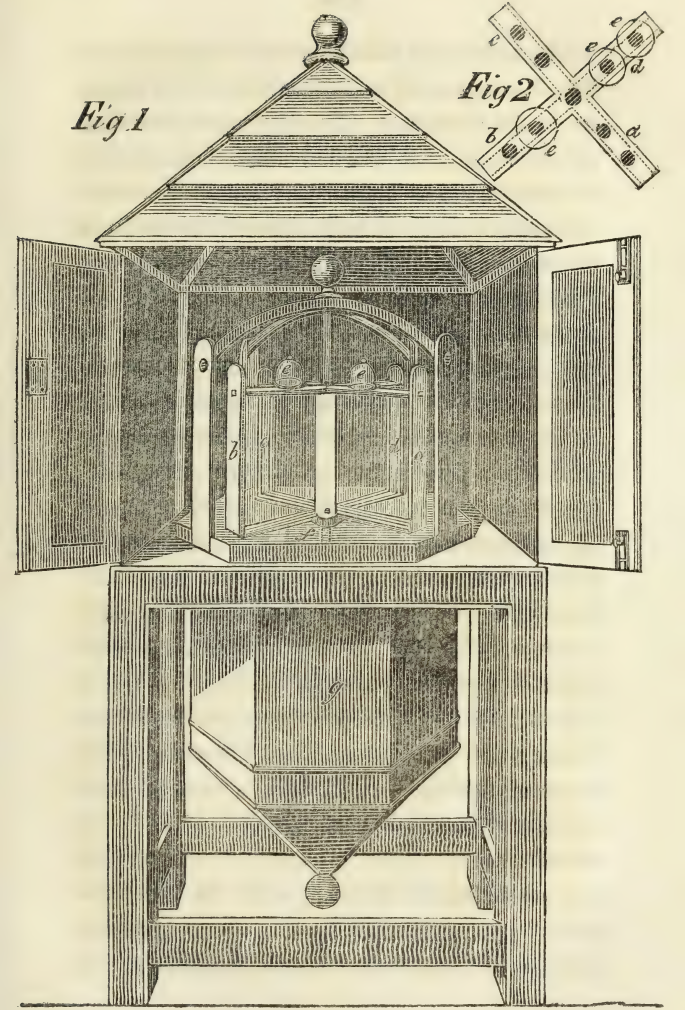


Fig 1
Fig 2
c
e
d
b
a
f
g

The observatory-hive, as here exhibited in Fig. 1, consists of two apartments—an upper one and a lower one. The upper one, (marked a. b. c. d. e. e.) is properly the observatory-hive, and may be called the summer-pavilion; the lower one, (marked g.) may be termed the winter-pavilion. Of this winter-pavilion but little need be said, except that it is an octagonal box, in size, in substance, and in every respect, similar to the octagon-part of the *inverted-hive* described in the last chapter; save only that its top must not be cut away, as is there directed to be done. At present let us suppose this top to be a perfect plane—an entire surface, without any aperture of any sort to form a passage for the Bees from and through it down into the pavilion below; farther let us suppose an alighting-board of the usual size to be fixed in front, and on a level with this floor or top; then the quære will be—how, from the same front-entrance, the Bees are to have a passage both into the observatory-hive above, and into the winter-pavilion below? The difficulty is—to get a convenient passage into the summer-pavilion, because the whole of that pavilion is made to turn round on the shoulder of an

upright shaft, through which shaft the passage for the Bees must of necessity be made, and which does not admit of a bore of above an inch in diameter. As, however, this narrow, perpendicular passage is of no great length, (it need not be more than three inches) many thousands of Bees will, in the course of a few minutes, if necessary, make their egress and regress through it without incommoding one another. That this rather intricate part—the construction of this passage-work—may be fully comprehended, I will endeavour to illustrate it by references to a well-known article, now standing on the table, on which I am writing. It is a telescopic candlestick, the pedestal of which covers a square space upon my table, each side of which superficial square is three inches. Now suppose this candlestick was screwed or glued to the centre of the plain, tabular top of the octagon (g.) having one of its sides parallel to that side of the floor to which the alighting-board is attached. Next, suppose *that* side of the candlestick to be cut away so as to form an entrance into the interior of the pedestal, two inches in front and half an inch in height; and let there be a covered-way of this height,

from the opened side of the pedestal to the front-entrance of the hive: then, if the front-entrance be six inches wide, the Bees on coming in will enter this covered-way, which from six inches narrows to three at the part where they enter the pedestal, and begin to ascend the perpendicular passage which leads through it and through the upright shaft of the candlestick into the—at present—*supposed* apartment above. The top-part of a telescopic candlestick may be turned round at pleasure; consequently, if the pedestal be fixed and made immoveable, the top, and whatever may be upon that top and fastened to it, may be moved round notwithstanding: this is what we particularly want in the construction of an observatory-hive, and must, therefore, be particularly attended to. A piece of clean, close-grained wood—beech, elder, mahogany, or any other firm wood—made much in the shape of our telescopic candlestick, but of not more than two inches and a half in height, with a bore through it of an inch in diameter, and turned, that is, wrought in a lathe, so that an inch of the top-part may enter into, and neatly fit, the cap fixed round the inch bore at the centre of the bottom-frame of the upper

pavilion (Fig 2), and which cap is represented by the moveable top of the candlestick, is, as well as I can describe it, the pedestal to support the observatory-hive,—is, with the cap just mentioned, the compound, or double-hinge upon which that hive is turned round,—and is also the Bee-way into that hive.

The way into the winter-pavilion, or octagon (g.) is made by cutting a circular hole through the very centre of the plane top, an inch in diameter, directly under the upward passage; so that the Bees, whether their way be into the summer-pavilion above, or into the winter-pavilion below, lies through the pedestal, and the only difference is, that one passage leads upwards and the other downwards. The covered-way which has been so often mentioned, may easily be made by taking out of the under-side of the bottom-board of the paneled and roofed box, made to secure the observatory-hive, and which is placed upon the top of the winter-pavilion, just as much as will allow a sufficient space for that way.

Having completed the passages, my next business is—to describe the novel apartment into which the passage through the pedestal leads—that is, the real observatory-hive.

Figure 2 shows the upper glass-frame of this hive with two small circular openings through the top of each arm, over which openings are placed small glasses, (at e. e.) in both Figures, for receptacles for honey, and are intended to answer the same purpose as those do which are placed upon the inverted-hive. A line drawn from one extremity of any one of these arms or wings, to the extremity of the arm or wing directly opposite to it, is twenty-three inches; and the distance between the dotted lines, which are intended to mark the glass-way, or, in joiners' phrase, the *rebate* to receive the edges of the glass, is exactly one inch and three-fourths. The lower glass-frame, which (in Fig. 1) is placed upon f. the shaft of the pedestal already described, is the exact counterpart of the upper frame, with the exception of its not having any perforations for honey-glasses: the only perforation in this frame is that at its centre; which must be made to correspond with that of the shaft, and be a continuation of the Bee-passage into the hive. These two frames are connected and made one by four upright pieces, or ends, (marked a. b. c. d. in Fig. 1,) these upright, end-pieces must be rebated, or channeled, to receive the

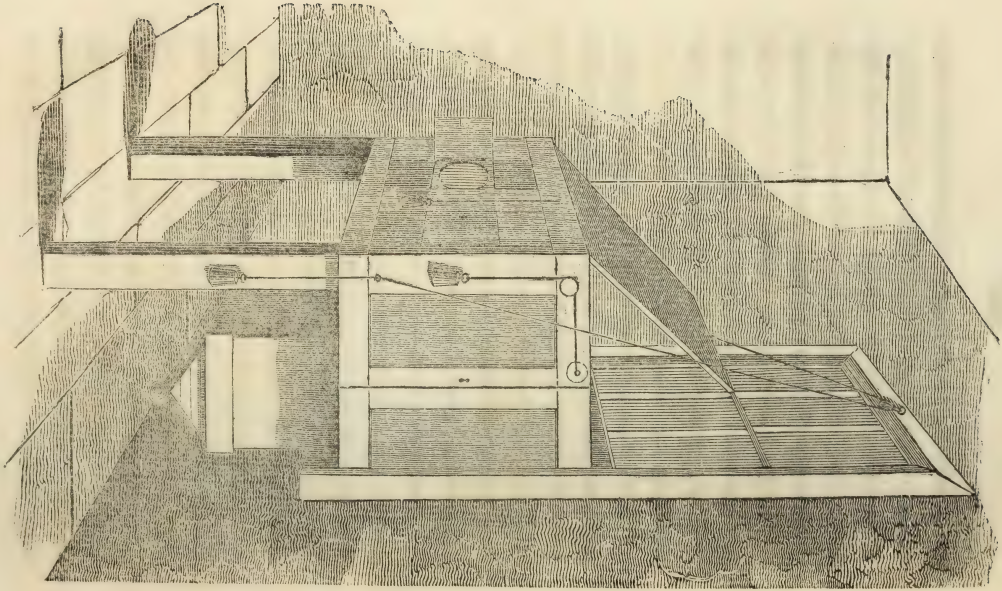
ends of the glass-plates. Eight squares of glass, each ten inches and a half by ten inches, fastened with putty into this frame-work,—that is, two squares into each wing, will complete the glass-hive; which, when placed upon the top of the pedestal, and made steady by an axis fixed at the central point of the upper frame, and turning in a socket under the ball, constitutes *an observatory-hive*. Confined as is the space between the glass-plates in each wing, they being but an inch and three-fourths apart, there is, nevertheless, room enough for the construction of one comb; and space for more than one comb would spoil it as an observatory-hive: and, though each wing may appear to be but small, there are upwards of 760 cubic inches of clear space in the hive. It is so constructed that plenty of light and the utmost transparency are afforded for observing and minutely examining the Bees and the works of the Bees in all their stages. Indeed the grand object of this contrivance is —to expose to view the labours of the Bees in the inside of their hive; and as the machine may be moved round at pleasure, not a Bee can enter it, without being observed, nor can a single cell be constructed in secret. I will

only add—that the appearance of the Bees in this hive is beautiful, and excites admiration and surprise,—nay, is capable of enlivening the drooping spirits of the most desponding apiarian; for who can view the Queen of the hive constantly laying her eggs, and, by so doing, constantly propagating her species, and her thousands of loyal subjects, whose indefatigable labour in all its parts is so conspicuous, without experiencing sensations of the purest pleasure,—nay, more of gratitude to God for his goodness to man!

It has been suggested to me by some ingenious friends—that a couple of magnifying glasses set in the doors, and some mechanical contrivance to open a part of the roof by simply pulling a cord, and to throw a proper light upon the four wings of the hive, would be a great improvement; because, by these means, or by some such means as these, the opening and shutting of the doors would be rendered unnecessary,—and, because the Bees and their curious works would be more interesting by being viewed through magnifying glasses,—and because the exterior appearance of the whole concern would be more handsome. Without the slightest hesitation I

admit—that, to those persons to whom expense is no object, the mode of examining the observatory-hive would be improved by some such arrangements as those just mentioned; but *the hive itself would not be improved in the least,—it* would remain just as it was before these costly additions, whether ornamental, or useful, or both, were made to its covering only—*not to the hive.*

The following cut will, in some degree, represent and tacitly explain an observatory-hive, fitted up in this way.



THE MODE OF STOCKING AN OBSERVATORY HIVE.

This operation may be performed in various ways, and almost at any time during the summer months, by an experienced apiarian. I will content myself with describing *how* it may be done most easily, if not most scientifically, by any person possessed of courage enough to operate at all among Bees. It is as follows:

When your Bees swarm from a cottage-hive, take it (the swarm) into a common hive in the usual way, place it in a cool, shaded situation, and let it remain there until the evening; and even then attempt no further operation, unless the Bees be all settled and quite still. When they are all within their hive, peaceable, and retired, as it were, for the night, you may suddenly strike them from their hive upon a clean, white sheet, spread over a table prepared and ready for the purpose, and within the space occupied, or rather—enclosed, by four bricks placed edgewise. Upon these bricks place your glass-hive as expeditiously as possible with its entrance just over the Bees. Then envelope your hive with a cloth so as to darken its interior, and, lastly, throw the corners of the sheet over the whole. This done, the Bees will presently ascend into the

wings of the hive. When they are all safely lodged in it, you may carefully remove the sheet and the other coverings; and, having securely made up the entrance into the winter-pavilion, then place the stocked hive upon its pedestal, and the Bees will be ready to commence their labour the next day.

At the latter end of August invert the parent hive from which the swarm issued, and place it in the octagon-box (g.) below the summer-pavilion. Take out the plug that is between the two hives, that is—open the passage into the winter-hive, and you will have accomplished the union of the two families: they will join or unite, and thenceforward continue to labour as one family. By this movement you give to your Bees a winter-residence, secure from all enemies, which are numerous at this season. And so well-stocked will the winter-hive be, that an early swarm from it, for the observatory-hive, the following season may reasonably be expected.

The honey may be taken from the e. e. glasses, placed upon the arms of the summer-pavilion so easily, by turning round the loose boards under the glasses, that further explanation is unnecessary. The machine itself will point out to the perfect stranger the proper method of doing it.

CHAPTER VIII.

FUMIGATION.

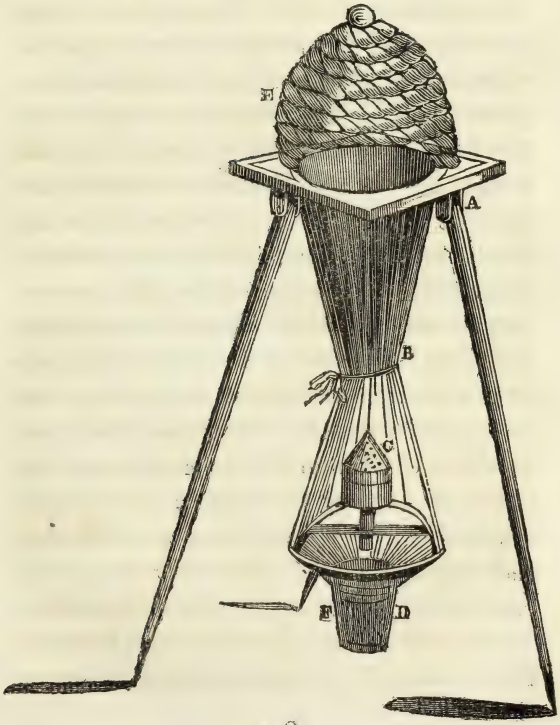
FUMIGATION is a rather portentous word; but, as soon as I shall have explained for what purposes, and in what manner, I occasionally make use of it, it will be totally divested of all *deadly* signification. In my practice it is not a Bee-destroyer, but a Bee-preserver;—when resorted to by me it is never carried, nor intended to be carried, to suffocation: but, in the operation of uniting weak swarms or poor stocks with more wealthy and prosperous ones —which I consider to be a meritorious and most humane practice,—when it is necessary to examine the state and condition of even a populous colony, should unfavourable symptoms as to its healthiness or its prosperity manifest themselves,—when it is known, or but suspected, that there are wax-moths, mice, spiders, or other Bee-enemies lodged in a hive,

which the Bees of themselves cannot dislodge nor get rid of; and which, if not got rid of by man's assistance, would soon destroy almost any colony,—when Bees and their works (for I never transfer the former without transferring an ample sufficiency of the latter at the same time) are to be taken out of a decayed straw-hive, in order to be put into a more substantial one, or into collateral-boxes, which I hold to be the best of all hives,—and on innumerable other occasions, it is absolutely necessary *to subdue Bees* so far as to render them incapable of using that formidable, venomous, little weapon, with which Providence has armed them, and which generally dreaded little weapon they can use so dexterously, before we can operate upon them for their own good. By means of a very simple apparatus, which may be called *a fumigator*, and which is a contrivance as novel and as useful in the management of Bees, as any of my hives or other inventions, *Bees may be totally subdued without being injured in the slightest degree, and dealt with as if they had neither stings nor wings.*

I beg, however, to re-state distinctly—that, in taking off a box or a glass of honey, *no fumigation whatever is necessary*, or ever practised

by me. It is only in cases such as those just enumerated that I have recourse to it; but in no case for the destruction of Bees. Fumigation, therefore, in my practice, is not suffocation.

The following figure is a representation of a fumigator, which a brief explanation will render intelligible.



This useful article consists of a square top-board upon which is placed a straw-hive (E.) so as to show an open, circular space under the hive and through the square board into the bag below. I need hardly observe—that the straw-hive is no part of the fumigator, but is here represented as standing upon it in order to exemplify its use. The top-board is of inch-deal, and is nineteen or twenty inches square. A round piece is cut out of its centre of not more than thirteen inches in diameter—that being something near to, or perhaps rather more than, the inside diameter of a common hive—so that a hive will stand upon the wooden circumference of the part left, without there being any ledge inside, that is—any part so enclosed by the hive as to catch and detain the falling Bees. From the upper-edge of this circle is suspended a bag, a yard in length, made of glazed calico, the bottom-part of which draws round the rim of a shallow, funnel-shaped, tin Bee-receiver, which Bee-receiver is about ten inches across at the top, and its lower-part, or neck (D. or F.) is three inches and a half in length, and its throat (if I may so term it) is nearly three inches in width. To fit this neck, which is thickly perforated

for the purpose of admitting fresh air, when fresh air may be required, is a close lid, just like that of a common, tin canister, to hold up the fumigated Bees, and also to stop the ventilation when not wanted. C. is the fumigating lamp with a perforated top through which the fume ascends, and is made conical, so that a fumigated Bee in its fall cannot rest upon it and be thereby scorched or injured, as would inevitably be the case were this top flat. The tie (B.) closes the bag and keeps every Bee above until the lamp and every thing below be adjusted, and it is *then* to be untied. The fumigator is here represented as standing upon three legs made fast to the top-board by small bolts, as at A.; but it is quite as convenient in practice, and more portable, if, instead of these legs, it be made like a common scale with a cord from each corner, which may be gathered into a small iron-hook, and thereby suspended from the branch of a tree, or from any other convenient place, when used. The lower part of the bag is represented as being transparent, but that is done purposely to show how the lamp is placed inside when prepared for operation.

