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A
NEW PLAN
FOR
SPEEDILY INCREASING
THE
NUMBER OF BEE-HIVES,
&c. &c. &c.



A
NEW PLAN
FOR
SPEEDILY INCREASING
THE
NUMBER OF BEE-HIVES
IN
SCOTLAND;

AND WHICH MAY BE EXTENDED, WITH EQUAL SUCCESS,
TO
ENGLAND, IRELAND, AMERICA,
OR
TO ANY OTHER PART OF THE WORLD CAPABLE OF PRODUCING FLOWERS,

By JAMES BONNER, BEE-MASTER,
AUTHOR OF PRACTICAL WARPING MADE EASY, &c.

*Though small's the Insect, great will be the Gain ;
If heavenly Powers permit, and Phoebus not disdain.*

VIRG.

EDINBURGH:

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TO THE
MOST NOBLE,
THE PRESIDENT,
AND THE OTHER
RIGHT HONOURABLE
AND HONOURABLE MEMBERS
OF THE
HIGHLAND SOCIETY OF SCOTLAND.

MY LORDS AND GENTLEMEN,

THE generous and distinguished mark of respect already bestowed upon me, for my small exertions in the service of the Public, while it commanded my gratitude, at the same time emboldened me to solicit your Patronage to the following sheets, wrote upon the important subject which first introduced me to your notice. Your ready and unanimous acquiescence, in granting me this additional honour, with the particular favours I have received from many of you, adds exceedingly to the obligations

obligations formerly bestowed, and calls for fresh ebullitions of my utmost gratitude to you, both as a Society and as Individuals.

THAT your laudable endeavours, for promoting the good of your Country, in every respect, may be crowned with the greatest success, and that both the present and future generations may be extensively benefited by your public-spirited and patriotic exertions, is the earnest wish of,

MY LORDS AND GENTLEMEN,

Your most obedient,

Most obliged, and

Most humble Servant,

JAMES BONNER.

EDINBURGH, }
JULY 18. 1795. }

P R E F A C E.

BIOGRAPHERS and PHILOSOPHERS are equally puzzled to account for the great diversity of talents among mankind, and the peculiar bent of genius to be found in each individual. While some pretend to account for these peculiarities, from the accidental circumstances in which individuals happen to be placed, others, with at least equal probability, attribute them to peculiar inclinations, implanted by Nature, or rather the Author of Nature in the human mind. Perhaps both causes must co-operate to produce that degree of enthusiastic fondness for particular pursuits, which, in all ages, has distinguished some individuals in every branch of science, or of art, and which is so humorously entitled by the facetious STERNE, a man's HOBBY HORSE. *

The author of this work has been, almost from his infancy, an admirer of bees, and the

a

fruit

* Tristram Shandy, vol. 1.

fruit of their labours. When a school-boy, he read with peculiar pleasure, the description given of CANAAN, as a land flowing with milk and HONEY.

Being appointed by his father,* when a boy, to watch his bees in swarming time, his fondness for these wonderful insects daily increased; and he could not help thinking himself in a kind of paradisaical state, when employed in this delightful office in his father's garden, and
 running

* The author's father, JAMES BONNER, was, like himself, fond of rearing bees, and often had a dozen of hives at a time in his garden. He lived above 50 years in the married state, and had twelve children, of whom the author is the youngest alive. He frequently boasted, that, in good seasons, he made as much money by his bees, as nearly purchased oat-meal sufficient to serve his numerous family for the whole year. He purchased a large quarto Bible with the wax produced in one year from his hives, which served as a family book ever after; and his house was always well supplied with honey, and a kind of weak mead, which served for drink at all seasons of the year. As he lived regularly and temperately, he preserved a great degree of health and vigour to the last; and was employed in his ordinary business of weaving, till within a few days of his death; which happened in the 86th year of his age, when he left four sons and a daughter, to regret his loss. He had always an uncommonly retentive memory; for, upon the smallest hint, he could repeat almost any passage in scripture verbatim. He used often to entertain his family with a narrative of his treatment of his bees, and of the profit, as well as pleasure, which he had in keeping them.

running among the blooming bushes, and variegated flowers, to look after the young swarms. When very young, he purchased three hives, which he gradually increased to a pretty large stock, and has ever since taken great pleasure, over and above every view of emolument, to study the nature of these valuable insects, and to investigate the causes of their thriving and unprosperous states; their health and diseases; the best means of preserving the individuals, and of propagating and multiplying their industrious race, with their management in every respect. For this purpose, he has perused with avidity every book in the English language, on the subject, that he could get access to; and has spared neither time, trouble, nor expence, (having bestowed much indeed of both, beyond what he could well afford,) in trying numerous experiments upon them.*

a 2

But

* So great was the author's curiosity, and enthusiastic attachment to the study of the nature and properties of these curious insects, that, above twenty years ago, he went from Berwickshire to London, on purpose to converse with Mr WILDMAN on the subject; but that gentleman happening to be in France at the time, he contented himself with purchasing every book he could find on the management of bees, and has ever since made it

But, however valuable and useful many of the treatises already published on this subject have been, he is confident, from the repeated observations and experiments he has made, that most of them are not only defective, but even erroneous in many particulars; and that the culture of bees in Britain †, has never yet arrived at any thing near that degree of perfection, to which it might be brought, if the system which he has formed, and now submits to the public, were generally understood and properly practised. If we only consider the almost infinite number of mellifluous flowers, which perfume the air in the honey season; and, in particular, the white clover, which so generally and profitably now overspreads so large a part of our lands in grass; the various

his chief pleasure, as well as business, to study every possible improvement respecting that wonderful race. During the honey season, he has often been so intent upon this study, that he hardly allowed himself sleep for whole weeks together.

† Although the author, in making out his calculations relative to the increase of Bee hives, was under the necessity of confining himself to some one particular country, and naturally made choice of his native land, his plan will, nevertheless, he is confident, apply with equal propriety to ENGLAND, IRELAND, AMERICA, or indeed any other part of the known world, capable of producing proper food for these insects.

rious species of mustard, and plants of a similar kind, found still in our corn fields, together with the vast abundance of heath, that grows spontaneously on our extensive moors and hills, we may justly say, how large and numerous are our pasture grounds, but how very few are our flocks to feed on them !

A judicious author justly observes, that the culture of bees is a branch of rural œconomy, the more valuable, that it is within the reach of the poorest cottager, and requires neither plowing, manure, cattle, nor rich meadows. All that is wanted, is a small degree of attendance, which may be given by the meanest, as it is requisite only for a short time ; and therefore the plentiful harvest of honey and wax that is produced, may be considered as so many RICH CROPS REAPED WITHOUT SOWING.

As nothing is so hurtful to bees as bad weather, so nothing can be so little counteracted ; although even the bad effects of it may, in some measure, be prevented ; for, we can preserve our bees in cold and snowy winters, by confining them ; and, in a late spring, or rainy summer, we can preserve them from famine, by feeding them properly. But, even in the most unfavourable weather, I never despond ; for

I have observed, that in the very worst seasons, and notwithstanding the small number of hives; that there are in Scotland, a tolerable quantity of honey is always produced: And therefore, had there been 20 times more hives in the kingdom, and a few flowers artificially raised, with proper attention, there would have been, even in these very bad seasons, just 20 times as much honey and wax collected as there was: and in good seasons, such as last year, (1794) when there was a great deal of honey produced, even from our small stock of hives, what an immense quantity would have been collected, had there been forty or fifty times more stock hives in spring!

Impressed with these ideas, and anxious to do all in his power to promote an object so beneficial to the country at large, as well as to individuals, the author first ventured to lay his sentiments before the public in 1789, by publishing a Treatise on the Management of Bees, which, he was happy to find, attracted the notice, and procured him the patronage, of many respectable and public-spirited gentlemen. Encouraged by these flattering marks of approbation, he had thoughts of publishing a second edition; but as, in the conti-
nued

nued prosecution of this his favourite study, he has made a number of very important discoveries relative to these useful insects, he thought it better to present these new ideas, along with the substance of his former work, compressed into as small bounds as possible, in a new form, and under a new title, than merely to reprint the old work with additions. And the chief object of the present performance being to excite the attention of the public in general, but especially of gentlemen in opulent circumstances, to the rearing of bees, by showing them the PRACTICABILITY of increasing the number of bee-hives in this country at least TWENTY-FOLD, if not to FIFTY times the number there are at present, he thought it proper to entitle the whole mass of old and new matter, "A New Plan for speedily increasing the number of Bee-Hives in Scotland, &c."

Nor is it to his literary labours alone, that he has been indebted for the liberal encouragement he has met with. In his *commercial* concerns, as a dealer in honey, he has been honoured with the patronage and employment of a number of the nobility and gentry in Edinburgh, Newcastle, and many other places ;
for

for which he embraces this opportunity of returning them his best thanks. And here he cannot help mentioning a circumstance which he esteems peculiarly fortunate, as it introduced him to the employment and patronage of that respectable patriot, the PRESIDENT OF THE BOARD OF AGRICULTURE; whose exertions for the improvement of his country, and general benefit of society, far exceed his praise. One morning in autumn last (1794) as the author was carrying a few very fine honey combs, to a gentleman in the New Town, he was met by Sir John Sinclair, whom previously he did not know, * and was desired to bring to him some of his fine honey next morning. This he accordingly did, and a conversation having ensued, respecting the time he had spent in the culture of bees, the number of hives he kept, &c. &c. he was desired by the public-spirited Baronet to draw up a plan for the rearing of bees in a more extensive manner: and the author having executed this task to the best of his

* About a year before this, several gentlemen had desired the author to wait upon Sir JOHN SINCLAIR, and lay before him a plan for the rearing of bees; but diffidence always prevented him, and probably ever would, if Providence had not brought about the interview in some such manner as the above-mentioned.

his abilities, Sir John Sinclair was kind enough to lay it before the Highland Society, who were so good as to honour him with one of their highest premiums, for his unremitting and successful attention, during a period of no less than 26 years, in acquiring a knowledge of the operations of bees; and for the various discoveries made by him, tending to multiply the number of hives, and quantity of honey and wax in this kingdom, contained in his communications to the society, and now laid before the public, in this treatise.

This encouragement led the author to hope, that his plan might turn out to be generally adopted, if once universally known. He therefore distributed subscription papers, in order to try the minds of the public in general; and in doing this, his success far exceeded his most sanguine expectations; for he scarcely met with one in an hundred, who did not approve of his plan; as will appear from the respectable list of subscriptions prefixed to this work, and which might have been rendered greatly more numerous, if the author's time and other avocations had permitted him to circulate his proposals more generally.

The author, therefore, without farther apology, now submits his plan to the attention of the public; and he has not a doubt, but that, if the directions therein given are strictly adhered to, and persevered in by gentlemen of property, and the public in general, in a few years Scotland will not only save much money now sent abroad for honey and wax, but will even be able to render them articles of export.

He needs only add, that, in the following treatise, he has not, as too many authors in all branches of science are apt to do, strained any arguments to support a favourite hypothesis: But, on the contrary, his whole theory and practice being founded on experience and facts, he flatters himself, that he has delivered his sentiments throughout the work, in a manner so plain and intelligible, that the most unlettered reader will not mistake his meaning.

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NEW PLAN
FOR
SPEEDILY INCREASING
THE
NUMBER OF BEE-HIVES
IN
SCOTLAND.

CHAP. I.

OF THE PLEASURE AND PROFIT, THAT ATTEND THE
KEEPING OF BEES.

BEES, those emblems of virtue, have long been the study and delight of wise men, and have employed the ablest pens in many nations, and in different ages. In the sacred writings, the land of Canaan is spoken of as a good land, and, as an evidence of its being so, it is called a land flowing with milk and *honey*. Among the ancients, Aristomachus contemplated bees for the space of fifty-eight
A years;

years; and Philiscus retired into the woods, that he might have more convenient opportunities of observing them. Among the moderns, I shall just only mention Purchas, Roufden, Geddie, Butler, Warder, Bradley, Thorly, Thomas and Daniel Wildman, Stephen and William White, and Keys, all Englishmen, and Robert Maxwell, a Scotchman;—all of whom have published treatises on them, the most of which have appeared within this century; and they have given many useful directions how to manage bees, according to the knowledge they had attained to, respecting that admirable insect.

The knowledge of bees, like that of many other things, is found out by degrees, and may be said, in some measure, to be still but in a state of infancy, as appears by the many mistakes fallen into, and taught by those who have wrote on that subject, notwithstanding their fair promises in their title pages; as—“A Complete Guide for the management of Bees,” &c. They have all been strangely misled in their opinion about the generation of bees, asserting that the Queen lays three different kind of eggs, *viz.* one kind for the production of the Queen Bee, another for that of the Working Bees, and a
third

third for the Drones ; an opinion, which the author of the following sheets will, he humbly hopes, prove to be erroneous.

As in every undertaking there is some leading motive, which excites us to engage in it, so the rearing of bees is attended with a degree both of profit and pleasure, highly deserving the attention of the philosopher, the gentleman-farmer, and the industrious peasant. What is more pleasant, than to observe the labours of a hive of bees in the spring, when the days begin to lengthen, and frost and snow, like birds of darkness, cannot bear the sun ! Then these industrious creatures begin to fly about, and dance and sing, rejoicing at the return of the genial season ! Then they reform what is amiss in the hive, and, as their family enlarges, they omit no opportunity of gathering in fresh provision for their increasing young. In the honey season, how delightful to see them hurrying in their yellow loads ! How diligent they are to lay up provision for the returning winter ! View them in this smiling clover field, or yonder flowery mead ! See how busily they work ! And hear how sweetly they sing ! How pleasant to behold a swarm of bees lightly flying in the air, and darkening the heavens

4 *Pleasure and Profit of keeping Bees.*

with a thousand varying lines ! Now, behold the innumerable tribe, formed into one compact body, suspended from yonder verdant shrub, establishing themselves into an independent colony, while their careful master, with conscious delight, meditates on his increasing store !

Bees, when properly managed, are also very profitable, as, in good years, most hives will throw two swarms; in moderate years, one. Although, in bad years, perhaps, some will swarm none at all, yet, estimating by moderate years, and allowing each hive, one with another, to swarm only once, which valuing at 15s. each, twenty stock hives will thereby yield their master 15l. yearly;—no small sum to be got with so much pleasure, and so little toil. They will yield that much, although one or two should die in winter; nor need any think my estimate too high; if their hives be good, they will have that much one year with another. For example, in summer 1787, the advantage arising from bees was such, that many proprietors of them made 30s. and some even 40s. of one single hive; and in March 1788, I sold a hive to a neighbour of mine, which in the following summer

mer increased to five, four of which he set aside for stock hives that autumn.

As there is no concern, in rural œconomy, more profitable than bees, in favourable seasons, considering the trifling expence that attends them, we shall here give an estimate to what extent bees may be reared, and also what their value may amount to in ten years.

Suppose, for instance, one should begin with five hives, which will cost him 5*l.*, no great sum to commence bee-master with, and allowing each hive, one with another, to double their number, they will increase in the following proportions :

Years.	Hives.
1	5
2	10
3	20
4	40
5	80
6	160
7	320
8	640
9	1280
10	2560

Thus,

Thus, in the space of 10 years, 5 hives will produce 2560 swarms, which, valued at 10s. each hive, a very moderate estimation, amounts to 1280l. clear profit; allowing the second and third swarm to pay for hives, stools, labour, and incidental losses.

By the above calculation, my reader must not conclude, that every hive of bees will produce so many; but, I confidently assert, that many have done so, and much more, in proportion, according to the time they have stood; but, supposing 160 of these hives should fail by cold, robbers, famine, or bad management, during the above mentioned years, there will still remain 1200l. of clear profit.

Let it also be considered here, that by the above estimation, it is taken for granted, that the seasons are very favourable for bees, being fine, calm, sunny warm weather, with soft showers now and then, and also plenty of good pasture in their neighbourhood, whereon they will work and sing without molestation; wantonly skipping from flower to flower, and rifling all their sweets, rejoicing that they are amply provided with such plenty of provision, while the smiling sun invites them to enjoy it. With what delight have I often witnessed my
industrious

industrious servants carrying on their work with so much simplicity, alacrity, and cheerfulness, and singing so sweetly; insomuch that they are fit to make me join the concert, and sing,

*What's this I hear, makes such melodious sound!
Surely I've got on some enchanted ground.
'Tis Canaan's insects that I here behold,
Whose legs do glitter like the yellow gold.
The furze and broom in lustre here do shine,
Whose yellow tops regale those flocks of mine.
Here silver streams in flow'ry valleys glide,
And rows of willows deck the river's side:
Here lambkins play upon the sunny braes,
And sweetest nectar smells on clover lees.
Here are the fields with Nature's colours dight,
Grateful to smell, and pleasant to the sight.
Retired pleasure soothes and calms the mind;
A noisy world oft leaves a sting behind.*

On the contrary, however, should the season go to the other extreme, and, instead of fair weather, should windy, cold, wet, cloudy, and heavy weather take place, during summer, the bees will by it be so much disheartened and discouraged, that they will lament and mourn, in so piteous

piteous and disconsolate a manner, that they have often made such an impression on my spirits, that I was fit to mourn along with them. The truth is, I have often thought that there was something of the nature of a bee in myself; as always when they are happy, and rejoicing, so am I; when they are mourning and disconsolate, my spirits are also low; when fighting and plundering from one another, my temper is so chagrined, that it is with difficulty I restrain the effects of my ill humour; insomuch, that my domestics, with little knowledge in physiognomy, can easily judge from the cheerfulness, depression, or chagrin, apparent on my countenance, the state and temper of my little republics.*

It

* A two-fold reason may be assigned for this. Fine weather enlivens the animal spirits, whereas a dull sky, and a cloudy atmosphere, generally produce the contrary effect. In the latter case, the bees can do nothing but consume a part of that delicious store, which they had laid up for their own and their master's use. Sympathy and interest are therefore equally excited, by such weather, to produce this effect; and still more by the circumstance of their killing one another; for that man must be callous, indeed, to every feeling of humanity, who can, with indifference, behold numbers of such useful and industrious animals, lying like so many murdered heroes on the field of battle, mutually slain by each other; not to add, that a person of the most stoical disposition must feel somewhat ruffled, at the loss of so many useful servants, whom he would do every thing in his power to preserve,

In such unfavourable seasons, bees increase so very little, that, perhaps, the owner can scarcely collect, from among all his hives, as many good ones, as will keep up his stock properly for the next season; but as such bad seasons does not happen often, it should not discourage any person from commencing bee-master, as even, in the very worst, with proper care, the stock may always be preserved, which is not the case with many other articles in which mankind deal.

It is hardly necessary to observe, that bees have amazingly thriven last year, as almost every hive produced twice, and many even thrice; and consequently, the price of honey has thereby been greatly reduced, from what it was in former years.

C H A P. II.

OF THE APIARY.

As a general rule, place your hives where they will be least exposed to the wind, and enjoy as much of the influence of the sun as possible; for wind always retards the bees in their work,

B

while

while the sun's beams invite them to it. Although it is well known, that bees will thrive well in high and windy situations, yet a low one is always to be preferred. In the neighbourhood of the apiary, there should be abundance of flowers, from which the bees may collect their wax and honey.

Were a choice allowed me, where to place my bees, it would be in an early situation,—a hollow glen by the side of a rivulet, surrounded with abundance of turnips in blossom, in the spring,—mustard and clover in summer,—and heath in the latter end of summer and harvest; with a variety of other garden and wild flowers in their seasons. However I would not be understood, as if I hinted that bees would not thrive, unless they were placed in such an advantageous situation, as the contrary can be proved: for bees have thriven amazingly well, in places where they were not within reach of many of the above mentioned flowers; but although they will do well in most situations, and fly far for food, yet they will thrive far better, when situated among or near good pasture; and surrounded with abundance of food. This leads us forward to shew what is the proper pasture for bees, which shall be the subject of the following chapter.

C H A P. III.

OF THE PASTURAGE, OR FLOWERS, PROPER FOR BEES TO FEED
ON, WITH A CATALOGUE OF SOME OF THE PRINCIPAL ONES.

AMONG the great variety of flowers, which wise Nature has so profusely laid before our noble insects, from which they may abundantly supply themselves with food, we shall, in the first place, give some particular account of those five principal ones in this country, from which bees extract vast quantities of honey;—viz. turnips, rape, mustard, clover and heath; and then conclude this chapter, with some account of many other excellent flowers which bees feed on.

Turnips, in particular, blow early in the spring, and continue long in flower; and they also yield both honey and farina, by which the bees are greatly excited to go abroad, and work upon them, when perhaps, in late situations, they have scarcely any other flower to

work upon. In such places, therefore, it is highly proper, that turnips be sowed, and allowed to remain in the ground during winter. These, yielding their flowers from the middle of March to the end of April, will afford the bees six weeks good pasture, and thus render them equal to those in more favourable or earlier situations ; whereas they would perhaps have scarcely had any other flower to work upon, that could do them much good. I would therefore, strongly recommend to all proprietors of bees, particularly those in late situations, if they can by any means, to let always as many turnips run into blossom in the spring, as may be sufficient to afford plenty of early pasture for their bees to work on. Thus the rich may supply themselves with that seed for sowing, and the poor will have it to sell to those who need it, which will enable them to pay the rent of the ground they grow upon. But here it may naturally be asked, By what rule are we to judge, what quantity of ground will yield a sufficiency of food for any given number of hives ? I answer, that very little ground will keep many hives abundantly at work ; as, for example, one acre of good land would not be overstocked with 20 hives ; and consequently, the

the twentieth part of an acre would keep one in constant employment.

The rape in blossom answers the same end to bees as the turnips; and as it is a little later of flowering, it will yield the bees a fresh and seasonable supply, when the turnips begin to fade, and thereby keep them constantly at work till the latter end of May,* when all the herbs of nature will, as it were, vie with each other who shall contribute most to supply this noble and virtuous race, with abundance of the sweetest nectar. Then, at this season, the balmy plane-tree regales them in the morning, before the drowsy herd ascends the hill to relieve his imprisoned bleaters: and the gold-like furze, mustard, and broom, invite them to feast till the day decline.

Garden and wild mustard, with runches of all kinds, bees are very fond of, and work keenly thereon; and these flowers are attended with this advantage, that by sowing their seeds at different times in the Spring, their flowering
may

* The two flowers above mentioned, as they are easily raised, should be paid particular attention to, in the Highlands of Scotland, or any other Moorland situations, where there are very few natural flowers growing, except the heath.

may be so protracted, as to afford the bees a sufficiency of pasture during the whole working season.

In June comes the white clover, which continues long in blossom, and also yields abundance of the finest of honey: And wherever the proprietor of bees has it in his power, he should be particularly attentive to raise it in his pasture lands; and, as I hinted with respect to turnips and rape, the clover grass will pay the rent of the ground, exclusive of what advantage the bees derive from it. So fond are the bees of this flower, that whenever it appears, they will desert and overlook many other excellent flowers, as unworthy of their attention, and eagerly dart upon it, and work and sing thereon all the day long, until the cold evening chase them with reluctance home to rest: But, as all nature's beauties fade, and thereby give way to their successors, so does this beloved herb, as, about the end of July, they begin to blacken, and the balmy dew to forsake their sweetest lips; then our heroes go in search of fresh provisions, and in their rambles, as they skim over our lofty mountains, are attracted by the blue heather bells, which are numberless as the sands on the sea shore;

each

each one of which, by the assistance of Phœbus, discloses its sweets, and thereby invites the transported bee to rifle all their charms.

Heath is attended with this advantage, that it needs no culture nor rearing; but, on the contrary, grows spontaneously, in too great abundance, in many places; as, most certainly, the greater half of Britain is covered with it; but, like the clover, it yields also vast quantities of the finest honey; and, when the month of August is favourable warm weather, no thriving hives of bees, placed near it, need fail, in a short time, to enrich themselves with plenty of honey.

The flowers of furze, broom, and plane tree, as formerly hinted, are highly grateful to bees, as all of them afford abundance of matter to collect their honey and wax from. Furze, in particular, generally flowers early, and continues long in blossom.

Besides the flowers above mentioned, there is a great variety of others, which, in their different seasons, afford employment and materials for the bees; such as lillies, rose-marys, yellow gowans, and the blossoms of crocuses, snow-drops, oziers, fallows, vetches, alders, poppies, beans, gooseberry bushes, and fruit trees of all kinds.

kinds. In short, I know no flower that they will refuse, when they are at a loss for variety; for, like the poor among mankind, when a choice is denied them, they will be contented with coarse fare; but give them their option amongst a variety, and it will soon be perceived, how little they value the gaudy *show*, when put in competition with *substance*; for they will fly over the finest gardens, and the most beautiful flowers, and cheerfully feed on their beloved turnips, runches, clover, and heath.

There is one thing very observable, that whatever flower a bee first pitches upon, she always continues to work upon the same species, till she is loaded, although she should be obliged to fly over better kinds, and even to some considerable distance for them; but, if the bees cannot obtain a full loading from those flowers which they prefer, they sometimes make up the remainder from other flowers.

What the honey dew consists of, is disputed among the learned. According to the ancients, it was an efflux of air, a dew which fell upon flowers. The moderns say, it is rather a perspiration of the finest particles of the sap in plants,

plants, which, evaporating through the pores, afterwards condense upon the flowers *.

“ The honey dew (says Mr Key) is not a liquid deposited by the air on the leaves of plants, as is generally supposed; for then, like other dews or fogs, it would fall on, and adhere to, all sorts of plants indiscriminately; whereas, it is found only on a few particular plants; and on them but partially, for the young leaves afford none.

“ This substance is as transparent and as sweet as honey, and is, in fact, perfect honey, attracted through the pores of the leaves, by a peculiar sultry heat; particularly when reflected through clouds. Sometimes it is found on the leaves in the form of little drops or globules. But, at other times, being more diluted by the greater moisture of the atmosphere, it covers the leaves, as though they were spread with a fine syrup.

“ The time, in which these honey dews are generally found, is from the beginning of June to the middle of July. But it will vary, in proportion as the weather is wet or
G “ dry;

* Nature Delineated.

“ dry ; which will occasion them to be either
 “ sooner or later. The hottest and driest sum-
 “ mers produce the largest and most frequent
 “ honey dews. In cold and wet seasons, few
 “ or none of them are to be seen.

“ Whenever a honey dew is found, the bees
 “ are so extremely eager to fetch it, that they
 “ quit all other work, that their returns may be
 “ the quicker and more numerous ; and lest a
 “ gloomy change should deprive them of the
 “ precious prize. No harvest swain, dreading
 “ impending storms, can be more anxious or
 “ expeditious, in hastening the housing of his
 “ crops, than these aerial tribes in this their
 “ delightful office ; so much so, that thronging
 “ in too great numbers at the door, they
 “ jostle and tumble each other down. And
 “ smarting woe to those who shall thoughtless-
 “ ly stand in their way at this important cri-
 “ sis ! Their joy on these occasions, is ex-
 “ pressed in such incessant and loud notes, as
 “ to be heard at a great distance. By these to-
 “ kens it may be known, that there is a honey
 “ dew, without seeing the trees from which
 “ they gather it.”

A friend informed me, that he has often
 discovered both bees and ants upon the oak
 leaves

leaves, sipping the honey dew; which agrees nearly with the Abbe BOISSIER DE SAUVAGES's account of it, in France, as quoted by WILDMAN, p. 80, et seq. For my part, although I have often travelled many miles, in the finest weather, to places where oaks were growing in great abundance, in order to satisfy myself on that point, yet I never could discover a single drop of honey dew on them, or any bees to collect it. And many persons have assured me, that they never saw a single bee upon an oaken leaf collecting honey. I am, nevertheless, far from discrediting the report; as those who are situated nearer extensive woods, have doubtless much better opportunities of ascertaining this fact, than I. And that there are honey dews to be discovered in such situations, I readily believe; as I have often observed my own bees collecting honey from the *outsides* of the sockets of different flowers, particularly from those of the wild runches, instead of extracting it by their proboscis from the *inside*. I have sometimes, though very seldom, observed them, in a fine morning, about sun-rise, busily employed upon the leaves of the white thorn, at a season when there was not a single flower to be seen

on it ; which inclines me to think it is not an *efflux of air*, as some suppose, but rather a perspiration of some of the finest particles of the sap of plants, which, evaporating through the pores, afterwards condenses upon the leaves. At such favourable opportunities, the bees will doubtless soon fill their hives with honey ; but I am of opinion, that such happy seasons are generally very short, and that for many years they last but a very few days ; and in some cold years, perhaps they scarcely occur at all.

