I

A Path to Natural Apiculture

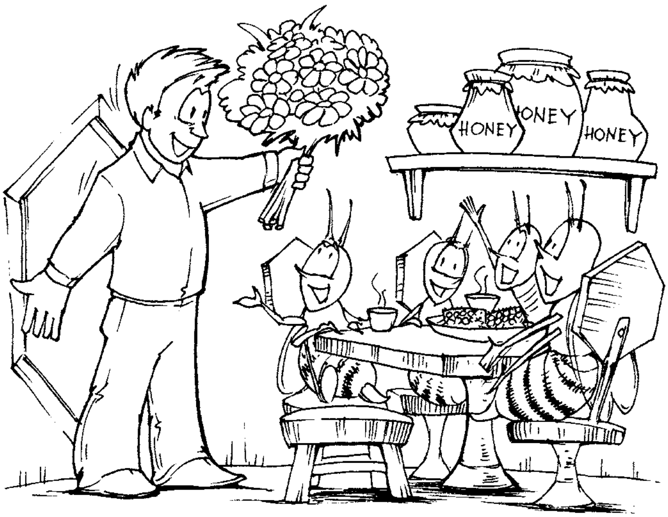
A Brief Introduction

Dear reader, the book you have before you is anything but another run-of-the-mill beekeeping manual. It's not a textbook and doesn't pretend to say anything radically new about apiculture. Rather, I simply felt the irresistible urge to share the experiences and observations that inspired me, some time ago, to adopt a particular approach in working with these remarkable insects.

What I have in mind is a natural beekeeping method that keeps human intervention into the life of bees to a minimum: no feeding them sugar, no changing the size of the nest with brood boxes and supers, no subjecting the bee colony to chemical agents of any kind, and no artificial propagation. In short, a natural beekeeper gives his bees the maximum degree of freedom to live their life as they see fit.

But is this even possible?

Of course it is! Even as I type this, looking up from my computer screen, I can see a modestly sized beeyard outside my window. I only inspect my bee nests twice a year, in the spring and late summer; the rest of the time I'm simply an onlooker, admiring the finely choreographed work of these amazing insects. And despite the fact that our hives are populated by European dark bees, known for their



grumpiness, my wife and son and I work all summer on our grounds, passing near the hives repeatedly every day. All of our guests (of which we have plenty!) also make a point of visiting our beeyard, to take a look at our beautiful hives and their inhabitants, without the least fear of being stung (see photo 23, color insert).

Without exception, no one can believe at first that everything could possibly be so simple. And no wonder, since the ingrained stereotype paints beekeeping as a labor-intensive day-in-and-day-out chore that is all but incompatible with any other activity. On top of that, beekeeping is portrayed as an extremely complex profession, one that requires years of training.

It is precisely this stereotype that has dealt such a heavy blow to modern beekeeping. The results are simply ludicrous: 3.5 million bee colonies in all of Russia![1] In a country seemingly designed by nature herself to host hundreds of times more bee colonies and feed the nations of the world with its honey! And all of this without harming nature—in fact, by benefiting nature immensely.

1. For comparison, the European Union, with a land area four times smaller than Russia's, has some 15 million bee colonies. The United States, with 40 percent less land area, has some 2.7 million colonies (down from almost 6 million in the 1940s).

Does this all sound like a fantasy? Not in the least. Only a fraction of a percent of the nectar supply produced in Central Russia's temperate zone (about which I'm writing primarily, since I'm most familiar with it) is being taken advantage of. Just spend some time in a village! You'll be lucky to find an apiary with ten bee colonies. In fact, you'll be hard pressed to find even a couple of apiaries with a hundred or more colonies in an entire district. How can this be?

I've done a lot of thinking on this topic, sifted through mountains of literature, and spoken with both professional and amateur beekeepers. And I've come to understand that the root of the problem lies in the modern approach to nature in general, and to bees in particular.

Once upon a time, man—fancying himself the ruler of the natural world—granted himself the right to interfere in the most delicate of the mechanisms that govern the life of a bee colony. And those mechanisms began to break down. Ever since, apiculture has been struggling with the consequences of this breakdown, sinking ever deeper into the mire.

However, in the 19th century and the crazy 20th, a good number of people have kept their bees naturally, striving to honor nature's laws to the fullest possible extent. Even today, many such people remain. For a variety of reasons, they rarely trumpet their existence, and their voices are seldom heard in print or in beekeeping forums on the internet.