By persons inexperienced in such matters it may be thought to be an extraordinary feat

to unite the Bees of one hive with those of another—to bind, as it were, the legs and wings, and pro tempore, to render useless the sting of every individual Bee, until such union be effected. Nothing, however, is more easy; nor is any part of apiarian practice attended with more pleasing consequences to the operator, or with more important and beneficial ones to the Bees themselves. When in a state of temporary intoxication from the fume made to ascend through the perforated tin (C.) into their hive, these beautiful insects are perfectly manageable,—perfectly harmless.

This intoxicating fume is caused by introducing into the fumigating lamp a piece of ignited vegetable substance, called puck, puckball, or frog-cheese, or, most commonly, *fuzzball*. It is a species of fungus, or mushroom, and is plentiful enough in the autumn in rank pastures and in rich edishes. Shepherds, milk-maids, or country-school boys are well acquainted with them,—know very well where to find them,—and for a mere trifle will easily pick up as many of them as will supply the demands of twenty apiarians. They are frequently as large as a man's head, or larger. In 1826 I had an unripe, white puckball, which weighed ten pounds. When ripe they are

internally of a brown colour, and turning spongy and powdery become exceedingly light, and are then properly *fuzzballs*. For the substance of the following directions respecting the preparation of fuzzballs for Bee-fumigation, and for its application to that occasionally necessary purpose, I have no hesitation in acknowledging myself to be indebted to Thorley's treatise on Bees—no mean authority on such a subject.

When you have procured one of these pucks, put it into a large piece of stout paper,—press it down therein to two-thirds, or, if you can, to one-half, of its original size, and then tie it up closely,— and, lastly, put it into an oven sometime after the household bread has been drawn, that is, when the oven is nearly cool, and let it remain there all night, or, until it will hold fire and smother away like touch-wood, i. e. burn without kindling into flame. In this state it is fit for the fumigating-lamp, and may be used in the manner following, when the union of two stocks is the apiarian's object.

Take a piece of this prepared fungus, as large as a hen's egg, (it is better to have too much of it than too little to begin with) ignite

one end of it with a candle, and then put it into the fumigating-lamp,—next fix the lamp in its socket over the Bee-receiver, and place the whole inside the bag, as shown in the plate, and untie B—the fastening round the middle. In a very short space of time the Bees in the hive placed upon the top-board (which is necessarily the first thing to be attended to in every operation of this kind) will be totally under your control. The operator should be particularly careful to close every vacancy, however small, that there may happen to be between the top-board and the edge of the hive, by tying a cloth round it—the hive—as soon as ever it is placed upon the board. This precaution will prevent the escape of any of the fume, and will also prevent the Bees from annoying the operator during the time he is making the arrangements necessary previously to every fumigating process.

In the course of a minute or very little more you will hear the Bees dropping like hail into their receiver, at the bottom of the fumigating apparatus.

When the major part of them are down, and you hear but few fall, gently beat the top of

the hive with your hands, in order to get as many down as you can. Then, having loosened the cloth, lift the hive off and set it upon a table, or upon a broad board, prepared for the purpose, and knocking the hive against it several times, many more Bees will fall down, and perhaps the Queen amongst the rest; for, as she generally lodges near the crown of the hive, or is driven thither by the fume, and surrounded and protected there by the other Bees to the very last, and as long ever they have the power loyally to cling round her, she often falls one of the last. If the Queen is not among the Bees on the table, search for her among the main body in the Bee-receiver; first, however, putting them upon the table, if you discover her not before lying among the uppermost Bees therein.

During this search for the Queen, or with as little delay as possible, you, or some one for you, should be proceeding in a similar manner with the Bees in the other hive, with which those already fumigated are to be united. As soon as the Bees of the hive last fumigated are all composed and quiet, and you have found and secured one of the Queens, you may put the Bees of both hives together into

an empty one, for the purpose of mingling them thoroughly together, and of sprinkling them at the same time with a little ale and sugar; this done, put them and *one only* of the two Queens among the combs of the hive you intend them to inhabit, and gently shake them down into it. When you have thus got all the Bees of your two hives into one, cover it with a cloth and closely bind the corners of that cloth about it, and let them stand during that night and the next day, shut or closed up in this manner, so that a Bee may not get out; but not so close as to smother them for want of air.

In the evening of the following day, having previously removed the hive, containing your united-stock, to its proper stand, viz. that which it had occupied before the operation, loose the corners of the cloth and remove it from the mouth of the hive, and the Bees will, with a great noise, immediately sally forth; but being too late to take wing, they will presently go in again; and remain satisfied in and with their new abode—new at least, to one half of them, and new to the other half also when transferred into a fresh hive, or into boxes.

But in taking away the cloth discretion and caution must be used, because the Bees will for some time resent the affront put upon them by such to them, no doubt, offensive treatment.

The best time of the year for unions of weak stocks with strong ones is in autumn, after the young brood are all out—in the latter part of August, or any time during September: but for removals of stocks from straw-hives into boxes, the best time is early in the spring before the eggs of the Queen have changed and quickened into larvæ,—I will say—in the month of March; and if the weather is cold, it is advisable to perform the operation in a room where the temperature is about 60 degrees. For if Bees are displaced, that is—taken from their hive, in a cold atmosphere, it is but rarely that they recover from the effects of the fume so as to marshal themselves into working order in a box or new hive. But this they can do, and will do most effectually, under this agreeable temperature. As twelve hours are sufficient for the Bees to regain their former independency in their new domicil, you may place them at the end of that period on their summer stool, and they will work, as soon as the weather will permit them, as if they

had never been removed from their former hive, nor in any way disturbed.

The great number of operations of this kind, which I have performed before hundreds of admiring and gratified spectators, chiefly of the higher ranks of society, renders it almost unnecessary for me to observe—that once being present at and witnessing it, will convey a more perfect idea of the whole performance than any written description of it can give. If, however, any gentleman, or other apiarian friend, who has not yet seen the performance of this operation, should be desirous of witnessing it, the author will freely undertake that, or any other Bee-service in his power, by which he can oblige, assist, or instruct him.

The same degree of precaution is not necessary on the removing of the Bees of a cottage-hive on my principle; it is only requisite in the particular case of joining or uniting two or more hives together, that such nice management need be observed. And certainly the more expeditiously the whole is performed, the more pleasing will be the result of the operation, and the more certain of success.

I will conclude this subject with an

anecdote:—In the year 1828, I was engaged by the Honourable Lady Gifford, of Rochampton, to unite the Bees of two hives; and as the operation was novel to the spectators, who on that occasion consisted principally of the branches of that worthy family,—when I had drawn the Bees from the cottage-hive and they were all spread on a white cloth, and every eye was anxiously intent upon discovering the Queen-Bee, there was some trouble in finding that particular Bee; even I myself—an old practitioner—had overlooked her; and having occasion to leave the table and my fumigated Bees surrounded by my young Lord and Lady Gifford, and by the rest of her Ladyship's family, her infant son, in the arms of his nurse, eagerly called out—"Mamma, mamma, what is that?" Hearing the child's animated expression, I returned to the table, and instantly beheld and caught the Queen of the Bees,—and her actually pointed out by an infant not three years of age. Is there any excuse then for not knowing the Queen-Bee? And, as a true description of this Bee and of the office she fulfils in the hive, will be given in the course of this work, accompanied with a plate of her and also of the other Bees, I trust my Bee-friends will not hereafter allow a child of

only three years of age (although that child was the son of a late Attorney-General,) to excel them in this particular point of apiarian knowledge, which is not only highly interesting, but very useful to the operator, when uniting stocks, or transferring Bees from one domicil to another. Never shall I forget the look of satisfaction that beamed on the countenance of the affectionate mother. To see each of her eight amiable children around the table with her Ladyship, minutely searching every little cluster of Bees, in order to give the first information of the Queen, was a lovely sight; but to hear her infant son proclaim, as it were, the Queen of the Bees, by pointing his little, delicate finger to the object of his curiosity, and exclaim—"Mamma, mamma, what is that?" was most gratifying even to me. Well might the little naturalist inquire—"what is that?" when he was in the presence of royalty, and pointing to one of the most extraordinary monarchs in the world, while I myself—an old practitioner, had not previously observed her. Be it so, I acknowledge my oversight in this instance, and feel it incumbent on me to give the merit of the discovery to him, to whom on that occasion it was so justly due.

CHAPTER IX.

OBJECTIONS AGAINST PILING BOXES.

HAVING gone through the explanation of my different hives, and of all my Bee-machinery, I will, previously to entering upon other matters, here state my objections to the piling of Bee-boxes one upon another, which is sometimes, and not improperly, called—*storifying*. It is also termed super-hiving, nadir-hiving, or centre-hiving, according to the place occupied by the added box: if an empty box be placed *upon* a stocked one, it is *super-hiving;*—if put *under* such box, it is *nadir-hiving;*—and if introduced *between* two boxes, it is *centre-hiving*. But with whatever term dignified—not to say—mystified, it amounts to, and in effect is—*storifying*. From an old book in my possession I find—that in 1675 a patent was granted to John Gedde, to secure

to him for a term of fourteen years the advantages of his invention of boxes for storifying; so that it is at least of a hundred and sixty years' standing. After Gedde it was successively adopted and encouraged by Rusden, Warder, and Thorley, and has been the fashionable or fancy practice down to the present day; for it is a mode of managing Bees that has been recommended by some modern authors,—principally, if I mistake not, by Dr. Bevan; and it is practised by some Bee-masters, who, I am told, consider it to be the most humane mode, and the only humane mode of managing Honey-Bees. I have no wish to depreciate the inventions and labours of others, nor to offend any man, and particularly that man who has exerted himself so much to better the condition of the Honey-Bee. If he has been mistaken in the *means* to be employed to gain so desirable an end, and in my humble opinion he certainly has been mistaken, every praise is due to him for his good intentions.

My first objection to the piling system is—because it occasions a great deal of extra trouble, labour, and inconvenience to the Bees, and consequently prevents their collecting so

great a quantity of honey and wax as they will do where they are not subjected to these drawbacks. And where, I would fain know, is the humanity in increasing and obstructing the labours of these indefatigable, little insects? Is it not inhumanity to force them to deposit their treasures in a garret, two or three stories high, when a far more convenient store-room may be provided for them on the first floor? Let not, then, the piling advocate of the present day any longer recommend this faulty practice, nor erroneously contend that the elevating of boxes one upon another, is the best and only way of ensuring an abundance of honey and wax. But fairly to get at the merits—not to say—demerits of this practice, I will examine it a little in detail. First, then, the piling practitioner puts a swarm of Bees into a box, which I will call box A. This box, if prosperous, of course soon becomes a pavilion of nature,—that is, it soon contains quantities of brood-comb, young brood, larvæ, and embryo Bees in various stages of existence. It is allowed to stand alone until it be filled, or nearly filled, with the Bees' works. It requires no great skill to know that the contents of box A. at this period are as just described.

When nearly full it is placed upon another box (B.) to prevent what is called the maiden-swarm. This box, like box A. is quickly filled with combs: the Queen too follows her labourers and progressively lays her eggs even to the lowest edges of the combs. Of course box B. like box A. soon contains quantities of brood. The second box (B.) gets full just as the first did, and as a cottage-hive does—not with pure honey, but with brood, pollen or farina, and other substances, as well as with honey; in short, there is no provision for, nor means of, dividing the works of the working Bees from the works of the Queen-Bee; consequently they become, as *of necessity* they must become—one promiscuous mass. The brood continues to increase and occupies that part of the box which should be of pure honey and wax. This goes on until more room is wanted; and *then* it is that the two full boxes (A. and B.) are exalted and placed upon the third and last box (C.) This, however, does not mend the matter; but, as will be seen presently, it *does* occasion a great deal of additional labour and inconvenience to the Bees. In the meantime they carry on their works of nature and of art—they construct

new combs and store some of the cells with honey, and the Queen lays her eggs in others, just as in the other boxes. The fact is—the three boxes soon become as one: they soon become and continue to be of one temperature, —the same compound of the old hive,—the brood-cells are intermixed with those containing honey,—wreaths of pollen are in every pile, —and animated nature is everywhere peeping from the waxen cells, in which nothing but pure honey should have been deposited. But this is not all, nor the worst part; though bad enough, if *purity of honey* be any consideration.

It is a fact known by me and by every one at all experienced in the management of an apiary, that no sooner are the combs in box C. got into a state of forwardness—it would be saying rather too much to say—completed, than numbers of working Bees are, as it were, struck off their work there, and set about removing all superfluities and nuisances from the combs lately filled with young brood in the uppermost box A. Every cell in those combs that has been the nest and nursery of a young Bee they cleanse thoroughly and repair, where repairs are needed, preparatory to its being made a receptacle for honey, or for the other

treasures brought from the field. At this time, that is—as soon as the combs are free from the first brood, the uppermost box is nearly empty, instead of being full: it contains *empty combs and Bees, but little or no honey.* Here then the Bees are subjected to that extra labour and inconvenience which form my first objection to the piling-plan. From the entrance into box C. through box B. and up into box A. the way, to a loaded Bee, is neither short nor pleasant; it is a labyrinth beset with difficulties and obstructions, in surmounting which much of that time is occupied which would otherwise be more profitably, and we may suppose—far more agreeably employed, in passing from flower to flower, and in culling their various sweets. Any person, it may be presumed, would rather set down a heavy load on the ground-floor than have to tug it up two or three long flights of stairs, and through intricate, winding passages, and be jostled and impeded and pushed about, and perhaps backward every now and then, by countless crowds of busy men, unceasingly hurrying up and down and passing and re-passing the burdened man in every direction. And is it not comparatively the same with Bees going

through boxes C. and B. up into box A.? I maintain that it is so,—and that Bees in piled boxes lose much time in performing the *unnecessary*, climbing labour, imposed upon them by their unskilful masters.

The natural consequence of this—I repeat —*unnecessary* waste of their time, must not be placed to the account, or laid to the instinct of the Bees; for of all creatures in the world, Bees perhaps work with the most extraordinary celerity. The beautiful piles of honey, and *when unobstructed*, the regular movements of these wonderful insects, are admirably scientific and correct. The consequence, namely, a deficiency in the quantity of honey and wax, is chargeable solely to the account of the unskilful manager.

At length the time arrives when the three piled boxes are, or are supposed to be, well stored,—and when a part of the Bees' treasure is to be taken as a remuneration for the *care* and trouble of the proprietor. Let him then put on his grotesque Bee-dress, and booted up to the middle and gloved to the very elbows, let him proceed to take the uppermost box. He divides it from that on which it stands, that is—from box B. by a slide or a divider of

some sort prepared for such an operation, or in any way he pleases, for that I leave to him. Well, he succeeds in getting off his prize; not, however, without the destruction of a considerable number of Bees: for *to presume* that he is acquainted with my easy mode of taking away a box, would be to presume too much; I therefore allow him a Bee-dress at once, and have accoutred him in the best way I can for his arduous undertaking. The box, then, is off. He turns it up and examines it, and to his great disappointment, he finds that the combs are discoloured, that each pile of the expected treasure contains parts of the young larvæ, and that there is much pollen commingled with the other substances in the box; in short, he finds that the whole is dirty and filthy in appearance; and that he has destroyed a part of the most valuable brood for another year. And, if instead of box A. he take box B. he will fare little, if any better; nay, he will in all probability destroy a greater quantity of brood: and in box C. he cannot expect to find more than half-filled cells, or empty combs. Such are the fruits and profits of the piling-system of Bee-management. There are Bee-masters resident

within twenty miles of the good town of Spalding, and in many other places that might be mentioned, who know that the foregoing account is true, *lamentably true:* but, until such practitioners are sensible of the faultiness of their system of Bee-management, it would be folly in me to appeal more directly to any of them for a confirmation of what *I know* to be the truth. How, I would ask, can the Bees' sweet treasures be divided from their other work, if there be no means of varying and regulating the temperature in their hive? Without the aid of ventilation it is, in my opinion, impossible; but with it, it is perfectly easy, perfectly safe, and not at all distressing nor even unpleasant to the Bees.

Before I take my leave of the piling or storifying practitioner, whom I consider, as perhaps he may consider me, to be very, very imperfect in the management of Bees, I feel it to be my duty to my readers, and of course to the piling Bee-master, if he should vouchsafe to me a reading, to record a few other facts that bear strongly against the piling practice—facts derived from long and attentive observation of the nature and habits of Honey-Bees. Twelve years' steady practice and constant

attention to the movements of these ingenious insects are the foundations I have to build upon. Besides I have proofs, well-authenticated, indisputable proofs, of the abundant produce of honey having been taken from collateral-boxes, and that of very superior quality too; which honey I take from the Bees as being a superabundant store, and not as a part, the taking away of which has any tendency to weaken, or in any way to injure, the prosperity of the colony from which it is taken. But what do we behold when a box is taken from a storied pile?—what that in the least deserves to be termed humanity? Do not a thousand murders stare us in the face? Why should the operator be veiled and muffled up and made sting-proof, if no conflict was expected—if no deeds of violence were anticipated? But violence is anticipated, and practised too, to such an extent that it is no uncommon occurrence for the Bees that escape destruction to desert the other boxes altogether. This ends one part of the business.

And these objections against the practice of storifying boxes will, I trust, induce the reflecting, ingenuous reader to turn his attention to the importance of ventilation in

collateral-boxes. By regulating the interior temperature of the hive, suitable and generative heat is confined to the pavilion, that is—to the mother-hive, which heat causes the Queen to propagate her young in the pavilion—this being the middle-box, and near the entrance, a great advantage is thereby afforded to all the Bees passing in and out, that fully demonstrates the necessity of their labours being assisted in the breeding-season, *and not obstructed.*

It is the heat which causes the working Bees to deposit their pollen in the immediate vicinity of the seat of nature. This pollen, which is called by some writers Bee-bread, is gathered and deposited for the special purpose of supporting the young larvæ, while helpless insects, or babies, as it were, in the hive. Combined with heat, it is this material which discolours the much admired works of the Bees; it is this which also makes the wax and honey yellow: besides where this pollen is deposited by the Bees, there, or in that part of the hive, will the Queen lay her eggs,—and there of course propagate her species. And as animal nature advances to perfection, so rises the interior temperature of the hive,

until an almost suffocating heat obliges the Bees to leave their home. This heat extends itself to the most remote parts of their domicil; and were it not for the influence of ventilation in the end-boxes, a discolouration of their beautiful works would also be extended through the hive, and the Queen would lay her eggs promiscuously as she does in the cottage-hive. But this mischief is corrected by ventilation: can then any reasonable man deny its powerful and useful effects in the management of Bees?