Some writers believe, that when the liquor which the bees collect, has been for some time in their stomachs, it comes from thence changed into true honey ; the liquor having been there properly digested, and rendered thicker than when it entered. Others are of opinion, that the bee makes no alteration in the honey, but collects this delicious syrup just as nature produces it, and first fills her bag, and then discharges it into the magazine ; which appears to me to be the most probable opinion ; as I have sometimes taken a bee from a flower the moment she was collecting the honey, and torn her asunder, (although with the greatest reluctance.)

reluctance,) to satisfy myself on that point; when I found the finest *blob* of honey in her bladder, exactly of the same taste, colour and smell, with that honey which is usually collected from such flowers as the bee was working upon; for those bees which I picked off the white clover, contained fine white transparent honey, while such as were taken from heath, produced it of a high colour; and as the honey had not been above a minute in their bladders, it certainly could not undergo any change in so short a space of time. But even allowing the bees their own usual time to collect, carry home, and deposit the honey in their cells, the time will be found not to exceed five minutes; and yet the honey is, at this period, in as great perfection, nay, rather better, if there is any difference, than at any time thereafter: for it is proved by experience, and acknowledged by all connoisseurs in apiaries, that the younger the honey and honey-comb are, they are so much the fairer and better; as, when they remain for some time in the hive, the combs, by the breath of the bees, gradually become of a darker colour, and the honey becomes neither so fair nor so transparent,

rent, as when it was first collected*. From all which considerations, it appears plain to me, that bees are not the makers of honey, but only collectors of it; and that the honey is in a great perfection in the flowers, before the bees touch it, if not better, than it is after it has passed through their bodies. †

* The author would not be understood here, as if he meant that honey suddenly underwent a change to the worse, as it will remain many months locked up in the hives without undergoing any material change; yet, nevertheless, it is certain, that honey is never better, than when it is newly deposited in the cells.

† Some alledge, that the syrup in the flower, by passing through the body of the bee, undergoes a material change, and is thereby converted into real honey. But there is no analogy between the honey extracted by the bee, to be carried home to the hive, and the meat or drink taken into the stomach by any other animal, to be digested for its nourishment. The former is retained in the bladder of the bee only a few minutes; whereas, the latter continues many hours, and, by the operation of the gastric fluid, is changed into chyle, blood, &c. The honey itself, when taken afterwards by the bees for the purpose of nourishment, undergoes a similar change; but, in its first state, when put into the cells, it has undergone no change whatever.

I was this day favoured with a letter from a very intelligent gentleman, whose opinion, on this subject, although quite different from my own,—I shall present to my reader.

“ Honey does not exist in the plant in that form, but only becomes so by passing through the body of the bee. While it is in the flower, it constitutes what is called its saccharine juice

From the above reasoning we may conclude, that every single *beather bell*,* or cup of any other flower, is a vessel containing some of the finest honey, and that nothing in nature is wanting to make our land flow with it, and thereby enable both rich and poor to feast upon it always at their pleasure.

A conjecture may naturally arise here, that, seeing bees do not *make* honey, but only collect it, if we could, by any device, fall upon a plan to extract it from the flowers; or, in other words, to pour 10,000 of Nature's vessels full of honey into one of our artificial ones, it would be astonishing what a prodigious quantity might be produced throughout the island.

Scotland

“ juice, and, when sucked up by the insect, is changed by the
“ action of its vessels into honey.

“ In proof of this assertion, take a number of hungry bees, and
“ give them a full *meal* of sugar, diluted in water, tear one of
“ them asunder immediately after, and its bladder will be found
“ full of honey; now, if sugar is so quickly converted into that
“ form, have we any reason to doubt that the juice of the flower
“ will undergo a change equally quick by the same means?

“ I have often made this experiment, and the result has been
“ uniformly the same. If the bee has made a meal of white su-
“ gar, the honey found in its body is white; if it has got brown
“ sugar or triacle, the honey will be brown.”

* Flower of heath.

Scotland alone, I will venture to affirm, would, in such a case, produce more honey and wax, in one good season, than would load one of his Majesty's first rate men of war. But as, hitherto, no such method has been discovered, and perhaps any such attempt would prove fruitless, let us study to increase, as quickly as possible, the number of those *natural chemists*, our valuable, faithful, and industrious servants, the BEES, who are every way qualified for the important task : having an exquisite smell to direct them to the flowers containing the nectarine juice,—a *proboscis*, or sucking tube, to enable them to extract it,—a reservoir to contain it,—wings to carry it away,—and fine clean vessels of their own manufacture to treasure it up in. And let us ever deprecate the barbarous practice of destroying such valuable creatures, who seem designed by Nature to work indefatigably for the benefit of mankind* ; and
therefore

* We cannot more strongly express our detestation of the barbarous, and too general practice of smoaking hives, than in the beautiful and energetic language of the immortal Thomson :

Ah, see where robb'd, and murder'd, in that pit
Lies the still heaving hive ! at evening snatch'd,
Beneath the cloud of guilt concealing night,

And

therefore, instead of death and extirpation, merit every encouragement and preservation; and ought, at least in autumn, to be allowed to retain a reasonable share of the fruits of their own industry, to preserve them through the

D

winter

And fix'd o'er sulphur: while, not dreaming ill,
The happy people in their waxen cells,
Sat tending public cares, and planning schemes
Of temperance, for Winter poor; rejoiced
To mark, full flowing round, their copious stores.
Sudden the dark oppressive steam ascends;
And, us'd to milder scents, the tender race,
By thousands, tumble from their honeyed domes,
Convolv'd, and agonizing in the dust.
And was it then for this you roam'd the Spring,
Intent from flower to flower? for this you toil'd
Ceaseless the burning Summer-heats away?
For this in Autumn search'd the blooming waste,
Nor lost one sunny gleam? for this sad fate?
O Man! tyrannic lord! how long, how long,
Shall prostrate Nature groan beneath your rage,
Awaiting renovation? When obliged,
Must you destroy? Of their ambrosial food
Can you not borrow? and, in just return,
Afford them shelter from the wintry winds;
Or, as the sharp year pinches, with their own
Again regale them on some smiling day?
See where the stony bottom of their town
Looks desolate, and wild; with here and there
A helpless number, who the ruin'd state
Survive, lamenting, weak, cast out to death.

winter and spring ; whereby they will be enabled greatly to increase in numbers, as well as in produce, in the course of the succeeding season.

In the next chapter we shall take a view of the vast increase of the number of hives that may easily be made in Scotland ; an object which I am happy to find already begins to occupy the attention of many gentlemen of property ; and the promotion of which I hope will soon become general. Nothing indeed would yield me greater pleasure and satisfaction, than if, by any exertion of mine, I could be instrumental in setting on foot, or carrying into execution, a measure of so much utility and importance to the public.

C H A P. IV.

REASONS WHY THERE ARE SO FEW BEE-HIVES IN SCOTLAND.

IT is not to be expected, upon my proposed plan, that I should enter deeply into the nature, generation, and properties of bees ; although

though each of these subjects might afford an investigation equally useful and interesting. On such subjects, I have often thought, I could write a thousand pages, and, after all, be far from exhausting my thoughts on them. But, without diving deep at present into them, or entering the lists of controversy with other authors, who have wrote upon them, my chief design in this treatise was—

To excite men of property, who are the only proper persons to be addressed on the business, to exert themselves with spirit and perseverance to promote the increase of bee-hives in this country, by convincing them, that the cultivation of bees is an important object to the nation at large as well as to every proprietor of them.

To show, that the prices of HONEY and WAX would be thereby greatly reduced, and consequently these articles would become a source of national wealth; and

That Britain, instead of expending large sums of money in purchasing these articles from foreign countries, might even be enabled to render them an article of exportation; and therefore that they merit the attention of every patriot and real friend to his country. Also,

To show those who incline to make the attempt, how to proceed in such a laudable undertaking.

To give a brief account of the bee, as divided into its different classes of Queen, Drones, and Working bees; and to conclude with

Some plain and easy directions, how to manage that useful and industrious race, through the different seasons of the year, so as they may prove of the greatest advantage to the country at large, as well as to their proprietors.

The principal reason, why bees have not been reared in greater numbers in this country, is, the almost total neglect of them, by gentlemen of property; who seem, in general, to act as if they thought these useful insects entirely below their notice; and the rearing and increasing of bee-hives, as a business so very insignificant, as to be unworthy of their patronage. Hence many gentlemen will rather purchase honey at the highest rate, than give themselves the trouble of rearing bees; which neglect often likewise proceeds from an erroneous idea entertained by many, that bees will not thrive with them, and therefore the attempt would be fruitless. *

It

* Perhaps, in former ages, bees may have been more plentiful in
Scotland,

It is not the want of proper pasture, that prevents bees from thriving well every year in this country. The only preventative is the inconstancy of the weather; for if it be windy, or cloudy, they will not go out of the hive; and, on the other hand, though the day should be quite dry, yet if the weather be cold, the bees will collect very little honey.

From all the above mentioned causes, therefore, it is plain, that the bees and the bee-master, have nothing so adverse to their interest as the mutability of the weather; and the worst of the matter is, that nothing can be done to remedy this evil. Only the proprietor, by having plenty of good pasture at all seasons, has this advantage, that whatever good weather occurs between February and September, he may have his bees so well supplied with good flowers,

Scotland, than they have been for a considerable time past. This appears probable from different places still bearing their names from these useful animals. For instance, in my own native parish of Coldingham, there is a steading called *Bee-Edge*, another named *Bee-Park*, and a rivulet denominated *Bee-Burn*. All these places have evidently derived their names from large quantities of bees having been formerly reared in them; as they are situated on the skirts of a large common, which is now divided, and where bees would still thrive well with proper care and attention, if the proprietors would exert themselves to render these places worthy the names they bear.

flowers, as that they shall be enabled to make the most of it, and to collect honey (as his hay-makers make hay,) while the sun shines. Here it may be observed, that bees will thrive well, and collect a good quantity of honey in a short time, if they only have three favourable days in the week, during the honey season; as a good hive, in thirty fine days, will collect four pints of honey: besides, many people will alledge, that their situation is too cold, windy, or rainy, with many other reasons, which in fact are of no weight; for the principal reason of bees not thriving is bad weather; and the next chief cause is the neglecting to take proper care of them. Their bees indeed will sometimes thrive long and well, with very little care, which leads their proprietor to entertain an erroneous idea, that they always will do so, and that hardly any care is necessary. But when cold, famine, or robbing bees attack his hives, and destroy his stock of bees, the lazy proprietor regrets his mistake when it is too late.

I believe poor people, in general, make more by their bees annually, than those in more affluent circumstances; and even the latter might make far more of them than they do, if they would only study to increase their stock to a considerable

considerable extent. The reason is, that they are a kind of *estate* to the poor, who, when once they enter upon the business of rearing bees, take a great pleasure in it, and, by paying proper attention to them, gradually acquire more and more knowledge in the profession. And, the only reason why such persons do not increase their stock of hives, to a much greater number than the country at present possesses, is, that pinching poverty obliges them often to sell the best of their hives for ready money, to make up their house rent: Not to add, that such persons, when obliged to leave their cottages, owing to raised rents, monopolies of farms, or the like, think bee-hives a very troublesome species of property for removal. Besides, as they keep but a few hives each, they never think of raising any flowers for provision to them. And if a person in such circumstances should lay out 20 s. for a hive, and she prove a bad one and die, he and some of his neighbours will perhaps ever after look upon the culture of bees as a dangerous and precarious adventure, not to be attempted by any but persons in affluence. To obviate such objections, shall be the subject of the following chapter.

CHAP. V.

REASONS FOR, AND PRACTICABILITY OF, INCREASING THE
NUMBER OF BEE-HIVES IN SCOTLAND.

ANY person, who considers how very abundantly Scotland is supplied by nature, with food proper for bees, throughout almost every county in the kingdom, and observes how very few bees are reared, notwithstanding these great advantages, must be surprized that so little exertion has hitherto been made in that line. For instance, were we to consider, that some parishes, which might abundantly maintain 300 hives in each of them, have not at present 20 or 30, we must be surprized at that infatuation which has hitherto prevented us from attending more to our own interest. Were we to consider our large extended heath-covered moors, and beautiful clover fields, with the great quantities of runches, wild mustard, &c. that grow spontaneously in our corn fields,
together

gether with the many elegant gardens, nurseries, &c. raised by art, in the neighbourhood of this metropolis, and almost every other town in Scotland, as well as the country seats of our gentry, together with those numerous wild flowers that grow in our meadow grounds and pasture lands, we might justly say, “the HARVEST truly is GREAT, but the LABOURERS are FEW.”

And here I shall mention a thought, which struck me lately in a gentleman's garden, and indeed has often struck me in similar situations;—“Here I am surrounded with a variety of fine flowers, and the prospect all around me is equally pleasant and delightful! What a variety of Nature's beauties and sweets are here exhibited, and how many thousands of millions of sockets of flowers there are, in the vast number of gardens in this metropolis and its environs!—and yet, the infatuated inhabitants and proprietors rather allow the honey contained in these beautiful vessels to be wasted, than employ a few of those faithful servants, provided by nature, to extract and collect it for them:—Servants, who would cheerfully labour, without wages, and find themselves in food and cloathing during their

E employment

employment, if the proprietor would only provide them a few small lodgings. Will these people still rather be at the expence of purchasing honey from me, or others, at a high rate, than rear hives to manufacture it for themselves? Will they continue to send their money to Dantzick, for honey of a far inferior quality, rather than encourage the produce of it at home?—Why do not the gentry of Edinburgh and the neighbourhood, especially those who live in the confines of the city, replenish their gardens and nurseries with some hundreds of hives, which they are so well able to fill?” Similar reflections have often struck my mind, when I have seen extensive fields, abounding with white clover and heath, where the flowers, like the stars of heaven, or the sand on the sea shore, could be numbered not by units, tens, hundreds, or thousands, but by *millions*!—Suppose, for example, 1 square yard of heath or clover to contain 500 cups of flowers, each one of which contains some honey, what an immense number would be contained in an extent of 6 square miles?

Some however here may reply, that a field may be overstocked with bees, as well as with sheep or black cattle. I will grant that there

is a possibility of this, but I will venture to affirm, that such a thing has seldom ever yet happened in Britain*. Or, at least, if there is, or ever was, any one place in the island overstocked with them, there are twenty other places, which never reared the fourth part of the number that they were able to maintain. Nay, there are many excellent situations for bees, which perhaps never had 20 stock hives on them, although by nature abundantly provided with excellent pasture for many hun-

E 2

dreds.

* There are some few places, indeed, such as white bent ground, where there is scarcely a heath, clover, mustard, or runch flower to be seen, nor even any furze, broom, or plane trees growing, and which are almost quite void of all other flowers. Such places are certainly very bad situations for bees, and they will never thrive on them, or on any similar unproductive grounds. There are again some other places, which have but a few natural flowers, and where no artificial ones are reared. Such places may perhaps have hardly a sufficient quantity of flowers in eight miles circumference, to feed eight stocks of hives; Whereas, in more favourable situations, the same extent of ground could easily produce as many flowers as would feed eight score. There are some other grounds, which are excellent for producing corn, but which perhaps have little clover, mustard, or runches, in their neighbourhood, and neither gardens nor moors within reach. Such places are naturally bad situations for bees; but by rearing some turnips, mustard, or clover, and some furze in hedges, or on waste grounds, they may easily be rendered excellent situations for these useful insects.

dreds. For, as has been often mentioned, when we consider the vast quantity of flowers, which the earth naturally produces, and which might be still much more increased by art, how prodigiously great may we estimate the total? This consideration may convince us of the little danger we have of running into the extreme of overstocking our fields with bees.

Some may perhaps alledge, that if there were twenty times more hives in Scotland than there are at present, the produce, in a bad season, would still be very trifling: But this is a very childish objection; for, even in the worst of seasons, the quantity of honey produced, would, by proper care and attention, still be twenty times greater than, in such a season, it is at present. For instance, were there but one hive in all Scotland, in a cold rainy summer; even that hive would produce but a very small increase, perhaps swarm only once, and that swarm produce but only one pint of honey; whereas, if there are 100 hives, granting the weather to be equally bad, the produce must be at least 100 pints of honey. Estimating the number of parishes in Scotland, capable of raising bees, to be only 800, which I think is below the truth, the following calculation will give a view
of

of the immense quantity of honey that might be produced, even in ordinary favourable years.

	<i>Hives.</i>		<i>Pints of Honey.</i>
Supposing, (which is moderate)	1	to produce	4
Then 1 hive in each parish -	800	produces	3,200
Supposing the number in each parish increased to 30, -	24,000	will produce	96,000
But supposing, (which is still very moderate) the number in each parish increased to 100 -	80,000	will produce	320,000
Supposing the number in each parish increased to 400 -	320,000	will produce	1,280,000
			<i>lbs. of wax.</i>
Besides wax, which at 1lb. each hive, is			80,000

But there are many parishes in Scotland so very large and extensive, and so full of rich flowers, that I believe 1000 hives erected in each of them, would not contain bees sufficient to extract the one half of the honey contained in their flowers, in favourable weather; and therefore, it would not be estimating the possible increase of honey, all over Scotland, too high, to state it at near 2,000,000 of pints of honey. For example, the parish in which I reside, was so richly provided last year with abundance of fine white clover, wild mustard, and heath flowers, &c. that 1500 hives of bees, placed properly on it, would not have nearly exhausted

exhausted its flowers of their honey. To what an astonishing extent then might the bee-husbandry be carried? *

But lest I should be thought extravagant, in my calculations and statements of the profits to be made from these useful animals, and inclined to lead my readers to build *castles in the air*, instead of erecting hives in their gardens, I shall mention a few facts out of many on this subject, which I can vouch, either from my own concern in them, or upon the authority of persons with whom I am particularly acquainted, and who informed me how much they had made of their bees last season.

To a person near Greenlaw, I

paid for honey and wax, a-

bove, - - - L. 4 0 0

To another near Dunfe, for

ditto, above, - - - II 0 0

To another, near Hamilton, I

paid for *one hive*, which was

weighed in the Edinburgh

Weigh-house, - - - 4 0 0

For

* But it is necessary to caution the reader here, that, in a very bad season, it perhaps could do little more than produce the fourth part of that quantity; not for want of abundance of flowers with honey in them, but for want of favourable weather for them to go and collect it. See pages 7, 9 and 29.

For 40 hives, purchased from
 different persons, some of
 them at above 2l. Sterling
 each, I paid - - - - - 70 0 0

A friend in Mid-Lothian af-
 fured me, he had cleared last
 feason, by his bees, no less
 than - - - - - 12 0 0

All of these persons had but a very few
 flock hives at Whitsunday, and yet they made,
 at an average, above 30s. by each of their hives.
 But had they increased their flock, they might
 easily have made ten times more than they
 did.

With regard to the profit arising from bees,
 one consideration should not be overlooked,
viz. that almost the whole produce, arising from
 the sale of both honey and wax, is in a great
 measure clear profit; as bees, and bee-hives
 are, particularly in Scotland, equally free from
 rents and taxes; and the culture of them does
 not in the least injure or impede any other im-
 provement, in any respect. Nor do they re-
 quire a constant attendance, as most other ar-
 ticles of improvement do; for a proper person
 might easily oversee, with a little assistance in
 swarming time, at least 500 bee-hives. And

as Nature has amply supplied them with food, and with powers to provide it for themselves, they put their owners to little or no expence for that article; which cannot be said of any other of our servants whatever.*

Thus, by following the above plan, with a little attention and exertion on the part of our landed gentlemen, such a number of bee-hives would soon be raised all over the kingdom, that

* Here I have in view Scotland in general, as it has many hundreds of situations where bees would thrive well, but where not a single flower is sown for that purpose; but even were this plan adopted, of rearing artificial flowers in those places, where a scarcity of natural flowers prevails, during part of the working season, in order to supply that defect, and thus afford the bees abundance of provision at all times, still the expence would be so trifling, that it is scarcely worth taking notice of; as is already hinted, p. 12, &c. for, should we plant some trees, with a view to assist bees, we have their wood; if we rear turnips, we have their feed; if we sow white clover, we have the best of pasture; and if we even allow furze or broom to overspread waste grounds, we can be at little loss, as even these have also their uses, by supplying us with hedging, fuel, shelter for sheep, &c. I wish not to be here understood, as if I meant to recommend the sowing of large fields purposely with food for bees, excepting white clover, which provides food for larger animals: All that I intend is, that gentlemen, who have great stocks of bees, and plenty of ground, may easily spare three or four acres, out of as many hundreds, for the rearing of turnips, mustard, furze, broom, &c.

that the quantity of honey and wax would be increased to such an extent, as to produce the greatest advantages to the nation at large, as well as to the private proprietors of the hives. All the money sent to foreign markets for these commodities would be kept at home; which would be a saving of perhaps not less than 50,000*l.* a-year. And honey would be produced in such abundance at home, as to supply the poor, as well as the rich, not only with a delicious *luxury*, but also with an excellent substitute for some *necessaries*.

It might, for instance, be converted into *mead*, a fine well-tasted wholesome liquor, which would prove an excellent substitute for strong ale and porter, and could be sold at a very moderate price. A weaker kind of mead, called *bragwort*, could also be made of it. This is an agreeable wholesome liquor, much esteemed by many, who use it as a substitute for small beer. When properly made, it will keep long: And when of a proper degree of strength, it is so highly exhilarating, that many persons have been sent home half intoxicated with it.

The increase of the quantity of honey would also reduce the price of it so much, that in-

stead of paying 10d. or 1s. *per* pound for it, as at present, it might be sold so low as 3d. *per* pound, in which case it would prove an excellent substitute for butter to the poor. Even at the present prices, it is already used by many persons mixed with butter.

As to the wax, almost every person knows the great uses made of that article, in medicinal preparations, wax candles, sealing wax, &c. &c. as well as the high esteem in which wax candles and wax tapers, are held by persons in the higher ranks of life, on account of their clear light and odoriferous smell, as well as their freedom from all danger of greasing any thing, as tallow candles do, when a drop falls from them,

C H A P. VI.

HOW TO INCREASE THE NUMBER OF BEE-HIVES IN A FEW
YEARS IN SCOTLAND.

I PROCEED next to show, in what manner the number of bee-hives may be speedily encreased in Scotland. If a gentleman of property has a proper situation for bees, and the above reasoning has inclined him to commence the cultivation of bees with spirit, let him apply to some person tolerably skilled in that branch of science, and let him purchase 100 or more bee-hives, in the month of August, and place them properly, according to the directions which shall be laid down hereafter. Let him next rear a sufficiency of turnips in their neighbourhood, that they may blossom next spring; and in the month of February, let him sow some mustard seed, and some furze and broom upon dykes, or waste ground. Gentlemen of property, who have any ground proper for planting, should by all means plant a number

of plane trees and fallows. They should likewise sow a good deal of white clover, sweet refida, or mignonette, &c. with any other flowers that will grow upon the ground, either by nature or art.

In winter, particular care should be taken to preserve the bees from cold; in spring, from famine, and robbery by other bees. And when they are ready to swarm, great care must be taken to lodge them in proper habitations.

With such attentive management, I can venture to assure all who will make the experiment, that 100 well-chosen stock-hives, will, in a tolerably good season, produce from 180 to 200 or even 220 hives, whatever more.

Some may object, that, while the proprietor, who wishes to increase the breed of bees, raises many flowers for that purpose, his neighbour, who, perhaps, takes no trouble of this kind, may share the benefit, by his bees coming and feeding upon them §. To this it may

§ I was sent for on the 23d of May last, by a gentleman in Edinburgh, who wished me to bring him a hive of bees, and to pitch upon the most proper situation for placing it in his garden. The day being very fine, and the fruit trees in full blossom, there was a pear tree among many others, which was full of fine blossoms: Observing a number of bees busily employed upon them,

be sufficient to reply, that the industrious proprietor, having done every thing in his power to supply

them, he told me, “ they belonged to his *neighbour*, who lived “ a few yards from him.”—“ Perhaps not,” replied I, “ for a “ bee will fly far for food in fine weather : and, therefore, these “ bees may come from Leith, or some other place as far distant, “ while your neighbour’s bees may fly as far as Leith for their “ loading.”

As for the reason why bees will sometimes travel a mile or more for a heavy loading, when they could get the same quantity and equally good, from the same species of flowers within a few yards, I can scarcely hazard a conjecture ; unless it be, that perhaps some of the old and experienced bees, from a mistaken apprehension, may suppose those flowers near their hives to have been exhausted, by the most part of the hive having had constant access to them, and feeding on them ; as is said of the old cattle, that they commonly feed on the borders of their pasture grounds, where few of the younger cattle have previously fed. But, as a proof of the fact, let any person who has one or two hives, with abundance of flowers to keep his bees constantly employed, within 100 yards of their hives, make the experiment, by going to another place, where there are also flowers growing 1000 yards distant from his own, or any other persons bees, and he will find a great number of bees at work on the distant flowers.

But though some bees, by being expeditious travellers, seem to disregard distance, and to be fond of undertaking long journeys even when loaded, yet, in general, I believe, the greater part of them are wise enough to collect their loading as near their hives as possible. And, therefore, the nearer the flowers are situated, the more work will they perform, and the greater quantity of honey will be carried home in a day. For this reason, I have already advised the hives to be always placed as near as possible to plenty of provisions.

supply his own bees with ample provisions, will have the pleasure to see them feed and thrive upon it; and should those of his neighbours occasionally partake, he will not have any reason to regard it, there being no danger of a famine. But to obviate this objection completely, let ten (or more) persons in a village, or neighbourhood, join together and contribute equally in proportion to the number of their hives, to rear a sufficient quantity of flowers amongst them, and upon this amicable plan, the expence of each proprietor will be exactly in proportion to the number of his hives.

Supposing, that there are, in May 1795, twenty stock hives in each parish in Scotland, the amount in 800 parishes would be 16,000. Then, supposing each of these hives to throw one swarm, which would probably keep through the winter, in September we would have 32000 stock hives. At this period, let every gentleman, who rears bees, keep all his hives, young and old, for stock hives, that are fit for it* :

Let

* All stocks, or first swarms, and even some second swarms, will probably answer for that purpose; and all swarms which are nearly full of combs, but rather light, such as I would not advise to be kept, if they were not speedily to increase the stock; by keeping them

Let the poor, who are able, do the same with theirs ;—and let those, who are not able to lie out of the produce of their bees, sell them to those who are inclined to purchase them for stock hives. By doing this, they will raise as much honey as if they killed all the bees, and sold the honey and wax†, and with far less trouble.

On these principles, by keeping 32,000 stock hives, with proper management, during a tolerable season, and always preserving all that will preserve, for the space of seven years, the stock would increase as follows ; viz,

HIVES.

them, and feeding carefully with course honey, which might be purchased from any foreign market, where it could be got at the cheapest rate. For this purpose, two or three very light swarms, which are not fit to be kept for stocks separately, might, by conjoining both bees and honey, form a good stock hive. And all hives, containing honey or combs, whose bees desert them from whatever cause, during any season of the year, might be kept carefully, to lodge new swarms next season. The method of uniting, feeding, &c. will be described in their proper places ; and by following the directions laid down under these heads, our hives would in a short time turn out very numerous.

† But should it here be asked, How are we to be supplied with honey during the time of rearing the stock hives ? we may reply, that it may be purchased from other counties, in order to supply ourselves, as well as to feed our weak hives.

	HIVES.
In the 1. year, Sept. 1795, there would be	32,000
— 2. — 1796, —————	64,000
— 3. — 1797, —————	128,000
— 4. — 1798, —————	256,000
— 5. — 1799, —————	512,000
— 6. — 1800, —————	1,024,000
— 7. — 1801, —————	2,048,000

Thus, within the short period of seven years, the number of our bee-hives would be increased to no less than TWO MILLIONS and FORTY EIGHT THOUSAND HIVES. But allowing the forty eight thousand to be discounted for dead hives, there would still remain two millions of stock hives. Although this number may appear to be large, yet there is no reason to suppose, that the calculation is neither impossible or improbable. But, even dropping the one half of this number, upon the supposition of losses by bad seasons, &c. there would still remain, at the lowest estimate, a clear MILLION of stock hives; which, next year might produce FOUR MILLIONS of PINTS of HONEY, and ONE MILLION of POUNDS of WAX; and still keeps the stock entire. With such a quantity, indeed, of these useful animals, and valuable commodities, we might rest contented; as such a quantity, besides every other advantage, would afford employment to hundreds of old and

and

and poor people to watch them in swarming time, and to make hives to receive the young colonies.