At one time, when I began keeping bees on an extra-deep frame, I almost felt as if I'd invented an entirely new hive. But not for long! When I looked back through all the available literature (around 70 books and a large number of journals), I suddenly discovered exactly the same kind of hives and highly similar systems for keeping bees in them. The first such hive was that of Georges de Layens (described in more detail below, pp. 81–82 and 103–105). Invented in 1864, his hive became very popular in Russia in the early 1900s. Until, that is, the forced introduction of industrialized collective-farm apiculture.

So over the past several years I've been asked regularly to share my beekeeping experience and to speak of the difference between the natural and industrial approaches, of the global history of beekeeping, and of what it has led to. It turns out that a great number of people are interested in bees.

Many people dream of adding a few beehives to their garden, and in such a way as to have as little fuss with them as possible, to have them look pretty and not ruin the view, and without the bees bothering the family members and neighbors. That is, they have the same dream that I once had. It is for people like these that this book was written—as well as for those who sincerely love these wise little insects and keep them in “traditional” Dadant or Langstroth hives, but have long suspected that something isn’t quite right.

Meanwhile, I am overjoyed at the sight of the beautiful horizontal hives with extra-deep frames popping up at the homes of many of my friends. After all, having bees as neighbors makes people kinder, wiser, and happier.

How It All Got Started

Back in the day, when I decided to set up two or three beehives on my land, I was absolutely certain that apiculture was a long-established branch of knowledge and that the only thing left for me to do was to arm myself with its conclusions and recommendations and competently put its theories into practice.

This certainty was reinforced by the ten or so booklets I managed to buy or borrow from friends, which, with a neophyte’s zeal, I read through voraciously and in good faith.

They all contained highly similar descriptions of the bee colony and its life cycle, the products of beekeeping and nectar plants, and bee enemies and diseases. They all had completely identical drawings of hives designed by Langstroth, Dadant, and a few others, along with some basic recommendations for using them.

And while I made sense of the first part rather quickly, attaining a solid understanding of the basics of bee colony life, the second part—the practical side of things—left me more or less stumped. Why?

First of all, I very much wanted to understand the train of thought that motivated these hives' creators to build them as they did; I wanted to tease out the logic behind the methods applied in working with bees and to see some kind of comparative analysis that spelled out the pluses and minuses of various beekeeping systems.

But the books only contained ready-made plans, without further explanation or commentary. Do this, that, and the other, they said—this is the right way, the scientifically justified way, of doing things. And there were no answers to the many questions that had arisen during my reading. Not only were no answers forthcoming from the literature—my seasoned beekeeping friends had no answers either.

At any rate, I brushed all of this aside for the time being and got down to business. All of the colorful stories detailing beginners' bungling forays into beekeeping, of which I'd heard quite a few by that time, I attributed exclusively to a failure to follow the specialists' recommendations.

I, of course, did everything with absolute perfection: I built three solid Dadant hives and populated them with colonies of Carpathian

bees I'd bought from a commercial beekeeper I knew. And, as I started working with them, I began to understand very quickly that something was wrong.

Or, more accurately, everything was!

I sensed with all of my being how much bees abhorred any intrusion into their homes—for example, when a beekeeper lifts the top off the hive and pulls the frames out into broad daylight, one after another, with their fragile brood and busily working bees. Or when, all summer long, he constantly smokes the bees, sweeps them off the frames, and adds and removes the supers.[2]

I greatly disliked artificial propagation methods, swarming prevention, and other procedures the beekeeper is forced to perform on an almost daily basis. Meanwhile, as all of this went on, questions continued to pile up that neither books nor beekeeping friends could provide sensible answers for.