The Queen-Bee is but seldom seen by the most acute observer; she loves to propagate her young in secresy, at the regular temperature of the hive at her own birth. If she can possibly avoid it, she will not lay her eggs where man can overlook and examine her movements; consequently the ventilation in the side-boxes prevents her extending her works of nature beyond the limits of her native hive. As soon as she feels a cooling change of temperature, she immediately withdraws to her native clime, and leaves her working subjects to store the beautifully white combs with the purest crystal sweet. But, were the Queen permitted, as she is in the piling system, as well as in the cottage-hive, to follow

her subjects through the whole hive, with one and the same temperature throughout, she would most certainly propagate her young just as she does in the piled-boxes. In that case there would be no advantage derivable from the purity of the honey. Again, on my plan, the middle-box is so situated that the Queen in it is placed conveniently to superintend her labourers; her eye can behold them in the throngest of their labour, being so near the well fortified entrance of her pavilion. In such a favourable situation, she can view the movements of her subjects, and not a moment need be lost, because all their streets and passages are short. The direct ascent to the top of one of my boxes is not quite eleven inches, and with a middle-sized bell-glass superadded, it does not exceed eighteen inches; so that in one day, when the honey-dew is plentiful, ten thousand Bees will gather more treasure than three times that number on the piling system, in which the Bees are compelled to mount up to the Babylonian height of Thorley's fourth box.

These (partly repetitions of what has been stated before, I am aware,) are conveniences which collateral-boxes possess, and which *do*

not belong to piled-boxes. In piled-boxes Bees are subjected to unnecessary labour, which is so far a waste of time. From piled-boxes not nearly the quantity of honey and wax is procured, that may be procured from collateral-boxes,—nor is that deficient quantity of a quality at all comparable with the other. In managing piled-boxes many Bees are destroyed.

These are my objections to that system of Bee-management; and I put it to every person who has practised storifying to say whether they are not well-founded.

L. Bennett and Co. Typ.

10, Guildford Place, Spa-Fields, London.

THE APIARY.

At the most noble the MARQUIS of BLANDFORD'S,

DELEBERE PARK, FANGBOURN, (near READING,)

BERKSHIRE.

L. Bennett and Co. Typ.

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At the most noble th

DELEBERE PARK,

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CHAPTER X.

APIARY AT DELABERE PARK.

HAVING stated (in page 144) that "I have well-authenticated, indisputable proofs of the abundant produce of honey having been taken from collateral-boxes, and that of very superior quality too," I could, in support of this statement refer the reader to a great number of my apiarian friends, a bare catalogue of whose names would fill several pages of this book. But as the best proofs of the merits, advantages, and practicability of a new system, are in its established success, I will select one instance, and have great pleasure in referring to that of the apiary established on my principles, at the seat of my noble patron—the Marquess of Blandford, at Delabere Park, near Reading. Situated in a part of the country most abundantly favoured by nature,—effete

with every variety of Bee-herbage, and with every local advantage combined in its favour, the noble Marquess has prosecuted his apiarian pursuits with a spirit of liberality and enterprize redounding to his credit, and well meriting the success which has equalled my own as it has his most sanguine expectations. I do not consider that I can introduce this better to the notice of my readers, than by transcribing the account of a visit, that was paid to it by my intelligent friend Mr. Booth, the Lecturer on Chemistry, and which appeared in the *Stamford Mercury* of July 26th, 1833. It is as follows:—

"To the Editor of the Mercury.

"Sir,

"From the interest you appear to take in whatever relates to the extension of Mr. Nutt's invaluable system of Bee-management, and the prompt attention you have given to former communications on the subject, I am induced to detail the successful results of that system in the hands of the Marquess of Blandford, who has gone most extensively into the subject, and with an ardour and enthusiasm second only to that of the intelligent inventor. As

I had the permission of the noble Marquess to make my observations, so I am enabled to make reference to his Lordship for the accuracy of my statements, and I am only fulfilling the wishes of the noble Lord, in making these details as extensively public as possible, for the information of those who are interested in this most important, though long neglected branch of rural economy.

"His Lordship's park is most pleasantly situated near the beautiful and romantic village of Pangbourn, in Berkshire, and the choice of situation for the apiary is most excellent. It is at the top of a tower* forty-six feet high, situated in the midst of a wood, and commanding a most extensive view of the surrounding country, including Hampshire, Berkshire, Wiltshire, and Oxfordshire, the face of nature being clad in an almost endless variety of fertility, and old Father Thames gently meandering through the valley, formed by the distant hills which bound the scene, affording but few prospective traces of the immense physical developments of his powers, which render him, truly, the monarch of rivers. At the top of this tower his Lordship possesses

* Vide, plate at the head of this chapter.

four colonies in collateral-hives, and one inverted-hive, all of which have been started since April 1833. In the collateral-hives the labours of the Bees have been highly successful. From one colony has already been taken a box containing thirty pounds of honey; whilst another box and three small glasses, which cannot together contain less than forty pounds, are quite ready for taking, and which will afford the sum of seventy pounds, and this without infringing on the quantity necessary for the winter support of the Bees. The thermometer in the collateral-boxes did not exceed 70 degrees, whilst in the air it was at 64. A most remarkable contrast was afforded by the superior quality of the honey in the end-box and that of the 'pavilion of nature:' the superiority of the former was most evident. Mr. Smith, the keeper, who quite follows in the steps of Mr. Nutt, informed me that the average quantity of honey produced from a cottage-hive, upon the old principles, does not exceed from thirty to forty pounds; whilst, but in one case, did he ever obtain from a hive, enlarged by eking, the amount of fifty pounds. It is extremely satisfactory and fortunate, that, for the sake

of reference, Mr. Nutt's system has fallen into such good hands, as both his lordship and the keeper appear as devoted to the subject, as they have been happy in their results. For young beginners the results reflect great credit.

"I am not able to speak much regarding the progress of the inverted-hives, of which his lordship possesses two; the one being at the top of the tower and the other situate on the lawn, at the back of the house; the former containing twenty-three glasses and the latter thirty-three. The latter is really a magnificent construction —an ornamental appendage such as the gardens of few noblemen can boast. The Bees had, in each, filled all the intermediate parts betwixt the hive and the glasses, and were just then commencing their labours in the latter. Next summer his lordship will, I anticipate, reap a glorious harvest both from these, and his collateral-hives, which are getting into prime condition for the winter.

"I have troubled you with these details because they relate to facts, and a publication of such facts is all that is required to introduce this admirable system of Bee-management into universal practice. To what extension it

may be brought, it is impossible to state, but these results most strongly impress upon others of the nobility to 'Go and do likewise.' The mantle of the warrior has indeed fallen upon the philanthropist in the person of the heir to the title and fortunes of a Marlborough; and let the example but be extended, and the practice inculcated amongst our rural population, and, whilst it will greatly conduce to their advantage, we need no longer look to France or Italy for a supply of treasures, which our own country and peasantry can so efficiently produce. Nothing could possibly more advance these objects, than the formation of an Apiarian Society, which should offer premiums and prizes to the most successful competitors; and I do hope that for the sake of humanity as well as philanthropy, and when I see the long and noble list of names which dignify Mr. Nutt's patronage, I shall not be deceived in my anticipations of the speedy formation of a society, established for such laudable purposes.

Yours, &c.

Abraham Booth,

Lecturer on Chemistry.

"Reading, July 22d, 1833."

To the above very able and explicit description, and which is to me the more interesting because not written by a *practical* apiarian, I have nothing to add, but that it has met the cordial approbation of his Lordship, whose still more recent and continuous success has confirmed him in the practicability and value of my system.

The sketch which precedes this account was taken for the purpose by his amiable Countess, whose kind solicitude for the welfare of the industrious and valuable little insects, to which so much of my attention has been devoted, and approbation of my exertions, have not been amongst the least valued of my rewards and consolations.

CHAPTER XI.

HONEY-BEES.

THAT branch of natural history which treats of INSECTS is called entomology. And Linnæus, the celebrated naturalist and botanist, and the father of the classification of animated and vegetable nature, has divided insects into seven orders; the fifth of which is termed hymenoptera, and includes all those insects that have four membranous, gauze-like wings, and that are furnished with a sting, or with a process resembling one. To this class the Honey-Bee belongs. It has, however, been so repeatedly described by naturalists and by apiarian authors, that it would be difficult to say any thing respecting it as an insect merely that has not been said before. It is, moreover, so universally known, that it may seem to be a superfluous undertaking to attempt to describe it at all. As, however, my little work might be deemed to be imperfect without some

account of it, I will present to my readers the substance of what appears to me to be a condensed, well-written article on the Bee. It is from Watkins' Cyclopædia.

There are, he says, and I believe it, fifty-five species of Bees. The general characteristics of the Bee are these:—its mouth has two jaws and a proboscis enfolded in a double sheath; its wings are four, the lower or under pair of which is smaller than the upper pair; in the anus of the female and working Bees is a concealed sting. Of the fifty-five species the HONEY-BEE—classically, or at any rate entomologically—apis mellifica, is the most interesting and important, and that with which I am directly concerned. Of this Bee there are three kinds—the Queen, the drone, and the working Bee; it is no more than justice to the draughtsman and to the engraver to say, the following are beautiful representations, except the head of the working Bee, which is too round.

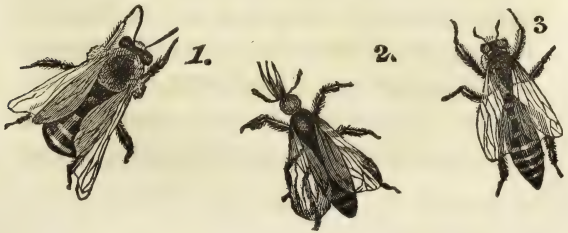


Fig. 1. represents a Drone.
— 2. ——— a working Bee.
— 3. ——— a Queen Bee.

The *Drones* are larger than the others; their heads are round, eyes full, and their tongues short; they are also much darker and differ in the form of the belly; they have no sting, and they make a greater noise in flying than the common Bees. Generally speaking, they are found in hives from the beginning of May to the middle or latter end of July: sometimes they may be seen earlier, especially in good stocks; and sometimes their destruction does not take place till the middle of August, or even later. They neither collect honey nor wax. It has been supposed that their office is to impregnate the eggs of the Queen *after* they are deposited in the cells; but according to Mr. Bonner this *supposition* is a mistake. In this I agree with him, and beg to remark—that in no case is a supposition a proof. Bonner says that the Queen lays eggs which produce young Bees without any communication with the drones. He supports this position by the statement of several very exact experiments. In this opinion he is supported by the respectable evidence of Schirach. On the

mysterious subject of the Queen's impregnation I am inclined to coincide in opinion with Huber, whose multiplied observations, and various and curious experiments, do render it highly probable that the Queen is impregnated by the drone, not whilst in the hive, but whilst flying in the air: but of this debatable subject more by and by.

The QUEEN-BEE is easily distinguished from other Bees by the form, size, and colour of her body. She is larger, longer at least, and her wings are shorter in proportion to her size than those of other Bees. The wings of drones and of common working Bees cover their bodies, but those of the Queen scarcely reach beyond the middle. Her hinder part tapers more than the corresponding part of other Bees, and is admirably adapted for the purpose of being introduced into the cells to deposit her eggs, which she does without being incommoded by her wings, as she no doubt would be, were they long in proportion to the length of her body. Considering then the office she has to perform, the shortness of her wings and the length and tapering of her body are alike conveniences to her; her belly and legs are yellower, and her upper parts

darker than those of other Bees. Though furnished with a sting, she very rarely uses it, and will bear being handled without being provoked. A young Queen is smaller than a full grown one. When three or four days old she is quick in her motions; but when impregnated she becomes heavy. The common or working Bees have the faculty or instinctive power of raising a Queen-Bee, when they are in want of one, from an egg in a common cell. To do this, they choose a common cell in which is an egg, and inject a thick, white, liquid matter from their proboscis, they then build on the edges of that particular cell and enlarge it; on the fifth day the royal maggot appears in the form of a semicircle, in which form it swims in the midst of the matter in the cell; and on the seventh day it is sealed up. During which period the embryo Queen undergoes various metamorphoses. On the fourteenth or fifteenth day afterwards it comes forth a perfect Queen-Bee. Schirach has discovered a method of multiplying Queen-Bees to almost any extent, and consequently of making artificial stocks. This can only be successfully accomplished when there are in a hive eggs, nymphs, and little maggots two or

three days out of the cell, that is, when there is in a hive young brood in these three different stages of existence. When a Queen dies and the Bees are left without the means of raising another, that is—when there are no eggs nor young brood of a proper age in the hive, the Bees cease working, consume the honey, fly about at random, and if not supplied with another Queen, soon dwindle away; but if supplied with a new Queen, they revive, and exercise their labour with new and increased activity. The Queen is, as it were, the very soul of the hive. It has been computed that the ovary of the Queen contains above 5000 eggs at once, and that in the space of two months she may produce 10 or 12,000 Bees. I am inclined to think that this computation is too limited: from what I have witnessed in my observatory-hive this summer (1832), I am led to conclude that a fertile Queen is capable of laying far more than the beforementioned number of eggs in the space of two months.

The *working Bees* are considerably smaller than either the drones or the Queen. They, like the others, have four wings, which enable them to fly with heavy loads. They have six legs, of which the two foremost are the shortest,

and with these they discharge themselves of their loads. The two last or hindmost are the largest, and on the outside of the middle joint of these is a cavity in which the Bees collect the materials for wax, which materials they carry home to their hives; this hollow is peculiar to the working Bee. Each foot terminates in two hooks. The honey-bladder is of the size of a small pea, and very transparent. The sting is horny and hollow, through which the poison is ejected. The wound inflicted by it is mortal to many insects; and instances are not wanting of horses and cows having been stung to death by Bees. When the sting is left in the wound, and being barbed it commonly is left there, the Bee that loses it dies in consequence.

With regard to the age of Bees, the drones have a short life, being destroyed annually by the working Bees; these—the workers—are supposed by some to live but one year, but others are of opinion that they live several years: those of them that escape a premature death will live, if I mistake not, three or four years, or even longer. I once clipped one of the wings of a Queen so that I could identify her, in case I should ever meet with her again:

I then returned her to her hive, and had the good fortune to see her several times afterwards during three successive years. Of course she lived more than three years. What became of her at last I do not know; nor whether she may not still survive I do not know. If, however, working Bees be as long-lived as Queen-Bees, and I think it will be difficult to assign a good reason why they should not, they may live to be three or four years of age, and perhaps more than that. The ample provision they make for life seems to me to be a *natural* indication that they expect at least to live to have occasion for it. Sometimes fierce, destructive battles take place between the Bees of different hives in an apiary, and when the Queen of one hive is killed, the war ceases, and the surviving Bees of the two hives unite and become one peaceable stock.

Some apiarians have obtained an extraordinary command over Bees, particularly Mr. Wildman, who could entice a whole swarm to settle just where he pleased—on his chin, on his head, on his hand, or on any particular branch of a tree; but these feats, so surprising to the beholders, he effected, as

any other dexterous person may, by getting possession of the Queen-Bee, and placing her where he intended the Bees should settle; for it is a well-ascertained fact, that such is the attachment of Bees to their Queen, that they will congregate around her, and, as far as they can, protect her in whatever situation they find her. Were the attachment and *allegiance* of all subjects to their legitimate sovereigns thus true and powerful, it would, as Sterne says, be something!

In working the Bees are said by some, whose sayings are perhaps more fanciful than correct, in the following instance at least;—it has, however, been *said*—that in working the Bees form themselves into four companies, one of which roves the fields in search of materials for the hive, another is employed in laying out the bottoms and partitions of the cells, the third in smoothing the inside from the corners and angles, and the fourth in bringing food for the rest. According to this account some are labourers, others are builders, others finishers, and others purveyors. As there is no difference in the formation of the workers, I see no reason for assigning them any particular task or sort of work, nor do I think

the allotment of labour just mentioned rests upon any other foundation than that of vague conjecture. Their diligence, however, and activity, are so great, that in a favourable day they will make cells which lie on each other, sufficient to contain some thousands of Bees. To keep their habitations—their hives, close and tight, they make use of a resinous gum, which the ancients called, and which is still called—*propolis*. This substance is at first soft and pliable, but becomes firmer every day; when it has acquired its proper consistency, it is harder than wax and is an excellent cement. They guard against the entrance of ants and other inimical insects into their hive, by gluing or filling up with this propolis the smallest inlets; and with it they fasten the edge of their hive to its floor in a very secure manner. Some Bees stand as sentinels, and mount guard, as it were, to prevent the intrusion of strangers and enemies. But if a snail, or other reptile, or any large insect, forces its way into the hive, they first kill it, and then coat it over with propolis, to prevent being annoyed by the noisome smell, or by the maggots which might proceed from its putrefaction, if left to putrefy. Bees can perceive the approach

of bad weather; for when black clouds are in the sky indicating rain, they immediately hurry home with the greatest speed; and when to the eye of man there is no visible token of a sudden shower or other immediate change from fine weather to foul, Bees are aware of it, and by their sudden, hurried return to their hives, are the first to prognosticate a change as near; nor, often as I have observed them, have I ever found them wrong in this respect. The manner in which Bees rest when they settle, after having swarmed, and frequently in the hive also, is by collecting themselves into a cluster and hanging to each other by the hooks of their feet. When the weather has been warm I have frequently seen them, presently after being admitted into an end-box, hang in catkins or ropes: this they no doubt do to cool themselves the more. To view the Bees suspended from one another in these single ropes is a natural curiosity well worth attention. The flight of Bees when swarming is singularly rapid and most extraordinary: during some minutes after having risen into the air, they dart across each other in every conceivable direction, wheel round and shoot through the merry crowd again, again wheel round and

again dart through; and notwithstanding the very limited space within which they confine their gambols on these occasions, they never seem to come in contact or to clash with each other; though animated and excited to a degree of apparently frantic ovation, I never have observed one Bee fall foul of another, and this it is that strikes me as being wonderful. The balls attached to the legs of Bees returning to the hives, consist of a powder gathered from the stamina of flowers, not yet brought to the state of wax. The Bee, when it enters the cup of the flower, rolls itself till its whole body is covered with the yellow farina that is therein. It then brushes off this powdery farina with its hind legs, and kneads it into two balls or small pellets, loaded with which it returns to the hive. Bees powdered all over with farina may frequently be seen entering their hive: the Bees thus covered carry their loads upon their whole bodies, without the labour of packing them upon their thighs. Probably when farina is collected in the immediate vicinity of their hives, Bees may have the wisdom (I know not what else it can be properly called) to save themselves the labour of brushing and making

it into pellets. Some authors hold that this substance is eaten by degrees, and being digested in the body of the Bee, that it becomes wax,—or that by some peculiar process it certainly is converted into wax,—and that when there is a superfluous quantity of this undigested, or unmanufactured matter, it is laid up in store, and is called *Bee-bread.* For my part I am of opinion that farina is stored up purely as Bee-bread and food for the young brood, and that *it enters not into the composition of wax.* The material of which wax is formed I take to be quite distinct from farina—a material of a different nature.