Another method, by which the number of our stock hives may be more speedily increased in this country, might easily be adopted. Should any one opulent proprietor, or a company of individuals, incline to have 2000 or 3000 bee-hives, let a commission be sent by a proper person to Poland or Ruffia, where, in the month of August especially, they could be purchased at one third part of the price they generally draw here: And I am persuaded, if the Dantzick hives are made much in the same form with ours, or in any other form that will admit of carriage, a ship nearly loaded with other goods, which would help to pay her freight, might bring over a great number of them. Perhaps many will think this an extravagant attempt, but I am so confident of its success, that if I were possessed of 1000 l. Sterling in ready cash, I would set sail for Dantzick, and risk 800 l. of it upon the adventure. On bringing home my cargo of living bees, I would spread them all over the kingdom: But, before setting out upon such a voyage, I would first inform myself properly about

the form of the Dantzick hives, as well as about their prices, and whether they are to be got near the sea-coast; as land carriage of bees is equally troublesome, expensive, and dangerous: But I would not be afraid to risk 1000 bee-hives on board a ship; for, I would rather carry them 4000 miles on ship-board, when properly packed, than 100 by land.

C H A P. VII.

ACCOUNT OF THE QUEEN BEE.

THE QUEEN, or MOTHER BEE, is easily distinguished from all the other bees in the hive, by the form, size, and colour of her body. She is considerably longer, and her wings are much shorter in proportion to her body, than those of the other bees. The wings of both common bees and drones, cover their whole bodies, whereas those of the Queen scarce reach beyond the middle, ending about the third ring of her belly. Her hinder part is
far

far more tapering than those of the other bees : Her belly and legs are yellower, and her upper parts of a much darker colour than theirs. She is also furnished with a sting, though some authors assert that she has none, having been induced to form this opinion, because she is extremely pacific ; so much so, indeed, that one may handle her, and even tease her as much as he pleases, without provoking her resentment. For my part, I never could excite a Queen Bee to draw her sting, nor could I even get a sight of it, but when I pressed her body. The omniscient Governor of Nature has wisely ordained this majestic insect to be of a pacific disposition ; for, were she otherwise,—were she, like the other bees, of so irritable a temper as to draw her sting on every occasion, and to leave it in the body of her antagonist, it would prove of dangerous and often fatal consequences to the whole hive ; for every bee, after losing her sting, dies within a day or two at the utmost.

The Queen bee is solemn and calm in her deportment. A young Queen is a great deal smaller in size than a full grown one ; being not much longer than a common bee, and is therefore not so easily observed when sought for.

When only three or four days old, she is very quick in her motions, and runs very fast; but when pregnant with eggs, she becomes very large, and her body is heavy. When travelling, she drags along in a very slow manner, and is not very expeditious in flying. It is proper that every proprietor of bees should know the Queen, as it may often be of great advantage to him. The surest way to know her is to get a sight of one from some acquaintance, who keeps hives: or, if this cannot be obtained, he may search for her, by the above description, among some small hives.

That this majestic animal is a female, the very designation she bears, of *QUEEN*, seems to imply that all modern authors are convinced, though many of the ancients were of a different opinion. But as it is also now unanimously admitted, that she lays every egg in the hive, she ought rather to be called the *MOTHER BEE*. For, indeed, from the best observation that ever I could make, she possesses and exerts *NO SOVEREIGNTY* over the other bees. She evidences the greatest anxiety for the good of the commonwealth, with which she is connected; and, indeed, every member of it shows an equal regard for her welfare. But I never could ob-

serve,

serve, that she issues any positive orders, to be punctually obeyed by the other bees. The truth seems to be, that she and the other bees are all equally acquainted with their duty by *instinct*, and have an equal pleasure in performing it, without waiting for orders from each other. That there is, nevertheless, the greatest order and regularity among them, is certain; for they lay their plans and execute them in the best possible manner, by the influence of the above powerful substitute for reason.

Almost all writers, as formerly hinted, are of opinion, that the Queen lays three different kinds of eggs; viz. one kind for the production of a Queen Bee; another species for that of the working bees, and a third for producing the Drones. It was also long a received opinion, that no Queen could lay eggs, that were capable of producing bees, without the assistance of Drones. SCHIRACH †, on this subject, refutes this doctrine, and entirely denies such an use of the Drones. He advances this opinion, that
“ the Queen lays eggs, which produce young
“ bees, without any communication with the
Drones;

† Pastor of KLEIN BAUTZEN, in UPPER LUSATIA, and Secretary to a Society of Naturalists there.

“ Drones ; and affirms that all the working
 “ bees are females in disguise ; every one of
 “ whom, in an early stage of her existence, was
 “ capable of becoming a Queen ; from a know-
 “ ledge of which fact, swarms may artificially
 “ be obtained from the early months of spring,
 “ and in any succeeding month, even to No-
 “ vember.”

His experiments have been very numerous, and obviate every doubt and objection. He performed the operation, upon one and the same stock, for at least fifty or sixty times, from mere fragments of the combs, &c. &c. This novel and wonderful doctrine excited no small contention, and not a few counter experiments among naturalists on the Continent, without being decided even by the great BONNET. He asserts, which is indeed the grand and decisive proof, that “ the practice of this art, (of raising artificial Queens,) has already extended
 “ itself through Upper Lusatia, the Palatinate,
 “ Bohemia, Bavaria, Silesia, and several parts of
 “ Germany, and even of Poland.”

That a Queen can be raised from an egg in a common cell, or, in other words, that the self-same egg is capable of being reared up to be either a Queen, or a common bee, as the

bees please, appears to me, from my own experiments, to be past a doubt; and that a Queen, who never saw a drone, can lay eggs, which will produce bees, is equally certain. Both of these facts will, I flatter myself, appear to the curious and learned reader, to be clearly ascertained by the following experiments.

Long before I heard of Mr Schirach's theory, or experiments, I had often taken off swarms, without leaving any Queens or royal cells in the mother hive; notwithstanding which, they bred young Queens, which surprized me greatly how they had obtained them, as the received opinion then was, that they could not breed a Queen bee, if the old Queen was taken away, before a royal cell was erected. But after seeing Schirach's sentiments on this subject, I thought his theory extremely probable, according to what I had observed among my own bees; and resolving to ascertain the truth of it, I made many experiments of my own, which all succeeded to my wishes. But, in order to put the matter beyond all doubt, I shall relate an experiment I made with a hive in spring 1788, two months before the usual time of swarming, and which clearly ascertains both the facts at once. The hive
was

was beginning to carry well, and to breed fast, but it was not half full of bees. It had only one Queen, but neither Drone nor royal cell; neither of which could be expected at that season of the year, as it was about the middle of April. I took out the Queen, and most part of the bees, and left the hive with only some common bees, to hatch out the young brood in the cells, and provide themselves with a Queen, but without leaving one single Drone. They did not disappoint me; for as soon as the melancholy intelligence pervaded the hive, that their loving mother was torn from them, they made a mourning kind of noise for their great loss, for about two hours: After which, a general council, as it would seem, being called, the most experienced sages, in the distressed republic, may be supposed to have advised their brethren, "That it was in vain to mourn longer for the loss of their mother and brothers; that although they were gone, and although they had at present no royal cell to raise another mother, yet they had still sufficient resources from nature and their own industry; that they had power and means to raise a young monarch to the throne; that they had plenty of new laid eggs, and therefore

fore no time was to be lost, to raise a Queen bee from one of them; otherwise the eggs would all soon produce common bees, and then all hopes of future progeny would cease for ever, and their republic utterly perish, for want of a prolific mother to preserve and perpetuate the race."

That the bees seemed to have had some such reasoning among them, appeared pretty evident from their conduct; for about two hours after the capture of the Queen, they all fell busily to work, and exerted themselves amazingly for two days; some being employed in forming the royal cell, and others in injecting into it a large quantity of thick whitish liquid stuff, pretty much resembling cream. At the end of the 3d day, the royal cell was completely formed; and, in the mean time, the common cells were sealed up by the other bees, who all continued busily employed. On the fifth day, the royal cell was considerably enlarged, and I observed as much of the aforesaid white stuff in it, as would have half filled a thimble almost, with a white maggot lying on the top of it. On the seventh day, the bees sealed it up, and, on the seventeenth day, the young Queen came forth out of her little palace

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lace, in all her pomp and majesty. On the twenty-fourth day, the young Queen became a MOTHER, and laid eggs; on the thirty-first day, these eggs were sealed up, and, on the forty-third day, a number of young bees emerged from the cells. About the same time I repeated this experiment with other two hives, which both succeeded equally well.

I made another experiment with a different hive, out of which I took the Queen and most part of the bees. This hive had neither a royal cell nor drones in it, yet, in seventeen days thereafter, a Queen was reared, and on the 25th day she laid eggs. I then took out the young Queen again, leaving some new laid eggs in the old hive. Within eight days after, there was another royal cell erected and sealed up. This I immediately took out of the hive; but, upon inspecting the hive eight days thereafter, I found neither Queen, eggs, nor royal cell, none of which indeed I expected. Upon taking a piece of comb, however, with eggs in it, out of another hive, and putting it into this hive, the bees erected another royal cell, which in due time produced another young Queen.

The advocates for the doctrine of the drones being males, and their aid being necessary for

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the propagation of bees, may perhaps plead, that although there were no drones in the hive, when I took the Queen from it, yet there might have been eggs laid in drone cells, which would come forward to be drones as soon as the young Queen, and so impregnate her, and render her fit for breeding. But the contrary is the fact: for, when the old Queen was taken out of the hive, there was not a single egg in any of the drone cells. If there had, I would have seen the bees sitting upon the cells of the drone combs, as they did on those of the common bees, and on the royal cell. Besides, I turned up the hive every second day, during the whole period of forty-three days, in order to determine how long the bees took to erect the royal cell, and seal it up; how many days elapsed before an egg produced a Queen; how old the Queen was, before she began to lay eggs; how many days passed, before these eggs produced common bees; and, above all, whether the Queen needed the agency of the drones, to enable her to become a mother. To arrive at a certainty on this point, I often turned the bees over in the hive with a small stick, in search of young drones in drone cells, but could not discover the smallest vestige

tige of them. But the young Queen, on the 10th day of her age, began to lay eggs in drone cells, which produced young drones in the hive about sixteen days thereafter. Having repeated this last experiment again and again, I can now affirm, with the utmost confidence and certainty, that the common, or working bees, are endowed with the powerful faculty of raising a Queen bee, from an egg, in a common cell, when their community stands in need of one.

Their method is this: They make choice of a common cell with an egg in it, and inject some white liquid matter, from their proboscis, of a thickish substance. They then begin to build upon the edges of the cell, and enlarge it. On the third day, it appears fairly on the outside of the comb, in the form of a royal cell, and may now be properly so denominated. On the fifth day, the cell being now greatly enlarged, and a great deal of the whitish matter thrown into it, the royal maggot appears in the form of a semicircle, not unlike a new moon, being biggest in the middle part, and small at each end. In this form it is to be seen for two days, swimming on the top,
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and in the midst of the said matter in the cell ; and on the seventh day it is sealed up.

During this period, our young princess undergoes various metamorphoses. I have opened the royal cell on the tenth day, and have found the maggot still on the top of the white liquor ; and having taken it into my hand to show it to any friend, it would have moved for a short time, although at this period, it had not the smallest resemblance to a bee, being still only a maggot. But on the fourteenth or fifteenth day, the metamorphosis is so complete, that instead of a gross white worm, forth comes a charming young Queen bee, † arrayed in all her glory. From the whole of these experiments, therefore, which I have repeated on various occasions, I can positively affirm, that the Queen bee is capable of becoming a mother, without so much as seeing a drone ; and that
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† The same process, or nearly so, is used by the common bees, to bring forward both their own species and drones, by throwing the whitish matter on the eggs, and sealing them up, till the maggots undergo the usual changes in the cells, &c. And each egg generally produces a bee in about fourteen or sixteen days. I have seen them differ two or three days in point of time. Perhaps an egg, should the bees let it alone and inject no matter upon it, might, nevertheless, keep warm for 8 days, and produce a bee at last.

the doctrines of almost all former writers on this subject, (Schirach and one or two more excepted,) who affirm that the Queen cannot breed without the agency of the drones, or males, as they call them, is founded on a mistake. For a small piece of comb, with common eggs in it, may be taken and put into a box along with 400 common bees, and transported 1000 miles from a Drone; and yet the bees will rear a Queen from one of those eggs, and that young Queen will lay eggs, which in due time will produce Queens, Commons and Drones. But whether every egg in the common cells of the hive can be nourished up to produce a Queen, I dare not positively say; although I am much inclined to think so, as I can safely affirm, that not above one in a dozen of my experiments, in rearing Queens from what are called *common eggs*, (i. e. eggs that commonly produce working bees,) has ever yet failed, when I either made the trial by way of experiment, or adopted the plan as a matter of œconomy. Sometimes a single egg has failed in making the experiment; but this might have happened from some other accidental cause. As a proof of this, I offer to rear 20 Queens, if not 30, out of one hive, during the course of one summer. For I have,
within

within these last six years, caused the bees to rear, from eggs taken from common cells, which the bees would otherwise have reared up for working bees, no fewer than 200 *artificial* Queens; and which Queens laid eggs, that came forward to be bees, in the same manner as other Queens, which may, for distinction's sake, be stiled *natural* ones.

Sometimes, when I have taken the Queen out of a hive, and left none but common bees in it, after looking for the space of fourteen or sixteen days, for royal cells, as usual in such cases, I have observed, that, instead of Queens being produced, there were three or four royal cells, which contained nothing in them, except that some of them had a red tough matter, of a hard kind of substance, about the size of a pea, which would tear, but would not break: while others of them would have contained neither egg, maggot, nor chrysalis, but were quite empty. These empty cells I shall, for distinction's sake, call *false royal cells*. What was the intention of the bees, in rearing these false royal cells, I cannot determine. The bees were surely sensible, that there were no young bees in them: and yet they would have allowed them

to continue in the hive for many months. One circumstance inclines me to think, that the bees intended them to be of some use for rearing Queens, as I never saw these false royal cells reared, but when the hive wanted a Queen. I am equally certain, however, on the other hand, that I have never once seen an egg or decayed maggot in any of them. I own that some common cells will sometimes be sealed up, as if there were young bees in them, although none would ever appear. All of these, however, had eggs in them at first, which had decayed and rotten, by cold or some other accident. But this I never found to be the case, in those false royal cells, not one of which appeared to have ever had one in them. Therefore, when we leave a hive without a Queen, we cannot positively say, that the bees will rear one for themselves : yet were the practice eligible in every other respect, we might trust to it, as scarcely one case in a dozen fails. But if a royal cell, on the 2d, 3d, or 4th day, after it is erected, appear to have an egg, or some of the whitish matter in it, a Queen may be depended upon, to be produced in due time, if no accident prevent.

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appears clearly proved, by Schirach's experiments and my own. On the other hand, if we hold it to be of a nutritive nature, then we suppose the Queen to be a hermaphrodite, or *self-prolific*, without the assistance of any other creature. It is indeed reported, that the whole genus of snails are hermaphrodites, and that each individual of the species is endued with both sexes.

But although I have not a doubt as to the fact, that an egg in a common cell is capable of being nourished up to produce a Queen, yet I rather doubt, whether any great improvement can be made of this discovery, so as to increase the quantity of honey and wax; as it is not a great number of hives that will produce that effect, but only real good ones. I also doubt, whether more hives can be reared by this method, as our bees generally produce more Queens naturally, than they are able to supply with a sufficient number of common bees to compose a proper swarm with; as appears from their killing the supernumerary ones, which they have no need of.—Often, for instance, in a garden containing four stock hives in May, they will breed perhaps 24 Queens during the summer, but will kill two thirds of them, and send off the

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the other 8, with as many young swarms.—It must be allowed, however, that hives will sometimes ly long out; and, therefore, if the owner had a spare Queen, he might easily rear new swarms with them, which he cannot safely do without them.

C H A P. VIII.

ACCOUNT OF THE DRONE BEE.

THE DRONES are a species of bees, well known to every Bee-master, and may easily be distinguished from the common or working bees. They are both larger and longer in the body. Their heads are round, their eyes full, and their tongues short. The form of the belly differs from those of both Queen and common bees; and their colour is darker than either. They have no sting, and they make a much greater noise when flying, than either the Queen or the common bees;—a peculiarity of itself sufficient to distinguish them.

The drones are, by almost all writers reckoned the males, (See p. 62,) and are so stiled by most authors ; but for my part I neither know what to call them, nor of what use they are, although I have often thought upon the subject, yet I cannot be satisfied with any theory I ever heard of. Various conjectures have been made with respect to their use. Although almost all agree that they are the males, and couple with the Queen ; yet they acknowledge that they never saw an instance of any one of them in the act with her. It is surely wonderful, if the drones are the males, that they should have escaped the prying eyes of philosophers in all ages, whereas, almost every eye has detected smaller insects in the act.

SWAMMERDAM, sensible of this, to shelter himself, flies to that false refuge, that the *smell* of the drones answers the same end as copulation. Others say, that their heat is necessary for hatching the young bees. But this argument has no weight with me ; as bee-hives have most part of their bees bred, and are well nigh swarming, before any number of drones appear in the hive. Besides, by the time that they become numerous, so as their heat might do good in that respect, the heat is generally

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so great, that the bees have too much of it; and, therefore, often fly out in the fore part of their hive to get air. It is therefore plain, that they need not be at the expence of maintaining a parcel of idle gluttons, for the sake of increasing what would do them more harm than good.

That the Queen stands in no need of their assistance to fecundate or impregnate her, has already been observed, and appears plain, from this consideration, that she lays eggs, which produce young bees, without having had any previous communication with the drones. I will not, however, suppose that the drones are of no use in the hive; but that the Queen lays eggs which produce young bees, without so much as seeing a drone, I can with the utmost confidence affirm.

The advocates for the old doctrine, that the drones are males, alledge, that they impregnate the Queen, before their brethren kill them. According to this theory, she should continue for no less a period than seven or eight months, with about 12,000 impregnated eggs in her ovarium, which would certainly make her appear very large during the whole of that period. But it is unnecessary to waste arguments

arguments in refutation of this doctrine, as I have already shown (pages 56, 57, 58) that I have repeatedly had Queens breed and lay eggs, and those eggs become bees, although these Queens were bred seven months after all the drones were dead, and some weeks before any new ones were hatched. These experiments, I think, are sufficient to silence all the arguments advanced by the advocates for the drone system. Mr DEBRAW, indeed, creates *little drones*, and gives them power to live all the year, and to impregnate the Queen at pleasure. But as room does not permit me to narrate the experiments whereby he attempts to prove this, I shall content myself with stating his sentiments in as few words as possible. He asserts, that, besides the common large drones, which every person, acquainted with bees, knows at first sight, there is a small kind of drones, which are, to all appearance, like the common bees, there being no visible difference, except that they have no sting, which he discovered by immersion in water, and pressure. After relating an experiment on this head, he says, " I once more
" immersed all the bees" (of a small swarm)
" in water, and when they appeared to be in
" a senseless state, I gently pressed every one of
" them

“ them between my fingers, in order to distinguish those armed with stings from those that had none, which last I might suspect to be males. Of these I found fifty seven, exactly of the size of common bees, yielding a little whitish liquor on being pressed between the fingers.”

He farther alledges, that if there be only a Queen and bees that have stings in a hive, although the Queen lays eggs, yet if she has no drones to inject the seminal matter upon them, the eggs will still remain unproductive, and will decay, even although there were 1000 bees with stings in the hive. In answer to this, I shall here narrate an experiment I made several years ago.

On the first of Sept. 1788, I took all the bees out of a hive that was breeding very fast, and in which I found only four drones, which I killed. I put the bees into a hive that had nothing in it but empty combs. After waiting ten days, upon looking between the combs, I found maggots newly sealed up, in the cells. I then took out all the bees, and shook them into a tub full of water, from which immersion I recovered them gradually, and while doing this, I pressed each bee individually, to try if

I could discover any of those stingless little drones; but not one appeared, all of them having stings, to the number of 3000. After this I searched the old hive I had taken them out of, and cut out all the combs that had eggs or young in them; among which I found some cells that had new laid eggs in them; others whose eggs were converted into a small worm, and others some with maggots in them. I then restored the Queen, and all the bees, putting them into the same hive again, but without leaving a single egg in it. During the succeeding twenty days, I inspected the hive, and found the bees, in fine weather, working with great alacrity, a sure sign that the Queen was breeding again. After this, on turning up the hive, and cutting out one of the brood combs, I found new laid eggs in some of them; others containing maggots; besides some young bees, almost ready to emerge from their cells.

I made another experiment, about the same time, upon a hive that had some brood combs, but had not had a large drone for several weeks preceding. This hive did not contain above 500 bees, a circumstance that was in my favour, as, being less numerous, the trouble was proportionally less. I carried the hive into a close
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room in my house, that not a single bee might escape me; but, after repeating the former experiment of immersing them in water, recovering, and pressing them one by one, I found that every one of them had a sting.

I think these experiments may satisfy any unprejudiced person, that there is no such creature in existence as a small drone bee; unless it be in Mr DEBRAW's *brain*. But, if Mr Debraw, who says he can find fifty-seven in a small swarm of bees, will send me the odd seven, I will give him one of my best hives for them, and I think he will not say that they are ill fold.

I have often had good hives, with few or no drones in them, during the whole year. Mr KEYS is wrong, when he says, a top swarm will not thrive without drones, for I am certain of the contrary. In summer 1785, I took off four swarms of my own in one day, without a single drone in one of them; yet they all thrived well, and the bees bred drones in them about four weeks thereafter.

Although I cannot determine of what use the drones are to a hive, unless it be to help to consume the honey, which they are very well qualified to do, yet it is observable that the

best hives produce them earliest in the year; as they generally appear in such hives about the beginning of May, and the working bees put an end to their existence at Lammas, at which period I generally assist them as much as I am able.

After my first work upon this subject appeared, I had the honour of a conversation with two very intelligent gentlemen in my neighbourhood, who declared their satisfaction with the arguments I had formerly advanced. I also repeated, in the presence of one of them, some of the experiments I had made, to prove that the common bees are endued with the power of rearing any egg, from a common cell, to become a Queen, when the community stands in need of one; and that a Queen, although she never saw a drone, will, at a proper age, lay eggs in abundance, which, again, by the assistance of the common bees, will produce Queens, commons, and drones, as well as those eggs that are laid by Queens, who are surrounded with drones in the hives to which they belong.

After seeing these experiments, of which he expressed his approbation, I had another conversation with both these gentlemen, when they

they asked me,—What then is the use of the “ drone ? ”—In answer to this, I candidly acknowledged that I could not tell, as any conjecture, that I could form respecting their use, appeared to be attended with insurmountable objections. We all agreed, however, that they certainly must be of some use, as Nature, or, more properly speaking, the GOD of Nature, does nothing in vain.

One of the gentlemen said, that, perhaps bees might be like some other insects, whose males were not necessary in every act of generation ; and that, perhaps, although a Queen bee, who had never seen a drone, could lay an egg which would produce a Queen, and that Queen again do the same, and thus the production of Queens and bees be continued with equal success, for perhaps six, eight, or ten generations ; yet it might perhaps turn out, that these Queens would gradually become more and more unfruitful, and at last grow altogether barren, unless they should cohabit with the drones. The other gentleman, however, was of opinion, that if one Queen was fruitful without the agency of the drones, every other one would be so likewise, to the end of the world.

There is one thing, however, that seems to favour the former gentleman's conjecture; viz. that some hives, which had not a single drone in them, have been known to breed well for one summer, pretty well the next, and even tolerably the third; but at last, have bred drones, and thereby turned out much more prolific thereafter: although it must be owned, that such hives generally fail at last. Seeing the drones are great consumers of honey, though they do nothing to provide any, should the above conjecture, therefore, turn out to be true, a practical inference may naturally be drawn, that a hive may thrive fully as well, or rather better, for 3 or 4 years, without drones than with them; after which period, they might again be introduced into the hive, for the purpose of renewing the prolific powers of the Queen, and prevent the royal race from becoming barren or extinct. It may be farther observed, as an additional argument in favour of the above conjecture, that although the Queen and her daughter, none of whom ever saw a drone, might lay abundance of eggs, which would all produce bees; yet they might probably have laid a great many more, had the drones been in the hive with them.

I must confess, it appears somewhat paradoxical, to say that females will breed successfully for several generations without the assistance of the males ; and yet at last prove barren, and give over breeding altogether, till their prolific powers are renewed by fresh males cohabiting with them. But however paradoxical or unaccountable it may appear, that is not a sufficient reason for us to reprobate the supposition ; as there are many of the arcana of nature that are equally wonderful and unaccountable, and the elucidation of which has hitherto baffled the investigation of the most penetrating geniuses, and deepest enquirers into the secrets of natural philosophy.

One of the above-mentioned gentlemen desired me to try an experiment, and endeavour to ascertain the fact, whether the want of drones will occasion a gradual barrenness to take place in a succession of Queens. My answer was, that I had long entertained an idea of a plan, whereby I am persuaded that I could dive into, and probably discover this secret of Nature ; but that the execution would both require time, and be attended with a considerable degree of expence, by the loss of many hives, which at present I do not find myself inclined

inclined to risk. Whereupon he desired me to make the experiment with his own hives, which I engaged to do the first leisure opportunity: And as it may doubtless be a piece of useful natural philosophy, I shall certainly communicate the result of my inquiries to the public on a future occasion.

CHAP. IX.

ACCOUNT OF THE WORKING BEE.

THE WORKING, OR COMMON BEES, are so often seen by every body, and so universally well known, that a particular description may almost appear unnecessary, although, for uniformity's sake, I shall give it. They are smaller in size than either the Queen or the drone bees; and, the denomination they have so justly obtained, of *Working Bees*, plainly denotes their superior industry, in labouring for the whole hive.

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The common bee as well as the other two species of that valuable insect, consists of three parts, viz. the head, which is attached by a narrow kind of neck, to the rest of the body;—the breast, or middle part;—and the belly, which is nearly separated from the breast by an inflection or division, and connected with it by another narrow neck or junction. There are two eyes in the head, of an oblong figure, black, transparent, and immovable. The mouth or jaws, like those of some species of fish, open to the right and left, and serve instead of hands, to carry out of the hive whatever encumbers or offends them. In the mouth there is a long proboscis, or trunk, with which the bees suck up the sweets from the flowers. They have four wings fastened to their middle part, by which they are not only enabled to fly with heavy loads, but also to make those well known sounds and hummings, to each other, that are supposed to be their only form of speech. They have also six legs fastened to their middle. The two foremost of these are the shortest, and with these they unload themselves of their treasures. The two in the middle are somewhat longer; and the two last are the longest of all. On the outside

of the middle joint of these last, there is a small cavity in the form of a marrow spoon, in which the bees collect, by degrees, those loads of wax they carry home to their hives. This hollow groove is peculiar to the working bee. Neither the Queen nor the drones have any resemblance of it.

The belly is ornamented or distinguished with six rings ; and contains, besides the intestines of the animal, the honey bladder, the venom bladder, and the sting. The honey bladder is a reservoir, into which is deposited the honey that the bee sips from the cups of the flowers, after it has passed through the proboscis, and through the narrow pipes, that connect the head, breast and belly of the bee. This bladder, when full, is of the size of a small pea, and is so transparent, that the colour of the honey can be distinguished through it. The sting is situated at the extremity of the belly, and the head or root of it is placed contiguous to the small bladder that contains the venom. It is connected to the belly by certain small muscles, by means of which the bee can dart it out, and draw it in, with great force and quickness. In length it is about the 6th part of an inch. It is of a horny substance ;

is biggest at the root, and tapers gradually towards the point, which is extremely small and sharp; and when examined by the microscope, appears to be polished exceedingly smooth.*. It is hollow within, like a tube, that the venomous liquor may pass through it, when it strikes any animal, which it does the very instant that the sting pierces the skin, and insinuates itself into the wound; which proves mortal to many small animals, as well as to the bee herself, when she leaves her sting in the wound; as it draws after it the bladder, and sometimes part of the entrails of the bee.

These working bees may be said to compose the whole community, except in the season of the drones, which hardly lasts three months. During all the other nine months, there are no other bees in the hive, except them and the Queen. The whole labour of the hive is performed by them. They build the combs, collect the honey, bring it home, and store it up in their waxen magazines. They rear up the eggs, to produce young Queens, common bees and drones; they carry out all incumbrances that are in the hives; they defend the community against enemies of every kind, and kill all the drones.

C H A P. X.