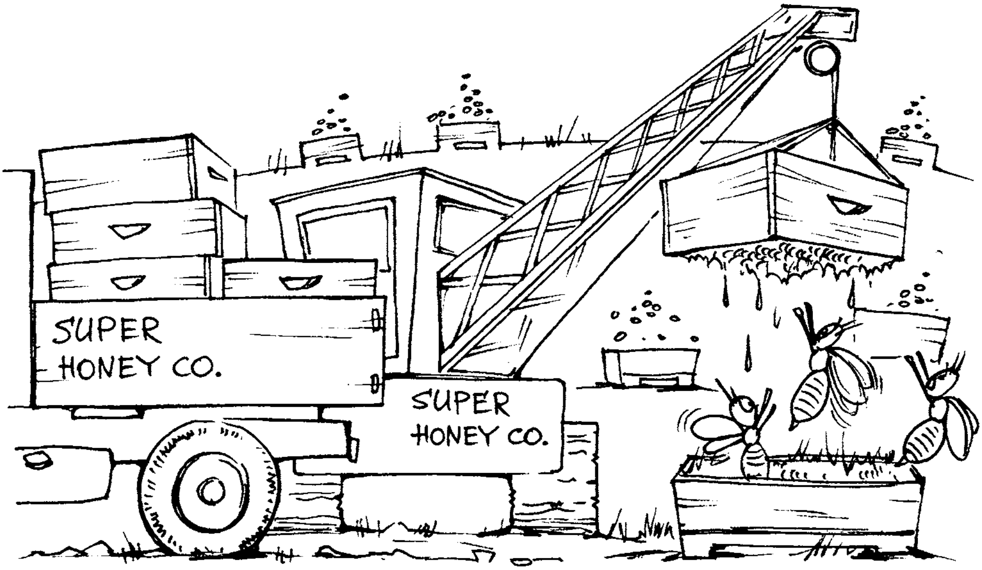
Over the course of the following winter, I delved much more deeply into the topic of beekeeping. When spring arrived, based on the conclusions I'd drawn, I transferred my bees into warm, solid horizontal hives consisting of 25 extra-deep frames. One year later, I bought around ten bee colonies of the local race, as closely related to the European dark bee as possible, and installed them in the same kind of hive. Ever since then, I've continuously been filled with joy at the sight of my bees, living and working peaceably not far from our house.

But the question remains:

WHAT'S WRONG WITH MODERN BEEKEEPING?

Why does beekeeping continue to decline further and further, despite all of the scientific developments? Why, despite being so clearly healthful and beneficial, has beekeeping not become a popular, widespread activity? Why are bees everywhere falling ill and dying?

2. In Russian, the words "beekeeper" and "human being" are both grammatically masculine, and the vast majority of Russian beekeepers are male. Following the style of the original, we are using masculine pronouns to refer to a beekeeper, while gladly acknowledging that many beekeepers are women. Please forgive the editor this imperfect choice.



I eventually began to compare modern beekeeping with someone who, having set out for another town, made a wrong turn long, long ago. And despite everything, he keeps plodding along, crossing rivers and mountains, enduring cold and hunger. He senses that he's going the wrong way, but refuses to admit it to himself, because he's afraid to.

And yet, there's simply no denying it!

Through studying the literature, watching my bees, and speaking with many people, I came to understand that a natural approach to beekeeping is a healthy alternative to the industrial approach that still dominates the world's apiaries. This understanding gave rise to a beekeeping system based on deep respect and complete trust in a bee colony as an intelligent and highly advanced living being capable of independently governing its life and solving all of life's challenges.

This system makes it possible to keep bees while expending a minimum of effort and labor, practically without interfering in their lives, without disturbing them unnecessarily, and without doing them any injustice. And the bees respond with gratitude: they work peacefully, without bothering family members or neighbors, all while providing you with the most healthful and tasty product in the world—honey.

Yet the greatest joy for me was to realize that I hadn't discovered anything new. All I'd done was arrive, after considerable independent thought, at the same conclusions that many others had reached long before I did. It was only after finding numerous confirmations of my thoughts and conclusions in the literature that I decided to publish this book.

A Small Side Note

I must hasten to add that the natural approach to beekeeping, whose principles are described in this book, may prove interesting and useful to anyone and everyone. However, the practical recommendations directly apply only to those living in the deciduous forest zone of European Russia. And this is very important! This area enjoys an abundance of nectar plants, forests and meadows filled with wildflowers, and its natural environment has not been as damaged by human activity as it has been in many areas farther south.

This region is very well suited to hosting large stationary apiaries. At the same time, it has a short summer, an extended period with no honeyflow whatsoever, and long winters that require a warm hive and substantial winter reserves.

All that being said, by relying on natural beekeeping principles, anyone can develop a system for any locale and climate, as long as they're serious about it.

The Industrial and Natural Approaches

No book that expresses the viewpoint of one or several people can claim to be entirely free of subjectivity. For my sometimes excessively sharp tone, I apologize in advance to those who keep bees in Langstroth or Dadant hives[3] and do so with the best of intentions,

3. *Dadant hives*—hive model designed by Charles Dadant and still widely used in Russia, France, and other countries. Not to be confused with hives produced by Dadant & Sons, a US manufacturer, which now only makes Langstroth hives.

like so many beekeepers in the past. That is, they leave up to 50 pounds (25 kg) of honey for the winter, keep an emergency supply of capped honey, use no feeds other than honey, avoid disturbing their bees unnecessarily, and only keep bees of the local race.