The following account of a working Bee appeared in the Farmers' Journal some time ago, I subjoin it, because, in some respects, it is more particular than that just given; but in one thing it is deficient—it makes no mention of the eyes—the two luminaries or lights of the body. The eyes of Bees are of an oblong figure, black like jet, transparent and immoveable.

BEE, says the Farmers' Journal, a small and well known insect, famous for its industry. This useful and laborious insect is divided by two ligaments into three parts or portions,—

the head, the breast, and the belly. The head is armed with two jaws and a trunk, the former of which play like two jaws, opening and shutting to the right and left; the trunk is long and tapering, and at the same time extremely pliant and flexible, being destined by nature for the insect to probe to the bottom of the flowers, through all the impediments of their chives and foliage, and drain them of their treasured sweets: but were this trunk to be always extended, it would prove incommodious, and be liable to be injured by a thousand accidents; it is therefore of such a structure, that after the performance of its necessary functions, it may be contracted, or rather folded up; and besides this, it is fortified against all injuries by four strong scales, two of which closely sheath it, and the two others, whose cavities and dimensions are larger, encompass the whole. From the middle-part or breast of the Bee grow the legs, which are six in number; and at the extremity of the paws are two little hooks, discernible by the microscope, which appear like sickles, with their points opposite to each other.

The wings are four, two greater and two smaller, which not only serve to transport

them through the air, but, by the noise they make, to give notice of their departure and arrival, and to animate them mutually to their labours. The hairs, with which the whole body is covered, are of singular use in retaining the small dust that falls from the chives of the flowers. The belly of the Bee consists of six rings, which slide over one another, and may therefore be lengthened or contracted at pleasure; and the inside of this part of the body contains the intestines,—the bag of honey,—the bag of poison,—and the sting. The office of the intestines is the same as in other animals. The bag of honey is transparent as crystal, containing the sweet juices extracted from the flowers, which the Bee discharges into the cells of the magazine for the support of the community in winter.

The bag of poison hangs at the root of the sting, through the cavity of which, as through a pipe, the Bee ejects some drops of this venomous liquor into the wound made by the sting, and so renders the pain more excessive. The mechanism of the sting is admirable, being composed of two darts, inclosed within a sheath that tapers into a fine point, near which is an opening to let out the poison;

the two darts are ejected through another aperture, which being armed with several sharp beards, like those of fish-hooks, are not easily drawn back again by the Bee; and indeed she never disengages them if the wounded party happens to start and put her in confusion; but if, when stung, one can have patience to continue calm and unmoved, the stinging Bee clinches those lateral points round the shaft of the dart, by which means she recovers her weapon, and gives less pain to the person stung.

FOR THE STING OF A BEE.

The poisonous liquor which the stinging Bee infuses into the wound causes a fermentation, attended with a swelling, which continues sometimes several days; but that may be prevented by immediately pulling out the sting, and enlarging the puncture, to let the venomous matter have room to escape.

Many nostrums have been recommended as cures—*infallible cures*, of course—for the sting of a Bee, a few of which I will just mention; premising, however, that I myself never make use of any of them; for, if by chance a Bee happens to sting me, which is very rarely indeed the case, though I never so much as

cover my face, nor even put on a pair of gloves, when operating among thousands and tens of thousands of Bees, I extract the sting instanter, and never afterwards experience the least pain, nor suffer the slightest inconvenience. But, if the sting be suffered to remain in the flesh, during a few seconds only, it is not very easy to stop the inflammation and to allay the pain. An onion cut horizontally into thin slices, and pressed closely to the wounded part, and renewed at short intervals, has been accounted a good application. If the part stung be first well-rubbed with one of those slices, that would perhaps have a soothing effect. The juice of the plantain is also said to be a specific; olive oil is another; so is common salt; so is laudanum; so is spirits of hartshorn; so is a solution of sal ammoniac; and so is chalk or whitening.

The Doctor (and who so likely to prescribe properly for the case as the Doctor?) says* "common whitening proves an effectual remedy against the effects of the sting of a Bee or wasp. The whitening is to be moistened with cold water, and immediately applied. It may be washed off in a few minutes, when neither pain nor swelling will ensue."

* See "The Doctor," page 15.

In "The Apiarian's Guide, by J. H. Payne," published since the first edition of this work, I find the following novel mode of treatment recommended as "almost a perfect cure," and which is said to be "as immediate as it is effectual." "The method I (J. H. Payne, Esq.) have of late adopted, by which the pain is instantly removed, and both the swelling and inflammation prevented, is to pull out the sting as soon as possible, and take a piece of iron and heat it in the fire, or for want of that, take a live coal, (if of wood the better, because it lasts longer) and hold it as near to the place as I can possibly endure it, for five minutes; if from this application a sensation of heart (quere heat) should be occasioned, a little oil of turpentine or goulard cerate must be applied.

"I have found the quicker the application, the more effectual the cure."*

Pressure with the hollowed end of a small key, or with a pencil-case, is practised by some unfortunates, and is said to check the circulation of the poison.

This last mode of treatment—i. e. pressure with a small key, or pencil-case—the smaller the better—is the simplest, and, if *immediately*

* See the Apiarian's Guide, pp. 58, 59.

adopted, is I believe the very best: but its efficacy depends upon the instant application of the key or pencil-case to the part stung, by which the poisonous matter is not only prevented from being absorbed into the system, but the puncture is laid open, and the virus thereby expressed and entirely got rid of more readily than by any other means.

Accidents may sometimes happen, and the most cautious and humane apiarian may occasionally receive a sting; but gentle treatment does not irritate Bees; and when not irritated they have no disposition to use their stings.

CHAPTER XII.

IMPREGNATION OF THE QUEEN-BEE.

NOTWITHSTANDING the most persevering attention of Huber and of other ingenious apiarians, and notwithstanding the experiments and expedients had recourse to, to discover the secret, it is still doubtful—it is still undiscovered, in what precise way the Queen-Bee becomes impregnated. No one has ever yet witnessed the fact of her copulation with a drone, either in the hive or elsewhere,—in all probability no one ever will be witness to it; consequently the contradictory conclusions apiarians have come to on this subject are unsatisfactory, because unsupported by sufficient and convincing proofs. Huber, after having made a variety of observations and tried numberless experiments to get at the fact, gives it as his opinion—that the impregnation

of the Queen is accomplished by her intercourse with the drone during a flight in the open atmosphere; but modestly states that he never witnessed the act of copulation. On this last point I entirely coincide with him, and firmly believe that no man ever yet has been present to confirm the supposed fact; neither can any person deny the possibility—not to say—the probability of such an union. On the other hand, Mr. Huish is an advocate for the drones in another way, stating them to be the male Bees, and that they fecundate—*not the Queen,* but all the eggs of the Queen, produced by her, the year in which the drones are brought into existence. But Mr. Huish has nowhere stated, in his much admired treatise on Bees, what fecundates those eggs of the Queen which are produced by her in the absence of the drones. It is well known that those eggs do well and come to perfection, long after the drones have ceased to exist in the hive. *Eggs are laid and matured into Bees when there is not one drone in the hive.* This, therefore, is an argument in favour of Mr. Huber's opinion —namely—that the Queen once impregnated remains so during her life,—and that, as the Queen lives some years, the drones are called

into being to fecundate the young Queens, brought into existence for purposes that will be noticed in the next chapter. Neither should we overlook the singular services of the short-lived drones in other circumstances of the colony; for most essential is their presence in the hive during the months of May, June, and July. Do we not in those months behold the extraordinary rapidity with which the working Bees leave their hive in search of materials for their various works? So indefatigable are these admired insects, after enriching their commonwealth, that in the time of honey-dews, scarcely a mechanical labourer is left in the hive. Now, were it not for the drones—those large bodied Bees—what would become of the young larvæ then in existence? It would undoubtedly perish. No sooner, however, is this busy season at an end, than the total destruction of the drones takes place; but not until the animal heat which the drones impart to the hive has accelerated the production of the young Bees, and added thousands of them to the mother hive.

It is not possible that the drones can influence the impregnation of the Queen's eggs, particularly those eggs which are produced

after the total destruction of the drones, which generally takes place in August, and sometimes in the latter end of July. These later eggs are hatched, and brought to a state of perfection by the crowded population of the hive at that period: for a sufficient number of common Bees, that is—a well-populated hive, will always bring to perfection the Queen's eggs that have been deposited in the cells, after the total destruction of the drones. This seems to prove, that there is some probable truth in Huber's opinion respecting the agency of the drones in the procreation of Bees, by their sexual union with the Queen. Though I was once inclined to differ in opinion with Huber on this subject, and even went so far as to venture to say with Huish, and in Huish's own words—that the Queen knows not coition, and that she is both virgin and mother,* from what I have seen in my observatory-hive this summer (1832) I am led to doubt the accuracy of that remark, and am disposed to lean to Huber's doctrine, and to think, that there *may be* more truth in his experiments than has hitherto been awarded to them: in short, I see no objection to Huber's theory, although

* See Huish on Bees, page 13.

there is no direct proof of the copulation of the Queens with the drones. All apiarians allow that there are male and female in a hive or stock of Bees;—all admit—indeed, it is impossible to deny—that Bees *do increase and multiply* at a prodigious rate, and so fulfil the Divine injunction; the only question to be solved is this—*How* is the Queen-Bee impregnated? This secret in nature—if those matters, or natural operations which we cannot clearly explain, which, though in themselves sensible and gross, may, nevertheless, be too subtile, too refined, for our obtuse understandings to comprehend, and for our dull faculties to investigate,—if these may be called secrets in nature, there is a secret of this description respecting the sexual union of Queen and drone Bees, or, at any rate, respecting the manner of the impregnation of the Queen-Bee. I condemn no man who differs from me on this nice subject, as I have no direct proof, either that Huber is right, or that Huish is wrong, in their surmises relative to this disputable matter. Individually they are men deserving the highest respect; their labours and perseverance to throw light upon this mystic branch of apiarian science deserve the utmost praise; as also do the labours

of the learned and ingenious Dr. Bevan, whose treatise on Bees I have read with much pleasure; and have occasionally referred to, and shall again make use of it, in this my humble attempt. We have all exerted our best abilities to become the favourites of our patrons and friends. How much each of us deserves the honours conferred on us, is best known to those who have been most benefited by our unceasing endeavours to improve and extend apiarian science. My great object is—not to dispute with the naturalist, the philosopher, or with the apiarian, *how* the Queen-Bee becomes impregnated: because, be that as it may, it is, no doubt, consistent with the law of nature,—it is, no doubt, a part of that all-prevailing law; and though hitherto undiscovered, — hitherto "one of nature's gambols with the human mind," I do cherish strong hopes that the observatory-hive I have constructed, will on some auspicious, future day, disclose such facts as will set the matter at rest for ever: my great object at present is—to endeavour to improve the culture of Honey-Bees, and to lay before my readers *practical* instructions for the more humane, and more profitable management of those interesting, little insects.

CHAPTER XIII.

SUPERNUMERARY QUEENS.

In the last chapter we were at sea without a compass by which to steer our course aright,—with two pilots on board, 'tis true; one of them a foreigner, *experienced* beyond most other men, though aged, and infirm, and defective in his eyesight, but willing, nevertheless, nay —anxious to conduct us to our wished-for haven; the other, though not inexperienced, less practised, it is thought, in voyages of discovery, and more venturesome than his senior in the office, contending that the respectable, old gentleman had put us on a wrong tack,—that we were in a wrong latitude, —that our reckoning was incorrect, and even making merry with the old man's infirmities. Perplexed, and doubting in whom it is most reasonable and safest to confide, we seize

the helm ourselves and make to the nearest shore, and luckily land on terra firma—terra cognita, and are now approaching a *field* with every corner of which we are thoroughly acquainted. But metaphor apart, lest we should not properly sustain it.

There is but one reigning Queen in a colony of Bees at one time: but previously to swarming, royal cells are constructed, and provision made, for ensuring a successor to the Queen that leads the swarm and emigrates, when the too-crowded population, and over-heated temperature of the hive, render such emigration necessary. That it is the old Queen that leaves the hive with a swarm I am well convinced, notwithstanding what some apiarians assert to the contrary. To satisfy myself on this point, I have sometimes in the evening of the day on which a hive has swarmed, at other times on the second, and at others on the third day after that event, put the parent-stock under, or rather, I may say—*over* fumigation, dissected and examined the combs and Queen-cells minutely, and the Bees also, and whenever I did find a Queen, she was invariably a young one; but, instead of a Queen, I have more frequently found a royal cell just ready

to give birth, as it were, to a successor to that that had left the hive; and in general there are several of these royal cells containing embryo Queens, in different states of forwardness: so that it seems, Bees have an instinctive foresight which leads them to provide against casualties, for they are generally provided with the means of bringing forth *supernumerary Queens*, that in case the first that comes forth should prove steril, should be defective, or in any way unfortunate, or unfitted to assume the sovereignty of the hive, there may be others ready to burst into being, and remedy the misfortune that would ensue, were there but one chance of a successor, and were that one chance to prove abortive. But no sooner is a young Queen enthroned, as it were, and established in the government of the hive than the supernumerary ones, in whatever stage of existence, are all discarded, and cast out of the colony. Mr. Porter, of Cowbit, has this year (1832) picked up eight of those discarded, virgin Queens, together with the old Queen, which last was sorely mutilated, *but not killed*—she alone was cast out alive, the others had been killed: these nine supernumerary Queens were all cast out of one fine colony of Bees in

the course of two successive days. That colony is a remarkably prosperous one, *and has not swarmed.* I myself have observed no fewer than twenty-four supernumerary, virgin Queens that were cast out of one of my stocks; and that stock is flourishing, *and has not swarmed:* and my respected friend, Mr. Salmon, of Stokeferry, informs me that he once collected upwards of thirty of these young Queens; whether his stock swarmed or not I am unable to state positively, but presume it did not; for, generally speaking, when supernumerary, virgin Queens are cast out of a colony, it may be considered as an indication that that colony is not only prosperous, but that swarming is not contemplated—in fact, is abandoned for that season. The question then is—how are Bees to be managed, in order that they may be induced to rid themselves of these supernumeraries? The relation of the following practical lesson will both answer the question, and exemplify and confirm the foregoing remarks.

It has already been related (in pages 62—66) that in 1826 I forced a colony of Bees to swarm,—that I returned that swarm to its parent-stock, and managed so as to prevent

its swarming in future,—and that two royal nymphs were cast out on that occasion. To prove whether I could not accomplish the same object, and prevent swarming altogether, I had recourse to the following experiment.

On the 26th of June, 1827, at one o'clock p.m. the thermometer, in one of my colonies of Bees, suddenly rose to 96. The progressive rise and constantly high temperature in that colony, during the evening and night, together with the extraordinary weight of the hive, induced me to suspect that swarming, if not prevented, would shortly take place. Not, however, perceiving any of the symptoms that usually precede the immediate act of swarming, I suffered matters to go on until the 6th of July, on which day the thermometer stood at 102. The drones came out and sung their merry tune; and during the whole night the temperature of the colony continued to increase. On the next day unequivocal symptoms of swarming presented themselves. These urged me to push my experiment to the highest pitch of proof; I therefore went on narrowly watching and ventilating this stock, until the 10th of July, when, in spite of my endeavours to keep down the temperature by *merely ventilating*

the thermometer was standing at 112, consequently I concluded that it was high time to lay this prosperous colony under contribution; and in the evening of that day, I took from it a beautifully finished glass of honey, as pure as the crystal stream; its weight was sixteen pounds. I continued ventilating the side-boxes, and placed an empty bell-glass upon the middle one, from which I had just before taken the full one, I then withdrew the dividing-slide, and the Bees immediately entered the glass, and began their works in it, and in four days filled it with comb, and partly filled the cells with honey. On the sixth day after those operations had been performed, a continuance of the former temperature demonstrated to me the necessity of taking away a side-box. I did so, and found its weight to be no less than sixty-five pounds. On removing the box of honey, I replaced it with an empty one; and on drawing up the tin-slide, in order to admit the Bees into the empty box, to my great gratification I found the thermometer standing at 82 in that box, and in the space of five minutes the other collateral-box was under the same agreeable temperature. By this continued ventilation,

within the short space of twenty-four hours afterwards, I ascertained the following important fact,—viz.—that no sooner did the Queen-Bee feel the agreeable change that had taken place in the interior of her domicil, than the royal nymph was dislodged from its cell, and by the Bees brought out of the pavilion, and laid lifeless on the front-board.

This fact taught me by experiment, that the reigning Queen would very soon, from real necessity, have been compelled to leave the now discarded nymph to take possession of the hive.

The Queen, owing to the excessive and daily increasing heat of the hive, would have left her wealthy colony—would have been compelled to leave it—had not the ventilation, and the enlargement of her domicil, prevented the painful necessity of her so doing. This, I think, proves the truth of the observation—that it is the old Queen which leaves, when Bees are compelled to swarm; but, if not, the following experimental operations have demonstrated the fact. I have united many swarms, and every sovereign Bee I have been under the necessity of making a captive, has invariably been an old one.