DIRECTIONS TO GUARD AGAINST THE STING OF A BEE, WITH
THE METHOD OF CURE.

As we must now proceed to the handling of our industrious insects, it is necessary to put our readers on their guard against their stings.

Unless they are hurt, provoked, or affronted, bees seldom make use of their stings; but they are so extremely irritable, that whoever wishes to be on a friendly footing with them must beware of giving them the smallest offence. They will hazard their lives, rather than let an affront pass unrevenged; and, when exasperated near their hives, one may as well take a lion by the beard, or a bear by the snout, and expect to come off unpunished, as to hope to capitulate with them.

When a person has any thing to do about his bees, which, he thinks, may provoke their vengeance, and which, nevertheless, must be done, such as making them swarm, uniting light hives, &c. then he must equip himself properly

properly, by putting on his harness, * and keeping it on, as long as their rage continues. But when they are surpris'd or frightened by rapping on the hive, they will be very pacific, and will not attempt to sting. After which, the Bee-master may safely throw off his harness, and even his coat, by which he will be more fit for performing business with them.

But should they be greatly enraged, the best method, if there is a house or open door near, is to run as quickly as possible into it, and shut them out, (for it is easy to out-run them,) and thus prevent them from following. In such a case they will fly about the door for some time in great rage, impatient for an opening

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* The HARNESSE, or SAFEGUARD, should be formed on this plan. Let a net be knit with such small meshes, that a bee cannot pass through. Silk, gauze, catgut, crape, or any thing woven of a fine thread, will answer equally well. The safeguard must be made large enough to cover a man's hat, head, and neck, and to tie close together before his breast with a string. In tying it, great caution should be observed, that not the smallest chink or opening be left for a bee to get in at; otherwise the remedy will prove worse than the disease; as those that get in would sting with the utmost virulence, and it would be impossible to get either the stings or the bees quickly out from under the harness. The hands should be covered with a pair of gloves, and the legs with a pair of coarse stockings, or two pairs of fine ones, as the bees will often sting the legs through one pair.

§4. *Directions to guard against the Sting of a Bee.*

to get in ; but the person must take care to remain close prisoner, till his winged enemies retire. But if there be no house of refuge at hand, where he can retire by rapid flight, he should by no means retire gradually, but rather stand still like a statue, or ly down flat upon the ground, without any motion, with his face downwards, in which case he may get off with only two or three stings ; but if he attempts to fly and the bees overtake him, they will sting him in so many parts at once, that he may not come off with less than one or two dozen of wounds.

After their fury is abated, and the remembrance of the affront entirely obliterated, the bee-master may then renew his acquaintance with his winged labourers ; and if he comes in a humble manner, and walks gently and submissively among them, they will treat him kindly. In every business one has to do with bees, he must do it in a calm, soft, gentle, and submissive way ; he must take care not to approach them in a rash, hasty manner, puffing and blowing, or accompanied with any thing that has a disagreeable or unfavoury smell, as their organs of smelling appear to be very acute. In a word, gentle reader,

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er, you must approach your bees, as you would appear before your patron, when you are going to ask a favour of him ; and not, as you would meet an opponent in a duel, unless you be armed cap-a-pee.

When the bees attack a person who is walking among them, let him put them gently aside from his face with his hand, or thrust his head into a bush, and they will soon leave him.

When they are offended at any person, the chief parts they aim at are the face and hands, knowing these parts are most vulnerable. But if the face and hands are covered, they will surround him, and try to discover any aperture in his shirt, neck, breast, sleeves, breeches-knees, &c. and if they find an opening at the smallest slit or crevice, they will push in at it, and leave their stings, with their venom behind, though they lose their lives in the conflict.

The hair of the head, beard, and eye-brows, are all very offensive to bees, and if they accidentally light on any of them, they will sting that very instant. When at work in the field, they never offer to sting, let them be ever so much affronted. One may then chase them
from

from flower to flower, without provoking them to sting : they rather, on such occasions, fly off from the intruder, as unworthy of their notice.

The stings of bees have very different effects on different persons. There are some persons, upon whom the sting of a bee produces neither inflammation nor pain. Such people need use no precaution, even when they are sure to receive many stings. Upon others, again, the sting of a bee, occasions such exquisite pain, accompanied with swelling and inflammation, that nothing can terrify them more than the sight of a bee. This last class should not be discouraged. I myself have felt very different effects from their stings at different times. The seldomer I am stung, and the longer interval that occurs since I was last wounded, the greater pain I feel, and the more I swell : but when I am stung twice or thrice in a day, I value it not a pin. I have sometimes received forty stings in a day without swelling in the least. The reason of this I presume not to account for ; I only mention the fact, leaving it to medical people, or those who have studied the nature of animal poisons, to investigate the cause.

Many remedies have been prescribed, most of them to little purpose, to cure the wound received by a sting. Oil of olives, or any mild oil, is thought by many to be effectual. Bruised parsley is recommended by others; the honey taken out of the bee that inflicted the wound, is prescribed by a third class. Some say, that the sweet spirit of vitriol, well rubbed into the wound, will prevent both the pain and the swelling. Repeated experiments, however, have shown that the ease, received from any of the above medicines, is not always to be depended upon, and therefore may be imputed as much to accidental circumstances, such as the wounded person's state of health, blood, &c. as to any peculiar specific virtue; although I doubt not, but that any or all of them may sometimes afford relief.

The sting and its poison are injected in a moment, and the pain and swelling instantly succeed, when such remedies are often very distant. My remedies are more simple, and one or other of them is always at hand. The moment I am wounded, after pulling out the sting, I take a blade of kail, dock, ash, or almost any green leaf of any plant or shrub nearest me, and, bruising it a little, rub the
juice

juice into the wound. When near water, I wash the wound, or apply a wet cloth, which I have sometimes found give relief. But, indeed, I do not, once in a dozen of instances, apply any remedy at all, except pulling out the sting, as it seldom makes me uneasy; and I know a short time and a little patience will afford an infallible cure.

C H A P. XI.

HOW TO CHOOSE STOCK HIVES IN SEPTEMBER.

ANY person, who intends to erect an apiary, must take particular care to have it filled with proper inhabitants. He must be peculiarly attentive to this, as all his future profit and pleasure, or loss and vexation, will, in general, depend upon it. He must therefore pay the utmost attention to the choice of his stock hives; for the man who takes care to keep good stock hives will soon gain considerably by them; but he who keeps bad ones, will, besides

sides a great deal of trouble, and little or no success, soon become a broken Bee-master.

In September every stock hive ought to contain as much honey, as will supply the bees with food, till June following; and as many bees as will preserve heat in the hive, and thereby resist the severity of a cold winter, and act as so many valiant soldiers, to defend the community from the invasions of foreign enemies in spring. And, as September may be said to be the bee-master's feed time, as well as his harvest, we shall begin with it, and go round the circle of the year, giving such directions as are necessary to be observed in the different seasons, till we arrive again at the same period. Therefore the bee-master should purchase a proper number of hives in August, or September, when they are at the cheapest rate. They should be full of combs, and well stored with bees and honey; and should weigh at least 30lb. each; if heavier, so much the better; for light hives run a great risk of perishing by famine, unless the bees are supplied with food; which will cost as much expence, and a great deal more trouble, * besides a con-

M siderable

* However, when a sufficient number of good single hives

siderable risk of their dying at last, after all this extraordinary trouble and expence. Whereas, a well chosen hive of 30lb. weight, allowing 12lb. for the empty hive, bees, combs, &c. will contain 18lb. of honey, which will supply the bees with food till next June; a time, when, it may be presumed, they will find abundance of provisions for themselves among the flowers.

When a choice can be obtained, the youngest hives should always be preferred, because old hives are liable to vermin, and other accidents. But although a hive should be four or five years old, it should not be rejected, if it possesses these two essential qualities, plenty of bees, and abundance of honey; but, if
either

for stock cannot be obtained, they may be made up, by conjoining the bees and honey of two or three light hives into one, and thereby making one tolerably good hive out of several bad ones. The method of doing this shall be noticed afterwards; but it is a measure that ought never to be adopted but in cases of necessity. For neither such conjunctions of light hives, nor feeding of bees ought to be adopted, at this season, on purpose to make them stand the winter's cold, if they can possibly be avoided. Indeed, sometimes very light hives, with few bees in them, will stand through the course of a mild winter, and do well the following summer; but such hives are at best precarious, and therefore not to be depended upon.

either of these be a-wanting, the purchaser will regret his bad bargain when it is too late.

C H A P. XII.

OF THE REMOVING OF BEE-HIVES.

IN the removal of hives, the distance, to which they are to be removed, must be chiefly considered. If it is small, they may be transported in a hand barrow, carried by two men;—or they may be carried on a man's or woman's head, in the manner that a milk-maid carries her pails.

To prevent the bees from coming out during the carriage, a little straw or grass may be put into the mouth of the hives. But, in warm weather, the greatest care must be taken, not to suffocate them with too much heat; especially if there is a great number of bees in the hive. For this purpose, they must not be so closely shut up, as not to admit abun-

dance of fresh air. For, the great heat of the bees, when no air is admitted, will melt the combs and the honey, and suffocate or drown the bees. In this manner, valuable hives have often been lost in the summer season, by ignorant persons, who had been employed to transport them, shutting up the door of the hive so close, that no air could get in. The proper method to prevent the bees from coming out of the hive, in case of removal, in warm weather, or indeed at any time, and at the same time to admit a circulation of air, is, to get a piece of lead or tin plate, pierced full of small holes, and fixed to the entry of the hive. This will answer both purposes, by admitting fresh air, and at the same time preventing the bees from flying away.

When the distance is great, and there is a considerable number of hives to be transported, (perhaps to the distance of 6, 12, 20 or 50, miles) into an in-land country, carriages that move on springs are by all means to be preferred. When these cannot be obtained, the hives may easily be carried on carts or waggons, in cold weather, by placing them with their bottoms upmost on large quantities of straw, hay, or any other soft article. By this method I have carried

carried 20 hives at one time, with very little damage, either to the bees or the combs. Great care must be taken in placing them in the cart or waggon, that one hive may not interrupt or intercept the current of air from another. In hot sultry weather, the removal should be made in the night.

Before placing the hives in the carriages, every one of them should be lifted off the stool it usually stands on, and placed upon a piece of cloth about three feet square. This cloth should be of the same texture, with those kinds of which window blinds, or cheefe-cloths are made, that it may admit air, at the same time, that it effectually prevents the bees from escaping out of the hives. Let it be drawn close up, around the edges of the hive, and, when properly secured to it with pack-thread, not a single bee will get out. All this should be done the evening before they are removed.

The utmost care should also be taken, that no other opening be left at any other part of the hive, for the bees to get out at, as the most dangerous consequences might arise, as the jolting of the vehicle might provoke the bees to sting both the driver and the horses; which might occasion the overturning of the carriage,
and

and of course not only risk the destruction of the whole cargo, with the carriage and horses, but even the life of the driver himself.

Another method, if the distance is great, I would recommend as preferable to every other, where it can be obtained, viz. carriage on ship-board, either by sea, canals, lakes, or navigable rivers. By this mode of conveyance, the bees run no risk of being jolted or hurt in the least, provided they are properly stowed in the vessel. This last winter, (1794,—5,) I carried twenty hives on ship-board, with great safety, to a gentleman about 300 miles distant. I would, therefore, earnestly recommend water carriage wherever it is practicable, as preferable to every other mode of conveyance whatever; for I would rather carry a number of bee-hives 4000 miles by sea, than 100 miles by land carriage.

C H A P. XIII.

HOW TO PREPARE STOCK HIVES FOR WINTER.

AFTER the hives are brought home, if room will permit, let every hive be placed two or three yards afunder, that the bees of one hive may not interfere with those of another, as is sometimes the case, when the hives are seated near one another, or upon the same standard; for the bees, mistaking their own hives, alight sometimes at the wrong door, and a battle ensues, wherein one or more may lose their lives. There should not be too many hives in one place. Eight or nine are sufficient for one garden*; and as many more may be placed at
at

* When too many hives are placed in one apiary, they are often troublesome in swarming time, by the swarms going together, and by robbing one another, which they often do in Spring and Autumn, as will be shown afterwards. Besides, when one has to feed them, the smell of the honey entices them to steal from each other, which sometimes occasions many battles, whereby many of the bees are killed. But when there are
not

at about half a mile's distance in every direction ; and thus the whole kingdom, or even the whole island, might be covered with bee-hives, at proper regular distances, wherever there is a sufficiency of food for the bees to work on.

The hives should be placed on boards or stools, made of well seasoned wood. These boards should be made a little broader than the bottom of the hives, and should project about six inches before the entry to it, that the bees may have a sufficient breadth to alight upon, when they return from the fields. When a proper place is fixed on, where the hive is to be erected, let three stakes be driven into the ground, till the tops of them are within ten inches of it, and the foremost stake one inch lower than the other two. The stool with the hive on it may then be placed upon these ; and at sun-set, let the skirts of the hive be plastered all close to the board with plaster lime. Next, let two small holes be cut, in the under side of a small piece of hard wood, which must be fixed to the entry of the hive with lime. These holes must just
be

not too many hives in one place, they are not under so much temptation to enter into such conflicts. But at the same time, twenty or thirty may be placed in one large apiary, and all do very well, although the other method is rather to be preferred.

be wide enough to admit the largest bee, but no wider, lest the mice should go into the hive through them †. Each hole should scarce exceed a quarter of an inch in height and in wideness. This size must be exactly attended to. The whole hive should then be covered all over with a large quantity of peat tow, or straw, which may be fixed to the hive with ropes made of straw, or hay. A large *divot*, or turf, should be laid upon the top of the tow or straw, to hold it close down to the hive, and keep the bees dry and warm. Afterwards, some of the

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tow

† Mice are most pernicious enemies to bees; for when they get into a hive, they not only eat the honey, but the combs and eggs, and even the bees themselves. I am persuaded there are hundreds of hives destroyed every year in Britain by these vermin. I myself, in my younger years, had no fewer than five hives ruined in one winter by these rapacious invaders: but now, by taking care to have the entries to my hives made no larger than will just admit the largest bee, my hives are proof against their depredations, and I never lose either a single bee or a particle of honey by them. The only chance the mice have, when this precaution is observed, is to gnaw through the hive itself, which they will sometimes attempt; but in this they may easily be detected and defeated, by taking off the covering now and then.

During the cold months, small snails often creep into the hives, and lurk about the insides of them, though not among the combs: but I never observed that they did much hurt. When the hives are turned up in winter to discover their state, it is easy to dislodge them, and large snails cannot get into the hives, when the entries are made small.

tow or straw, should be rolled up about four inches above the entry, which will permit the bees to get in thereat; for the less that is uncovered of the hive, the drier and warmer it will be, which should be aimed at in all seasons, especially in winter.

The best of all covers for hives, however, that I have yet seen or heard of, are such as I ordered a potter to make for me of burnt earthen ware. They are made in the form of a hive, pretty strong, about 21 inches wide, and 12 deep; with a circular edging turned up at the skirts, and a spout about an inch in length. These, being placed above the pob tow, or straw, keep it close to the hive, and may easily be taken off or put on at pleasure. The spout being placed behind, all the water runs off at the back of the hive. The hives, when thus covered, may be compared to a man's head with a wig and hat upon it; the pob tow resembling the wig, and the earthen cover the hat. The only objection to these covers is, that they are brittle, and easily broken; but the care, that every good bee-master will readily bestow upon his hives in any case, is sufficient to preserve them from accidents of this kind. I sold above 30 of these covers to a gentleman in Northumberland

thumberland about three years ago, and I have reason to believe that there is not one of them yet broken.

C H A P. XIV.

HOW TO MANAGE BEES IN WINTER.

THE hives in September, being properly placed, covered, and made fit to endure the winter, there is very little more necessary to be done, for about three months. This season may, therefore, be called *the Bee-master's resting time*. It will be proper, however, occasionally to take care, that the covers continue to stand firmly upon the hives, and that no mice nestle about them. When the frost is severe, or when snow is lying on the ground, it will be necessary to prevent the bees from coming out of the hives, by shutting up their entry quite close with poptow; which will keep them warm, at the same time that they will run no risk of suffocation in

very cold weather.* In extreme colds, the hives may be taken into out-houses, which will preserve

* Bees should by no means be disturbed in cold weather, so as to provoke them to go abroad out of their hives, unless some very important object is in view: For, not only in winter, but even in spring, summer and autumn, if they fly out of their hives in cold or wet days, especially in the evenings or mornings, and alight on the ground, their active powers become instantly so benumbed, that often within half a minute thereafter, they will be rendered totally unable to rise, in consequence of which they must crawl about till they perish. If bees are permitted to go abroad in time of snow, which they are tempted to do, by the glare of the light, they will alight upon it, and sip a little; but their delicate bodies are soon so chilled by the cold, that their wings lose their power of raising them, and inevitable death succeeds.

Every other part of the hive, as well as the entry, should be carefully examined, to discover if it be all quite close; for after long confinement, especially when the season is advanced to about the middle of February, the bees will make every possible attempt to get out of the hive, as their own ordure then becomes offensive to them. At times, when I have thought the entry to the hive was made so completely secure, that not a single bee could get out at any opening, yet, in walking through my apiary, I have discovered them making their way through places, where I could not have supposed they would have attempted an escape. When bees are completely shut up in a good close hive, they are in a state of perfect darkness; but, if there be the smallest aperture in any part of it, the light, shining through it, leads them directly to the place; when they are apt to make every possible effort to widen it, and, in such cases, they will often squeeze through

serve them from cold. But, indeed, when the hives are properly covered, and the entries to them closely shut up, they will resist a very severe cold.

Many ingenious gentlemen have tried different methods to preserve bees in winter. Some have shut them up in cold out-houses, from September to April; others only from the 1st of November to March. A third class place grates before their entries, to admit air, but keep the bees close in their hives, during the whole winter.

The limits of this performance will not permit me to enlarge upon the fruitlessness of these inventions. Suffice it therefore to observe

through a very narrow hole. It is therefore adviseable, though the hives may be supposed perfectly close, to inspect them frequently, lest any bees should get out at an unsuspected place, and not only perish themselves, but leave an opening for invaders to get in. Besides, upon returning to their hives, they will go to their usual entry to get in again, and not finding admittance, will wander about in search of it, till they perish, unless they chance to alight upon the aperture by which they had got out. The same caution must be observed, when a hive is shut up at any other season of the year, or upon any account whatever.

I have sometimes picked up great numbers of wandering bees from off the cold ground, or snow, and, after recovering them by gradual warmth, have restored them again to their hives.

serve in general, that long confinement is prejudicial to the health of the bees ; and that, as they do eat a little during their confinement, it is necessary that they should get out to void their ordure ; for, I have even seen bees, in some hives that have been long confined, swelled to such a size, for want of such opportunities, that they seemed larger than a Queen bee ; and, when they did at last get liberty to go out of their hives, being unable to fly, they would fall over the edge of their stool, and creep about on the ground, till they died in great numbers ; so that scarce one of a dozen of them ever recovered. But when they are permitted to go out occasionally, in fine winter days, they get so much benefit by the free air, and by easing their bodies in flying, that, when they return to their hives, they are able to turn out the dead bees, and they conclude the day with a *song* ;—a sure sign that they are healthy and happy. In short, I find by experience, that bees thrive best, when the hives are allowed to stand out, and when the bees are at liberty to go out and in at pleasure in fine days, even in winter ; for they are wise enough to know when they may venture out with safety ; and they will come to the door

of

of their hive to ease nature, and return again, when the weather forbids their going abroad.

It is said by many writers on this subject, that a fine winter is dangerous to the bees, and that many more of them die in a mild winter than in a cold one. They argue, that as the appetite of the bees increases by their going often out, they consume their provisions, and die of famine; whereas, when long confined in their hives, they hardly eat any. * I acknowledge

* Some Authors, particularly MR STEPHEN WHITE, alledge, that severe cold is rather salutary for bees, as it keeps them in a torpid state, in consequence of which they eat none at all. I acknowledge, that they eat much less in cold weather than in warm, because they have little or no exercise, and their appetite increases or decreases in proportion to the exercise they take. In November, December, and January, bees eat very little food, as any person may be convinced, by weighing their hives in the beginning and the end of these months, when he will find very little difference in point of weight. But if he will weigh a hive in the beginning of March, and weigh it again at the end of it, he will find a considerable decrease; for the bees, having now much exercise, eat more honey during that month, than during all the three above mentioned cold months; and I am persuaded, that they devour three times as much in May as in March, owing to the same cause operating in an increasing proportion. But that the bees eat *none at all* in cold weather is a great mistake, and may easily be refuted: For let any person, in winter, put a number of bees into a hive that has nothing but empty combs,

and

knowledge, that, in a mild winter; they do eat more food than in a cold one, when they cannot get out; but this, as well as the fine air, contributes greatly to their health; besides that they hatch earlier, and consequently increase the number of bees in the hives sooner. The fact is, that experience, which is preferable to the conjectural reasoning of the most eminent authors, may convince any person, that many more bees die in severe winters than in mild ones. In winter 1776 which was very cold, a great number of Bee-hives perished; and also during last winter, (1794-5) being an excessively

and let them be kept equally cold with those in hives that contain both honey and bees, and a trial of eight or ten days will convince him, that *honey*, and not *cold*, is the proper food of bees.

In the very midst of a severe frost, I have often seen my hives with young broods in them; a sure sign, that they were neither motionless, nor in a state of inactivity. This fact also proves how greatly mistaken many authors are, who assert, that bees do not breed, till they begin to carry home loads in spring. I am confident, that there is not a month in the whole year, in which I have not seen many of my hives, with some eggs as well as young bees in the cells; although there are at least four months in the year in which the bees carry home no loads. I will allow, however, that although they do breed some in winter, the number is very small. Perhaps the Queen does not lay above three or four eggs in a day, whereas in summer she will lay daily above a hundred.

ly severe one, many hives were destroyed from that cause alone; whereas in winter 1779, which was remarkably mild, not one hive in twenty failed; and the bees, in general, swarmed a month earlier than usual.*

I have seen the bees of a hive that had been long confined by cold, (perhaps for ten weeks,)

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* MR WILDMAN says, page 249, “ The degree of cold, which bees can endure has not been ascertained. We find that they live in the cold parts of Russia, and often in hollow-trees, without any care being taken of them.” Page 252, he says, that bees suffer such degrees of cold, as we here are strangers to, without detriment, seems certain; nor is it easily accounted for, why a much less degree of cold becomes fatal to them in our mild climate. If I may venture my opinion, I think that in these extreme colds, the bees are so perfectly frozen, that their juices cannot corrupt or putrify but they remain in the same state till the return of spring; when the change of the weather being sudden, the bees soon come to life; whereas in our climate they are so far chilled as to lose the signs of life, and their juices being still in a liquid state, soon putrify, and real death ensues with corruption.”

With all due deference, I shall now venture to give my opinion, on this point. I would account for it in this manner; that the same *degree* of cold will prove equally fatal to bees in BRITAIN, RUSSIA, SIBERIA, or any other place in the world; and that whenever the cold is so great, as to render the bees entirely *motionless*, they will continue in that state for ever; or, in other words, they will *die*; unless they be recovered by heat,

before

so diseased, that, when good weather returned, and they came abroad, very great numbers would have died within a day or two thereafter; and the hive in general would have been greatly reduced. It is evident, that their long
confinement

before putrefaction takes place, which will otherwise happen within two days at most, after they are frozen. Last winter (1794-5) it was perhaps as cold here, at least for one week during the storm, as it is in Russia or Siberia, in some moderate winters. Some of our bees were, at that period, as completely and irrecoverably frozen, during those eight days, as ever any hive could be in Russia; and all the heat that human power could apply, however gradual or moderate, could not have recovered them to life again.

As a proof of this, any person may make the following experiment: Take a bee, during a hard frost, and lay it upon a stone; within two minutes it will be frozen, and to all appearance dead. If it ly on the stone, for six or eight hours, it will be as completely frozen, as if it had been eight days in the coldest place in the world. Yet, by warming it in a warm bed, for half an hour, it may be brought to life again; whereas, if it be allowed to ly for eight days upon the same stone, (during which time it would be as completely frozen, as if it had been eight days in Russia) neither the heat of a bed, nor any other degree of heat whatever, will ever be able to recover it. On the whole, I am of opinion, that all possible care should be taken to preserve bees from severe cold in every corner of the world; and I doubt much, if ever there was a single hive, that was once completely frozen for twenty days, that, even in Russia itself, or any other part of the globe, was ever recovered to life again.

confinement was the cause ; but it is also certain, that, even in those cold countries, where the winter lasts eight months, bees thrive and prosper well, else they never could produce so much honey*. I have known bees do well, however, that had been confined in their hives for five months, even in this country ; while others of them were ready to perish, by retaining their fœces for so long a period. Sometimes, about Martinmas, I have seen four hives, standing in one place, all equally thriving and numerous ; but, in consequence of having been confined by bad weather for six or eight weeks after that period, one of these hives would have had several hundreds of dead bees, lying swoln on the stool, while the other three were still in a thriving condition, and had scarcely a dozen dead bees in each. Upon tearing one of the dead bees asunder, I found her intestines quite full of fœces ; which, I therefore conjectured,

was

* The reason may be accounted for in this manner : suppose, for instance, that one fourth part of the bees in those places should fail by long confinement or severe colds, (from which I suppose the natives will guard their bees as much as possible,) yet the remaining three parts will increase greatly in bees and honey during their summer, as the weather is very constant and warm while the honey season lasts.

was the cause of her death ; whereas the intestines of the thriving bees had very little matter in them, and therefore, I am inclined to think that this was the reason of their continuing healthy and active. Whether the original disease of the former class, and their premature deaths, proceeded from their gluttony, in gormandizing more food than was necessary ; or whether it was an epidemical disease that had got in among them, and carried them off in such numbers, I will not presume to determine ; though I rather incline to the former opinion. But, from whatever cause the disease proceeds, such hives often lose their inhabitants at the rate of a dozen' or more *per* day, till they are greatly reduced, or perhaps quite desolated at last.

For such misfortunes, I know of no remedy or even preventative ; but it is fortunate, that scarcely one or two hives of a dozen meet with them. Sometimes I have united the living bees, that remained of such a hive, with those of a healthy one, but seldom found it turn out well ; owing perhaps to this cause, that the disease was really contagious, and the diseased bees might carry the infection along with them, and thereby hurt the healthy hive, I generally,

generally, therefore, let the remaining bees of such an unfortunate hive, take their chance; and on the first favourable day allow them to fly about, and discharge their burdens, which must doubtless enable them to return to the hive with a greater degree of health; but I am confident that many of the diseased ones never return, and indeed the hive will be fully as well without them.

About the middle of January, every hive may be gently lifted off the stool, and the state of it examined. The stool should then be carefully cleansed of dead bees, or any filth that may have gathered upon it during the winter. The hive should then be replaced upon the stool, and carefully plastered about the skirts again, and covered over as formerly. If the bees of any hive have deserted it, and gone into another, which they sometimes do, (as shall be further noticed in a subsequent chapter,) the hive may be carefully kept, in order to feed bees with the honey it contains in spring, or to receive a young swarm in summer.

C H A P. XV.

DIRECTIONS HOW TO SUPPLY BEES WITH FOOD.

As bees sometimes run short of provisions, especially when there is a long continuance of cold or wet weather, during Spring, or even in the beginning of Summer, it is absolutely necessary to re-inforce the hives, especially the light ones, with additional store. There are four methods of supplying the hives in such cases, which I shall lay before the reader, and one or other of which, every bee-master should attend to, at such seasons of the year as he finds his bees will need a re-inforcement of provision.

I. The first, and indeed the best method is by *eeking**. Take an eek,* of six or eight rows deep, and place it on a stool, with the quantity

** To *eek*, in the Scotch dialect, signifies literally to *add* to any thing. The *eek*, or *addition* here meant, is a part of an old hive, cut down on purpose, to give room for placing the supply of provision under the deficient hive.

ty of honey, necessary to supply the deficient hive, within it, which may be from one to four, or even eight pounds of honey, according to the deficiency that appears, and the number of bees in the hive. The combs should be placed in the eek, in such a position, that the bees may have free access to the honey, on all sides. At night, let the deficient hive be gently placed upon the eek, and let the interstices between the hive and the eek be plastered up with lime; after which let the entry be shut, that neither native bees nor strangers may get access. Let the hive and the eek continue in this situation for 24 hours; in which time the bees will have removed all the loose particles of the honey, and the smell of it will not be so apt to invite strange bees. The entry at the bottom of the eek may, therefore, now be opened, and the bees allowed free egress and access. If the additional quantity of honey given in the eek did not exceed a pound or two, the eek may be removed within three or four days; but if it amounted to six or eight pounds, it may be allowed to remain for six weeks in Spring. † If, in September, a hive

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* This method may be practised at all seasons of the year,
and

has got an additional supply of twelve or sixteen pounds, it should be allowed to remain at least as many weeks, if not altogether; only at this season, place all the combs in the eek, in the same order in which they were naturally in the hive they were taken from;—the uppermost cells to be still uppermost, and so of the rest, leaving a space of an inch and a half between the combs. The combs must be fixed with sticks to make them stand on their edges, and they should run as much in the same direction as possible, with those in the hive. The bees will soon join the combs together, and render them fit to be lifted all at once. In Spring, if the original hive be large, the eek and combs may be removed, but if small, they should both remain during Summer.