Furthermore, I do not dispute the fact that one can indeed apply various scientific methods (a two-queen system, uniting colonies, and others) to encourage the bees to produce record-setting honey harvests, as certain apicultural shock-workers managed to do during the Soviet period. If anyone has the time and desire for this and enjoys constantly fiddling around with their bees, testing all sorts of approaches and theories on them—be my guest!

Just don't think that there's no other way to do things! After all, thanks precisely to unrelenting and even aggressive propaganda advocating industrial methods as the only methods possible, millions of people have been deprived of the possibility of keeping just a few bee colonies in their gardens, as they did in the old days, exclusively for their own use and enjoyment.

And what a joy it is! My wife and I (and our six-year-old son) have already gotten so used to our little bees that we simply can't imagine life without their friendly buzzing, their unflaggingly energetic vibe, and their delectable honey on our table.

In short, it is a verified and indisputable fact that one can keep bees naturally, with a minimal expenditure of time and labor; thousands of years' worth of experience with tree hives[4] and log hives prove it. As if that weren't enough, we also have a century-and-a-half's worth of experience keeping bees in hives with extra-deep frames—experience that is conspicuously absent from the pages of books and beekeeping magazines.

Reminding everyone of this method is one of the goals of this book.

The Bee Colony's Intelligence

Observing a bee colony, striving to understand what motivates its particular actions, will inevitably leave you asking some deep philosophical questions. In the end, how you answer these questions will prove decisive in choosing your own approach to beekeeping.

In my view, a willingness to make splits,[5] force-feed bees with sugar, or artificially impregnate queens speaks to a certain approach to life, or rather a lack of any approach whatsoever—that is, doing things "the way everyone else does," without a second thought.

For me, it became clear long ago that every life form is governed by intelligence. Just take a careful look at any insect! An ant crawls along a blade of grass. It stops, wiggles its antennae, pauses for a moment (in thought?), then hurries on about its business. Its every action is carefully thought out and aimed at achieving a goal. And what's true of insects is all the more true of higher animals.

The behavior of any living creature, even the very smallest, is so complex and multifaceted that no science can hope to explain it fully. After the most complicated studies, the only thing scientific learning

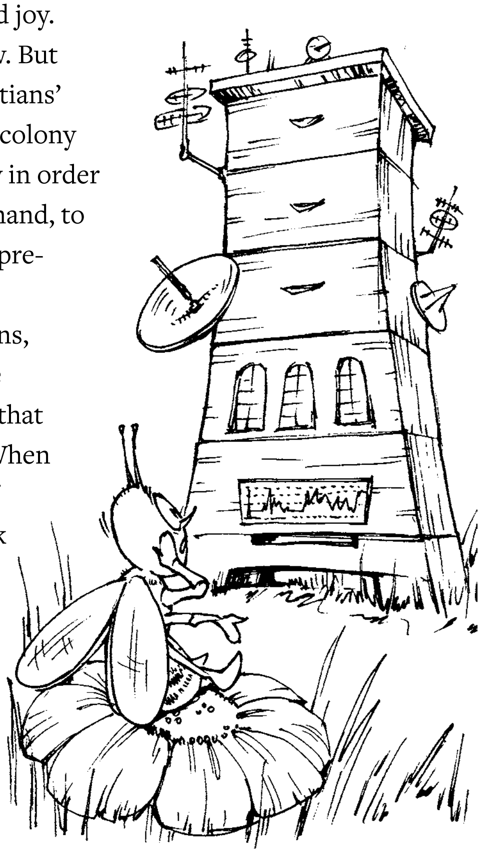
4. *Tree hives* (Russian: *bort'*)—artificial tree hollows in living trees, often at considerable height, made for attracting and housing bee colonies. After natural tree hollows, tree hives are Russia's most ancient form of beekeeping.
5. *Making splits*—artificially propagating bees by dividing a colony into several parts. This and other beekeeping terms can be found in the Glossary at the end of the book.

has learned (forgive the tautology) is to describe the processes taking place in living tissues—but the question of what stands behind these processes remains unanswered. The only possible answer requires us to assume that everything that lives is intelligent.

Personally, I am convinced that a Higher Intelligence exists that governs all of Life, and that every little plant and every little creature possesses its own individual intelligence. It's just that their intelligence doesn't resemble ours; it lies in other dimensions, beyond the reach of modern man's "vision."

I say "modern" man intentionally, since, it seems to me, there was a time—the so-called Golden Age of humanity—when humans still sensed their connection with this Universal Intelligence and recognized every creature's right to live. These humans understood the purpose of their existence and lived in peace with all other beings. They were filled with energy and joy.