On the 25th of June, 1828, I took up a parent-stock, four days after it had thrown off a swarm, and *there* found only the royal nymph within its cradle—*there was no Queen left in that stock, save the one in embryo*—the old Queen had gone with the swarm. This lesson caused me to carry my experiments farther. Having taken up the parent-stock, as just stated, I united all the working Bees of that stock to those of the swarm already mentioned, and I also put the young larvæ found in the parent-stock, to the now united stock; I then placed the intended royal species—the nymph already mentioned—with the remainder of the young brood, in one of the collateral-boxes, and immediately let the odour of the stock through the communicating slide. To my great satisfaction I discovered the willingness of the old Bees to bring to perfection the young they had been compelled to leave in their former domicil. The royal nymph, however, was an exception; she alone was instantly dragged from her cell, and cast out of the hive.

This confirmed the proof of the important fact gained the preceding year,—namely—that ventilation and the means of dividing the treasures of the Bees, by taking off a glass

or a box of honey,—or, if necessary, by taking off both a glass and a box, set aside the necessity for swarming. On all occasions, under this practice, a proper temperature may be supported in a colony; and in all critical points, by a just observation of the state of the thermometer, Bees may be relieved and assisted, and all the mischiefs attending the old mode of management may be guarded against and prevented. For when adequately relieved and properly assisted, they proceed to rid the colony of all embryo Queens, which would only become so many supernumeraries in a hive where the reigning Queen is fertile, and the necessity for emigration is superseded. But, unless Bees could be made to understand that accommodation will be extended to them at the proper time, they, guided by *their* sense of their situation—not by ours—naturally and wisely provide *their own means* of relieving themselves; and in so doing frequently bring forth what afterwards become supernumerary Queens, which are invariably destroyed and cast out of the colony, as soon as the Bees are sensible that they have no occasion for them. And, whenever a royal nymph or a virgin Queen is thus cast out, swarming need not be apprehended.

CHAPTER XIV.

BEE-FEEDING.

NEGLECTED generally, as is the management of Bees by their cottage possessors, there is no part of it less attended to, nor more slovenly performed, when performed at all, than that of feeding. The cottager commonly takes up, as he terms it, his best hives for the sake of the treasures they contain, or are supposed to contain. This is destroying Bees because they are rich! He also takes up the lightest and poorest—of course the late swarms—and those that are the least likely to live through the winter; because if he get from one of these but two or three pounds of honey, though he seldom gets so much, and a few ounces of wax, he thinks that that is all clear gain: and, if he get neither honey nor wax, he, at any rate, gets rid of the *expense* and *trouble* of feeding

his good-for-nothing swarms, which, in his opinion, however fed, would never come to any good. A pennyworth of brimstone will do the job at once, and is more easily paid for than a pound of sugar, and after that another, and perhaps another. Such is the reasoning, and calculation, and cruel practice of the generality of cottage Bee-keepers! Such is the destruction annually dealt out to hundreds of poor swarms, and thousands and millions of *poor* Bees!! I do from my heart pity and deplore the untimely fate of these suffocated, innocent, valuable insects. To destroy Bees because they are rich is a *barbarous* practice, and ought by all means to be discountenanced and discontinued;—to destroy Bees because they are poor and may need support, is cruel—is inhuman—is shocking, however little may be thought of it by those who still adhere to this practice. Even with the common straw-hives, this terrible havoc among poor stocks and late swarms might be prevented, if they, who happen to have them, would so far improve themselves in the practical management of an apiary, as to be able to fumigate, and to take such Bees out of the hives containing them, and to join

them to their richer stock-hives, in the latter end of August, or any time in September. This is by far the best plan that can be adopted with poor hives; and there really is no difficulty in the operation. This strengthens the population of rich stocks, and causes them to swarm early in the ensuing spring, *it preserves the Bees*, which is of itself, independently of the advantages accruing from it afterwards, a consideration that never should be lost sight of,—it leaves the contents of the fumigated hive, as absolutely in the possession of the Bee-owner, as if the Bees had been suffocated and destroyed,—and in most cases it entirely does away with the necessity of feeding. I confess I should rejoice greatly, and flatter myself that every friend of humanity would rejoice with me, to see this mode of disposing of weak hives universally adopted; because, it may be presumed, that the next step in the way of improvement would be to take away the superabundant treasure of the Bees and *still preserve them*.

Notwithstanding, under certain circumstances it will always be necessary, and judicious in Bee-masters, to have recourse to *feeding*. If, for instance, after an early swarm is put

into a hive, or into a box, two or three or more cold, ungenial days should follow, and more particularly if those days should happen to be rainy also, by feeding such a swarm you will assist your impoverished labourers, not only with *necessary food*, but with materials and treasure, which, unfortunately for them, they cannot at such an unfavourable juncture get abroad to collect elsewhere.

Different apiarians have adopted and recommended different ways of feeding Bees, none of which, in my opinion, possess any great merit; in order, therefore, to improve this part of Bee-management, my endeavours have been directed to the contrivance and construction of a feeding department; which is attached to my collateral-hives in so convenient a manner, that I can feed my Bees, at any time when feeding is required—in spring, in autumn, or in winter, without disturbing the position of the hive, and without changing its interior temperature; which temperature cannot be kept equable and comfortable, where a hive is frequently lifted up from its stand, and its interior is suddenly exposed to the action of perhaps an extremely cold atmosphere. Besides, a hive cannot be lifted up without

breaking the propolis by which it has been cemented all round and made fast to its stool. In sharp, cold weather, disruption of the hive from its stool is a serious mischief done to the Bees; because, however carefully it may be set down again, there will have been made many vents and crevices between the edge of the hive and the stool, which will occasion various currents of air, cold, frosty, or other—proper or improper—to be continually passing through the lower part of the hive. And should Bees be tempted by food, or urged by hunger, to descend into these currents in sharp, frosty weather, but few of them will get away alive; the keen air acting upon them whilst feeding, paralyzes and kills them. I am an advocate for keeping Bees cool in winter—yes, *cool and still also:* let them not be disturbed nor disunited,—let them not be forced nor tempted to (if I may so say) *uncluster* themselves. I have no objection to a current of air passing through the lower part of a hive in winter, *provided the Bees be not disturbed—be not exposed singly to its nipping influence;* but I strongly object to the feeding of Bees in such currents, because, in that case, feeding is prejudicial to them. The

cottager seldom protects his hives in winter with any other covering than that which a pot, called a pancheon, whelmed over each hive, forms; capped with this unsightly piece of earthenware, his hives are exposed to all weathers; consequently the less he disturbs them the better. He therefore should give his weak stocks *a copious feeding*, in September at the latest,—not molest them during the severity of winter,—but in the spring, as soon as the Bees begin to make their appearance at the mouth of his hives, introduce his wooden trough furnished with *a little* Bee-sirup, and then close up the entrance,—withdraw the trough in the morning, and return it replenished every evening, as long as feeding is necessary. Tearing off a hive at Christmas, and scattering a few ounces of brown sugar upon the stand, and then setting down the hive again, deserves not the name of feeding; though it is all the bounty that is bestowed on some stocks; and is even more than others are treated with. It need not then be wondered at that so many stocks of Bees perish in the winter, and in the spring of every year. *By judicious feeding, at proper seasons, almost any stock of Bees may be preserved: by*

injudicious feeding, at an improper season, even good stocks—stocks that would survive, if not fed at all, nor molested, during the depth and severity of winter, may be seriously injured—may be totally destroyed. The peasant Bee-keeper, however, does not often subject himself to the charge *complimental* of being accessary to the death of his Bees *through mistaken kindness*.

The sum and substance of my directions, as respects Bee-feeding, are these:—

1. In spring feed *sparingly*.
2. In autumn feed *plentifully*.
3. In winter *do not feed at all*.
4. Feed swarms, if unseasonable weather immediately follow the act of swarming.
5. Preserve the Bees of weak stocks, and prevent a great deal of the necessity for feeding, by adding them to those that are rich and able to support them. This last is the best and cheapest, nay—it is even a *profitable* method of feeding Bees.

Early swarming, where swarming is necessary as in the straw-hive colonies, is of great advantage to the watchful apiarian, but not to the inattentive and slothful manager. I have seen in a cottager's garden a swarm of Bees on

the 10th of May, which was considerably weaker in the month of August, than was a swarm on the 10th of July, and that solely on account of not being fed and properly attended to.

If early swarms are judiciously fed, and supported by a natural heat within, they will be greatly benefitted thereby, and eventually prosper.

But, notwithstanding what has been already said, the cottager may probably ask—"how can I feed my Bees without lifting up their hive?" I again and again request him to examine my collateral box-hive; and he will perceive that he may easily feed the Bees in his cottage-hive in the same easy manner, if he have but ingenuity enough to attach a proper feeder to the stool or floor of his hive.

Mr. Huish advises apiarians to make choice of a fine and warm day in which to feed Bees, he says, the danger to be apprehended from the change of the temperature in the hive will thereby be obviated. This, I grant, is rational and humane, and in some degree a confirmation of my already expressed opinion, respecting the mischiefs resulting from the inconsiderate practice of exposing the interior

of a hive to sudden and extreme alternations of temperature. But it matters not what sort of weather it may be, if my mode of feeding be adopted. I feed my Bees in their native temperature, without disturbing them or exposing their food to the temptation of robbers, which feeding in the ordinary way so frequently encourages, during the spring and autumnal seasons; and it is at these times that Bees stand in most need of assistance.

In the year 1828, I purchased a cottage-hive of a neighbour, it was a large hive, and well-stocked with Bees, but extremely light; I was fearful for the safety of its inmates, and, therefore, placed it over one of my feeders; in order to give them support by feeding, I placed the sirup intended for their food beneath the hive; but to my great surprise the Bees refused to take the proffered bounty. I persevered in my endeavours to induce them to feed for four days, but they would not touch the well-intended boon: I therefore resolved to ascertain the cause of their refusal, and on turning up the hive I discovered that thousands of the Bees were in a dying state, I had the curiosity to take the whole of them out singly. After several hours'

particular attention and patient search, I found the Queen was dead. I then united the weak, enfeebled Bees to a rich stock, and they nearly all recovered their strength. Their numbers greatly assisted in the labour of the hive to which they were joined. Certain it is, that if any accident befal their Queen in winter, it is total *ruin* to that stock of Bees: where such a death is discovered, feeding will avail nothing, the Bees dwindle away and perish.

Mr. Huish says—and he is perfectly correct in saying—that there are some persons who defer the feeding of their Bees until the moment they suppose that they may be in actual want. This is a most reprehensible plan; for should feeding be too long delayed, the Bees will become so weak and debilitated, that they will be unable to convey the food into their cells: the food ought to be administered to poor stocks, three weeks or a month before they may be supposed to be in actual want; it will then be conveyed with the greatest despatch into the cells, and the hive will be saved from a death of famine. He then goes on to observe—that some apiarians conceive that the feeding of Bees in the spring renders them lazy and inactive. On what this opinion

is grounded he is at a loss to conjecture, as must be every practical apiarian; for it is in direct contradiction, not only to Mr. Huish's experience, but also to that of many other apiarians. A little food granted to a populous, and even well-provisioned box or hive in the spring, is attended with very beneficial consequences. It diffuses animation and vigour throughout the whole community;—it accelerates the breeding of the Queen—and consequently conduces to the production of early swarms, where room is not previously given in order to prevent swarming altogether.

BEE-FOOD.

Artificial food proper for Bees may be made by mixing *coarse*, raw sugar, and good, sound ale, in the following proportions:—

To a quart of ale add a pound and a half of sugar, gently boil them, in a sweet, well-tinned saucepan, over a fire clear from smoke, for five or six minutes, or until the sugar be dissolved and thoroughly incorporated with the ale; and, during the process of boiling, skim off the dross that rises to the surface. Some persons boil these ingredients much longer, and until they become, when cool, a thick,

clammy sirup; this not only diminishes the quantity of the mixture, but renders it rather disadvantageous, to weak Bees in particular, by clogging and plaguing them, if, as they are almost sure to do, they get their legs or wings daubed with it. I prefer sirup in a more liquid state.

For spring feeding, I advise—that not more than a pound of sugar be put to a quart of ale, or sweet wort, if it can be obtained, and that a small quantity of common salt be added. By a *small quantity* I mean—a drachm or two at the most to a quart of the sirup. Salt, it has been said, is conducive to the health of Bees, and the most efficacious remedy for the dysentery, which sometimes affects Bees in the spring; therefore, it may not be amiss to put a little salt into their food, by way of preventive, rather than to have recourse to it afterwards as a remedy.

Speaking of the substances which are proper for the feeding of Bees, Mr. Huish says*—"he is perfectly convinced that honey alone is very injurious to Bees, as it in general gives them the dysentery." Whether by this *extraordinary passage* Mr. Huish has, or has

* Huish on Bees, page 272.

not, subjected himself to the lash of his own ridicule, it would be hypercritical and unbecoming in me to determine. As an apiarian I respect him; in no other character am I acquainted with him. His work on the management of Bees I have read, and have derived information and occasionally assistance from some of its pages. There are in it, nevertheless, several untenable positions, of which I consider the above-quoted passage to be one: and, if what he has remarked somewhat sarcastically, in a note at the foot of page 31, be read in conjunction with this passage, it will be for the candid reader, apiarian, or other, to decide whether Mr. Huish in propriâ personâ does not, oddly enough, exemplify his own remark. It is there said—that "there is no wonder in nature which an apiarian has not seen." Professedly an apiarian himself, he must have seen some, at least, of *the wonders in nature*, otherwise he never could have been "*perfectly convinced*" —that honey—"*honey alone*"—the very substance which Bees, guided by the instinct of their nature, collect with so much industry, and store up with so much care, for their subsistence, should be "very injurious to them,

and in general give them the dysentery." From this it seems that the substance, which is the natural food for one stock of Bees, is physic for another, if not poison!! I cannot but express my astonishment that a gentleman, so acute and experienced as Mr. Huish undoubtedly is, should have asserted in the most unqualified manner—that "honey alone is very injurious to Bees." Were this the fact, rich stocks, and all stocks that subsist upon "honey alone" during winter, would "in general" be affected with dysentery in the spring, which certainly is not the case. "In general" rich stocks are healthy and strong in the spring. Poverty is the predisposing cause of dysentery among Bees: a regular supply of their natural—their peculiar food, does not induce dysentery or disease of any sort. Had Mr. Huish analyzed the honey given to Bees as food, and which induced dysentery, he would, I suspect, have discovered that it was not "honey alone," but —*medicated honey—honey and brimstone*, or honey strongly tinctured either with brimstone or tobacco. That honey, tinctured with the pernicious qualities of those substances, should have a laxative effect upon impoverished,

debilitated Bees, is no more than might be expected: but then it is not the honey that has the "injurious" effect, but the essence of the brimstone or of the tobacco that is administered along with it. What effect honey, that has not been stoved and saturated with brimstone or with tobacco, may have upon *weak* Bees, when given to them for *spring food*, I pretend not to determine, because I have never tried the experiment. But I do say that before the arrival of spring, honey, that has been drained or expressed from the comb, undergoes fermentation, and that fermentation may, for aught I know, impart to it physical properties, which in its pure, liquid, unchanged state, in the warm hive, it does not possess. I am not chemist enough to venture to assert that it is so, but I think it highly probable that fermentation may alter the properties of honey, and perhaps may render it unwholesome to Bees. But fresh, unfermented honey, even that in the blackest and oldest combs—the very refuse, and all such as the cottage-housewife makes into common mead, if spread upon large dishes and placed in an apiary, will be banqueted upon by the Bees in the most eager

manner, and is apparently much enjoyed by them. They soon carry into their hives what they do not consume on the spot, and suffer no inconvenience whatever from the treat. I have feasted my Bees in this way scores of times, and esteem it the very best mode of autumnal feeding, and the most profitable way of disposing of broken combs and refuse honey. "Honey alone" is the natural food of Bees, and if given to them pure and untainted, in its primitive, limpid state, so far from being injurious, it is highly beneficial to them; of this I have not the shadow of a doubt. For autumnal feeding, I prefer honey to all other substances, and recommend it as the most proper food that can be given to them.

CHAPTER XV.

CATALOGUE OF BEE-FLOWERS, &c.

From the account of the mode of supplying Bees with artificial food, to the enumeration of such trees, plants, and flowers as are most frequented by Bees, for the purpose of culling from them the various substances, which their necessities, their nature, or their instinct (which is a part of their nature) urge them to seek for, the transition is so easy and natural—is so akin to the subject of Bee-feeding, as to be rather a continuation thereof than a transition to a fresh one; I therefore proceed to give a catalogue of those trees and plants which afford pabulum for Bees. It is furnished principally from my own ocular observation, and is partly collected from the observation of others, whose curiosity has led them to pay attention to the subject, and to make remarks upon it.