II.

and it has this additional advantage, that it may be executed at little expence, and occasion a saving of all the honey in the old combs that will not run out, or that happens to be mixed with bee-bread, eggs, or young bees. All such honey ought to be thrown into these *granaries*, and the bees will soon carry up all the honey, and place it in their own reservoirs; leaving only the empty combs, which can be melted and made into wax afterwards. It need hardly be added, that the bees do not, in such cases, instantly eat all the additional honey that is given them, but only lay it up for future use.

II. The second method is the same with the preceding, but differs only in this particular; that when the Bee-master has no old combs with honey in them, he must melt fresh honey, and pour it into large empty combs, of which drone combs are the best, and place them into the eek as above directed.

III. The third method is, to save the trouble of eeking the hive, (when a small quantity may serve,) by placing a comb, with melted honey in it, upon the stool, immediately before the entry of the deficient hive, and leaving it entirely to the industry of the bees, to collect and carry it into the hive. The only disadvantage of this method is, that strange bees will be tempted to molest the natives, in consequence of which a battle may ensue, and some lives may be lost. But, to prevent this, let the honey be given at a time of the day when no bees are abroad, and the danger will be avoided. I have sometimes had a dozen of hives in one apiary, with a feeding comb placed before each; which gave all the bees of each hive so much employment at their own doors, that they had neither time nor inclination to molest or rob their neighbours.

IV. The fourth method is, to turn up the

deficient hive, and, laying it on one side, to pour melted honey into the empty cells, where there are few or no bees; and, when the one side of all the combs are properly filled, to turn up the other, and fill their empty cells with honey also. A tea-pot is most proper for executing this plan. In this manner I have sometimes poured two pounds of honey into a hive at a time. When the hive is again placed on the stool, a little honey will run down from the combs upon it; but the entry being close shut up, will prevent robbers from smelling the treasure, and will keep such bees, as may have been besmeared with honey during the operation, within the hive. The native bees will soon not only lick up all the spilt honey from the stool, but will also suck it off the backs of their besmeared brethren, and lay it up in their reservoirs, with so much expedition, that next day not a drop of it will be visible, either on the stool or on the bodies of the bees.

It is not to be doubted, that, in cases of necessity, bees may be fed and preserved with other articles, besides honey; such as sugar, sweet wort, treacle and the like: but I am of opinion, that they cannot be fed, either at less expence or with as much safety, with any other thing
 than

than their own natural food. To give them any other substitute, would occasion as much expence, and a great deal of more trouble, especially when the hives are well filled with inhabitants : and I dare venture to say, that as such methods have never yet been much adopted, so, if ever they should, they will not turn out to the proprietors advantage, or become of general use, in the preservation of bees. But it must be owned, that, if no honey can be obtained to feed bees with, in spring, some of the above substitutes will supply the deficiency tolerably well. In such a case, let 1 lb. of brown sugar be mixed with half a gill, (or half a quartern) of small beer, and let a table spoonful at a time be placed before the entry to the hive, as above recommended in the third method. Let this be repeated daily as long as is necessary, and the hive will be preserved from famine, and will in all probability do well ; but when a hive is light in September, it ought to be supplied with nothing but honey.

C H A P. XVI.

OF THE WARS AND ROBBERIES THAT TAKE PLACE AMONG THE
BEES.

IT cannot be denied, that the animals, who are the subject of this treatise, have their *vices*, as well as their *virtues*. To the virtues of *industry* and *oeconomy*, which they are endued with in an eminent degree, we must add, what some would call a *martial spirit*, but which rather deserves to be denominated, a spirit of *theiving* and *robbery*. For when the weather is good, and there are not flowers in the fields for the bees to work on, they will risk their lives by robbing other hives, and strive to enrich their own hive at the expence and ruin of their neighbours. In such cases, the hives that are thinly inhabited, are ready to fall a prey to the bold invaders; for hardly one hive within their reach is left unassaulted; and as, among mankind, the strong overpower and subjugate

subjugate the weak, so a weak hive sometimes falls a prey to a set of strong invaders; but when strong and *populous* hives (so to speak,) are attacked by a less numerous body of robbers, they give them a terrible reception, and hardly a single bee, that they can get hold of, gets off to tell his neighbours the fate of his brethren. Sometimes a good number of hives will join in robbing one single hive. In such a case, all is confusion and rage, and great slaughter takes place. The bees are seen flying in the air like so many fiery dragons ready to attack every one; and whoever dares obstruct their flight, will feel their poisonous spears in a moment. At such a time, one dare scarcely venture near them, unless he is resolved to receive wounds from all quarters. When they are engaged thus, their sound in the air is easily distinguished.

*The people's actions will their thoughts declare,
All their hearts tremble, and beat thick for war.
Hoarse broken sounds, like trumpets harsh alarms,
Run through the hive, and call them forth to arms:
All in a hurry spread their shiv'ring wings,
And fit their claws, and point their angry stings:
In crouds before the hive they all do light,
And boldly challenge out the foe to fight.*

VIRGIL.

Various reasons have been assigned for this propensity of the bees to rob one another. A majority of writers impute it to the following causes :

1st, The scarcity of provisions : The bees of one hive, finding they have not sufficient provision for themselves, and the season being backward, try to enrich themselves at the expense of their neighbours.

2^{dly}, The artificial feeding of hives : When one hive is fed, their neighbours, smelling the fresh honey, wish for a share of it, and will take no denial, though it should cost them their lives : which it often does, the inhabitants of the fed hives standing up most heroically in defence of their property. This consideration will lead the attentive Bee-master to study the utmost caution and prudence in feeding such hives as require extra supplies ; else the remedy will prove worse than the disease.

3^{dly}, But the chief reason is, their insatiable avarice for honey.— In spring and autumn, when the weather is good, but little or no honey can be collected from plants, all bees whatsoever are apt to go a *marauding* and plundering their neighbour's hives ; although, it must
be

be owned, the poorest are most addicted to pilfering.

Here it is necessary to inform the reader, how these robbers are to be distinguished as well as how to get rid of them. When a number of bees are seen crowding into a hive, and many dead bees, lying slaughtered before the gates;—when others are seen flying as if affrighted, and the native bees pursuing, catching, wrestling, and bustling with them upon the stool, in a most furious manner, then it may be safely inferred that robbers are attacking the hive; which indeed, if it be weak in numbers, will not be worth preserving. In that case, the best way will be, to turn up the hive, and dislodge the robbers by rapping upon it, and at night to put the bees belonging to it into any other hive that will receive them. The manner of doing this will be taken notice of, when we come to mention the best mode of re-inforcing a hive. But if the hive that is attacked be tolerably full of valiant bees, who withstand their foes stoutly, then let the entry be made so small, that only one bee can get in at once, and let some person stand before the hive with a light cloth in his hand, to wave the robbers aside, and keep them off, till a shower of
rain,

rain, or night coming on, or perhaps a dark cloud intercepting the sun's rays, oblige the invaders to retreat. Next morning, if the weather be good, let the hive be shut up close, to prevent the robbers from getting access; and let it continue so for some time, till the invaders give over their attempt; but if they continue their inroads daily, let the hive be removed to the distance of a mile or so; and indeed this is the most effectual method to free the hive from farther molestation.

In my younger years, these robberies gave me much uneasiness, as I was alarmed at the sight of a slaughtered bee; but now I give myself no concern, as I either put the bees of the hive that is attacked into another hive, or remove them to a proper distance from danger. I have frequently, indeed, seen some fore battle take place among my own bees, and last for perhaps a day or two; after which a peace would have ensued, without my interference. But good hives seldom suffer much by robberies; perhaps not one in fifty. They may indeed lose a score of bees or so, but that will never hurt them.

CHAP. XVII.

DIRECTIONS HOW TO MANAGE BEES IN MARCH, APRIL, AND
MAY.

IN spring, hives are sometimes found without a single bee in them, and the owner, in such cases, is at a loss to account for the cause. The following circumstance, which occurred among my own bees, will throw some light on this subject.

The long continuance of the late storm (1794-5) having confined the bees in their hives for about four months, the bees of some hives contracted diseases, which, during the last month of their confinement proved very fatal to them; and some of them daily fell down, or rather *came* down of their own accord, from the combs to the stool, in search of some aperture to get out at, in order to void their fœces; but, after crawling about on the bottom of the hive for a considerable time in

vain, the cold benumbed them so much, that they could not return to their brethren again, and thus death ensued. Now, supposing only three dozen of bees *per* day to have come down upon this errand, and perhaps not a third of them to have been able to return, it is evident, that such hives must of course be soon greatly reduced in the number of their inhabitants. This made me anxious for good weather, that my diseased and distressed servants might get out, and recover their health, by flying about and getting rid of their superfluous matter. The long wished for period at last arrived. The storm broke, and the weather became mild; and, upon examining my hives, I found, that out of fourteen, which I had in one apiary, there were twelve whose bees were in a healthy state; and that those of the remaining two were partly diseased. The day being very fine, and the doors of my hives opened, the bees flew about as thick as hail, making a great noise with their usual music. My wife being present, we observed, that the two diseased hives gradually diminished in the number of their bees, whereupon I said, that I supposed the bees would soon desert these hives altogether; to which she replied, that she wish-

ed they would, and that they would go into some other hives, provided they did not fight. Upon farther observation, I found, that some of them entered into one hive, and some into another, till at last the original hives were totally deserted, except the Queen and about a score of bees; and that almost all the bees entered into those hives that were most happy, as appeared by their making a most harmonious sound at the entry of their hives, by which music they seemed to invite and welcome their new friends. The deserted hives were well stored with honey, and therefore I turned them upside down, and placed them below some of my other hives, in order that the bees might collect the honey that was in them. Such deserted hives I have often found useful for putting a young swarm into.

I have even seen young swarms gradually desert their hives in this manner, and go into other hives. When they go into one of their own master's hives, I never see any loss by it, especially when they unite peaceably; as one good hive is worth four bad ones.

It is worthy of observation, that the bees, on this occasion, deserted the weak hives gradually, and not in a body, as they do when they

swarm; and also, that it may happen at particular times, that different men's bees, standing in the same apiary, or near each other, may join together. Therefore, to prevent such circumstances from taking place, to the prejudice of others, it is necessary to allot a proper distance between one man's hives and those of another.

Those who live in places where vegetation is generally late, if they take the trouble to remove their hives to more early situations, especially if they have a great number of them, will soon find themselves doubly repaid for their trouble and expence, as their bees will thereby both breed and swarm much earlier. I would indeed advise every bee-master, who conveniently can, to keep two apiaries, an early and a late one, in consequence of which, his bees will be constantly employed, when the weather is favourable, during the whole working season.

In spring I generally shut up the doors of my hives every evening, as soon as the bees are all got in, and open them again next morning; and I even do this for whole days during that season, when the cold is severe; as cold winds blowing in at their entries are extreme-

ly prejudicial to them, and ought therefore to be prevented with all possible care. By this simple practice, the bees are kept warm and healthy, which is greatly beneficial to them in breeding. But in following this plan, great caution must be observed, that the bees have no other vent to get out at, as the consequences would be fatal. (See pages 100 and 101.)

In the beginning of March, if the weather be good, the bees will begin to carry home loads of honey and wax. I have seldom seen them carry so early as February, excepting in the year 1793, when I observed several bees go into one of my hives, heavy laden, so early as the term of Candlemas; but I believe they hardly carried any more for a full month thereafter.

At this season, every hive ought to be again lifted, and the stool cleaned; on which occasion, the state of the hive, both with regard to its provisions, and the number of its inhabitants, will be discovered. Hives of twenty pounds weight stand in no need of any supply of food, and may therefore be immediately replaced upon their stools, and covered, and their skirts plaistered as formerly; but, such as weigh only fourteen or sixteen pounds should be

be reinforced with six pounds of honey comb, as directed in page 110. Three pounds of honey will be a sufficient supply for such as weigh eighteen pounds. Some hives perhaps will not exceed fourteen pounds or so; yet, if they have few bees, they will not need to be supplied; for, besides that they stand in no need of it, a fresh supply of honey would invite robbers, whom they would not be able, on account of the paucity of their numbers, to withstand. A thinly inhabited hive ought, therefore, never to be reinforced with honey, unless the bees are ready to perish for want of food, which, in such a hive, seldom if ever happens. But a hive that is well peopled ought to be abundantly supplied, even although there may appear to be a sufficiency of food, because the superfluity will not be lost. The bees are faithful stewards, and will not fail to repay their master's generosity with usury. *

For

* The supplying of bees with food, in any season, but especially in spring, is of great advantage to them, as it cheers their spirits, and rouses them to breed earlier than they otherwise would. I would therefore recommend to every bee-master, to give a little additional food, even to hives that have abundance, in order to revive and exhilarate the bees, and encourage them

For I am confident, that when they are fully fed, they will breed fast, even in bad weather ; whereas, if they have little provision of their own, and receive no extra supply, they will breed very slowly.

From this, as well as from other peculiarities in the nature of these insects, it appears pretty evident, that they are endued with a high degree of free or voluntary agency, as they can breed early or late, frequently or seldom, at pleasure, and according to circumstances. All possible attention, therefore, should be paid to the full feeding of bees in Spring, and also in the beginning of summer, if the weather be unfavourable.

A hive will sometimes lose their Queen in spring, and of course will go to ruin, as it will then be impossible for the bees to raise another, if they have not an egg to raise one from. A hive may be known to be in this sad predicament, by the following symptoms : The bees
will

to hatch their young families, early in the season. But such hives as weigh heavy in March or April, having plenty of honey, with bees in them carrying well, may be safely allowed to remain without any fresh supply of food, as they will prosper without it ; although, if the owner has time and abundance of honey, he may reap additional profit by giving them a little.

will immediately give over working as soon as the young in the cells are sealed up; and one may wait an hour at the hive without seeing a loaded bee enter it. The bees then consume their own honey fast, and an uncommon number of them generally crowd about the entry: And if the hive has been long without a Queen, upon turning it up, and searching for maggots in the cells, they will be found quite empty.

As soon as these melancholy signs are observed, the owner should directly take out all the bees, and unite them with those of some other hive, that has few bees in it, the manner of doing which will be afterwards mentioned: and if the hive be young, it may be kept to put a young swarm into, but if old, the honey should be laid aside for use.

Sometimes, in spring, I have found, in particular cells in hives, a considerable number of young that, from some cause or other, had decayed and never come to perfection, as mentioned, page 64. I have sometimes observed the number of these so great, that in one comb, containing perhaps 600 young bees, the one half would have been in this state in the cells. The effluvia proceeding from these abortive productions, gave the hive a favour by no means

means agreeable to me, and which must doubtless have been very disgusting to the bees. I have often endeavoured to investigate the cause of these phænomena, but am as yet unable to satisfy myself, unless perhaps it be owing to extreme cold. But against this supposition the objection naturally arises, that some eggs in the same hive, and in the same degree of cold, produce bees which arrive at full maturity; and, therefore, in reply, it must be taken for granted, that some eggs are naturally more able to bear cold than others; and, indeed, it is most commonly in hives that are but thinly inhabited, that such misfortunes take place.

To distinguish hives in this condition, therefore, the following criterion may serve. In spring, when bees, which formerly carried well, and still are in no want of food, give over carrying, let the hive be directly turned up, and inspected between the combs. Then, upon taking a small stick, and putting it down among the thickest of the bees, where the maggots lie sealed up, and with it rubbing off the tops of two or three of the sealed cells, if fresh whitish maggots appear, it may be concluded, that the brood is coming forward: but if the cells appear quite empty, or if only blanched maggots

appear in a number of them, then it is certain that the brood is going backward.

If such a hive has but few bees, it will be proper to unite them with another hive ; but if it has a considerable number of bees, they should be allowed to continue to work on, in the best way they can, till the beginning of June, when the strong hives begin to lay out ; at which time a great number of common bees should be taken from one or two of them, to re-inforce that hive with, in the manner that shall be afterwards pointed out. I have seen a hive, with a vast number of such rotten eggs and decayed maggots in it, in April, which, when allowed to remain till June, and being re-inforced with fresh bees, would have turned out a fine thriving hive before autumn ; although many of the decayed eggs and maggots would have still been in it : For I believe some such abortions may continue in a hive for years, perhaps with little detriment to the bees ; for they in time dry up, and wither away in the cells, and their bad favour gradually goes off. Such hives, however, should always be taken in autumn ; and their bees united to more thriving hives. *

In

* Formerly I used to cut out the combs containing the most rotten

In May, if cold, misty, or cloudy weather, continues for a few days, the bee-master should pay particular attention to his hives, lest any of them should be in danger of famine; for, at this period, the number of bees in each hive is greatly increased, and of course they quickly consume the remains of their winter and spring provision, so that even the very best of hives will be in danger. When such weather occurs, therefore, in May or even in June, let every hive get some additional food, in order to prevent all danger of starving, now that they are just upon the brink of their honey harvest. For, as soon as the mustard blossoms, and the white clover appear on the lees, they will make the very air to smell

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of

rotten eggs, and the most decayed maggots, whereby I cleared the hive of a great nuisance, which I thought it would be much the better of wanting. But, in doing this, I found that the removal of such masses of combs occasioned a large vacancy in the hive, and thereby made it colder. To remedy this defect, I have some times put a piece of fresh comb in its place, in which I found the Queen soon laid eggs again. But still, as in these combs, containing the decayed eggs and maggots, there could not be fewer than one third, or perhaps one half of live young, intermixed among the abortions, which thus inevitably perished, I began to regret the loss of so many industrious servants thus destroyed, when just emerging into existence; and have, therefore, now laid the practice almost entirely aside.

of honey, which will make the bees eager of work during the day, and sing for joy through the night. Now is the honey season, and farewell famine and robbers; for, when there is honey in the flowers, they will not rob for it; and, a single hour of a fine day will refresh them, and put a period to the labour of feeding them, as formerly hinted.

When the flowers begin to open, the bees will visit them, and carry off their yellow loads from them. When a loaded bee is seen going into a hive, it is a sign that the flowers are beginning to spring; and, on every fine day during spring, summer, and autumn, they continue to carry on the beloved labour, with the utmost diligence and alacrity.

The first day in spring, that I observe a bee carrying a load, I generally call my family together, to take a glass, and rejoice with me and my faithful servants at the return of the salutiferous season. The first day, perhaps, only three or four loaded bees are to be seen; the next day, probably eight or ten; the third, fifteen; and so on, the numbers still gradually increasing, in proportion to the increase of the flowers in the fields. The bees then grow
numerous

numerous in the hives; and, about the beginning of May, when the furze and broom, and many other flowers, make the fields look yellow, a strong hive of bees will be all yellow loaded; and, at such a period, in a fine day, I have counted 100 loaded bees go into one hive in a few minutes.

When the hives are all equally good, the bees carry much alike, but in proportion to their number. In an apiary, where there are four hives, one will perhaps have twenty entering into it, in five minutes; another fifty, a third ninety, and the fourth a hundred and twenty, all within the same space of time. But in the height of the honey season, the bees carry amazingly fast, running out and in to the hive with the most surprising celerity and expedition. At this period, the number of loaded bees constantly flocking into the hive, as well as their rapidity, defies all power of calculation; for although they labour with great assiduity and constancy before this season, yet they do not appear to work with such incredible quickness, as after the honey season commences §.

If

§ In spring, as the bees gradually increase in numbers, their entry should be gradually widened, lest they should be impeded

If I were intending to purchase a hive in May, and came to an apiary where there were four hives, to make choice of one, I would desire four men to sit down for ten minutes, one at each hive, and count the number of loaded bees that entered into their respective hives in that space of time; and according to their report, I would pitch upon the hive that was most frequented during that interval, provided it had honey, and were not one of the oldest.

CHAP.

peded in their labours; but this should only be done in proportion to the number of bees in a hive. During March and April, they should be very little, as warmth is health to bees, and farther their hatching greatly. A numerous hive should, in May, have an entry two inches wide, and half an inch deep, while a hive, that has not perhaps half the number of bees, should have its entry only one inch wide and scarcely half an inch deep. But in the midst of summer, when the weather is warm, and the bees numerous, the entries of all the hives should be widened, as the bees ought to have both sufficient room to go out and in, and as much air as possible. In such hot weather, the entries might even be enlarged to three inches in wideness, and one inch in height. The method of enlarging or straitening the entries of hives is quite simple. Pieces of wood, all of one size outwardly, but with holes cut in the under part of them, of the various dimensions above described, might be made and kept ready at all times, to be exchanged with each other, according as the season requires, or the Bee-master wishes to widen or to straiten his hives; but indeed a little plaster lime will straiten or widen an entry in spring and summer, with very little trouble.

C H A P. XVIII.

HOW TO UNITE OR RE-INFORCE BEE-HIVES.

As the uniting or re-inforcing of bees is often necessary to be performed during the same season of the year, that they naturally send off young swarms, these two subjects will often fall to be occasionally intermingled in such a manner, that the one cannot be particularly described without taking notice of the other. But as each article is of too much importance, not to require a separate chapter, and of course a *precedence* to one of them, I shall first describe the UNITING OR RE-INFORCING of bee-hives, as it is often necessary in different seasons of the year, and shall devote a subsequent chapter or two to the subject of SWARMING.

In handling bees at all times, but especially when driving them, or managing a swarm, gentleness and boldness are equally necessary.

Every

Every motion must be made deliberately, and without hurry. The operator may take a glass of good ale, and rub some of it over his face and hands; but during the whole operation he must be particularly careful not to bruise any of the bees.

In uniting and re-inforcing bees,* upon the
very

* To RE-INFORCE a hive, signifies to take part of the bees out of a strong hive, and put them into a weak or deficient one, in order to strengthen it, and make it a thriving hive. But one thing to be observed here, is, that no bees must ever be taken from a flock live to re-inforce another with, unless in summer, when the hive is so full of bees as to lay out, or nearly so; for no good hive ought at any time to be hurt to enrich a weak one. It is often a very necessary and useful operation, when a hive has few bees in summer, by re-inforcing her from a more numerous hive that can easily spare them, the weak hive will soon become strong. Or should a misfortune befall a hive at any season of the year, the bees of the unfortunate hive should be put into another hive; and in September, all the bees belonging to the hives which are taken, should be put into the stock hives, whereby they will preserve heat through the winter, and be able to accelerate their labours in the spring.

In all cases whatsoever, where it is necessary to remove the bees out of one hive into another, the new hive must be placed in the same spot where the old hive stood, to prevent the bees from mistaking it. But when a hive is re-inforced by an additional number of bees, if these bees are taken from three or four different hives, situated in as many different places, the re-inforced hive should be removed about a mile distant from all of them, to prevent the new inhabitants from returning to their original hives
again;

very best plan that I know of, they will sometimes fight a little ; but, although I cannot absolutely prevent this inconvenience, nor indeed have I ever met with any author, or seen any person, who could take in hand to do it, yet I can use such means, as will probably prevent any conflict from taking place in one of a dozen of these operations ; and, although a few battles may occur among some individual bees, yet in general very few will be killed on either side. I am, therefore, never afraid to unite them, when I have reason to believe it will answer a good purpose in other respects. But, in all cases of uniting bees, particular care should be taken first to try the deficient hive with a specimen of the bees that are intended to be introduced into it ; and if these *ambassadors* are graciously received, the rest of their brethren may be safely offered : But, if otherwise, the whole of the bees should be kept back, till those of the receiving hive shall be in

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better

again. But after standing six weeks, it may be returned back to its former situation. The above general directions, I think absolutely necessary to be observed, in driving, re-inforcing, and swarming of bees ; and I am persuaded they will answer in most cases, though particular circumstances may occur, wherein the practical bee-master's judgment must direct him ; as it is impossible to anticipate every contingency, in a limited work of this nature.

better humour ; for, it is to be remarked, that the same bees will often fight at one time, who will unite in the most kindly manner at another ; on which account the receiving hive should always be previously tried, with a specimen of their intended new associates.

To drive all the bees out of a hive, at any season of the year, either to re-inforce another hive, or to raise an artificial swarm, the hive must be gently turned up, and the top of it placed in an eek, or in a hole made in the ground on purpose, to prevent it from being overturned. An empty hive of the same size must then be gently placed over it, mouth to mouth, and a sheet, or large cloth, wrapped round the joinings of the hives, to prevent any of the bees from getting out. The undermost hive must then be rapped with both hands in the manner a drum is beat ; rapping chiefly on those parts of the hive to which the edges of the combs are fixed, and avoiding the parts opposite to the sides of the combs, lest they should be loosened, and, by falling together, crush the bees between them, as well as the young in the cells. Even the Queen herself might be in danger of suffering. By not adverting to this, I have seen the loose combs and bruised bees

bees fall out upon turning up the hive, all of which are a considerable-lofs. The older any hive is, there is the lefs danger of loofening the combs; and the more bees there are in it, the fooner they will run into the new hive; for the concuffion of the hive, by the rapping, alarms them, as an earthquake alarms mankind, and they run to the upper hive in fearch of a more fafe habitation. Thofe that enter firft, finding themfelves fafe, invite their brethren by their founding to follow them, which they quickly do. The fheet may then be removed, and the edge of the upper hive next the right hand lifted up, when, upon a narrow infpection, the Queen fometimes will be obferved to go up along with the reft.

When all the bees are thus removed into the new hive, it may be placed where the old one flood, which will collect all the bees together, and within ten minutes, they will fall a working as bufily as any natural fwarm.

It is neceffary, before this operation, to remove the hive, eight or ten yards at leaft, from every other hive, to prevent difturbance from other bees. An empty hive fhould alfo be placed where the old hive flood, to amufe thofe bees belonging to it, that may return loaded from the

fields. This operation may be very easily performed at any hour of the day; but the safest time is when they are most busy at work, as they are not then so ready to sting the operator. In this manner, I have taken off four artificial swarms in one forenoon, and hardly received a single sting; for the operation is quite easily performed, especially in the middle of the day. †

In

† Indeed, there is hardly any thing that is requisite to be done about bees, that I would not take in hand to perform, with sufficient time and attention.

I could put TWENTY hives, for instance, into ONE, if necessary: I can cause my bees to rear as many Queens as I please: I can rob my bees of part of their honey, at any time: I could carry 100 bee hives to LONDON or RUSSIA: I could rear 5,000 bee-hives in a few years, if desired by any gentleman of property: I could travel through the streets of Edinburgh with three swarms of bees about me, unhurt: I can take a swarm out of any hive at any time: I can take 10,000 bees from ten different hives, and unite them into one hive; and I can re-inforce a weak hive with bees from any number of other hives, and from being the worst, make it the BEST hive in the county; I can unite the bees of forty hives into thirty, twenty, or ten hives; and next Summer divide these ten hives again into forty swarms: If I have a weak hive suffering by robbers, I can strengthen it with more bees, and make them fit to rob any hive in the neighbourhood: If I have a hive of bees perishing with poverty or famine, I can make it the richest hive in the place, or within many miles around: I can take a common bee egg, and cause

In summer, a weak hive, that has few inhabitants, may be re-inforced with a number of bees from a strong one, in the following manner: Supposing there are two apiaries, a mile distant from each other; and that, in one of them, there are a weak hive and a strong one, situated within two feet or two yards of each other; and no other hive near them: in such a case, let the strong hive be removed, about ten o'clock A. M. when the bees are busy at work, to twenty or thirty yards distance, and let the weak hive be placed where the strong one stood. All the bees, belonging to the strong hive, that were abroad in the fields, will thus, on their return, go into the weak hive and unite peaceably with its inhabitants. Upon this plan, scarce one of twenty will fight; but if they should, which is seldom the case when they are busy at work, then the strong hive must be immediately brought back, and placed in its former situation; and the weak hive turned up and rapped heartily, upon which
the

cause the bees raise it to be either a Queen or a common bee as I please: I can make my bees rest upon myself or any person near me, without offering us the smallest injury; and I can make them fall upon us with the fury of as many dragons, so that we would be glad to fly with as much precipitation, as a few rioters would do before a regiment of dragoons.

the bees will return to their own hive again ; and the weak hive may be placed in its former situation. But when a part of the bees of the strong hive unite peaceably with those of the weak one, the strong hive should be carried to the other apiary : for should it be placed too near the situation where it formerly stood, too many of its bees might go into the weak hive, and thus the one be impoverished by enriching the other. Another method, to re-inforce a hive with bees, is to bring it into a clean room, where there is only one window ; then turn it up, and rap upon it, till some hundreds of the bees fly to the light. They will run up and down the glass in a bewildered manner, wondering, (we may suppose,) how the air has become so thick, that they cannot pass through it. Let them remain in this situation for about twenty minutes, which will cool their courage for fighting. Then let three or four score of those bees, that are wished to be united to them, be introduced close to them. These will appear as much bewildered as the former, by the glass preventing their egress, and will readily unite with them, without killing a single bee. Upon finding them thus agree, let them all be brought

to the window ; and a short time after, let the hive be placed near them, and they will all run into it chearfully : after which the hive, thus re-inforced, may be placed in its former situation, provided it be about a mile distant from the place where the old hive formerly stood. Upon this plan, even all the combs may be taken out of a hive one by one, during which time, the bees will fly to the window, and a few of the bees of the receiving hive being made to join them, upon their uniting kindly, the receiving hive may be placed as above directed.