When was this exactly? I don't know. But accounts have survived of ancient Egyptians' ability to use certain sounds to cajole a colony of bees into leaving its hive (most likely in order to harvest the honey), or, on the other hand, to draw a swarm of bees into a new home prepared just for it.



As for the bee colony, all of its actions, the entire rhythm of its life, can only be understood if we acknowledge the fact that bees possess a collective intelligence. When they team up, bees give rise to a kind of overarching "field of thought" and work in unison to resolve highly complicated tasks, such as building a brood nest or maintaining the hive's microclimate.

Judge for yourself. There was a certain researcher studying how honeycomb is constructed. He compelled some bees to build comb under conditions they would never encounter in nature—and each and every time, they hit upon the ideal solution to the problem. He spun the hives in a centrifuge, altered the magnetic field—and eventually was even able to obtain a spherical comb that he dragged around to various forums and exhibitions for many years afterward.

By this researcher's own account, the bees built this comb in several stages: they went to work, stopped, "thought," destroyed what they'd built, and began anew—and they did this multiple times until they found the proper solution. I repeat: such actions cannot be chalked up to mere instinct, since this challenge was likely being encountered for the first time in the entire history of bees' existence.

Another researcher began moving a sugar feeder a certain fixed distance each day, in the same direction, until the bees (three days later) managed to anticipate where the feeder would show up next. That is, when he brought the feeder to its new location, the bees were already waiting for him!

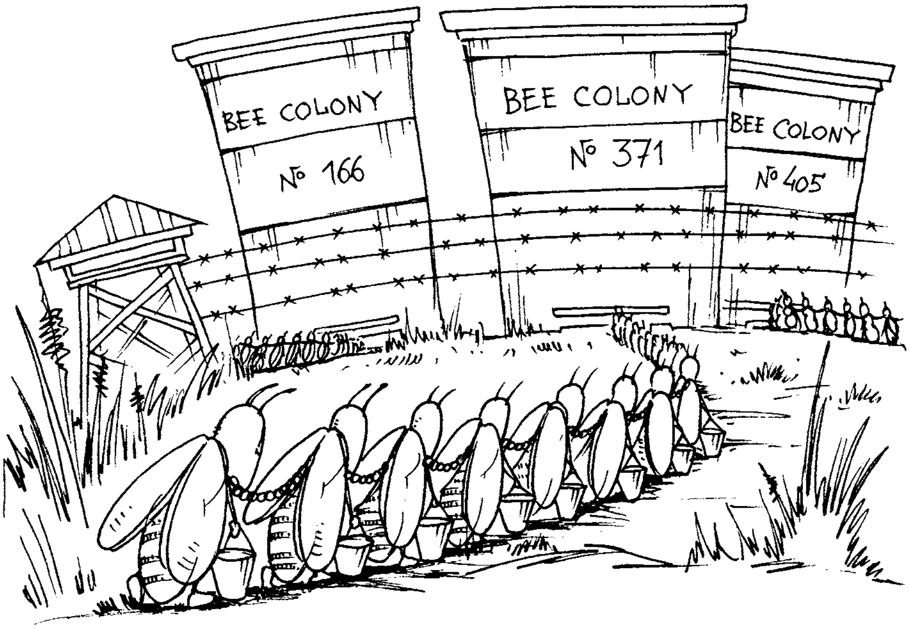
Are these not convincing examples of a bee colony's intelligence? And there are a lot more where these came from.

Now comes the surprising part. Almost all beekeepers know about all this; in practice, they've encountered the highly complex and often inexplicable behavior of their bees. And yet, willy-nilly, they're forced to turn a blind eye to it, since otherwise they'd have to abandon all of the methods they've grown so accustomed to. And that's a very hard thing to do. As a result, an industrial beekeeper will praise bees to the sky for their amazing intelligence, even while treating them like stupid, senseless little bugs.

Am I wrong?

If you think so, I recommend that you read the literature on methods for artificially inseminating queen bees—or, better yet, watch an instructional video. Personally, I've read the literature, but I couldn't bring myself to sit through the entire video—watching it was downright painful.

And the bees? They'd like nothing better than to escape and fly away, but, like puppets on strings, they can't stray too far. A bee-



keeper has a full arsenal of tools for forcing them to live in his hive: he can cut out queen cells, split up the colony, remove the brood, or change the queen. Take a look at Shimanovsky's classic work on beekeeping,[6] and you'll find hundreds of methods for preventing swarming!

The bees, meanwhile, are left with only one option: to respond with aggression and outbreaks of disease.