Alder-tree
Almond-tree
Althea frutex
Alyssum
Amaranthus
Apple-tree
Apricot-tree
Arbutus (alpine)
Ash-tree
Asparagus
Aspin

Balm
Bean
Beech-tree
Betony
Blackberry
Black-currant-tree
Borage
Box-tree
Bramble
Broom
Bugloss (viper's)
Buckwheat
Burnet

Cabbage
Cauliflower
Celery
Cherry-tree
Chesnut-tree
Chickweed
Clover
Cole or coleseed
Coltsfoot
Coriander
Crocus
Crowfoot
Crown-imperial
Cucumber
Currants
Cypress-tree

Daffodil
Dandelion
Dogberry-tree

Elder-tree
Elm-tree
Endive

Fennel
Furze

Goldenrod
Gooseberry-tree
Gourd

Hawthorn
Hazel-tree
Heath
Holly
Holly-hock (trumpet)
Honey-suckle
Honey-wort (cerinthe)
Hyacinth
Hysop

Ivy
Jonquil

Kidney-bean

Laurel
Laurustinus
Lavender
Leek
Lemon-tree
Lily (water)
Lily (white)
Lime-tree
Liquidamber
Liriodendrum, or Tulip-tree
Lucerne

Mallow (marsh)
Marigold (French)
Marigold (single)
Maple-tree
Marjoram (sweet)
Melilot
Melon-tree
Mezereon
Mignionette
Mustard

Nasturtium
Nectarine-tree
Nettle (white)

Oak-tree
Onion
Orange-tree
Ozier

Parsley
Parsnip
Pea
Peach-tree
Pear-tree
Peppermint
Plane-tree
Plum-tree
Poplar-tree

Poppy
Primrose
Privet

Radish
Ragweed
Rasberry
Rosemary (wild)
Roses (single)
Rudbechiæ

Saffron
Sage
Saintfoin
St. John's wort
Savory (winter)
Snowdrop
Snowberry-tree
Stock (single)
Strawberry
Sunflower
Sycamore-tree

Tacamahac
Tansy (wild)
Tare
Teasel
Thistle (common)
Thistle (sow)
Thyme (lemon)
Thyme (wild)
Trefoil
Turnip

Vetch
Violet (single)

Wallflower (single)
Woad
Willow-herb
Willow-tree

Yellow weasel-snout

Of these some are valuable for the supply of pabulum they afford Bees early in spring; as *the white alyssum, broom, crocus, furze, hazel, laurustinus, mezereon, ozier, plane-tree, poplar-tree, snowdrop, sycamore-tree, the willow-tree, &c.* Others again are valuable on

account of the lateness of the season that Bees derive assistance from them; as *the golden-rod, heath, ivy, laurustinus, mignionette, ragweed, &c.* Some abound with honey; as *borage, buckwheat, burnet, coleseed, currant and gooseberry-trees, heath, leek, mignionette, mustard, onion, thyme, the blossoms of apple, apricot, cherry, nectarine, pear, and plum-trees, and the leaves of those trees remarkable for what is called honey-dew, as the aspin, blackberry, laurel, laurustinus, lime, maple, oak, plane, poplar, and sycamore-tree.* Among those that are rich in pollen, may be classed—*the arbutus, ash, blackberry, box, chesnut, cypress, elder, laurel, marsh-mallow, turnip, &c.*

The cultivation of some of the most valuable of these is too limited to be particularly advantageous to Bees, as *alyssum, borage, burnet, golden-rod, laurustinus, mezereon, mignionette, &c.* The most extensive and lasting Bee-pasturage in this country is *clover, heath,* and in my own immediate neighbourhood *mustard.* In short, every one of the flowers, &c. mentioned in the foregoing catalogue, and others innumerable, are in their turns resorted to by Bees, and of course are more or less advantageous to them.

CHAPTER XVI.

HONEY-COMB.

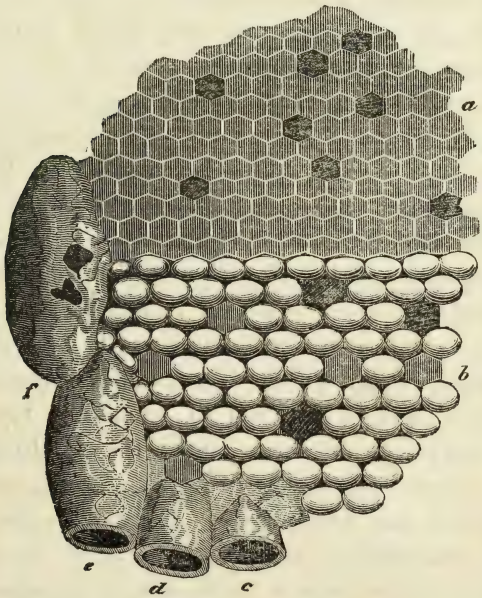
To excite our admiration of the industry and ingenuity of Bees, we need only take into our hands a piece of *honey-comb*, and examine it attentively. Its neatness, its beauty, its construction, the similarity and exact proportion of its double web of cells, for a honey-comb is, in fact, a web of cell-work on both sides, are most admirable, and calculated to lead the contemplative mind from nature's work up to nature's God.

When a swarm of Bees is put into a hive, or into a box, they immediately set about constructing combs in it, and proceed in their building work with a rapidity that is truly astonishing. The cells that are opposite to each other are advanced alike: the work on one side is just as forward and in the same

state as that on the other side. In the cells first finished the Queen begins to deposit her eggs. In an incredibly short space of time, an immense number of cells is completed, and the Bees store pollen, farina, or Bee-bread, (which are so many names for the same substance) in some of those not already occupied by eggs, and in others honey soon becomes visible: all is activity, industry, and apparently happiness. But, to come to particulars:—

As Dr. Bevan, in the course of his *masterly* chapter "on the Architecture of Bees," has given an engraved representation of a piece of honey-comb,—and as Mr. Huish also has given a somewhat similar representation, but better than Dr. Bevan's, inasmuch as it is more varied, and shows the royal-cells in their different stages to more advantage, and the drone-cells likewise;—I cannot, perhaps, do the *honey-comb* so much justice in any way, as by presenting to my reader a copy of Mr. Huish's piece of comb, which has been *greatly improved* by the skilful hand of my engraver, and by giving along with it Dr. Bevan's able description. Though after all, a piece of *real comb*, to look at and examine, is more beautiful and

far better than any engraving possibly can be, however cleverly it may be executed: and therefore, notwithstanding the plate, I would recommend it to my reader to procure a piece of real honey-comb, and with it in his hand read the following account, which is chiefly from Dr. Bevan's pen.



Royal-cells in different states of forwardness, common-cells, and drone-cells, are intended

to be severally represented in this plate. The ranges forming the upper half, and marked—a. are intended to represent common brood-cells and honey-cells—most of them in an empty state. The lower ranges, marked—b. are drone-cells, and are represented as closed up, and as they appear when full of brood. Drone-cells, when filled with brood and sealed up, present a fuller and more convex surface than the cells containing common brood—these, that is—the cells containing the brood that becomes working Bees, are sometimes flat and even, and sometimes rather concave. The four large cells, attached perpendicularly to the edge of the comb, and marked—c. d. e. f. are royal-cells in different states of forwardness; that marked—c. is similar in size and shape to an acorn-cup, and is supposed to be quite empty; that marked—d. is in a more advanced state, and is supposed to contain a royal embryo, in its *larva* state: the royal-cell, marked—e. is considerably lengthened, narrowed, and nearly closed, because the larva it is supposed to contain is about to be transformed into a royal nymph, in which stage of its existence, as it does not require the assistance of nurses or common Bees, it is

closed up entirely, as in the royal-cell, marked —f. In this closed cell it progresses from nymph to Bee, and in due time—that is, in about sixteen days from its being deposited as an egg, it emerges a virgin Queen. When the temperature of a hive, or pavilion of nature, is at a proper height—namely, between 70 and 80 degrees, sixteen days is the period nature requires for the production of a Queen-Bee,—twenty-one for the perfection of a working Bee,—and twenty-six for a drone Bee. But, as Dr. Bevan very justly remarks, "the development of each species proceeds more slowly when the colonies are weak, or the air cool,—and that when the weather is very cold it is entirely suspended."

But to return from this short, though it is hoped, not uninteresting digression, into which the explanation of the Queen-cells has led us.

"The combs of the Bee-hive comprise a congeries of hexagonal cells, formed by the Bees, as receptacles for honey or for embryo Bees. A honey-comb is allowed to be one of the most striking achievements of insect industry, and an admirable specimen of insect architecture. It has attracted the admiration of the contemplative philosopher in all ages,

and awakened speculation, not only in the naturalist, but also in the mathematician: so regular, so perfect, is the structure of the cells, that it satisfies every condition of a refined problem in geometry. Still a review of their proceedings will lead to the conclusion, as Huber has observed, that, "the geometrical relations, which apparently embellish the productions of Bees, are rather the necessary result of their mode of proceeding, than the principle by which their labour is guided." "We must therefore conclude, that Bees, although they act geometrically, understand neither the rules nor the principles of the arts which they practise so skilfully, and that the geometry is not in the Bee, but in the great Geometrician who made the Bee, and made all things in number, weight, and measure.

"Before the time of Huber, no naturalist had seen the commencement of the comb, nor traced the several steps of its progress. After many attempts, he at length succeeded in attaining the desired object; by preventing the Bees from forming their usual impenetrable curtain by suspending themselves from the top of the hive; in short, he obliged them to build upwards, and was thereby enabled, by

means of a glass window, to watch every variation and progressive step in the construction of a comb.

"*Each comb in a hive is composed of two ranges of cells, backed against each other: these cells,* looking at them as a whole, may be said to *have one common base,* though no one cell is opposed directly to another. This base or partition, between the double row of cells, is so disposed as to form a pyramidal cavity at the bottom of each, as will be explained presently. *The mouths of the cells,* thus ranged on each side of a comb, *open into two parallel streets* (there being a continued series of combs in every well filled hive). These streets are sufficiently contracted, to avoid waste of room, and to preserve a proper warmth, yet *wide enough to allow the passage of two Bees abreast.* Apertures through different parts of the combs are reserved to form near roads, for crossing from street to street, whereby much time is saved to the Bees.

> These in firm phalanx ply their twinkling feet,
> Stretch out the ductile mass, and form the street,
> With many a cross-way path and postern gate,
> That shorten to their range the spreading state.
>
> EVANS.

"*Bees*, as has been already observed, *build their cells of an hexangular form, having six equal sides*, with the exception of the first or uppermost row, the shape of which is an irregular pentagon, the roof of the hive forming one of the members of the pentagon.

"There are only three possible figures of the cells, "says Dr. Reid," which can make them all equal and similar, without any useless interstices. These are—the equilateral triangle, the square and the regular hexagon. It is well known to mathematicians, that there is not a fourth way possible, in which a plane may be cut into little spaces, that shall be equal, similar, and regular, without having any interstices." Of these three geometrical figures, the hexagon most completely unites the prime requisites for insect architecture. The truth of this proposition was perceived by Pappus, an eminent Greek philosopher and mathematician, who lived at Alexandria, in the reign of Theodosius the Great, and its adoption by Bees, in the construction of honey-comb, was noticed by that ancient geometrician. These requisites are:—

"First, economy of materials. There are no useless partitions in a honey-comb, each

of the six lateral panels of one cell forms also one of the panels of an adjoining cell; and of the three rhombs which form the pyramidal base of a cell, each contributes one third towards the formation of the bases of three opposing cells, the bottom or centre of every cell resting against the point of union of the panels that are at the back of it.

"Secondly, economy of room; no interstices being left between adjoining cells.

"Thirdly, the greatest possible capacity or internal space, consistent with the two former desiderata.

"Fourthly, economy of materials and economy of room produce economy of labour. And in addition to these advantages, the cells are constructed in the strongest manner possible, considering the quantity of materials employed. Both the sides and bases are so exquisitely thin, that three or four placed on each other are not thicker than a leaf of common writing paper; each cell, separately weak, is strengthened by its coincidence with other cells, and *the entrance is fortified with an additional ledge or border of wax*, to prevent its bursting from the struggles of the Bee-nymph, or from the ingress and

egress of the labourers. This entrance border is *at least three times as thick as the sides of the cell,* and thicker at the angles than elsewhere, which prevents the mouth of the cell from being regularly hexagonal, though the interior is perfectly so.

On books deep poring, ye pale sons of toil,
Who waste in studious trance the midnight oil,
Say, can you emulate with all your rules,
Drawn, or from Grecian or from Gothic schools,
This artless frame? Instinct her simple guide,
A heaven-taught insect baffles all your pride.
Not all your marshall'd orbs that ride so high,
Proclaim more loud a present Deity,
Than the nice symmetry of these small cells,
Where on each angle genuine science dwells,
And joys to mark, through wide creation's reign,
How close the lessening links of her continued chain.

EVANS.

"Having just adverted to the ingenuity of Bees in thickening, and thereby strengthening the mouths of the cells, it may here be observed —that *additional strength is also derived from the Bees covering the whole surface of the combs, but more particularly the edge of the cells, with a peculiar kind of varnish,* which they collect for the purpose. At first the combs are delicately white, semi-transparent, and

exceedingly fragile, smooth but unpolished: in a short time their surfaces become stronger, and assume more or less of a yellow tint. The deepening of the colour of honey-combs has been supposed, by some, to be the effect of age; and in part it may be: but it is principally owing to the coat of varnish, with which the Bees cover them. This varnish strongly resembles propolis, appearing to differ from it only in containing the colouring material which imparts to wax its yellow hue. The source of this colouring matter has not been discovered: it is insoluble in alcohol, but the manufacture of white wax shows that it is destructible by light. But to return to the construction of the cell-work.

"*The pyramidal basis of a cell is formed by the junction of three rhombodial or lozenge-shaped portions of wax:* the apex of the pyramid being situated where the three obtuse angles of the lozenges meet. To the exterior edges and angles are attached the six panels or sides of each cell. The apex of each pyramidal bottom, on one side of a comb, forms the angles of the bases of three cells on the opposite side, the three lozenges respectively concurring in the formation of the

bases of the same cells. This will, I hope, explain what is meant by "each cell separately weak, being strengthened by coincidence with others." The bottom of each cell rests upon three partitions of opposite cells, from which it receives a great accession of strength.

"As it is desirable that the reader should thoroughly comprehend this subject, I will restate it in other words. The partition which separates the two opposing rows of cells, and which occupies, of course, the middle distance between their two surfaces, is not a plane but a collection of rhombs, there being three at the bottom of each cell: the three together form in shape, a flattened pyramid, the basis of which is turned towards the mouth of the cell; each cell is in form, therefore, a hexagonal prism, terminated by a flattened trihedral pyramid, the three sides of which pyramid are rhombs, that meet at the apex by their obtuse angles.

"The union of the lozenges in one point, in addition to the support which it is the means of affording to the three partitions between opposing cells, is also admirably adapted to receive the little egg and to concentrate the heat necessary for its incubation.

"Each obtuse angle of the lozenges or rhombs forms an angle of about 110 degrees, and each acute one, an angle of about 70 degrees. Mr. Maraldi found by mensuration that the angles of these rhombs, which compose the base of a cell, amounted to 109 degrees and 28 seconds, and 70 degrees and 32 seconds: and the famous mathematician Koenig, pupil of the celebrated Bernouilli, having been employed for that purpose by M. Reaumur, has clearly shown, by the method of infinitesimals, that the quantity of these angles, using the least possible wax, in the cell of the same capacity, should contain 109 degrees and 26 seconds, and 70 degrees and 34 seconds. This was confirmed by the celebrated Mr. Mac Laurin, who very justly observes, that Bees do truly construct their cells of the best figure, and with the utmost mathematical exactness.

"The construction of several combs is generally going on at the same time. No sooner is the foundation of one laid, with a few rows of cells attached to it, than a second and a third are founded on each side, parallel to the first, and so on, (if the season give encouragement to the operations of the Bees,) till the hive is filled with their works; the

first constructed comb or combs being always in the most advanced state, and therefore the first to be completed.

"*The design of every comb is sketched out, and the first rudiments are laid by one single Bee.* This founder-Bee forms a block, out of a rough mass of wax, drawn partly from its own resources, but principally from those of other Bees, which furnish materials, in quick succession, from the receptacles under their bellies, taking out the plates of wax with their hind feet, and carrying them to their mouths with their fore feet, where the wax is moistened and masticated, till it becomes soft and ductile.

> Thus filter'd through yon flutterer's folded mail,
> Clings the cool'd wax, and hardens to a scale;
> Swift, at the well-known call, the ready train
> (For not a buz boon nature breathes in vain)
> Spring to each falling flake, and bear along
> Their glossy burdens to the builder throng.
>
> EVANS.

"The architect-in-chief, who lays, as it were, the first stone of this and each successive edifice, determines the relative position of the combs, and their distances from each other: these foundations serve as guides for the ulterior labours of the wax-working Bees, and of those which sculpture the cells, giving

them the advantage of the margin and angles already formed.

"The expedients resorted to by that ingenious naturalist, Huber, unfolded the whole process. He saw each Bee extract with its hind feet one of the plates of wax from under the scales where they were lodged, and carrying it to the mouth in a vertical position, turn it round, so that every part of its border was made to pass in succession, under the cutting edge of the jaws; it was thus soon divided into very small fragments; and a frothy liquor was poured upon it from the tongue, so as to form a perfectly plastic mass. This liquor gave the wax a whiteness and opacity which it did not possess originally, and at the same time renders it tenacious and ductile. The issuing of this masticated mass from the mouth was, no doubt, what misled Reaumur, and caused him to regard wax as nothing more than digested pollen.

"The mass of wax, prepared by the assistants, is applied by the architect-Bee to the roof or bottom of the hive, as the case may be; and thus a block is raised of a semi-lenticular shape, thick at top and tapering towards the edges. When of a sufficient size, a cell is

sculptured on one side of it, by the wax-working Bees, who relieve one another in succession, sometimes to the number of twenty, before the cell is completely fashioned. At the back and on each side of this first cell, two others are sketched out and excavated. By this proceeding the foundations of two cells are laid, the line betwixt them corresponding with the centre of the opposite cell. As the combs extend, the first excavations are rendered deeper and broader; and when a pyramidal base is finished, the Bees build up walls from its edges, so as to complete what may be called the prismatic part of the cell. Every succeeding row of cells is formed by precisely similar steps, until there is a sufficient scope for the simultaneous employment of many workers.

> These, with sharp sickle, or with sharper tooth,
> Pare each excrescence and each angle smooth,
> Till now, in finish'd pride, two radiant rows
> Of snow-white cells, one mutual base disclose.
> Six shining panels gird each polish'd round,
> The door's fine rim, with waxen fillet bound,
> While walls so thin, with sister-walls combin'd,
> Weak in themselves, a sure dependence find.
>
> Evans.

"The pyramidal bases and lateral plates are

successively formed, with surprising rapidity; the latter are lengthened as the comb proceeds, for the original semi-lenticular form is preserved till towards the last, when, if the hive or box be filled, the sides of all the cells receive such additions as give them equal depth.

"*The cells intended for the drones* are considerably larger, and more substantial, than those for the working Bees, and, being later formed, usually appear near the bottom of the combs. Last of all, are built the *royal cells,* the cradles of the infant Queens: of these there are usually three or four, and sometimes ten or twelve, in a hive, attached commonly to the central part, but not unfrequently to the edge or side of the comb. Mr. Hunter says that he has seen as many as thirteen royal cells in a hive, and that they have very little wax in their composition, not one third, the rest he conceives to be farina. Such is the genuine loyalty of Bees, that the wax which they employ with so much geometric œconomy, in the construction of hexagonal cells, is profusely expended on the mansion of the royal Bee-nymph, one of these exceeding in weight a hundred of the former. They are not interwoven with them, but suspended

perpendicularly, their sides being nearly parallel to the mouths of the common cells, several of which are sacrificed to support them.