I have often re-inforced weak hives in spring, which have done very well, though, at other times, they turned out very indifferently. I therefore seldom attempt to do it now, till the strong hives are full of bees, and seem to be near swarming : on which occasions they can afford 2000 common bees to strengthen a weak hive, with very little injury to their own.

Again, in summer, a weak hive may be re-inforced by changing its situation with that of a strong one, upon a fine day, when the bees are busily employed at work. I have often practised this business with much success and satisfaction. But, if they should not unite in a friendly manner, let both be turned up, the
strange

strange bees rapped out, and each hive restored to its former situation.

C H A P. XIX.

OF HABITATIONS PROPER FOR BEES TO LIVE AND WORK IN.

HIVES, or the habitations in which bees live, breed and work, have been made of different materials, and in different forms, according to the fancy of people of different ages and countries. MELISSUS, king of Crete, is said to have been the first who invented and taught the use of bee-hives. Not only straw, which experience now proves to be rather preferable to every thing else, but wood, horn, glass, &c. have been used for the construction of hives. Single box hives, however, when properly made, answer very well, and, when painted, last long. They have several advantages above straw hives: They are quite cleanly, and always stand upright; they are proof against mice; and are cheaper in the end than straw hives; for one

box hive will last as long as three of them. I have known many bee-masters, who never used any other kind of hives, and whose bees throve very well. I believe, however, they are rather colder in winter, but a proper covering will prevent all danger from that quarter. But straw hives are easiest obtained at first, and have been used and recommended by the most of bee-masters.

As to the size, a hive that will hold about $2\frac{1}{2}$ pecks, Linlithgow measure, will hold a pretty large swarm; but there is no certain rule to judge what hive will be exactly filled by a swarm. Much depends upon the succeeding season. If the swarm be early and large, it will require a large hive; but if otherwise, the hive should be proportionably less. If a swarm be put into one of the size above mentioned, and the bees fill it soon, and appear to want more room, it can easily be enlarged, by putting an eek below it: but if it be heavy enough for a stock hive, it will do, although it should not be quite full of combs.

A straw hive, when made, should have a piece of wood, fixed in the undermost roll, four inches long, with a notch cut out of it, three inches long, and one high, for an entry to the

bees. The straw of rye or wheat is best for making hives: The heads of the straw should be cut off: The rolls should be drawn very tight, and wrought together with small willows or brambles, split and properly dressed, with the pith taken out of them. The hives should be made as smooth as possible, without leaving any projecting straws; which, when not cut or singed away, (as should always be done when the hives are rough,) would occasion much unnecessary trouble to the bees, when put into them, to gnaw them off. When the hives are made, and, if necessary, gently singed with straw, four small sticks should be fixed across the inside of them, at proper distances, in order not only to keep the hive firm, but also to prevent the combs from falling down, (which they would otherwise do by their own weight;) or from being shifted out of their places, when the hives are rapped upon, or disturbed accidentally.

Some ingenious gentlemen have made their hives to consist of different apartments, though inhabited only by one swarm. This kind of hives are called COLONIES; but I do not much approve of them; as the partitions prevent that accumulation of heat, which is necessary for

for the health of the whole family; and as some of the rooms must be colder than others, the bees, especially in winter, will all draw to one place; leaving the other apartments empty, and exposed to such a degree of cold, as will probably make the honey candy and become uselefs. Besides this method is unnatural, for the bees always lodge in one apartment, when left to their own liberty, provided it be large enough to hold them: and as they lay their eggs in the middle part of their combs and hives first, and afterwards gradually enlarge the brood around the centre of the hive, they not only get them more easily defended from all danger, but also sooner hatched, by the superior degree of heat.

Colonies have never yet been, and I am persuaded never will be extended to general use, although it is nearly two centuries since they were invented by JOHN GEDDY, Esq. I will not deny, however, that bees may thrive pretty well upon this plan; which must be allowed to have one advantage, as, when properly constructed, these hives afford an opportunity to the inquisitive philosopher of seeing the bees carry on their labours. Colony hives are made in various forms, according to the taste of

different gentlemen. Some consist of three boxes, placed one above another; others of an equal number placed collaterally; and a third kind are made with one box in the front, another behind that, and the third behind the second. All these different kinds have square holes in the sides or tops of the boxes, to allow the bees liberty to go from one box to another, as they may find necessary; and there are small panes of glass fixed in them, in order to observe the operations of the bees; with wooden shutters to cover the glass, when it is not intended to inspect the hive.

I have seen, in those favourable years when the bees had swarmed very liberally, that the proprietors have been greatly distressed for want of hives, to receive their second and subsequent swarms. But an experienced bee-master will never be at a loss in such circumstances. If all his empty hives are filled, and if he intends to take honey in Autumn, he will find many other articles in which they will cheerfully build and work; such as any large jar, half barrel, tub, pot, or box of any kind, that is large enough. For the bees are not delicate in their choice of a habitation; witness the well known instance of SAMSON'S dead lion.

lon. They will work in any place during Summer; for although the manufacture of honey and honey combs is so natural to them, that they can work at no other employment, yet the *shop* in which they make them, is a matter of indifference to them, provided it is only large enough, and capable of excluding cold, rain and robbers. Even darkness itself is no disparagement, but rather renders their habitation more agreeable to them.

C H A P. XIX.

OF THE NATURAL SWARMING OF BEES.

As it would evidence a considerable degree of folly to desert an old beaten path, for a new road, unless the latter were both nearer and better, so I would by no means recommend artificial swarming, if natural swarms can be obtained. But even, in the latter case, many useful directions may be given, and shall be laid down in as plain a manner as possible.

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We shall likewise show, how it is sometimes equally necessary and advantageous to make artificial swarms, along with the manner of doing it to the best advantage, when it is necessary.

As the time when a hive will throw a swarm is quite uncertain, especially to young beginners in the bee-husbandry, a constant attendance is necessary in swarming time, from eight o'clock in the morning till about three or four in the afternoon. But this may be done with little trouble or expence. A boy, or a girl, or any old person, may be employed to watch the bees during these hours; and this needs only to be done in fine days, as the bees seldom send out a colony in cold, damp, or chilly weather.

Some hives will ly out long before they swarm, though they will swarm at last; others, although they lie out equally long, will not swarm at all; a third class will swarm without the smallest previous appearance; and a fourth will make a bustle about their doors, for three or four days before they swarm: And, therefore, from such a variety of chances, it is scarce possible to determine the precise time of swarming; although we may reasonably conjecture,
from

from the following symptoms, that this wished for period is approaching.

When the number of bees in a hive increases fast, about the end of May and beginning of June, and drones appear among them; in a short time before this, water of an insipid taste appeared on the stool, about or within the entry; if this water, which is called *sweat*, and is occasioned by the increased heat of the hive, be dried up, by the still greater increase of that heat, from the bees becoming more and more numerous; if the bees, about 11 o'clock, A. M. fly about in a reeling manner, making a noise and motion about the front of the hive; all these are signs to put the Bee-master on his guard, and to prepare him for the joyful event that is fast approaching, of a young colony within a day or two, or even, perhaps, within an hour or two. But if the bees, after all this, run hastily up and down the outside of the hive, and at last gather together in a cluster upon the stool, he may call his friends together, to behold his increasing store, as he may depend that they will swarm immediately: * and nothing can surely be more delightful

* It is indeed surprizing, to see the young colony leaving their mother

to the bee-master, than to behold the young emigrants flying in the air and darkening the sky with a thousand varying lines.

Mean-time, while he is satisfying his curiosity as to the manner of their swarming, he should observe, whether they are beginning to settle upon any place, in, or near his own apiary,

hive, and deserting it seemingly in the utmost hurry and precipitation, in so much that they can hardly clear the way for each other. A stranger to the nature of these wonderful insects would be apt to conclude, that there was some formidable enemy within, who was murdering them by wholesale, and from whom they were flying for their lives; or else that they were leaving a disagreeable habitation, where there was nothing but war and poverty; and emigrating to some happier situation, where they would enjoy peace and plenty. But the reverse of all this is the truth; for they are going away of their own accord, cheerfully parting with their dearest friends, and leaving a warm habitation, and well-stored granary, to seek their fortunes in a new situation, where they will have every thing to provide for themselves, and all the varieties and inconsistency of weather and climate to struggle against.

An old custom still prevails with many, when a swarm of bees are rising, to make a tinkling noise upon a pan, or kettle, as they think that the noise makes them settle the sooner, and prevents them from flying away. But I am of opinion, that when the swarm comes naturally off, it is proper that they should hear and understand each other, which a noise of this kind will prevent. On all such occasions therefore, I use none. But, when the bees attempt to fly off, all kinds of noise should then be used, to frighten and prevent them from hearing each other, and thus incline them to settle at home.

ry, or attempting to fly away, which they they will sometimes do. If the former, he should keep at a distance till they settle, as going near them might not only prevent them from settling, but might also occasion the death of some of them, by trampling upon them.

As soon as they alight on any thing, that can easily be brought to the ground, such as the small branch of a tree, or a berry bush, or the like, let a sheet be spread on the ground near the swarm, and two sticks placed upon it, a foot asunder. Then place the swarm upon the sheet, between the sticks, and gently cover it with a hive †, resting the edges of the hive upon the sticks, to prevent it from crushing any of the bees; who will thus have free air, and access to and from the hive, which must be covered with a cloth, to prevent the rays of the sun from scorching the bees, and provoking them to rise and seek out a more comfortable habitation. If their new lodging pleases them, they will take

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immediate

† Some advise to rub the hive, before it be placed over the swarm, with a little honey, or sugar and ale mixed, in order to allure the bees. This can do no harm, but I seldom adopt the practice, as I have seen little or no benefit from it; the Queen getting into the hive is the only allurement to excite the bees to go into it, and also to keep them there, when they are gone safely in.

immediate possession, and fall to work with alacrity. Sometimes, after continuing two or three hours in it, and beginning to work, they will rise and fettle on some other place, or go back to their mother hive again; and sometimes they will fly off altogether, in search perhaps of a habitation previously fixed on. They must therefore be carefully watched till the heat of the day be over, after which, it may be presumed, they will not rise again.

As soon as the young colony are fairly lodged in their new habitation, let the hive be placed on a stool, and carried with all due caution to the place where it is intended to stand †; for the sooner the hive is stationed, the sooner the bees will be acquainted with its situation. A few stragglers, indeed, may fly about the place where the sheet was first laid down; but they will soon either find out the swarm, or return to their mother hive, either of which will be no loss. When the hive is placed in its proper station

† At all seasons, as soon as a swarm is fairly settled, both the size of the swarm and the season of the year should be taken into consideration. If the swarm be pretty numerous, if the mother hive can bear the want of it, and if the season be not too far advanced, let it be put into a hive by itself. But directions will afterwards be given, how to act if any of the contrary circumstances occur.

station, the cloth should be allowed to remain upon it, to keep off the rays of the sun §, till night, when the skirts may be plastered over with lime mixed with hair, and thus fixed to the stool, and the top covered with turf, as formerly directed, page 97.

Sometimes, though seldom, a swarm will fly off, notwithstanding every method that can be used to prevent it. This happens only in very fine calm weather, when the bees have

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had

§ Sometimes, in very hot weather, young swarms have suffered greatly, by the intense heat melting the wax, and making their combs fall down on the stool, in consequence of which the honey runs out, the bees are besmeared, the young ones bruised, and the hive almost totally ruined. Many hives suffered in this manner, by the great heat last summer, (1794;) but such misfortunes only happen in the best years for honey; and, indeed, it is to be regretted, that we have so seldom reason to complain of too much heat.

In such favourable years, the best method to prevent such consequences, is to keep the young swarms, (for the stock hives are in no danger,) well screened from the scorching rays of the sun, by covering them over on the south side, or placing screens before the hives in such a manner as to keep off the heat, at the same time, that they do not obstruct the bees from going out and in to their work. One of the large boards or stools, which the hives usually stand on, being placed on edge upon the stool before the entry to the hive, but in such a position that the bees may have free access and egress, will answer this purpose, and can easily be removed, as soon as the excessive heat is over.

had liberty some days before swarming, to roam about in search of a commodious habitation; which, if once they find, it is difficult, and often impossible, to prevent them from emigrating to it. When the weather is very favourable, the bees often, before swarming, send out scouts in search of a proper habitation; and when they discover a hive whose bees are dead, or any empty place about the roof of a gentleman's house, or a church, castle, or trunk of a tree; more especially, if bees have wrought combs in it the summer before, but have died out of it in winter, they will send out a squadron of bees, three or four days before they swarm, to clean out the place, and render it fit for the reception of the young colony, the first favourable opportunity. At such places, I have often seen a considerable number of bees, busily employed in clearing away the dead bees, broken crumbs of wax, and all other rubbish; and sometimes I have observed bees from different hives, laying an equal claim to the newly discovered habitation, and, as mankind too often do in similar cases, fighting and killing each other for the uninhabited territory; for, two swarms have been seen fly-
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ing to such a place in one day, in which case a bloody battle between them often becomes inevitable.

There have been many instances of a swarm of bees flying in a direct line to a dead hive, when it happened to be within their reach in a neighbouring apiary. Such hives are often left standing by the owner, either from his not knowing that the bees are dead, or from his ignorance of the consequences. They are also frequently left by roguish bee-masters, on purpose to entice their neighbours swarms; which is as villainous as stealing a swarm, if not more so. Mr Maxwell says, there is a law against suffering a dead hive to stand in an apiary. If there is, it is a very just one, but if not, an act of parliament should be passed against such a pernicious practice. Such causes have been several times tried in courts of justice, and some judges have punished the trespass, which was certainly just. But I lately heard of a cause of this nature, which was tried before a judge, who assailed the aggressor, upon this principle, that every man has a right to keep what he pleases in his own garden. By this decision the judge evidenced his ignorance; for, if such a precedent were
once

once established as law, no person, who has a covetous bee-master in his neighbourhood, would be sure to lose some swarms of his bees; for, a dead hive, left standing in an apiary during summer, seldom fails to receive a swarm before Lammas.

Many have been not a little difficulted how to determine, whether the old hive that the swarm went into, had living bees in it or not, before that event took place. One easy method of deciding this point, is, by inspecting it, to see if there are live young in it; and another is, by the distance from which the swarm has come; for, I know for certain, that a swarm will not fly a mile to a living hive; whereas, they will fly four miles to take possession of an old one with combs in it, whose inhabitants are dead. I have, indeed, seen a swarm go into a living hive, that stood in the same apiary; but this was rather accidental than otherwise. The Queen returning home in confusion, perhaps from a fruitless expedition, might mistake another hive for her own. In such cases, a great battle frequently ensues, in which many are slain, and often the Queen among them. Sometimes I have seen them agree very well, and make a good colony, when the hive was properly

properly raised with a very large cee. At other times, I have seen a swarm, after joining another hive, being well received, and remaining in it very peaceably, come off, notwithstanding, the very next day.

When a swarm emigrates, with a view to settle in some habitation, which their spies had previously discovered, they fly to the place in a direct line. The bee-master should, therefore, run or ride along with them, as far as he can; for on such occasions they sometimes fly so slow, as a person who is swift of foot may accompany them. But if he should be prevented from following them in a direct line, by any interruptions from woods, waters, or inclosures, let him, upon recovering the line, proceed straight forward, without turning to the right or left, and the chance is ten to one that he will discover them, especially if they happen to alight or rest upon any dike hedge, or brush by the way. But should this not happen, upon proceeding still forward, the line will probably lead him to some garden where there is an apiary; the owner of which should be told the case; and if he is an honest man, he will doubtless allow his hives to be searched, in the presence of witnesses, to see if the swarm have taken up their abode

abode in any of his dead hives. This will easily be discovered by examining the entries of his hives, and if there are any small crumbs of wax lying like as much saw dust, on the stool before them, it may be presumed, that the bees of the new swarm have cleaned it off the combs; and, therefore, a farther search should be demanded; and upon turning up the hive, and searching with a small stick for young bees in the cells, as directed, (p. 129) the matter can soon be decided, whether the hive was inhabited by living bees, previous to the swarm entering it, or not. If sealed up maggots, or young bees appear in the cells, the owner of the swarm can have no claim; but if none of these appear, he has a right to the hive, which, if the proprietor of the apiary should refuse to deliver, he ought to be instantly summoned before a Magistrate, while the hive is still totally deficient of young bees; when the case being plainly stated, and *this decisive proof* adduced, the young swarm will doubtless be ordered to be restored, and the greedy proprietor of the dead hive in all probability fined for his covetousness.

But if the swarm should not have alighted at the first apiary in the direct line, the owner should still proceed straight forward, and he will

will in all probability arrive at another apiary, where the same inquiries and mode of investigation should be repeated: Or if any hollow tree, church, gentleman's mansion-house, old ruin, or any other building, should happen to lie in the direct line, they should be inspected attentively, and proper inquiries made at the people in the neighbourhood, if they observed a swarm of bees flying or settling on any of them. By these means persevered in, a discovery will certainly be made; and if the swarm has settled in any such place, the following directions will show the method of taking them out in this and other cases of a like nature. If a swarm settle in a hollow tree, or any cavity of a building, it will be impossible to get it out by any other means, than taking them out by handfuls. Some indeed, alledge, that rapping will force them out; but not one swarm of twenty will yield to that method, unless the Queen can be laid hold of, and brought out. The owner should, therefore, make as much room as possible, to get his hand introduced, so as to pull them out by handfuls, and put them into an empty hive; and as soon as he is so fortunate as to get hold of the Queen, he should put her into the hive, where she will prevent

the bees from straying; and those that were still remaining in the building or hollow tree, will quickly come to the hive, and join the rest. In such cases, I have searched whole hours for the Queen, who generally hides herself with so much art, that it is extremely difficult to lay hold of her, although in such searches I seldom failed to catch her at last. But when the Queen cannot, by any means, be got, and when all or the greatest part of the swarm is recovered, let the hole be close shut up, and a weak hive brought, and re-inforced with the common bees, (as directed page 142) which is the best use that can be made of them in such cases.

Before bees swarm the second or third time, they do not ly out in clusters about the hive or upon the stool; but as soon as they are ready, they come off in a body, even in weather that is by no means favourable. The signs, when these after swarms will come off, are more certain than those that precede the first swarming; for, if the weather be good, one may almost prognosticate the very hour. By listening at night to the sound of a hive, about eight, ten, or twelve days, after the first swarm is gone off, that peculiar sound, commonly called *tolling*, will be easily distinguished. This sound

seems

seems to be the royal proclamation issued by the young princess, to warn, or rather to invite her fellow emigrants to prepare for their intended journey. It sounds, says one, as if the words *peep! peep! peep!* were rapidly pronounced fifteen or twenty times in half a minute. She then stops, and begins again repeatedly, like a chicken peeping for its mother, when it has lost her. When there are several young Queens in the hive, there will be so many distinct voices repeating this call. I have sometimes heard these princesses calling from all corners of the hive; and, as it were, answering each other; some calling out *peep, peep*, in a treble voice, and others answering in a voice rather more hoarse, and comparatively like bass*. When these sounds are heard

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* Almost all authors agree, that these peculiar voices proceed from the young Queens *petitioning* (so to speak,) for leave to emigrate with a young swarm. I have sometimes thought, however, that this noise might also proceed from fear or rage being excited amongst them. I was led to entertain this opinion, by observing their different screams one day, which made me suspect that there were more than one Queen in the hive. And as I wished to have one or two of them to enable me to cause some out-laying hives swarm; I drove all the bees out of that hive. One Queen went along with them; but I still perceived other two Queens, besides three royal cells sealed up. I still heard the usual quick cry of the Queen; and, upon attentively observing their motions;

in the hive, the emigration of a swarm may be depended upon, within a day or two at most, if the weather holds tolerably good. The first night that these sounds are observable, they are low, and not very frequent, nor even the next day; but, on the second night, they become louder and more frequent, in so much that they may sometimes be distinguished at the distance of some yards from the hive. Next day, if the weather be favourable, a swarm may be depended upon. "It is delightful, (says Mr THORLEY) to hear those peculiar and "musical sounds or notes, being an eight or "chord, which is truly harmonious." They are scarcely ever heard before a first swarm goes off; I believe not once in sixty cases. The reason, I suppose, is, that they have in general, only one Queen reared to go off with the first swarm; and sometimes, when tempted by very fine weather, even the old Queen will go off with the first colony, before the
young

tions, I saw them going to the royal cells, and tear at them with great fury, screaming and roaring seemingly with great indignation:—a phenomenon, which I could only account for, upon the principle of their entertaining a jealousy lest their rivals in the cell should come forward, and stand in competition with them.

young princefs comes out of the royal cell. * Whereas, before the fecond or third emigration takes place, they will fometimes have two or three Queens, and as many royal cells, in their hive; one of which may be taken to fupply any hive that needs them.

Often have I feen a young Queen take an airing. For instance, in Summer 1790, I had a hive that had no Queen in it, but a pregnant royal cell, which had been feven days fealed up; on which account, I expected that a
Queen

* The Queens are generally bred in fwarming time, as may be obferved by turning up a hive at that period, when the royal cells may be perceived on the edges or fides of the combs, although fometimes they hang from the middle. Thefe cells are of an oblong circular form, of confiderable thicknefs, and in appearance rather clumsy. One of them will weigh as much as four or five fcore of common cells. When half made, they are not unlike the lower part of an acorn, turned upfide down; they gradually lengthen, and, when finifhed and fealed up, are about an inch in length, and would refemble the end of one's little finger, if it wanted the nail. In fwarming time, there will fometimes be from one to fix of thefe royal cells; though commonly there are not above two or three. They all hang perpendicularly, with their open ends pointing downwards to the ftool. After the young Queens are hatched, thefe cells are fometimes removed by the bees, and fometimes allowed to remain; but I never faw an egg laid in an old cell to be a Queen; for the bees always build a new cell when they want a young Queen.

Queen would soon emerge out of the cell. And, as I was anxious to see what appearance she made the moment of her birth, I turned up the hive every hour, and luckily hit the time that she was opening the cell for herself, when I saw her come out of it, and creep about pretty well. Two days thereafter, I saw her come to the entry of the hive, and fly off and take an airing. She returned within about ten minutes thereafter, and went back into the hive, where the bees received her with joy. I have also seen many other young Queens do the same on the second or third day of their age. Perhaps old ones may do so too; but I think this happens very seldom, as they are large and heavy, and consequently may be afraid to trust themselves to their wings. No doubt, the old Queens can fly when they please, although, like many old people, they are not very fond of much travel.

It will sometimes happen, in an apiary where there is a considerable number of bee-hives, that two swarms will go together in the time of swarming, when they chance to come out of their mother hives nearly about the same time. When one swarm is nearly settled on a bush, hedge, or any other place, and another begins

to come off from the mother hive, the music of the former invites the latter to join them. In such circumstances, therefore, the most effectual method to prevent the junction of the two swarms, is to cover the first swarm completely with a large sheet, which will prevent the other swarm from hearing their melody. But if the first swarm be got into a hive, or nearly all entered, it should be carried into a house, and kept there for some little time, till the second swarm be fairly settled somewhere; after which the hive should be brought back to its former situation. But when both swarms are small, or but of a medium size, if they unite voluntarily and peaceably together, as they generally do in such cases, their junction will be rather an advantage than a loss: For it is certain, that 16,000 bees in one hive will collect more honey and wax than the same number of bees lodged in two different hives could possibly do*.

CHAP.

* This can be easily accounted for. In every hive there is a certain number of bees appointed to hatch the young, and to defend the hive from robbers, &c. Now, supposing that each hive requires 2,000 bees to be daily occupied in these employments, then it follows, that 16,000 bees, lodged in two different hives, must devote 4,000 of their number to these objects, and
leave

CHAP. XXI.

OF THE ARTIFICIAL SWARMING OF BEES.

ALTHOUGH, in most cases, bees are best directed by natural instinct, and on that account

I leave only 12,000 at work in both hives, whereas, the same number of bees in one hive, requiring only 2000 to be devoted to these employments, will allow 14,000 to be constantly employed in the fields, and of course one seventh part more honey and wax may be produced in the course of the season. There are also other advantages arising from such a junction of small swarms: They require, for instance, only one place in the garden; being more in number; they afford more heat to bring forward the young, and they are more able to defend the hive from robbers, &c. &c.

And here it may be both useful and entertaining, to take notice of the various weights and numbers of different swarms. "It has been found, (says BUTLER,) that a larger number than 40 or 50,000 will not thrive together in one hive. Swarms often amount to 30,000; a large swarm may weigh eight pounds, and gradually less to one pound; consequently a very good one weighs five or six pounds, a moderate one four pounds. No swarms less than this should be kept, but united with others." If we consider that about 5000 bees weigh a pound, a swarm weighing four pounds, will have near about 20,000 bees, which will compose a very good swarm. But I am of opinion, that a swarm, consisting of 15,000 bees, will do very well in a single hive, if the season is not too far advanced; and, indeed, the more numerous the swarm is, so much the better. I myself have had above 30,000 bees in one swarm.

I am always best pleased with natural swarms, yet it may be observed of them, as well as of most other animals, intended for the use or benefit of man, that considerable room is left for human art and ingenuity to assist them. Thus, for instance, they are provided by human art with much more convenient habitations, than they could either rear or discover by their own instinct: For, without our aid, if no ruinous house or hollow tree were near, a young swarm might hang on a bush, till they were either totally destroyed by wind, or drowned by rain. Artificial swarming, therefore, when a natural swarm (which is always preferable,) cannot be obtained, is sometimes a necessary and useful part of bee husbandry; and will, indeed, turn out ultimately to our own advantage, as will appear from what follows.

Before proceeding farther, however, with any directions on this subject, it is proper to caution the reader, that although artificial swarming is very profitable, when properly performed by an experienced bee-master, yet it always has been, and ever will be, very destructive to bees, if performed by unskilful persons: and, indeed, all new beginners may

be almost certain of ruining some hives in their first attempts. But, by carefully observing the following directions, the most inexperienced bee-master may soon come to the practical knowledge of the art, and thereby avoid such blunders as would prove destructive to his bees.

CASE I. Sometimes, when two swarms meet, a dreadful battle ensues, on account of there being two Queens among them. Each party seems determined to defend their own Queen and mother at the risk of their lives. Their fury generally lasts till one of the Queens is slain, after which a peace commonly takes place, and the two bands unite harmoniously in one community*.