Where does this leave us? Well, we're left with the fact that if people have various approaches to a certain subject, then arguing with them or trying to persuade them is useless. It's been proven many times in practice: despite appearing to have a conversation with someone, you always seem to be talking past each other.

This work was written from the viewpoint of the natural approach, and therefore simply can't be understood from any other

6. Vsevolod Shimanovsky, *Beekeeping Methods*, 1916 (in Russian). Note that most of the Russian sources cited in *Keeping Bees with a Smile* have not been translated into English.

angle. Consequently, anyone who can't accept the position laid out above *internally* shouldn't bother reading any further.

Those who remain, however, I invite to join me, as we march on together.

The Goals of This Book

This book's primary goal is to gather and systematize the scattered bits of information concerning the natural approach, found in practically any publications dealing with this topic.

The second goal is to present the minimum amount of knowledge about the life of bees and the principles of beekeeping that is absolutely essential for anyone who has decided to set up even a couple of bee colonies for the first time.

The third goal is to make life easier by answering, once and for all, numerous questions asked by those interested in the natural approach.

Finally, the fourth goal is to promote a return to apiculture's former glories, when everyone, young and old, knew how to get along with bees, when every yard was home to numerous beehouses, when people ate their fill of honey and lived to be a hundred.

In my presentation, I hope to avoid, as much as possible, commonly known or easily accessible information, emphasizing instead information you're unlikely to find in a standard text on beekeeping.

So let's get down to business!

The Tree Hollow as the Bees' Natural Home

The tree hollow, as the bees' natural home, has been studied and written about repeatedly. Information about a tree nest's structure provides a wealth of inspiration for reflection and for drawing the practical conclusions necessary when building hives. After all, bees (especially our local northern bees) have adapted their entire life cycle to life in a tree nest.

What are the primary features of a tree hollow that should be kept in mind?

- A tree hollow has thick walls—four inches (10 cm) and beyond—that ensure solid insulation, protecting it from the cold during winter and the heat during summer.
- The tree hollow is especially well insulated from the top by several yards' worth of tree trunk, situated directly above the bees' nest.
- As a rule, a tree hollow has only one entrance, formed by a knot in the wood that has rotted out. The bees attempt to seal off any other gaps or openings.
- Bees are especially fond of tree nests whose entrance is situated halfway up the hollow, at least 9–10 inches (22–25 cm) from the top; that is, the upper portion of the bees' nest should always consist of an *extremely warm vault with no air vents whatsoever*.
- Moreover, the tree nest can have a considerable depth, sometimes exceeding even six feet (2 m). That is, as long as there's a warm vault at the top, the bees aren't bothered by a large empty space toward the bottom. This may even be advantageous, since extra moisture can accumulate at the bottom of the nest during the wintering period, which then escapes during the summer.
- Bees like a nest that is at least 20 inches (50 cm) tall.
- And, to state the obvious, the tree nest is never moved from one place to another, nor does the location of its entrance ever change.

A falling tree might, I suppose, be an exception to the final rule—after all, such things do happen. So beekeepers know that, when removing from a tree a swarm trap[7] in which bees have been living for several days, one can move it a bit lower, or a bit to the side, and the bees will still find it. But if it's moved much farther, they'll continue to congregate where the swarm trap was hanging previously.

7. *Swarm trap* or *bait hive*—a small hive placed on a tree in the spring to attract swarms. See more on pp. 117–120 and 265–269.

That is to say, bees have a strong sense of place, and become very accustomed to the location of the entrance to their home; any and all changes are a source of distress. For example, if, on a horizontal hive, one round entrance is sealed and another one opened, the hive's bees, upon returning home after foraging, continue to beat their heads against the closed entrance, without immediately locating the new one, for a very long time (more than a week).

Here's another interesting point. A tree nest located in a live tree may sway slightly in the wind, along with the tree trunk itself. Could this explain why bees, starting at a certain depth, join individual combs with brace comb?

One especially important matter is a tree nest's diameter, since this topic has given rise to widely conflicting data.