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

EVANS.

"The form of these royal cells is an oblong spheriod, tapering gradually downwards, and having the exterior full of holes, somewhat resembling the *rustic* work of stone buildings. The mouth of the cell, which is always at its bottom, remains open till the maggot is ready for transformation, and is then closed as the others are.

"Immediately on the emergence of a ripened Queen, the lodge which she inhabited is destroyed, and its place is supplied by a range of common cells. The site of this range may always be traced, by that part of the comb being thicker than the rest, and forming a kind of knot; sometimes the upper portion of the cell itself remains, like an inverted acorn-cup, suspended by its short peduncle.

Yet no fond dupes to slavish zeal resign'd,
They link with industry the loyal mind,

Flown is each vagrant chief. They raze the dome,
That bent oppressive o'er the fretted comb,
And on its knotted base fresh garners raise,
Where toil secure her well earn'd treasure lays.

EVANS.

"In this mutilated state only, and not in the breeding season, could Mr. Hunter have seen this cradle of royalty; for he describes it as the half of an oval, too wide and shallow to receive its supposed tenant.

"I have spoken of the perfect regularity in the cell-work of a honey-comb;—particular circumstances, however, induce a departure from this exactness: for instance, where Bees have commenced a comb with small cell-work, and afterwards wish to attach to it a set of large cells, as in the case of drone-cells being required to be appended to workers'-cells. These deviations from the usual regularity renew our admiration of Bee-ingenuity, though Reaumur and Bonnet have regarded them as examples of imperfection. They effect their object by interposing three or four series of, what may be called, *cells of transition*, the bottom or bases of which are composed of two rhombs and two hexagons, instead of three rhombs; the rhombs and hexagons

gradually varying in form and relative proportion, till the requisite size, namely, that of the cells which they are approaching, has been attained.

"The same gradation is observed when returning to smaller cells. Every apparent irregularity is therefore determined by a sufficient motive, and forms no impeachment of the sagacity of the Bee.

"The common breeding-cells of drones or workers are occasionally (after being cleaned) made the depositories of honey; but the cells are never made so clean, as to preserve the honey undeteriorated. The finest honey is stored in new cells, constructed for the purpose of receiving it, their configuration resembling precisely the common breeding-cells: these *honey-cells vary in size*, being made more or less capacious, *according to the productiveness of the sources from which the Bees are collecting, and according to the season of the year:* the cells formed in July and August vary in their dimensions from those that are formed earlier; being intended for honey only, they are larger and deeper, the texture of their walls is thinner, and they have more dip or inclination; this dip diminishes the risk of the honey's running

out, which, from the heat of the weather, and the consequent thinness of the honey, at this season of the year, it might otherwise be liable to do. *When the cells*, intended for holding the winter's provision, *are filled, they are always closed with waxen lids*, and never re-opened till the whole of the honey in the unfilled cells has been expended. The waxen lids are thus formed;—the first Bees construct a ring of wax within the verge of the cell, to which other rings are successively added, till the aperture of the cell is finally closed with a lid composed of concentric circles.

"The brood-cells, when their tenants have attained a certain age, are also covered with waxen lids, like the honey-cells; the lids differ a little, the latter being somewhat concave, the former convex. *The depth of the brood-cells* of drones and working Bees is about half an inch; *their diameter* is more exact, that of the drone-cells being three lines* and one third, that of the workers two lines and three fifths. These, says Reaumur, are the invariable dimensions of all the cells, that ever were, or ever will be made.

"From this uniform, unvarying diameter of

* A line is the twelfth part of an inch.

the brood-cells, when completed, their use has been suggested, as an universal standard of measure, which would be understood, in all countries, to the end of time."

> While heav'n-born instinct bound their measur'd view,
> From age to age, from Zembla to Peru,
> Their snow-white cells, the order'd artists frame,
> In size, in form, in symmetry, the same.
>
> EVANS.

BEES' WAX.

BEES' WAX, in its strictest sense, *is a secretion from the body of the Honey-Bee*, and is that peculiar substance or material with which Bees principally construct their combs; —I say—*principally*, because the foundation of every comb is *propolis:* it is by this tenacious substance (propolis) that combs are securely attached to, and suspended from, the roof of a hive or a box,—and it is by this that they are firmly glued to the sides, wherever they are made to touch them.

BEES' WAX, however, in the common acceptation of the term, is that well-known, valuable article, obtained from honey-comb by the following process:—

Having *drained* all the honey from the combs, put them into a clean pot, together

with as much rain-water as will make them float; then simmer over a clear fire until the combs be completely dissolved; and the wax and the dross mixed with it will swim at the top of the water. Pour the whole into a strong and tolerably fine canvas bag, made wide at the top and tapering downwards to a point, in the form of a jelly bag. Hold this over a tub or large vessel in which is a quantity of cold water. The boiling water will, of course, soon drain through, and leave in the bag the greater part of the liquefied wax commingled with dross. Have ready then a piece of smooth board of such a length that, when one end of it is placed in the tub of cold water, the other end may be conveniently rested against, and securely stayed by your breast. Upon this inclined plane lay your dripping, reeking strainer, and keep it from slipping into the cold water by bringing its upper part over the top of the board so as to be held firmly between it and your breast. If the strainer be made with a broad hem round its top, a piece of strong tape or cord passed through such hem will draw it close, and should be long enough to form a stirrup for the foot, by which an additional power will be

gained of keeping the scalding-hot strainer in its proper place on the board: then by compressing the bag, or rather its contents, with any convenient roller, the wax will ooze through and run down the board into the cold water, on the surface of which it will set in thin flakes. When this part of the operation is finished, collect the wax, put it into a clean saucepan, in which is a little water to keep the wax from being burnt to the bottom; melt it *carefully* (for, should it be neglected and suffered to boil over, serious mischief might ensue, liquid wax being of a very inflammable nature) therefore melt it *carefully over a slow fire,* and skim off the dross as it rises to the top; then pour it into such moulds or shapes as your fancy may direct, having first well rinsed them, in order that you may be able to get the wax, when cold and solid, out of them without breaking either the moulds or the wax: place them, covered over with cloths or with pieces of board, where the wax will cool slowly; because the more slowly it cools the more solid it will be and free from flaws and cracks. You will thus have your wax in cakes, which may be rendered still more pure by a second melting and moulding. If run into very thin cakes,

and afterwards exposed to the influence of the sun and the air, frequently turned, and occasionally wetted, it will lose its yellowness, and become beautifully white. This last process is called *bleaching;* and, though more simple and practicable than that pursued in establishments where large quantities of wax are bleached—where bleaching wax is of itself a regular business—it may probably be sufficient to answer all the purposes for which *white-wax* is wanted in private families. I have by me wax of my own bleaching that is equal in whiteness and delicacy to any I have ever met with.

Good wax is a heavy, solid substance, of a deep yellow colour, has an agreeable, balsamic odour, and possesses several medicinal and other valuable qualities.

Combs that have never been filled, and those that have been filled with honey only, afford the best wax. Of the former kind but very little need ever be taken from Bees in collateral-boxes; and when any such combs are taken, they may be far more advantageously disposed of than by being melted down for the wax they contain.

Instead of crushing and melting all the combs of three or four hives together, as is mostly done by cottage Bee-keepers, the fine, clean parts should be separated from those that are discoloured, less pure, and inferior, by reason of their age,—of having been brood combs,—or of containing pollen, and should be melted first. By this very easy mode of manipulation, the quantity of wax would not be lessened, and the superior quality of the fine would command a price that would be an ample remuneration for the additional trouble attending the management of it in this way.

Should the preceding directions be thought to be tediously or unnecessarily minute, my apology for making them so is—an anxious wish on my part to render every thing relating to Bees clearly understood—understood so as to be set about and properly managed by persons who never before bestowed one thought upon the subject.

CHAPTER XVII.

WINTER SITUATION FOR BEES.

THERE is no part of Bee-management more utterly disregarded by cottage-hive Bee-keepers than that which relates to a proper situation for store-hives during winter. From whatever cause this inattention may proceed,—whether from custom, ignorance, or prejudice, it is much to be regretted; because nothing is so essentially conducive to the future prosperity, and often to the very preservation, of a colony, as due attention to its winter situation. Left, as stock-hives commonly are, in their summer aspect, and to stand upon the very spot they have occupied ever since the day of their existence as stocks,—with their entrances wide open, just as they were in summer,—exposed alike to every change of weather and to every attack of prowling enemies; or, if covered at all, it

is mostly with a rude coat of straw, or reed, or such material as affords to mice, vermine, and various sorts of Bee-enemies, shelter and concealment, and, in fact, encouragement to attack and destroy the hives. Thus, neglected and unheeded, it is no wonder that so many stocks of Bees perish in the winter and spring of every year; the wonder rather is that any should escape.

Some apiarian authors are opposed to the confinement of Bees in their hives, except when snow is on the ground: *then*, and *then only*, they recommend the confinement of Bees as necessary for their safety. Now, I would respectfully ask—if, in the North of England and in Scotland, snow does not lie on the ground for weeks, and in some years for months together? and I would ask further—if Bees can bear this confinement with snow on the ground, why they cannot bear it when there is no snow? They argue, however, in the face of this admission, that confinement is injurious to Bees, and that a flight in the open air on a fine day, if there should happen to be a fine day, in the depth of winter, is beneficial to Bees, otherwise, they say, the Bees would not take it. A mild, open winter, every body knows,

renders unconfined Bees poor—and when kept in a state of perpetual agitation and alarm by the restless enemies that surround them and nestle in their straw covering, and tempted by the faint, wintery sun-beams that gleam upon their floor-board through the unclosed entrance of their hives, they will, no doubt, sometimes sally forth. But what is the consequence? Hundreds and thousands of them become paralyzed* and never return; and those that do get home again have occasion for food: of course, the oftener these winter flights take place, the more the population of the hives they issue from is diminished, and the more pauperized that diminished population becomes in consequence of such flights: whereas, if Bees were confined, kept in darkness, or, at any rate, out of the influence of the sun, kept

* In the 15th page of his "Apiarian's Guide," J. H. Payne, Esq. says—"a Bee becomes torpid at a temperature of thirty-two degrees"—Payne is an experienced apiarian. What credit then is due to the anonymous critic, who in one of the weekly periodicals† has told us that "Bees in a glass hive, exposed in the open air, when its temperature was twenty degrees below freezing, instead of being in a state of of torpor, continued very lively?!!"—Before yielding implicit credence to this statement, it would be exceedingly satisfactory to be informed *how long* the Bees so exposed continued very lively. † *Mechanics' Magazine, No. 564, p. 155.*

dry, cool, still, and undisturbed, no such disastrous consequences would ensue.

The following detail will show my readers the results of some experiments, relative to the aspect and situation of Bee-hives during winter; and whilst in some degree they corroborate the foregoing observations, they may perhaps induce those, who are anxious for the prosperity of their Bees, to submit to be taught a useful lesson respecting the winter management of them.

In 1824 I had six cottage-hives, which had prospered well with me during the summer of that year. In the autumn of the same year I resolved to weigh those six hives, and to place three of them on the north side of my house, and to let the other three remain in their summer situation. The separate weights of my hives, in November of the year 1824, were as under, viz.

No. 1.	35 lbs.	No. 4.	42 lbs.
2.	38 —	5.	32 —
3.	40 —	6.	37 —
	113		111

The first three of these Nos. viz. 1, 2, and 3, weighing together 113 lbs. remained during

the winter in their summer situation: Nos. 4, 5, and 6, weighing together 111 lbs. were removed to a cold dry place, on the north side of my house. On the 26th of March, 1825, I again weighed those six hives, and found their respective weights to be as follows, viz.

No. 1.	15 lbs.	No. 4.	37 lbs.
2.	16 —	5.	27 —
3.	19 —	6.	32 —
	50		96

So that the three hives, remaining in their summer quarters during the winter, had decreased in weight just 63 lbs. being on an average 21 lbs. each; while the three which had wintered on the north side of my house had decreased only 15 lbs. being on an average only 5 lbs. each. This gives an average difference of 16 lbs. a hive, between a proper and an improper winter situation and aspect for Bees. It is lamentable to think how many people lose their Bees, either from ignorance, prejudice, or want of attention to this particular point—*a proper winter situation.*

I need scarcely relate to my readers, that the Bees which were placed fronting, or open

to the north, were the first that swarmed the next spring. They swarmed in the month of May; while those hives that had remained fronting, or open to the south, did not swarm until July; and one hive (No. 2.) never swarmed at all during the season. At the latter end of October, 1825, I again weighed my hives, and found them to be as under:—

No. 1...	28 lbs.	Swarm from ditto	10 lbs.
2...	22 —		
3...	30 —	Swarm from ditto	14 —
	80		24
No. 4...	44 lbs.	Swarm from ditto	32 lbs.
5...	43 —	Swarm from ditto	28 —
6...	41 —	Swarm from ditto	30 —
	128		90

Hence it appears that the three hives (Nos. 1, 2, and 3) that had never been removed from their summer stands, were 33 lbs. lighter than when I first weighed them, that is, on an average, 11 lbs. a hive; and even with the weight of their two swarms added to them, there was a falling off in the year of 9 lbs.

or, on an average, of 3 lbs. a hive: whilst Nos. 4, 5, and 6, had gained 17 lbs. or, on an average, nearly 6 lbs. each; and with the weight of their swarms added to them, they had gained 107 lbs. or, on an average, nearly 36 lbs. a hive in the year.

I could carry this subject much further in my explanations, as I did in my experiments, but it requires no facts in addition to those just stated to explain the difference of aspect in the winter-season to Bees.

Every cottager must know that the richer his Bees are in spring, the sooner they will swarm. Then, to make them rich, he must not neglect to place his hives out of the influence of the sun during winter,—*in a dry, cold, and quiet situation.* He will find by this practice, that not more than five or six pounds of honey will be consumed by a good stock; but if he suffer his Bees to remain fronting the south, they will in a mild winter, if they survive it at all, become paupers before spring.

Now what is proper during the winter for stocks in common hives, is equally proper for stocks in collateral-boxes, of which the middle box is the winter-pavilion or stock-hive. Long before winter all the Bees of the

most populous stock will draw into the middle box and cluster round their Queen; and when that is the case, the dividing-tins should be put down, in order that all the Bees may be securely kept in the pavilion; and previously to removing them from their summer situation, the entrance should be carefully closed with a piece of wire-cloth, or perforated tin; which, whilst it admits fresh air into the box, will keep the Bees within and all their enemies without. It is hardly possible for the smallest enemy to make its way into a box thus secured. A perforated tin may also be put over the way down into the drawer. Towards spring this last may be withdrawn, and the Bees, when they begin to revive, will soon rid themselves of those that may have died in the winter, by carrying them down into the drawer. Having made every necessary preparation, remove your stocks to such a situation as that herein before recommended, and there in quietude let them pass the dreary months of winter. I do not advise that they be taken too early to, nor that they remain too long in, their hibernacula: generally speaking, they may be removed towards the latter end of November, and again in the third or fourth

week of February; but the Bees themselves, if duly observed, will be the best directors.

This is *my* practice, and it is also the practice of my apiarian friend at Gedney-Hill, than whose, no stocks in this neighbourhood are more healthy or much more prosperous.

CHAPTER XVIII.

APIARIAN SOCIETIES.

The encouragement of any internal branch of industry, which will supersede the necessity for the employment of British capital in speculative adventures where no equivalent is returned, is in the mind of every patriot a subject worthy of consideration. And that the prosecution and encouragement of my system of Bee-management, undertaken by those who are qualified by their means, abilities, and powers of patronage, to set the example, and thereby influence others, will effect this to a considerable extent, as far as the production of honey and wax is concerned, will, I think, be sufficiently obvious to those who have witnessed, or who hereafter may witness, the successful results—the almost incredible quantity of these productions from

my apiary alone; or, leaving *my* apiary entirely out of the account, I will venture modestly to assert, *that from any one set of collateral-boxes, well-stocked and well-managed, the quantity and quality of honey that may be annually taken, without either destroying or impoverishing the Bees, must be seen to be believed; and being seen, will not be disputed.* The exact amount annually paid to other countries for these two commodities—honey and wax—I have not the means of ascertaining with accuracy, but it is probable that it exceeds £350,000.—a sum lost to this country, because, not only have we in the vegetable world a profusion of these productions, that "waste their sweetness on the desert air," but we have, or might have, if we would but encourage them, the labourers necessary to collect them, and this too without the deterioration of any other department of rural economy. Were Bee-colonies multiplied to any thing like the number that the Bee-pasturage of this country would support; were there, for instance, but one set of well-stocked collateral-boxes on every square mile of England, Wales, and Scotland,—or, to compute moderately, on every square mile of every rural

district of Great Britain, that is fertile in Bee-pasturage,—and were the price of the finest box-honey reduced to a shilling a pound, the annual *surplus* produce of these colonies would realize a sum far exceeding £350,000. which would be put into the pockets of, generally speaking, an industrious and deserving part of the community—the rural population, and a profitable remuneration given to them for their indulgence and perseverance in a most rational pursuit, requiring but trifling, and this only incidental attention. I know of no time more proper for throwing out these hints than the present, when the subject of *rural allotments* excites, and that justly, almost universal attention amongst those desirous of securing an industrious, prosperous, and virtuous peasantry.