But

* In these conflicts, it is astonishing to see what dreadful havoc they make in a very short time. In my younger years, I have seen above 1000 of these brave winged soldiers lying weltering in their gore, within the space of ten minutes. The Queen of one or both swarms is often seized instantaneously, and murdered. On such occasions, I have seen above an hundred bees, all wrapt together in a cluster, of the size of a small apple, and so firmly compacted together around the body of a Queen, that it was with the utmost difficulty I could separate them from her. Most writers are of opinion, that the bees, which thus cluster round a Queen, are her enemies, and that their being so closely compacted together about her proceeds from the keen enmity

of

But, if they do not unite in a friendly manner, there is not a moment to be lost. The hive must be instantly turned up, and the bees driven into four or five different hives. Every cluster of them must be searched for the Queen, who, when caught, must be separated from all the other bees, whether friends or foes, as, at such a time, it is impossible to distinguish the one from the other. And, while she is kept close prisoner, the bees may be frightened from farther fighting; and even gradually pacified, by rapping on the hives, and thus driven out of one hive into another. If this attempt does not succeed to bring the bees to a good understanding with each other, cold water may be sprinkled on them in the hives to cool their courage; or they may be taken into a room, as directed, page 142, and when, by their being thus tossed and tumbled about, (all due care being taken, however, not

Y 2

to

of each to be first at her with his dagger. It is, indeed, beyond a doubt, that Queens are often surrounded in this manner by their enemies, who frequently kill them very quickly. But I am of opinion, that they are often likewise encompassed by their friends in a similar manner, whose loyal zeal for their sovereign mother leads them thus to form an impregnable phalanx around her with their bodies, to protect her person from the rage of her most inveterate foes.

to hurt them) their spirits are brought low, they may be put into two different hives, and a Queen offered to each. To try their temper, however, a specimen of the bees may be first introduced to the Queen, and if they treat her with mildness, she may then be introduced to the whole swarm. But, if they appear to be still in bad humour, the Queen should be kept back till they become more pacific, which they will quickly do; for as soon as they get leisure to think, they will miss their Queen, and make all possible enquiry after her, running up and down the hive with the utmost impatience and anxiety, in search of their sovereign mother; and, when they cannot discover her any where, they will conclude that she has perished during the tumult, and most of them will creep out of the hive in despair, and crawl about on the ground till they die; their case being quite desperate, as they have not an egg to raise another Queen from. Some will perhaps attempt to fly home, hoping to find their mother there; and others will try if they can gain admittance into any other hive. This is the critical moment to present a Queen to them. As soon as a few of them discover her, they will surround her with the greatest pleasure

pleasure, and sing aloud for joy. The rest, hearing the joyful news, will all crowd around her, and be ready to suffocate her in their ecstasy. She should then be placed on the stool, as in other cases; but if, during the conflict, one or both Queens have been killed, the bees may either be restored to their original hives, or put into any others where they shall be most favourably received.

In this last spring, (1795,) having two hives, that had but few bees in each, I put the bees of the one hive into the other; suspecting, that as they had both bred slowly, there might be a defect in the health of one or both of their Queens; and hoping that, by putting them together, the bees would probably hold a consultation, which of the two Queens was most healthy, and, after electing her, kill or banish the other, as they thought proper. The common bees of both hives at once united kindly and seemed happy; but, upon turning up the hive within 20 minutes after, to see if all was well, I perceived a few bees clustered together, which, however, did not greatly surprize me, as I thought the conjoined republics had already decided, which Queen should remain in the hive, and that these bees were leading the
rejected

rejected Queen to exile or execution. But, upon a more close inspection, I observed the two Queens struggling together with the utmost fury, and darting the most deadly blows at each other. Being afraid of losing both, and thereby ruining the united hive, by their mutually killing each other, which must have been the case, had one of them thrust her sting into the other's body and left it, as sometimes happens, though rarely *, among the common bees in such conflicts, I separated them, and kept them asunder, though they still ran with great fury in search of each other along the table §. I then
took

* Instances of this do not happen above once, perhaps, in fifty times; although the fact is certain, that they sometimes kill themselves, by leaving their stings in the bodies of their opponents.

§ The above-mentioned battle, between the two Queen Bees, reminded me, at the time, of those lines in the old song of Chevy-Chace; where the brave DOUGLAS is represented as saying,

“ But trust me, PIERCY, pity it were,

“ And great offence to kill

“ Any of these, our harmless men,

“ For they have done no ill.

“ Let you and I, the battle try,

“ And set our men aside,”

“ Then c—st be he, (quoth Earl PIERCY,)

“ By whom it is denied.”

took the one that appeared to be the boldest, and put her again into the hive, where she was kindly received by the bees, and put the other Queen into another hive, to be dealt with, as the bees might incline, as I had no other use for her at that season.

Let not my readers, from this account, suppose, that the common bees are a race of cowards, who will stand regardless and indifferent, while their sovereigns, or mothers are in danger: On the contrary, they are a set of brave and *patriotic* warriors, who will risk their lives in defence of their hive, their property, or their sovereign mother. But, when a *duel* takes place between two Queen bees, they commonly, nay almost always, dispatch one of the Queens themselves.

CASE II. If the rays of the sun have been intercepted by a cloud, or a shower of rain has occurred in the time of swarming, the smallness of the swarm may be ascribed to these circumstances having prevented the half of the young colony from leaving the mother hive. In this case, let the swarm be placed where the original hive stood, for about a quarter of an hour, in which time, the bees that are returning from the fields, will soon make the
swarm

swarm large enough, and then the swarm should be removed to about a mile distance, to prevent the bees from going back to the old stock again.*

CASE III. When a person has a small swarm, whether it be a first, second or third one, and at the same time a lying-out hive, that has been long in swarming, he should drive all the bees out of the lying-out hive, into an empty one, (see the method, page 138) and set down the bees in the same spot where they stood formerly, which will make a fine large artificial swarm, as such a hive would have abundance of bees; after which, let the small swarm be put into the old hive, where they will hatch out all the young, and make a good hive; and let the old hive be placed on the same spot where the small swarm stood.

CASE

* When bees come naturally off in a swarm, they take a view of the place where they settle, and never think of going back to their mother hive; but, when they are separated from their mother hive by driving, or when the hive is shifted from where it formerly stood, they are insensible of the change of their situation, and always fly back to their former station; for which reason, the bee-master should always remove every artificial swarm, or re-inforced hive, to some considerable distance, otherwise a number of the bees will go back again,

CASE IV. If there are two small swarms, but no hives, that have bees sufficient either to exchange with, or re-inforce them, let them be united; for, in such cases, two swarms, conjoined into one, will prosper better, and turn out more profitable, than three small ones kept separate. See page 167.

CASE V. Suppose one drive all the bees out of a hive, and thereby make an artificial swarm, if the old hive has a royal cell in it, by introducing about 5000 common bees into it, they will hatch out the young Queen, with all the eggs and nymphs (or young bees) in the cells, and render it a flourishing hive. The method of introducing the common bees, is as follows: Let a strong lying-out hive be removed from its usual situation, about 10 A. M. and place the hive that has no bees on the spot where it stood. The bees, on their return from the fields, will enter it, and will no doubt be surprized at the sudden revolution, having left their hive full of their brethren, not one of whom is now to be seen; but, finding plenty of honey, and abundance of eggs, they will make the best of their misfortune, and speedily replenish the hive, by rearing up the young bees, and working with as much alacrity, if not more, than when they

were in their original hive. It will be necessary, however, in this operation, to remove the original hive to another apiary, (See p. 176.)

CASE VI. When one has a hive that has long lien out, and still shows no appearance of swarming, if a swarm is wished for, all the bees may be driven out, as directed, page 138. A swarm may thus be obtained, which, if the weather answers, will not fail to succeed. The old hive may be placed below some other hive, the bees whereof will hatch out the young bees, and in autumn the honey may be taken out of it, and all the bees put into the upper hive.

CASE VII. I have often formerly taken all the bees out of a hive to make an artificial swarm, and put into it a considerable number of common bees, in order to hatch out the young brood in the combs, build a royal cell, and rear a Queen for themselves. This practice I found in general answered very well, as the bees hardly ever failed to rear a Queen. The only objection against it arises from this consideration, that from the time the old Queen is taken away, till the young one is fit to lay eggs, a period of twenty five days elapses, during which time there is not a single egg laid in the hive. And when it is farther considered, that there
must

must be an additional loss of other 18 days, before the eggs can be bees for any use, it is evident, that the best part of the honey season will be over, and consequently that by autumn, the hive will be greatly deficient in bees. For these reasons I have now almost entirely given up the practice, though I have sometimes had hives that prospered very well under it. And, indeed, if I intended to kill a hive of bees in autumn, I would rather prefer the taking away their Queen from them about the end of July, and leaving a great number of common bees in the hive, which, as they would have few bees to nurse up, would collect a greater quantity of honey in that period, than if they had a Queen in the hive daily laying eggs for them, which would employ a good number of the bees, both to hatch and nurse up the young, and the re- by, the fewer would be employed in collecting honey.

CASE VIII. If a swarm should come off, which the mother hive cannot afford to want without great injury, it ought to be returned again into the old hive, in this manner: Take the Queen from the new swarm and confine her in a box; and then turn up the hive containing the new swarm, and place it before the entry of the old

stock which the bees came from, in such a manner that the bees in it may run from it into the entry of the old hive again; which they will soon cheerfully do, especially as their Queen was taken from them. This operation is so easy that it may almost be performed by a child.

CASE IX. When the summer is far advanced, and it may be rather late for swarming, an eek, placed below a strong hive, will give the bees more room to work, and may prevent a late swarm from coming off, which, in general, turns out more loss than advantage to the Bee-master.

C H A P. XXII.

OF THE KILLING OF DRONES.

IT is a good sign that a hive is thriving, and a certain proof that there is a Queen in it, when the working bees kill their drones early: for in those hives that have lost their Queen, the bees become so careless both about their honey and

and

and their hive, that they permit the drones to live till November or December. And perhaps there is no small wisdom in this, for the bees, knowing that they cannot breed any more, are probably sensible, that they will gain more by the additional heat of the drones preserving them from the severity of the winter, than they will lose by the expence of maintaining them; and consequently lengthen out their own lives, as well as those of the drones.

This leads me to think, that the drones are not so short-lived as is generally believed. If the working bees did not kill them in the end of summer and beginning of harvest, but left them to die of old age, they might perhaps live in a good warm hive till spring. The bees seldom begin to kill the drones, till the honey season be nearly over. When, therefore, the massacre of the drones begins, one may know that, in general, the honey is becoming rather scarce in their neighbourhood; although it is not an infallible sign; for the bees of some hives kill their drones sooner than those of others, standing in the same apiary. In hives situated near early pastures, when the flowers are mostly gone, the bees will kill their drones in the end of July. In later situations, they are permitted to
live

live till August. During this last autumn, (1794,) I saw many excellent thriving hives, situated among good heath, whose drones were not extirpated till about the end of September.

As the working bees, when the flowers become scarce, kill the drones, and thus show us plainly, that they are now become useless in the hive; so I agree with almost every writer on this subject, that it is proper to assist the bees in extirpating them. The manner in which the working bees kill the drones is this. They not only sting them, but pull and bite them with their teeth. It is incredible what havock they will make of them in a single day, as I have often been convinced, by observing great numbers of them lying dead before the door of the hive †. They also sometimes

† When the bees once fall a-killing the drones, it is amazing to see how intent they are on the business.—They not only dispatch the old ones, but they also tear out and destroy the young drone-maggots in the cells,—especially in bad weather. I have indeed seen them, even before swarming time, when it had been wet weather for five or six days, become so disconsolate, so discouraged, and even desperate, (thinking, perhaps, that the weather would never mend,) that they threw out, before the entry of their hive, some scores of white young drones; but, on the return of fair weather,—instead of tearing out and killing the remainder of this unfortunate race, the Queen immediately

times kill them in a more tedious and lingering, but no less effectual way, by banishing them from their granaries of honey; upon which the drones retreat in great numbers to the stool and the under edges of the hive; and sometimes, though rarely, I have even seen them come to the outside of the hive, in small clusters. When thus exiled, they soon become very dull and lifeless, and at last die for want of food. Upon lifting up a hive from the stool, I have observed numbers of them sitting close upon it, with hardly three or four common bees among them, and on such occasions I have trode to death forty, or more of them, at once, with my foot. But, without lifting the
hive,

diately laid fresh eggs, in the drone cells, and the common bees again carefully reared them up to maturity.

Whenever, therefore, the young drones are torn out of their cells before swarming time, in bad weather, the bees ought immediately to be fed, which will prevent them from despairing, and save the lives of the young drones.

It is also necessary to mention, that if the weather be bad for two or three days, after a new swarm is introduced into an empty hive, the bees should be fed and encouraged by a little honey; as, in such cases, I have frequently seen them, when long confined, not only soon discouraged, but some of them die; whereas, by being carefully fed, they are not only kept in good spirits, but will, with greater cheerfulness, embrace the first favourable moment for resuming their labours.

hive, any person may easily assist the working bees to kill the drones, (as soon as the bees show us the example), by sitting down at the side of the hive the first good day thereafter, about eleven o'clock, and crushing them one by one, as they come out of the hive, by pressing them to the stool with his fore finger. In this manner, an hundred drones may be killed in a very short time. I generally kill the most of the drones in my hives when I have leisure; although there is no absolute necessity for doing it, as the working bees will perform the task themselves in due time. But it certainly occasions a considerable saving of honey, and I am inclined to think, that no harm can arise from it, especially in those hives whose honey is to be taken in Autumn. However, when there are very few drones in a hive I kill none of them; but when they are very numerous, I often kill some hundreds; at least two thirds of them, and leave the working bees to kill the rest at their leisure.

C H A P. XXIII.

ADVANTAGES OF CHANGING THE SITUATION OF BEE-HIVES
TO BETTER PASTURE.

ABOUT Lammas, those who live in situations where the vegetation is early over, especially if possessed of a large number of hives, ought to remove their bees to the neighbourhood of heath grounds, if they should even be six or eight miles distant, and allow them to continue in that situation till the heath gives over blossoming. This measure I would earnestly recommend, as the bees, after having had all the advantage of their early situations, will work as late in the season, as those in the latest situations. I have often seen a hive, by being placed nigh heath, become ten, twelve, or fifteen pounds heavier, in the month of August; † whereas, if it had remained in its ori-

A a ginal

† I can assure my readers, that, in the middle of September 1792, I have seen bees in such situations, filling their hives with combs and honey, as plentifully and as expeditiously,

ginal early situation, it would probably have become every day lighter after Lammas. The only risk in this case is, that if the weather turn out bad in August, the bee-master will lose all his trouble; but contingencies of this kind happen in every other business in which mankind engage, which nevertheless do not deter us from adventuring.

When bees are placed in a new situation, they should not be permitted to come out of their hives, for the first time, in cold weather; for, finding themselves in a strange place, they will fly about and take a view of the neighbourhood; and some of them alighting, and resting on the cold ground, the cold benumbs them, and they perish, unless speedily recovered by the heat of the sun. When I remove a hive to a new station, I keep them close prisoners till the first fine day, when, about 10 o'clock A. M.—the time they are most impatient to

as if it had been the middle of June. In the beginning of September, that year, I purchased for a gentleman in Northumberland, a considerable number of hives, that were only about half full of combs when placed in his apiary; but the heath in his grounds being extremely rich and in full blossom, the bees were so expeditious in their labours, that they filled the hives completely with both combs and honey, within a week thereafter.

to get out, I place a feeding comb before their entry, which I at the same time open, and the bees come out in great numbers, and fly about with great alacrity, making their usual cheerful music in the air, for two or three minutes, and taking a view of their new situation. In the mean time, some of them discover the feeding comb, and entertain themselves with it, while the flying bees alight at the entry, and make their usual music for joy; which invites the straggling bees to return home, so that, perhaps, scarce a single bee of the whole hive will have missed its way; whereas, if they are allowed to go out singly, especially in cold weather, a considerable number of bees will be lost, for want of such music in the air, or at the entry of the hive, to call them home.

In the removal of bees in general, it is better and safer, to remove a hive to the distance of a mile or so, than to a nearer situation; for, when a hive is removed out of an apiary, where there are a considerable number of hives, to the distance of about a quarter of a mile or so; and especially, if the bees are allowed to come gradually out of their hives, they will fly to their old place of abode; but not finding their own hive, they will fly about in search of it, in a disconsolate

manner, for hours perhaps ; and after being repeatedly disappointed, they will at last try those hives that stand nearest the place where their own hive stood, to see if the inhabitants will admit them, as so many *destitute orphans*, into their community. When they thus come in a humble supplicating manner, they are seldom refused permission to enter, and associate with the rest of the hive, as fellow-labourers. Being favourably received, they are ever after treated, not only as *allies*, but as *brethren* of the same family, and live in the greatest harmony with them ever after.

Similar measures ought to be adopted in all cases of uniting and re-inforcing whatever. If any person should take a hive out of his own apiary, and drive all the bees out of it, they would fly about in the same manner, and at last enter into those hives, that would admit them kindly. In such cases, however, the first ambassadors, (like those of King DAVID to HANUN, the Ammonite,) may, perhaps, be mistaken for SPIES, and treated accordingly. But it will sometimes happen, that the bee-master is in such circumstances, that he will be obliged to remove a hive a quarter of a mile from other bees. In this case, he must keep
the

the bees prisoners for some time, as above-mentioned, especially if the hives in the original apiaries be shut or covered over, till the bees of the removed one fly about for an hour or so. Thus, the loss will be the less, as perhaps some of the straggling bees may find their way back to their own brethren again. But even although an hundred, or two hundred bees should fly off in this manner, a strong hive will suffer little by the want of them.

CHAP. XXIV.

OF BEE-BREAD AND WAX.

THE substance, commonly called BEE-BREAD, is to be found at the bottom of many of the cells, and is frequently covered over with honey. The bees carry it home in loads upon their legs, or rather their thighs. It is generally of a yellow colour, but often takes its colour from the flowers from which it is collected.

Various

Various conjectures have been made by different authors respecting its use. Some alledge that the bees eat it ; hence the name, *Bee-bread*. Others suppose, that, after being taken into their stomachs, it is converted by some peculiar action of their internal juices into wax, of which every body knows their combs are made. But an objection to this hypothesis, arises from the consideration, that the bees, when first put into an empty hive, carry little or none of this stuff on their legs for some time, till a great number of combs are made ; and that after the combs are completed, (which they generally are within two or three weeks after the swarm have taken possession of the hive,) the bees still continue to carry in this stuff during the whole working season. To this, however, it may be replied, that perhaps, as they have no cells to put it into at that time, they carry it home in their bellies, where it probably undergoes a speedy change in passing through their bodies, and may thereby be converted into perfect wax, with which they manufacture their combs.

There is another class of authors, who suppose that the bee-bread is used by the old bees to feed the young ones in the cells, by the
mouth

mouth, as pigeons feed their young ones. To this it may be objected, that the young bees surely cannot make use of all the bee-bread, which the old bees are almost constantly carrying into the hive when they are at work. Perhaps both these last hypotheses may be true; as it may not only serve to feed the young bees, but also, by passing through the bodies of the old ones, may be converted into wax; with which bees not only build their combs, when a swarm is newly put into a hive, but also seal up both their young in the cells, and their honey in the combs. If this supposition be true, then the consumption of bee-bread, through the course of the year, but especially during the honey and breeding seasons, must be very great; and therefore we need not be surprized at the quantities imported by the working bees. But, whatever truth may be in either or both of these theories, I am certain of one thing, that the bees do not live on bee-bread alone; for they will die of hunger, although there be plenty of it in the hive, if there be no honey in it; whereas, when they have abundance of honey, they will live without bee-bread, at least for many weeks. REAU-

MUR, however, says, that it is absolutely necessary for food to bees.

For my part, I have always observed the bees most busily employed in carrying in this stuff while the young bees are breeding; but when they want a Queen, and have no eggs to rear another, they immediately give over carrying it into the hive, thinking, (as it would seem,) that as they have no young bees to feed or seal up in the cells, it would be an idle business to bring any more of it home, especially as they do not make much use of it themselves, and have more already in the hive than they will stand in need of, for their own use. MR THORLEY alledges, that the bees carry the wax home from the fields in fine small scales † between the folds of their bodies. He says, that
 “ For several seasons, after I became a Bee-master, I was very desirous and diligent to find
 “ out how, or where, they brought home their
 “ wax, well knowing that gross matter to be of
 “ a very contrary nature, and applied to some
 “ other

† These scales are well known by bee-masters, and somewhat resemble small salt at a distance, but, upon a nearer inspection, they are more like the scales of very small fish, being thin, small, round and white. Their substance is nothing but pure wax.

“ other use, but was, not able for a considerable
“ time, to enter into the secret.

“ At last, viewing a hive of bees very busy
“ at labour, I observed one bee among the rest,
“ as she fixed upon the alighting place, of an
“ unusual appearance; upon which I seized
“ her directly, before she had time to enter the
“ hive; where, with a very sensible pleasure, I
“ found what I had (till then) been in vain
“ searching for. Upon the belly of this bee,
“ within the plaits, were fixed no less than six
“ pieces of solid wax, perfectly white and tran-
“ sparent like gum; three upon one side, and
“ three upon the other, appearing to the eye e-
“ qual in bulk and gravity; so that the body
“ of the bee seemed duly poised, and the sight
“ not in the least, obstructed by any inequali-
“ ties.

“ Here have I found it at other times, and
“ once I took away eight pieces together, and I
“ knew that it was wax, and nothing else. Will
“ not this pass for demonstration?”

That Mr THORLEY, and probably some o-
thers, have seen bees carrying such white scales,
or pieces of solid wax, on their bodies, once
or twice perhaps in their lives, I will not dis-

pute. I myself have seen the same phænomenon, once, or at most twice, during an experience of thirty years. But it certainly would be absurd to infer from these rare cases, that all the wax, which the combs are made of, is carried into the hive in this manner. The contrary inference must be drawn, were it from nothing else but the consideration, that these white scales have been so very seldom observed. It is also well known, that when a young swarm is newly set down, within a short time thereafter, small scales of fine white wax will be seen on the stool; which is a certain proof that the bees are beginning to build combs: and perhaps a few of the bees may pick up some of these scales, to prevent them from being lost. But, if every bee, that is employed in carrying wax for building the combs, either within or on the outside of her body, could be observed, we would see thousands thus loaded every day after a young swarm is first set down, instead of observing only one or two solitary instances in the course of twenty or thirty years.

If a natural or artificial swarm is confined 24 hours in a hive, after it is newly put into it, the bees will be found busily employed in making combs. From this it may be argued, that

that the bees, having eaten a quantity of bee bread on purpose, before they left their own hive, and having it still in their stomachs, had made wax of it to erect the combs.

Of this fact any person may convince himself, by driving the bees out of any hive into an empty one, and confining them 24 hours; after which, upon examining the hive attentively, he will find a piece of comb, perhaps six or eight inches long, besides several hundreds of scales lying on the stool. It is evident, then, that these scales could not be brought from the field, as Mr THORLEY supposes, seeing the bees were never out of the hive; and, it is farther to be observed, that when they are at full liberty to work in the fields, and when a young swarm is most busily employed in rearing combs, nothing can be seen on their bodies of these scales, or any thing else.

I have sometimes, indeed, been inclined to think, that the wax might be an excrescence, exudation, or production from the bodies of the bees; and that, as the Queen bee can lay eggs when she pleases, if need require, so the working bees can produce wax from the substance of their own bodies. If this conjecture be right, it will follow of course, that all the

food which the bees take, contributes to the formation of wax, in the same manner as all the food which a cow eats contributes to the production of milk: or, (to adopt a more near simile from the insect tribe,) as all the food which a spider takes, contributes not only to the nourishment of the animal, but to the production of the substance of the cob-web from its body. Numberless other analogies in nature might be adduced in favour of the probability of this theory. The silk, for instance, produced from the body of the silk worm, is a substance as different from that of the animal itself, or of the mulberry leaf it feeds on, as wax is from that of the body of the bee, or of the honey or flower she sucks. And the excrescence produced in the human ear, which also goes by the name of *wax*, is certainly a substance as different from that of the body which produces it, as either the one or the other. Upon the whole, until I meet with a more probable theory, supported by facts, I must give it as my humble opinion, that the wax is either produced from the bodies of the bees alone, or rather that the bees can speedily convert what they bring from the flowers into it, and therewith build their combs, and seal up both their young and their honey.

C H A P. XXV.

OF THE HONEY HARVEST.

I ONCE thought, that if we preserve all our bees, we must also keep all our honey in the hives, to maintain them during winter and spring. But I am now of a different opinion; for the severity of the winter not only reduces the number of bees, but sometimes even kills whole hives, although they have large quantities of honey in them. It is, therefore, much more profitable to preserve all the bees alive, and unite them to other hives, although we should be at the expence of some honey to feed them during spring. It is indeed, probable, that every Queen is capable of laying only a certain number of eggs. Supposing, then, that we should put 100,000 common bees in a hive, the old bees would gradually die out, and as there would be but one breeding Queen in the hive, it would soon have no more bees than any

any other hive. Indeed, experience convinces me, that there never was a hive, however large, prosperous, and numerous of inhabitants in summer, either naturally, or by being united, that did not gradually decrease against next spring, so as very little to exceed the most ordinary hives in number. It is true, indeed, that some swarms of bees, by being kept in a very large hive for several years, have had as much honey and wax, as three or four ordinary hives. But such cases only occur, either when two or three swarms go together in swarming time, or when a thriving swarm continues for some years in a large hive; and, by collecting perhaps 60lb. of honey every year, and consuming only the half of it during winter and spring, thus increases the stock of honey, and the weight of the hives, at the rate of 30lb. a-year*.

Nevertheless

* I am quite certain, however, that a great number of bees in one capacious hive,—I shall suppose 30,000,—will breed amazingly; as they will have perhaps, in June or July, not under 7,000 young in the cells; for almost every comb in the hive at that season, will be quite full of eggs, nymphs and young bees, all gradually coming forward. According to this calculation, allowing 18 days to pass between the time that an egg is laid, and a complete bee produced from it, there would not be fewer than 300 eggs laid each day in the hive,—an astonishing num-

Nevertheless it is evident, that a hive that has a great number of bees in autumn, stands

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ber to be all laid by one mother. Monsieur REAUMUR says, that the Queen will lay 200 in 24 hours ; but I am persuaded, that, in some extraordinarily populous hives, she lays near double that number. She is acknowledged by all authors to be very prolific. SWAMMERDANE beheld in the ovarium of a Queen bee, 5100 eggs at once ; and REAUMUR says, that, “ in the space of three weeks, 6000 bees are brought to perfection.” Nor, indeed, is this at all incredible, when we consider that some cod fish have had no fewer than 9,344,000 eggs in their ovarium at once.* The prolific powers of the Queen bee seem to depend very much on the state of the hive she belongs to ; and I am apt to think, that the increase of a hive scarcely ever fails on her part, if she be in a healthy state. For, during the months of May, June, and July, all Queens breed surprisingly fast, if the weather is good, and if they have abundance of common bees to rear the young brood. When one, therefore, has a hive, that, on account of the paucity of its inhabitants, does not breed fast, were he to add a great number of common bees to it in Summer, it would soon increase as fast as any in his apiary.

It must, however, be allowed, that some Queens will be more fruitful than others, although a hive seldom suffers from that cause alone. One single author alleges, that two or three Queens may be permitted to live for a short time in a hive, during the middle of summer, and that of course a greater number of eggs will be laid each day, than if there were but one Queen in the hive. But I am pretty confident, that this is a mistake ; for, among the many hundreds of swarms, which I have driven out, I never saw more than one breeding Queen at a time. Indeed, perhaps, in one hive among fifty, I have observed two Queens,

* Nature delineated, p. 130.

a much better chance not to perish by the severity of the winter, than a hive that has not half the number of inhabitants; for which reason I would earnestly recommend it to my readers, NEVER TO KILL A SINGLE WORKING BEE, at any season of the year; but, in autumn, to unite all the bees of those hives, from which the honey is taken, to those that are intended to be kept as stock hives. This will render them fit to defend themselves both against the severity of the weather in winter, and against robbers in spring; and will also greatly forward their labours as soon as the working season returns; for, as has been already observed, it is of the greatest importance to have the hives always well-stored with bees.

The time of taking the honey out of the hives is sometimes earlier, and sometimes later, according to the weather, and the earliness or lateness of the flowers in the neighbourhood.

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Queens, an old and a young one; but that hive would have sent off the young Queen with a new swarm probably in a day or two, as she was only waiting an opportunity for that purpose; and it may be observed, that the young Queen was not then arrived at the age of laying eggs, as she is about eight days old before she can become a mother; and therefore I am fully persuaded, that there are never on any occasion two Queens in the same hive, laying eggs at one time.

I have known a hive of bees waste their honey, and the hive become gradually lighter after the first week of August; and, at other times, in favourable weather, I have seen hives of bees, that were situated near heath, (as mentioned, page 185) continue working keenly during the whole of August, and the greater part of September, and become daily heavier. In a word, the harvest of honey, like that of corn, is earlier or later, more plentiful or scarce, in different years, according to the weather and the climate, and the variety of seasons and situations.