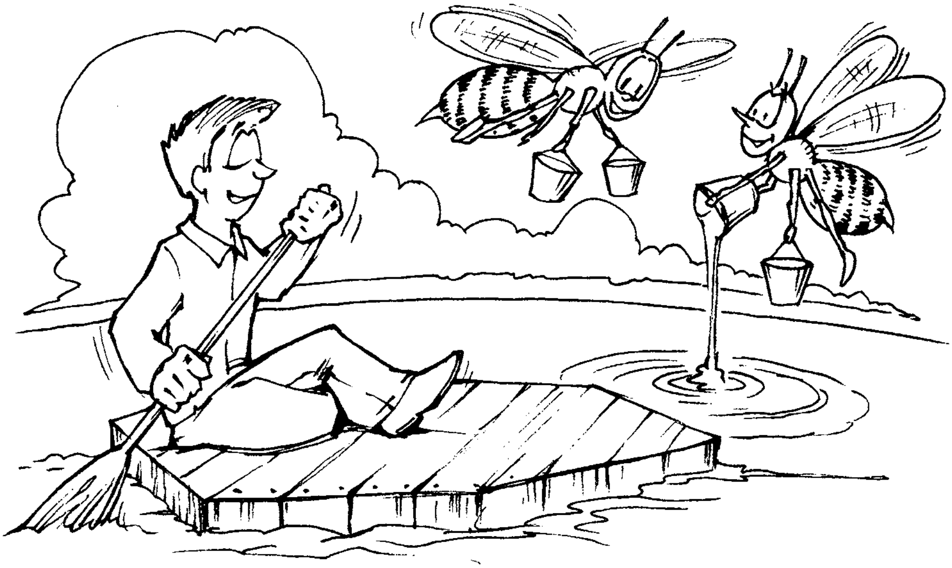
Some time ago (the mid-19th century), the renowned Polish beekeeper Kazimierz Lewicki, following an exhaustive study of the tree nests available to him, made his deep frames ten inches (24 cm) long. He took this length (or just over it) to be the diameter of the standard, statistically average tree nest (see Figure 7, p. 89, and Figure 5, p. 82).

But what, then, are we to make of more ancient testimony? Below is a well-known quotation, taken from Nikolay Krivtsov's book, *European Dark Bees* (St. Petersburg, Lenizdat, 1995):

> On the Russian forests, Iovii Novocomensis[8] wrote that "the most dependable harvest is of wax and honey, for the land is full of honeybees. Here, in the forests and the thick tree groves, one often comes upon extraordinary swarms of bees settled in the trees. One often finds tremendous masses of honeycomb hidden away in the trees; and the tree stumps, some of incredible thickness, sometimes harbor veritable lakes of honey."

A very simple explanation presents itself: at one point, there were virgin forests where oaks or linden trees of more than three feet

8. *Iovii Novocomensis*—reference to Paolo Giovio (1483–1552), an Italian humanist whose 1525 book contains a description of Russia's geography.



(1 m) in diameter, far from being giants, were the norm, as were hollows of more than 20 inches (50 cm) in diameter. By the late 19th century, however, such forests no longer existed in Russia's temperate zone, much less in Europe. Trees growing in regions settled by modern man simply aren't allowed to live to see a hundred.

So it turns out that bees aren't at all intimidated by the size of a hollow; during the winter, the bee cluster gets along fine in a spacious hollow with fresh air circulating on all sides, as long as there's honey stored up top, a nice warm vault above the nest entrance, and moderate ventilation.

By way of confirmation I'll give an example from my own experience. One spring, when I was inspecting one of my colonies, I discovered that I'd forgotten to place an insulated division board to one side of the nest, and that the bees had wintered on ten extra-deep frames, across the full 25-frame volume. And they'd had an excellent winter: the hive was completely dry and contained very few dead bees.

Meanwhile, in the summer, strong honey-producing colonies can develop in high-volume tree nests with a large comb area.

Some Useful Facts about Comb

A tree hollow, log, or hive merely provides the outer walls for the bees' home—or, to use some construction lingo, its "frame." They provide a convenient container for the waxen combs where the entire life of a bee colony plays out. In the comb's wax cells, reserve provisions are stored away, the queen bee lays her eggs, the larvae develop, and young bees are hatched.

Bees dedicate a great deal of energy to building their comb; therefore, the comb is used repeatedly, until it becomes completely unusable. For this reason, a swarm of bees loves to settle on some old, empty comb (frames from which the honey has been extracted), preferring it to an empty box or a swarm trap with some foundation.[9]

Detailed descriptions of comb, including its structure, dimensions, and uses, can be found in any classical text on beekeeping, so there's no need to repeat them here. However, I'd like to draw your attention to a few important points that will prove useful to us down the road.

So here goes:

Each individual comb is attached to the top of the hollow and drawn straight downward. Bees begin by building a central comb, on two sides of which (at the expected distance) two more combs quickly appear and begin to grow, and more and more combs beyond them, until no room remains in the hollow.