I do not presume to imagine that, antiquated as are the practices hitherto so generally adopted, and so pertinaciously adhered to in Bee-management in this country, and characterized as are these practices by so many superstitious and irrational usages—I do not presume to imagine that my system will, at once, up-root prejudices, dispel superstitions, and be immediately and heartily adopted by

the cottager. The generality of apiarians have yet to be taught that *Bee-management is a system;*—that it is something more than merely stocking a hive or box with a swarm of Bees, and then leaving it to chance alone to prosper or to perish; and, if to prosper, it is only until the time for its final doom—the reckless destruction of every Bee—arrives. They have yet to learn that the whole, or at least, the greater part of the contingencies, to which Bee-colonies are subject, may be averted; that the casualties of Bees are analogous to those of other descriptions of stock; and that, if they would ensure success, or expect to derive profit from them, it must be by attention to their domicils, to their protection from the variations of climate and atmosphere, and from external enemies,—in short, by proper management. If in many instances, the success of my hives has been so unqualified and extensive, it has been because the necessity for careful management has been impressed and adhered to, and because Bees, in whose welfare their owners had been previously uninterested, have been looked upon with some degree of attention, and their labours facilitated and requited by

timely administering to their wants and comforts. In the same way, I believe, that by attention to the observations contained in these pages, the cottagers' labours may be more amply repaid, and that more honey may be obtained, even by their rough practices; whilst this will be preparing them for the adoption of my improved plans and gradually pave the way for its general introduction. For this I more particularly refer to the preceding chapter, and to that on Bee-feeding, i. e. chapters XIV. and XVII.

It has often been suggested to me, to point out *how* the culture of Honey-Bees might be more generally extended in this country, and rendered more advantageous to the cottager than it has been hitherto. As regards the extension of Bee-cultivation, I would observe, that if those gentlemen, especially those gentlemen resident in the country, who possess affluence, influence, and leisure, would undertake to promote it—would set the example and keep Bees, their example alone would go far to induce the cottager to keep them; and that, as other countries boast, and that so usefully, their apiarian societies, the formation of such a society, or societies, could not fail

to be attended with beneficial effects. Some feeble attempts, it is true, to establish such a society have been made, but have proved abortive, whilst premiums on the subject have been offered by other societies,* injudiciously, as they have tended to perpetuate mistaken views, and to retard the progress of more correct ones. I am not insensible of the extreme benefit which has resulted to the different branches of industry, and to agriculture and horticulture in particular, by well-regulated scales of premiums, emulating to superiority and necessarily promoting a beneficial stimulus in the different branches with which they are connected. And, in my opinion, nothing would more easily tend to the inculcation of sounder views of practice, than, if gentlemen, pursuing my principles, would interest themselves in connecting with the objects of such associations more generally, graduated scales of prizes, regulated by the

* A premium was last year (1833) awarded by the Cambridgeshire Horticultural Society, to a Mr. Widnal, for his exhibition of a glass of honey. But whether the encouragement of Bee-culture be an object of that very respectable society,—or whether the reward given to Mr. Widnal on that occasion was a sort of bye-premium, bestowed for the gratification of seeing a curiosity, it did not appear.

quantity of honey obtained from stocks, the prosperity of the hives afterwards, and the state of the apiary generally, &c. Were they also to countenance the plan of placing colonies under the care of labouring cottagers, giving them premiums as an inducement to careful management, they could not fail of conferring a benefit, by initiating them into the plans of the system, as well as by more advantageously dividing the pasture of the district among the different hives, and thereby rendering the labour of their collecting the stores considerably less to the Bees. This would, undoubtedly, effect much, but I know of no means so decidedly calculated to foster and encourage the culture of Honey-Bees among all classes, and more particularly among the population of rural districts, as apiarian societies, formed for the express purpose of extending and improving the cultivation and management of Honey-Bees.

CHAPTER XIX.

MISCELLANEOUS DIRECTIONS.

In undertaking this work, as I originally did, at the pressing solicitations of several of those Noblemen and Gentlemen, whose names graced the list of the subscribers for the first edition, I had two main objects in view; of which a full and particular explanation of the mode of managing Honey-Bees, in my boxes and upon my principles, was one,—and the other, which I do ardently hope will result from the adoption and encouragement of my long-tried plan, is—the prospective improvement, not only of the culture and condition of those ingenious, admired, and most interesting little creatures, but also of honey and wax—the two valuable articles which Bees, and Bees alone, afford us. To prepare the way for the accomplishment of the latter of these objects, I have exerted my

best endeavours—I have spared neither pains nor expense, to give minute, and, I trust, intelligible descriptions of all my boxes and hives, of my Bee-machinery, and of every thing thereto pertaining; which descriptions have been accompanied with such practical directions and relations of experiments, as will, *if duly attended to*, enable my Bee-friends to put their apiaries upon my *humane and profitable system of management*. Therefore I do not think it is incumbent upon me to proceed farther at present. I might easily double the size of my book, by entering into and giving lengthy details of several matters relative to Bees, which are not here so much as hinted at; such, for instance, as the distance that they sometimes fly from their hives in quest of honey, and the experiments that have been made to determine that distance;—the nature of honey-dew, and how it is occasioned,—why it abounds on some trees and plants, whilst others are entirely destitute of it,—whether it be a natural exudation of the plants that afford it,—or whether it be produced by the leaf-lice, called aphides;—why, if the impregnation of a Virgin-Queen be retarded beyond a certain number of days after her coming

into existence, all the eggs she lays during her whole life, should invariably produce *drones;*—the language of Bees, for Bees, it has been held, have their peculiar language, though I profess not to understand it, nor even to have studied it, my business being with their *habits;*—the various diseases or maladies with which skilful men assure us they are occasionally affected;—their senses, their anatomy, and their instinct;—their affinity to the wasp;—exotic Bees from those of Lapland to those of China; and from those of Siberia to those of the Cape of Good Hope;—the stingless Bees of South America, mentioned by Dr. Hancock, that from the luxuriant ever-blooming, tropical plants and flowers, produce black wax;* what Aristotle hath remarked on one subject,—what Pliny hath said on another,—what classic Virgil hath so delightfully sung of the nature, economy, and management of Bees in Italy,—what Gelieu in modest prose hath said of Bees in Switzerland,—Huber and Reaumur in France, and a host of writers in Germany, and in our own native England; what opposite opinions have been entertained respecting honey; whether

* See page 11, antea.

plants and flowers secrete pure honey, or whether the saccharine matter culled from them undergoes any percolating, rectifying, chemical process in the stomach of the Bee.—I might observe, that the illustrious Hunter was of opinion that it undergoes no change; although the no less illustrious naturalist Reaumur, and the entomologists Kirby and Spence, imagine that some change does take place before the honey is stored in the cells,—that, as the nectarious exudation of plants is not of the same consistence as honey from the hives, it is reasonable to suppose that it undergoes some change *in transitu* whilst in the body of the Bee; that, as far as my experience has enabled me to make observations on this subject, I am disposed to lean to the opinion of Reaumur, Kirby, and Spence, and to ascribe the difference between honey in the nectarium of a flower or on the leaf of a tree, and honey in the cells of a comb, to the absorption of the volatile parts of the saccharine of the plants and flowers whilst in the honey-bag; which absorption is aided and accelerated by the natural heat of the Bee, and by which process honey is rendered of uniform consistence. In the graphic language of my chemical

friend—Mr. Booth—I might exclaim, "How necessarily do the least valued products in the economy of nature, eliminated in the most miniature laboratory of her operations, confirm us in the belief of the existence, wisdom, and power of nature's God—the Great Chemist—who has not only imbued matter to act upon its fellow matter in the infinity of space, to produce an infinite diversity of changes in the material world; but, within the small compass of a Bee, has provided apparatus for certain changes to take place, which are more elaborate, important, and complicated, than are produced in the largest apparatus of the manufacturer! In this little insect are performed all those chemical processes of life, by which nature is kept in the equanimity and beauty of existence—here composition and decomposition, solution and precipitation, sublimation, volatilization, distillation, and absorption, through the agency of heat and attraction, take place on the minutest matters, secreted by the plants and collected by the Bees; and in the hive, by the concentration of their individual efforts, is elaborated that immense quantity of those important products, which constitute such useful commodities in the arts and economy of life."

The discussion of some of these topics, and dissertations on others, might be made amusing, perhaps interesting, and would, at all events, swell the size of my book; but whether I should thereby enhance its intrinsic merits (if intrinsic merit it possess) is more than I dare venture to affirm. In short, these topics come not within my plan,—they are foreign to it, and I gladly leave them to be treated of by others, whose learning is more able to cope with them, and whose taste may direct them to such subjects. *I have withheld nothing that I deem to be essentially necessary to the thorough understanding of my mode of Bee-management;* consequently, I anticipate that my two main objects will eventually be attained —that Bee-culture will become a pleasing and a profitable study—a source of instructive amusement and of profit too,—and that our country will, at no great distance of time, be everywhere studded and ornamented with neat, well-ordered apiaries. I will, therefore, now close my present labours with a few miscellaneous directions, chiefly recapitulatory, which, on account of their importance, every apiarian should constantly bear in mind.

Have your Bee-boxes *well made,* and *of good substantial materials.* Strength and

durability are of greater consequence than neatness, though that need not be neglected—neatness and strength are not incompatible—they may be combined.

Paint your boxes annually, when they are in their winter-situation.

Make a clear ground or floor-way from the pavilion into each of the end-boxes, by cutting away about two inches from the lower edge of each of the corresponding ends, to the depth of half an inch; and make this way or passage as near the front entrance as it conveniently may be. This convenience has been suggested to me *since* the directions for making collateral-boxes were printed, and I therefore mention it here as an improvement, because such a way on the floor, and *without any climbing*, will afford an additional accommodation to Bees on many occasions.

Boxes will not work Bees, neither will Bees work boxes to advantage, unless due attention be paid to them—i. e. both to boxes and to Bees.

Situation is of prime importance: for summer it should be clear and open in front of your boxes, and sheltered at their back by a north-wall or by a thick hedge.

In summer let their aspect be south-east:—early in spring, and again in autumn, due south is the best point to be in front: therefore, as spring advances turn the front of your boxes eastward, and as summer declines move them back again to their spring aspect; or, in other words, when there is not more than twelve hours' sun, let the front of your boxes be due south; and during the time that the sun is more than twelve hours above the horizon, let it be south-east.

Always have the cheerful rays of the morning sun fall upon your boxes: but contrive to throw a shade upon their front for a few hours in the middle of the day, when the weather is very hot. Such a shade will be grateful to your Bees.

Elevate your boxes twenty inches or two feet above the ground: and always keep the grass or ground, under and near them, neat and clean, and entirely free from all nuisances.

A constant supply of water in the immediate vicinity of your apiary is highly desirable; if therefore you have not a natural supply of that element, *so necessary for Bees*, contrive to let them have it by artificial means—by placing it in or near your apiary, in large,

shallow dishes, or in wooden troughs, partially covering the surface with reed or moss, and be careful to replenish them, so that your Bees may always find it there.

Suffer not ants to burrow near your Bees. Ants are enemies to Bees, and will annoy them, if they get among them.

Spiders also are Bee-destroyers; therefore, brush away their entangling webs, whenever and wherever you find them about your boxes.

Fowls should not be permitted in an apiary.

Early in spring let the entrance be not more than an inch, and increase it gradually to its full extent, as you find occasion: contract it again towards the fall of the year; and, if the moths be troublesome in summer evenings, nearly close it every evening; but take care to open it again either early next morning, or as soon as the evening flight of the moths is over. This attention is more particularly due to weak stocks, and affords them great protection against the attacks of moths, which are among the boldest, the most persevering, and, when once they have got into a hive, most destructive enemies to Bees.

Destroy wasps and wasps' nests wherever you find them in the vicinity of your apiary.

The destruction of queen-wasps in spring is the most effectual method of diminishing the number of these formidable Bee-enemies; because the destruction of a queen-wasp in spring is tantamount to the destruction of a whole nest afterwards.

Light in the domicil of Bees, if not actually prejudicial to them, is, at any rate, displeasing to them; therefore, be careful never to expose your Bees unnecessarily to its glare: never leave the window-doors open, nor suffer careless visitors to do so.

My ingenious friend, the Rev. T. Clark, of Gedney-Hill, suggests the propriety of recommending that the window-doors be *self-shutting doors*. This, he says, may be done by fixing upon each door a light, easy spring, similar to those made use of to shut doors in good houses; or by a cord attached to each door, and passed through an eye, and over a small pulley fixed to the side of each box; from the end of which cord a weight of two or three ounces must be suspended. This weight, acting upon the cord, will draw the little doors to the windows, that is, it will shut them. The cords, eyes, and pulleys, he further says, may be so arranged, that one

small weight will keep all the hive doors, in a set of collateral-boxes, closed and safe, and may be made to hang under the floor. I have no hesitation in recommending his suggestion as ingenious, practicable, and useful. The best security, however, after all, is that afforded by lock and key, the key being in the constant possession of the owner.

Ventilate your collateral-boxes and bell-glasses, when the interior temperature is at, or above, 70 degrees.

Never irritate your Bees, nor offer any sort of violence or opposition to them; and should an angry Bee or two at any time attack you, walk quietly away, and leave them to settle into peace again.

On no account drive your Bees; it is a ruinous practice. With boxes, however, I trust, it is impracticable, and totally superseded.

Never disturb, nor in any way interfere with, the middle-box.

On no account destroy any of your Bees: independently of its cruelty, it is an impolitic practice: it is like cutting down a tree to get at its fruit, which may easily be gathered by less laborious and indestructive means. Encourage your Bees,—accommodate them,—

support them,—and *by all means preserve them;* and, when seasons are favourable, they will *richly* reward you for your attention to them.

Always keep a cottage-hive, or single box or two, in your apiary, for the purpose of having swarms from them, with which to stock empty boxes, or to strengthen such stocks as may stand in need of additional numbers; and proceed with such supplementary swarms as directed in pages 42—45.

Never impoverish your Bees by taking from them more honey than they have to spare. Always suffer them to be in possession of a plentiful store. Over-deprivation distresses them, and is no gain to the proprietor. Among other reasons this is one for my repeated directions—not to touch the middle-box.

Honey of the very finest quality may commonly be obtained from collateral-boxes, as early in the season as the months of May and June, without injuring the parent-stock in the slightest degree. The enlargement of their domicil by returning an empty glass, or an empty box, to the place from which a full one has been taken, is at this busy period of their labour an accommodation to Bees, and is one great means of preventing the necessity

for their swarming, as it enables them to continue their work at the time that there is the greatest abundance of treasure for them in the fields, and when Bees in cottage-hives cannot profit by it, owing to their want, not of inclination to gather it, but of room in their hive to store it; they therefore swarm once, twice, perhaps three times. What then can be afterwards expected from such exhausted stocks but weakness and poverty? The more numerous the working Bees are in any colony, the more honey they will collect, *provided they have room wherein to store it.* Accommodate them, then, with convenient store room, and the more workers you have in your boxes the better. Up to the middle of August you may, with safety, that is, without injury to the Bees, take off glasses and boxes, as they become ready. *After that time* it is advisable to have, and to leave, in every colony, honey sufficient for the subsistence of the Bees until next spring; and should you take off a full box, later in the season than the middle of August, instead of emptying it of all its treasure, be content with a part of it, —take a part, and *return a part—share it with your Bees, and let their share be a liberal one.*

As has been already enjoined—*on no account impoverish them by over-deprivation,* at that precarious season especially. They possibly may collect much honey after that time; if so, share with them again; if not, have them rich from your first bounty.

When a box, well-stored with honey, is taken off, it is not an easy matter to extract the first comb or two, without breaking them and spoiling their beauty, besides shedding more or less of the honey; therefore, be prepared with proper knives. Any common knife that has a blade long enough, may serve to sever the combs from the sides of a box: but, to cut them from the top, it is advisable to have an instrument, which may be called a Bee-knife, of the following construction:—a two-edged, lancet-shaped blade, two inches long and three-eighths of an inch broad, having the hole, through which the rivet would pass to fix it in a haft, drilled large enough to admit the end of a steel rod, upon which it is to be well brazed or riveted: the other end of this rod may be finished with a neat handle, leaving its clear length between the contrate blade and the handle eleven inches—that being rather more than the

depth of my Bee-boxes. A knife of this description may easily be passed between the combs, and is very convenient for cutting them from the top of a box.

Whenever you have occasion to perform any operation among your Bees, be provided with every requisite material, implement, &c. Have not any thing to seek for, much less to get made, at the moment it is wanted: *that moment may perhaps be a critical one.*

In September unite the Bees of poor stocks to rich ones; and now, or in March, transfer stocks from straw-hives into boxes.

Previously to withdrawing the tin-divider, for the purpose of opening the communication into an end-box, take off the end-box and dress its inside with a little liquid honey; this will bring the Bees into it, when, but for the honey, they would perhaps refuse to enter it; and at that time close the ventilation. It is wrong to ventilate empty boxes, because it drives the Bees into the pavilion: and it is a fact, that they will swarm from the pavilion, rather than take possession of an empty end-box, if its temperature be, and be kept, disagreeably cold, by having the ventilation open at the very time it should be carefully closed. This will both explain and remedy

the difficulty, that some apiarians complain of having experienced, in getting their Bees to take possession of an empty-box; it will also account for swarms sometimes leaving the pavilion when there is no want of room: the fact is—that the temperature of *that room* is not agreeable to them: but it is owing to the mismanagement of the apiator that it is otherwise than agreeable.

Whenever a box is taken off, be careful to open the perforations in the cylinder ventilator, many of which will be found sealed up with propolis. These perforations may be cleared at any time, by introducing a piece of wire with a sharpened point, turned so as to pick out the propolis; but they are most effectually opened when a box is off.

Towards the latter end of November, or earlier, if the weather be inclement and severe, remove your Bee-boxes to their winter-situation: this should be *dry*, *quiet*, *cool*, and *dark*, and place your boxes in it so that they may front towards the north or north-east.

Guard and close the entrance with a piece of fine wire-cloth, of Lariviere's patent tin, or of perforated zinc, (which is the best, on account of its not corroding) made fast to the box, either of which will confine the Bees

within their domicil, admit plenty of fresh air, and keep out inimical intruders. Thus prepared for winter, having every tin and block in its proper place, *disturb your Bees as little as possible*, and, come winter as it may, they will pass it in that state of semi-insensibility, or torpor, which nature, or with reverence let me rather say—nature's God has appointed for them.

Towards the end of February, or as soon as vegetation begins to make its appearance, take your boxes from their winter to their summer stands, and commence another course of attentions, observations, and humane management, similar to that herein directed and explained. And, though cases may arise, and difficulties occur in the course of your practice, for the remedying of which no specific directions are, or can be, here given, your own experience and progressive improvement in the pleasing science of Bee-management, will lead you to adopt the proper mode of treating the former, and the proper means for surmounting the latter.

THE END.

H. AND J. LEACH, PRINTERS, WISBECH.