One general rule, however, may be laid down for the proper time to take honey. As soon as the flowers, in the neighbourhood of an apiary, are mostly faded, although the bees may continue to work in favourable days, yet their families being now generally very large, they will probably consume as much honey in one day, as they will collect in two. At this period, therefore, the prudent bee-master will first choose his stock hives, according to the directions given, page 89. He will then put a mark on every hive he has picked out for this purpose, and sell or take the honey from all the rest, whether good or bad; for the sooner the honey is taken, it will run the more easily out

of the combs. And, as it runs best in warm weather, he should take the honey, that he intends to run out of the combs, immediately after the bees have nearly given over work, and unite the bees to his stock hives, as directed page 136, &c.

But honey, that is intended to be kept in the combs, ought not to be taken so soon, as cold weather renders the combs more fit to be handled; and as the bees are all to be kept alive, and of course must be maintained, it is of no consequence, in point of expence, whether they are allowed to feed on the honey in the hive they are soon to leave, or on that of the hive to which they are to be united. Besides, there is an additional advantage, that arises from their being allowed to continue in their native hive; as the longer they remain in it, the more young bees will be hatched; which both preserves a greater number of bees, and makes the honey combs more free of the young brood; so that there is no harm in keeping the bees in the hives till October, when the honey is not intended to be run out of them.

When the honey of a hive is taken in Autumn, and there is a great number of young in the cells, those combs which contain the young,
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and which may be intermingled with bee-bread, should be carefully and gently placed in an eek, (see page 110, &c.), and a numerous hive put over it, to hatch out the young brood, and suck up the particles of honey remaining in the combs, and probably also make some use of the bee-bread. This plan is of great advantage to the bee-master, as the young bees, which are always the best, and which would otherwise have been totally lost, will thus be all preserved; besides that very little use could have been made of such honey in the cells, as was mixed with young bees, eggs, and bee-bread. The eek and the combs may be removed in about three or four weeks thereafter, and the hive set down in its former station.

If the bee-master has not as many good hives as he wishes to keep for stock, he may supply himself, by conjoining the bees and honey of two light hives, and uniting them into one in September, as mentioned in page 47. The heaviest hive should be first selected; after which, the bees and honey should be taken out of the light hives in the following manner:

The Bee-master must first drive as many of the bees as possible into an empty hive, as di-

rected in page 138. But, at this period, and in all cold seasons, bees are not so easily driven out as in warm weather ; although, the taking them into a warm room, will make them run up the better. Afterwards, he should take the combs carefully out, especially if it be a light young hive, one by one, with his hand ; and, in doing this, all the bees that are upon the combs may be gently swept off with a large feather, into the hive, among their brethren. Their Queen must then be taken away, with about 100 bees, and kept close prisoners ; then re-inforce any hive with the common bees that appears to have fewest inhabitants in it, (as directed p. 136, &c.) or rather any hive that will give them the most favourable reception ; and, as soon as all the bees are united and happy, the Queen, with her hundred attendants, may be introduced ; and, if they judge her to be preferable to their own, (for the bees are doubtless the best judges in these matters) perhaps they will elect her and banish their own Queen. About two days thereafter, the hive intended for the stock may be re-inforced with the honey combs ; according to the directions given in pages 110, 111, and 112.

The Bee-master should proceed in the same manner

manner with every other hive, from which he intends to take honey ; and if any of his neighbours should happen to be still so prejudiced in favour of old customs, as to continue the barbarous practice of killing their bees, he may make an advantageous bargain with them, and save the lives of the useful insects, by offering a trifle for them, which will surely be accepted, as the owners can otherwise gain nothing by them. By uniting these to his own hives, every hive in his apiary will be fully supplied with bees and honey : And being now in a prosperous state, may be carefully covered over, and rendered fit to endure the winter. See page 97.

C H A P. XXVI.

OF PREPARING HONEY AND WAX.

BEFORE entering upon this necessary business, the bee-master should be properly provided with a sufficient number of utensils, such as large dishes, jars, sieves, knives and spoons. He should begin while the honey is warm, as
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it will run from the combs the more quickly ; and therefore, to preserve the heat till the operation is over, the hive should be brought into a warm room. He should next take hold of the ends of the cross sticks in the hive with pincers, and loosen them by twisting them round ; after which they will be easily pulled out. The edges of the combs should then be loosened with a knife from the hive all around. Upon giving the hive a gentle knock on the floor, on that side which is opposite to the broad side of the combs, they will fall to that side, and upon turning the hive, and giving it another knock on the opposite side, all the combs, which could be reached by the knife will be effectually loosened. The hive being still kept on its broad side, the combs will all be above each other. The uppermost being first taken off, if there are any dead bees in it, they may be blown or brushed off. The combs should then be divided into three parts. The empty combs being first laid aside for wax ; next the combs containing eggs or maggots ; and lastly, the most valuable part of the whole, the fine sealed combs, containing the honey, should be laid in a vessel by themselves. An assistant should immediately be ordered to cut these

these last into thin slices, first observing to pare off the sealed mouths of the cells, that the honey may run freely out. In this state they should be laid in sieves, or any other vessels that will afford a free passage to the honey, which will run quite clear, and the honey thus obtained should be kept by itself, as being the purest and best.

Those combs which may be filled with a mixture of live young maggots, bee-bread and honey, should immediately * be put below stock hives, as directed page 202, &c. and the bees will soon suck up all the honey in them. When the fine combs are completely run, they should be put into a pan, over a slow fire, and stirred constantly till they are more than milk warm; when they should be put into a strong canvass bag, and the honey squeezed out. This honey being of an inferior quality, may be either used in the family, for common uses; or rather kept for feeding the bees. All the combs, from which it was squeezed, may then be soaked in water, and a weak kind of mead

* All combs containing eggs and young in the cells must be put immediately to other hives, while they are warm; for, should they remain two or three hours out of a hive, they will become chill and cool, so as to make them decay in the cells.

mead drawn from them; or a stronger mead may be taken from the combs by soaking them, after the finest of the honey is run off, without melting or squeezing them at all. Indeed, in warm weather, fine combs will run almost quite dry, without the least pressure.

My method of running honey is this: I hang up a wide riddle, with the sliced honey combs in it, about 5 feet from the ground: About 8 or 10 inches below this, I place a sieve, somewhat wider in circumference than the riddle, and, at an equal distance under the sieve, a fine sear, proportionally wider than the sieve, under which, a foot lower still, I place one of my earthen covers, described page 98, with the bottom uppermost, and a small hole in the top, to answer the purpose of a funnel. This last being properly fixed in a vessel of a sufficient size, the honey that runs into it is completely purified from all extraneous matter whatever, by running through so many different sieves at one time. Thus, in a few hours, in a warm day, I can have my honey purified to the highest degree of fineness, without boiling or diluting it, or using any other means that would deprive it of its original genuine flavour; for any small crumbs of wax, bee-bread or the like, that pass through
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the riddle, are caught by the sieve; and if any thing still smaller should pass through the sieve, it is intercepted by the search, which permits nothing but the purest honey to pass through the funnel into the receiving vessel; and thus the whole process is completed in a short time. During this process, the combs in the riddle may now and then be turned over with a knife, to make the honey run the more freely.

This method should be adopted by all Bee-masters, who have many hives and much honey to run. But such as have but a small quantity may follow the other plan, and their honey will do very well, if they only keep it free of young bees and bee-bread: for a few crumbs of wax running through the sieve will not hurt the honey, as it will soon rise to the surface, and can be easily skimmed off.

The combs being now entirely free of honey, the next operation necessary is to make wax. My method of performing this is quite simple. I boil the combs in a kettle, with a sufficient quantity of water, over a slow fire, for about 40 minutes, during which time they are all melted, and I stir them about frequently all the time. I then take two or three ladle-fulls, and put into a bag, sewed together in

the form of a funnel, and which is commonly called *Hippocrates's Lever*. It is made of thin strong canvass, and of such a length, that the upper part may come over the end of a board, which leans upon my breast, while the other end of it is placed in a vessel fit to receive the wax, from which I press out the water and the wax, pretty much in the same way that the tanners dress their leather.

I generally boil what remains in the bag a second time, and squeeze it again to obtain more wax. By this method, however, the wax cannot be got entirely out of the dross; nor indeed can it be obtained by any other mode that I have ever seen or heard of being attempted. All the wax that is ultimately left among the dross, in this way of separating it, is of very little value, and would not refund the expence of any further trouble. *

After the wax is cooled in the tub, I again put it into the kettle with clean water, and hav-
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* I have tried several other methods, in order to extract all the wax from the dross. Near twenty years ago, I got a press made for this purpose, somewhat resembling those which the candle-makers use to squeeze their tallow with; but, finding it did not answer the purpose, I laid it aside. I have also put in practice Mr Keys's method, but, after repeated trials, found it not satisfactory.

ing melted it, I pour it into a bowl or vessel, † which is wider at the top than at the bottom, and skim off any dross that may float on the top of the wax. After allowing it to stand in some warm place, that it may cool gradually, which prevents it from cracking, I take out the cake of wax, and pare off all the dross from the under side, till there be nothing left but what is fit for the merchant. The skimmings and parings should be kept and boiled over again, next time any more wax is made, in order to obtain as much wax as possible.

† A vessel made something like a flower pot, that is both narrow and deep, answers best for this purpose: as the good wax rises to the top, and the drossy part is much more easily separated from it, than when the vessel is broad and shallow; as in this case, the cake of wax is thin, and not so easily separated from the dross, when cold.

C H A P. XXVII.

OF THE DIFFERENT KINDS OF HONEY.

IT appears that honey does not candy from cold alone, without some other concurring circumstances; for among a number of hives, all equally exposed to the same degree of cold, some will be found to have candied honey in them, while others have none. Even in the same hive, a comb will sometimes be found, with honey in it, partly candied and partly liquid: And it is well known, that some honey will turn thick and candy, almost as soon as it is run out of the cells, so early as the month of August; while other honey will continue liquid till November, December, or January: And some very fine honey will remain till April, before it candy. From all these facts, it must be inferred, that there are other concurring circumstances besides cold, that co-operate with it in occasioning honey to candy. What these circumstances are, it is difficult to determine.

mine. My opinion is, that the candying of honey proceeds partly from the nature of the flowers from which it is collected, and partly from the time that it has remained in the hive. But against this last supposition an objection arises, from this consideration, that the very finest of what is called *virgin honey*, will sometimes candy very soon after it has run from the combs, and become like fine white sugar*.

This fine white honey is collected from white clover, and also from some other flowers which yield a white juice, and it is reckoned by most people the finest of honey. But the species of honey which continues longest in a liquid state,
and

* Many authors affirm, that honey, candied in the comb, is very destructive to bees, and alledge, that they may as well eat poison; others insist, that it chokes them; while a third class alledge, that it hurts them by bedaubing them, with many other whimsical suppositions. But these authors certainly have either taken their own dreams for realities, or have wrote upon trust; which they certainly ought not, in a case that can be so easily decided by experiment. For let any person put a piece of comb into a hive, with the honey in the cells, partly candied and partly liquid, and he will find, that the bees will soon suck up all the liquid honey in the upper parts of the cells; and if the middle part of the honey be candied, they will throw it out, and thus get at the liquid honey in the under parts;—which they will cheerfully feed upon, without either choking, bedaubing, or poisoning themselves with it, and rejoice that they have got so much provision at so little expence of time and labour.

and is esteemed by many connoisseurs the very best of honey, (as it undoubtedly is as good as any,) is of a slightly greenish colour, and is likewise collected from white flowers. When candied, it sometimes consists of fine white particles, resembling small hail, intermixed with some liquid honey, and is very beautiful.

Heath produces a fine high-coloured honey, which looks also very beautiful in the virgin comb, shining like gold through the pure transparent cells. The gentlemen and ladies about Newcastle are very fond of this kind of honey in the combs. When run into pots and candied, it becomes all hard and gristly,—a species of honey which is also greatly esteemed by many.

There is another kind of honey, which is collected from all the above-mentioned flowers, and which, having been kept two or three years in the hive, is therefore called *old honey*. Some of that kind of honey will be very fine tasted, and pretty gristly when eat, but the greatest part of it, when it is run out of the combs, becomes in a few days thereafter thick and smooth; and is, on that account, suspected, by people who are ignorant of the nature of honey, to have been adulterated, and mixed up
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with butter, fugar, flower, and the like. This mistake prevails in many parts of the country, and it is much to be regretted; as this suspicion, so injurious to the characters of honest country people, who, in reality, sell their honey as it run from the combs, is even sometimes entertained by persons in the higher ranks of life, who might be expected to be better informed. For although the country dealers sometimes spoil their honey, by squeezing out the combs, and thereby occasioning bee-bread, eggs, &c. to mingle with it; yet in all my experience, I have never met with any honey, which I could discover to have been mixed with butter, fugar or flour. Once indeed, and only once, I saw honey which the owner had mixed with water, but he was justly punished for his avarice; for the honey and water, fomented by the carriage in such a manner, that the upper part of it had more the appearance of barm or yeast than of honey; and the unfortunate dealer lost both his cargo and his character.

Some alledge, that honey may be purified by warming or boiling it in pots, &c. which occasions it to throw up a scum, that is skimmed off. But I am persuaded, that honey is always best in its natural state; and that such methods
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of refining it, instead of improving the honey, often communicate a bad taste or flavour to it. I therefore use no other method with my honey, than to let it run freely from the combs, as above, and take particular care, that none of the eggs or bee-bread, get amongst it. And indeed this is all the art which is required to make the very finest of honey ;—namely, cleanliness : Let it only be kept as clean as the bees kept it, and the finest of honey will be the produce.

C H A P. XXVIII.

OF THE VARIOUS ENEMIES OF BEES, AND HOW TO GUARD
AGAINST THEM.

OF all the enemies the bees have hitherto had to encounter, MAN may justly be considered as the greatest. For while he follows the old barbarous custom of killing whole hives of that industrious race, for the sake of their honey, (a custom which, in many nations, has begun to yield to a more œconomical, as well as a more humane

humane

humane practice,) he certainly destroys more of these his faithful servants, annually, than any other class of animals whatever, or, indeed, than all the other beasts, birds, and insects united, ever did. Nor are those prejudiced murderers of the bees, their only enemies among mankind. The predatory class, who steal either their honey, or the whole hives, prove equally destructive to them. But it is to be hoped, that as self interest and humanity equally unite in exploding the practice of the murderers, so the effectual execution of the laws will prove a sufficient protection from the thieves †.

The three next greatest enemies of the bees are, Cold, Famine, and Robbers of their own species: To which may be added, as the fourth most destructive class of enemies, mice. By one or other of these, or all of them united, hundreds of hives of bees perish annually in Britain, while their other enemies hurt them but rarely or partially.

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† Perhaps I can boast of a degree of good fortune, in this respect, that scarcely one in the kingdom can equal; for, notwithstanding the great number of bee-hives I have had standing in the midst of muirs, and far from any houses, I never had a single hive stolen but one, nor ever lost one single swarm to my knowledge, by their flying away in swarming time:

Of the former, we need say nothing here, having already given sufficient directions in the preceding part of this work, how to guard against cold, famine, robbers, and mice; and shall, therefore, proceed to point out some of the latter.

WASPS are great enemies to bees, especially in warm dry years; and those hives that are near plantations, where they often resort, are the greatest sufferers by them. In my neighbourhood, wasps are seldom very troublesome, except that sometimes a mother wasp will appear before a hive in May, and offer to go in; but her hoarse voice and strange dress soon discover her to the bees, who banish her from their habitation. I know not if any hive in my neighbourhood was ever much hurt by wasps; but, a few miles distant from this, sundry hives have been sometimes considerably the worse of them.

The best way to extirpate wasps is to destroy their Queen or mother, in spring, wherever she can be found; for wasps, in this respect, as well as in some other particulars, resemble bees; and therefore, when a mother wasp is killed, a whole nest of them is in effect destroyed. Their nests, however, should also be carefully sought out,
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and as many of them destroyed as possible, by burning, scalding, or drowning them; lest, like the bees, the wasps should also possess the power of raising a Queen mother from a common egg.

When a number of wasps attempt to enter any, hive about the end of summer or beginning of autumn, the entry should be reduced to half an inch in length, and scarce as much in height, that the bees may be able to defend it; and those hives that have but few bees in them should be taken, and their bees united to other hives, as directed page 141, &c. But such as are intended for stock hives, if severely attacked by wasps, should be removed to some situation distant from plantations, and kept there, till the season of plundering, by both wasps and bees, is over. Vessels may also be placed in the apiary, with honey or sugar in them mixed with ale, which will allure and destroy the wasps; but in fine days these vessels should be removed, lest they should likewise allure and destroy the bees. Another disadvantage also frequently attends this method of destroying the wasps; as these vessels, placed in apiaries, are apt to attract all the wasps in the neighbourhood, and thus, by bringing hundreds that would not otherwise have come,

render the remedy worse than the disease. This should, therefore, be cautiously avoided; and indeed, in general, this method is of no great service.

The large moth, called the WAX MOTH, from its maggots feeding on the wax, is another great enemy of the bees. This animal is extremely alert at discovering any crevice, about the outside of the skirts of the hive, to deposit her eggs in; and when unsuccessful in such attempts, she nimbly runs in at the entry, unperceived by the bees, and lays her eggs, which quickly become large white maggots, above half an inch each in length. These maggots spin over themselves a covering for their defence, and become very numerous in some hives. Their depredations discourage the bees so much, that they sometimes desert the hive.

For my own part, I never suffered the smallest loss by these invaders: I never saw one of their maggots in any of my hives, except twice or thrice, that I observed a few of them in one hive; and I never heard any bee-master in my neighbourhood complain of them. But, about twenty miles distant, I once saw a dozen of wax moths in one hive; and the owner told me, that he had once two hives in one season,
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which had as many of these moth maggots in them as bees ; for which reason he burnt them both, with their bees, combs, honey, wax moths and maggots altogether. In doing this he thought he acted prudently ; but, in my opinion, he would have acted a much wiser part, if he had driven all the bees that were in them, into empty hives and made two swarms of them, or re-inforced weak hives, with them ; and then smoaked the wax moths and maggots to death : after which, he might have given the bees of his other hives the combs to suck the honey from them, and then melted the wax. His empty hive could have served another year, and thus he would have suffered no loss whatever, except that of the young bees, which would have been very trifling in comparison of losing all. The poorest and weakest hives are most infested with wax moths, as well as with other enemies. When any signs of such vermin appear, either without or within a hive, they should be instantly destroyed.

BIRDS of different kinds are also enemies to bees ; especially in Spring, when they catch them on purpose to feed their young with ; such as the swallow, the sparrow, the lark, the duck, and even the common hen. I myself have seen

seen hens pick up bees ; but they very seldom hurt them much. Birds, in general, however, ought to be guarded against by all possible means. A scare-crow placed near a hive will sometimes frighten away the wild birds.

SPIDERS likewise destroy some bees by catching them in their nets and sucking their blood ; though a strong bee will sometimes break through the flimsy texture, and escape. Nothing is easier than to protect them from this enemy, by destroying the cob-webs as soon as they appear about the hives, or their stools or covers.

EARWIGS are also formidable enemies to bees ; and Mr Keys says, that “ they steal into the hive at night and drag out bee after bee, sucking out their vitals, and leaving nothing but their skins, like so many scalps or trophies of their butchery.” They breed between the skirts of the hive and the stool, where their nests ought to be searched for and destroyed.

“ ANTS, (says Mr WILDMAN,) sometimes make their nests between the hive and the covering, without molesting the bees or being molested.” Although, for my own part, I was never sensible of my bees receiving any
injury

injury from ants, yet I have heard some bee-masters say, that they go into hives during the night, and suck the honey; and that they have seen hives ruined by them. To guard against such possible depredations, the covers should be now and then removed, in the end of Summer, and the ants destroyed.

WOOD-LICE are also hurtful to bees. When old decayed wood, which they harbour in, happens to be near a hive, either the wood should be removed to a distance, or the wood-lice carefully searched for and extirpated.

BAD WEATHER, wind, rain, and the extremes of cold and heat, &c. have already been repeatedly noticed as prejudicial to bees, and may be guarded against by the situations of the apiaries, covering the hives properly, &c.

NOISE is also somewhat hurtful to bees, as it disturbs them in their industrious operations. This can likewise be in general easily prevented, by placing the hives in a quiet situation, remote from noisy operations, high ways and the like.

To conclude,—FILTH and IMPURITY of every kind that may gather upon the stool, or around the outside of the hive, or be introduced near the hive, so as to occasion disagreeable
effluvia,

effluvia, ought to be carefully removed and guarded against, by keeping the hives and every thing near them perfectly sweet and clean.

C H A P. XXIX.

CONCLUSION.

As the principal intention of this work is to stimulate the attention of the public towards an important object, that has been hitherto too much neglected, I shall conclude with a few words of advice to people of all ranks and degrees amongst us, on the subject.

And, *first*, I would humbly advise all GENTLEMEN OF LANDED PROPERTY, to consider, whether they have not multitudes of mellifluous flowers growing in many places of their grounds, which might yield annually several hundred pints of honey, as well as many pounds of wax, with very little trouble or expence, but whose sweets being overlooked and neglected, serve only to feed the caterpillars and the wasps.

In

In the next place, I would seriously advise every CLERGYMAN, whether belonging to the established church, or to any other sect or party, to keep a few bee hives in his garden, or upon his gleebe. I have for several years past paid a clergyman's lady in my neighbourhood some pounds for honey and wax, which she had to spare after her own family was served. I have, in my possession, two books on the subject of bees, wrote by two clergymen, one of whom had EIGHTY SIX swarms in one year.

Mr Wheeler likewise informs us, that while he was viewing the beauties of Parnassus, he was entertained by a clergyman with the sweets of a repast of honey. "After I had discoursed
 "some time," says he †, "with the good old
 "Caloyer, (Priest) whom they esteemed a Saint, I
 "was conducted into a garden well planted with
 "beans and peas, (this was at the end of Janu-
 "ary,) and another by it, furnished with four
 "or five hundred stocks of bees. The good old
 "Caloyer presently went, took a stock of bees,
 "and brought me a little of delicate white ho-
 "ney combs, with bread and olives, and very

F f

" good

† A Journey into Greece, by George Wheeler, Esq; in company with Dr Spon of Lyons, p. 411.

“ good wine ; to which he fet us down in his
 “ hut, and made us a dinner, with far greater
 “ fatisfaction than the moſt princely banquet
 “ in Europe could have afforded us.”

That the number of our hives might be greatly increafed, wherever there is proper paſture for bees, appears evidently from Mr Wheeler’s narrative, and is confirmed by the following paſſage in the account lately publiſhed of the ſheep in Spain.

“ If ſheep loved aromatic plants, it would be
 “ one of the greateſt miſfortunes that could be-
 “ fal the farmers in Spain. The number of
 “ bee-hives there is incredible. I am almoſt
 “ aſhamed to give under my hand, that I knew
 “ a pariſh prieſt who had five thouſand hives.”

GENTLEMEN FARMERS ought, therefore, by no means to neglect the culture of bees. They have almoſt as many advantages as the proprietors themſelves. The great quantities of clover, muſtard, and heath, with which their grounds in general abound, would maintain a bee-hive for every horſe and cow they have upon their grounds. And gentlemen STORE-MASTERS might keep at leaſt a couple of hives for every ſcore of ſheep they have in their ſheep-walks. Indeed, farmers of every rank will find their
 advantage

advantage in keeping bee-hives, in proportion to the extent of the flowers that grow upon their farms ; as one single acre, planted with turnips, mustard, clover, or heath, will feed many hives. Even the meanest cottager, who has but a cottage and a kail-yard, might keep two or three hives, and sow a little mustard and turnips, or plant a few gooseberry bushes, on purpose to feed his bees. There is scarce a country village in the kingdom, that might not afford to keep as many bee-hives as there are dwelling houses in it ; nor a tradesman in such a village, who might not easily keep as many hives as he has hands employed in his business. Even servants might have a few hives kept as their own property, in the gardens of their parents, brothers, or friends. In short, persons of all ranks and degrees, from the KING to the cottager, might be profitably employed, or agreeably amused, by keeping bee-hives †.

F f 2

Let

† I am quite certain, and some others have often told me, that they were of the same opinion, that the melodious humming of bees, when busy at work, or sporting in the air for their own amusement, will have such an effect upon the animal spirits, that, however chagrined or ruffled the temper of a person might be, before he takes a walk among his bees, he generally does not withdraw till the mind enjoys a perfect calm and inward tranquillity.

Let none here alledge, that these our industrious insects are below the attention of the greatest. MELISSUS, the first inventor of beehives, was a king ; but perhaps we should never have heard of him, if he had not paid particular attention to these his little subjects. Encouragement might also be given to the culture of bees, by respectable societies, such as the Board of Agriculture, the Highland Society, &c. who might advertise small premiums, to be given to those who should rear the greatest number of hives, or bring the greatest quantity of honey and wax to the market during the season. Persons properly qualified might also be employed, either by societies or individuals, to inspect the state of the hives within certain districts. One person, thus employed by a society, might oversee all the hives within two or three counties in one season ; correcting, as he went along, whatever he found amiss either in the state or in the management of them, and strictly enjoining, that not a single bee should be killed at any season of the year. The increase of beehives might also be rapidly forwarded, if proprietors of ground, upon giving leases to their tenants, were to make it an article in their tack, that the tenant should furnish the proprietor with so many pints of honey produced upon
his

his own ground, annually, in proportion to the situation and extent of his farm, and for which he should be allowed the highest market price. And hints might be occasionally given in the newspapers, calling the attention of the public to perform the necessary offices about their bees, at the proper seasons of the year; as well as to inform the world when any new discovery of their nature, or improvement in their management, happens to be made.

Thus I have laid down a PLAN, in terms plain and intellegible to every capacity, for INCREASING THE NUMBER OF BEE-HIVES IN SCOTLAND; and have showed how HONEY and WAX may be increased to a PRODIGIOUS AMOUNT, by a proper exertion upon the part of all who have any favourable situations for hives, but especially of gentlemen of property, who must be supposed to have the greatest variety of such advantages. And I now take farewell of my readers, by assuring them, upon the credit of near THIRTY YEARS EXPERIENCE, that the plan I have laid down is no chimæra, or *Will-o'-the-wisp*, but that, by strictly adhering to the preceding directions, they may depend upon meeting with the utmost success.

FINIS.

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Any Gentleman, or Lady, who may be desirous of consulting or employing the Author of this work, with regard to the Management of Bees, in any respect, upon addressing a line to him at Mr GRANT'S, Leith Wynd, Edinburgh, will be duely waited upon.

The Author embraces this opportunity of returning his best thanks to his numerous customers in general, and to those of this metropolis in particular, for the very liberal encouragement he has repeatedly met with from them as a Honey Dealer; and begs that they will favour him with their orders, as early as possible, for the honey of the ensuing season, to prevent danger of being disappointed.

EDINBURGH,
July 18. 1795.

}

E R R A T A.

PAGE	v	Line 19th, For <i>both</i> read <i>all three</i> .
—	9	— 7th, For <i>does</i> read <i>do</i> .
—	21	— 21st, For <i>connioisseurs</i> read <i>connoisseurs</i> .
—	22	— 18th, For <i>meant</i> read <i>meat</i> .
—	22	— 27th, For <i>gentlemen</i> read <i>gentleman</i> .
—	27	— 26th, For <i>an article</i> read <i>articles</i> .
—	29	— 4th, For <i>preventative</i> read <i>preventive</i> .
—	31	— 21st, and 22d, For <i>she prove a bad one and die</i> , read <i>moss</i> or <i>all of the bees die</i> .
—	37	— 16th, For 80,000, read 320,000.
—	47	— 29th, For <i>counties</i> read <i>countries</i> .
—	76	— 7th, For <i>breed</i> read <i>bred</i> .
—	120	— 19th, For <i>some fore</i> read <i>a bloody</i> .
—	136	— 17th, For <i>her</i> read <i>it</i> .
—	149	— 2d, For <i>lon</i> read <i>lion</i> .
—	—	— 12th, For XIX read XX.
—	158	— 2d, For <i>no</i> read <i>every</i> .
—	159	— 13th, For <i>as</i> read <i>that</i> .
—	—	— 21st, For <i>brusb</i> read <i>busb</i> .
—	199	— 8th, For SWAMMERDANE read SWAMMERDAM.
—	210	— 3d, For <i>lever</i> read <i>sleeve</i> .
—	215	— 2d, For <i>flower</i> , read <i>flour</i> .
—	—	— 19th, For <i>fomented</i> read <i>fermented</i> .