A small colony will successfully overwinter on six combs, and a larger one on eight. An especially strong colony needs all of 12 combs for wintering (and growing in spring), but this is the limit. The famous French beekeeper Charles Dadant stopped at this number—12—when developing his hive model.

Young combs are semicircular in shape. Hanging nicely from the top of the hollow, they look something like slices of cheese, with the larger "slice" in the center, and the slices to each side of it growing progressively smaller (see photo 46, color insert). When the combs reach the vertical walls of the hollow or the log hive, the bees begin

9. *Foundation*—a sheet of wax stamped with the bases of honeycomb cells.

to fasten them to the walls as well—not along their entire length, but here and there, leaving vertical gaps. These gaps create popholes from one comb to another; they are also essential for properly ventilating the bees' dwelling (see photo 10, color insert).

After all, bees maintain a temperature of around 95°F (35°C) in areas where their brood is located, as well as a certain humidity, "turning on" the heat or the ventilation as necessary.

These are the purposes (popholes and ventilation) served by the openings and vertical gaps in the combs themselves; they are especially vital for wintering successfully. Winter, of course, is a critical period; bees spend all summer preparing their home for it! Once winter comes, they're no longer able to drill an extra hole or shift honey around.

A newly constructed bees' nest is quite a captivating sight. From the top of the hollow hang delicately fashioned combs, completely teeming with bees. Somewhere, in the thick of the crowd, the queen is on the move, surrounded by her retinue; the sluggish drones slouch about; the worker bees toil away, each occupied with her own particular task. Some store and process the nectar; some feed the brood; some clean the cells; and others, dangling like a cluster of grapes, are drawing fresh comb.

A bee colony doesn't fill in its dwelling with comb without rhyme or reason, but rather according to a very specific plan, developed in each instance based on the dimensions and shape of the hollow, the location of the entrance, and other factors. The bees leave popholes in some combs; some are built with undulations, like a wave; and some are even curved to one side and fused with neighboring combs.

Many people attribute all of this to sheer caprice, believing that comb is cobbled together haphazardly. But this is a major misconception—one that speaks to that human lack of intelligence that distinguishes him from an intelligent Nature.

But here's a contradiction: when we place a frame with foundation into a hive, we're forcing that hive's inhabitants to build their comb in a certain way, in a way they'd never build it if left to their own devices—that is, from the very start, we're working against nature!

Yes, this is indeed the case. And therein lies the fundamental drawback of a movable-frame hive. However, we do have two ways of compensating for it.

First, we can build a hive and fill it with frames in a way that approximates, as much as possible, the way bees would fill it themselves in a natural setting. And, secondly, following the springtime inspection, we can refrain from disturbing the nest portion of the hive. The bees themselves, in response to the task presented to them, will create the best possible conditions for raising their young and wintering successfully.

Here and there, they won't draw their comb to the bar of the frame, leaving a vertical gap; here and there, they'll leave openings in the comb. Experienced beekeepers know that bees are especially prone to "botching" comb in this fashion in the nest portion of the hive. And, in the name of "winterizing their bees," these same beekeepers will try to replace these botched combs with better ones, leaving the winter cluster without popholes or ventilation.

By the way, more than once I've read and heard about beekeepers who do not winterize bees—that is, they do not rearrange frames in the nest portion of the hive, leaving everything as is. They are quite successful, except for one little problem: the depth of the frames. Bees are incapable of wintering successfully on a Dadant frame $11\frac{13}{16}$ inches (300 mm) deep, let alone on a standard Langstroth frame ($9\frac{1}{8}$ inches deep).[10] That is, if they do winter on one, it's at the very limits of their abilities, under abnormal, unnatural conditions—with all of the expected consequences.

But we'll return to this question later. For now, let's get back to honeycombs, and to the following issue, one very important for us: the life cycle of the bee colony.

10. In Russia, the standard Dadant brood frame is $17\frac{1}{8}$ inches (435 mm) long and $11\frac{13}{16}$ inches (300 mm) deep. This is the "Dadant frame" referred to in this book. In the United States, the "jumbo" Dadant brood frame dimensions are slightly different: $17\frac{5}{8}$ inches long by $11\frac{1}{4}$ inches deep. The "deep" Langstroth frame is even more shallow, $9\frac{1}{8}$ inches (232 mm).

The Bee Colony's Developmental Cycle

We now see that a large amount of fresh, clean comb gives a bee colony the room it needs for growth, while a shortage of comb can slow or even completely halt its growth. This fact gives rise to a natural cycle in a bee colony's development, whose timetable depends on the size of the living space at its disposal and on the vitality of the colony itself.

Understanding this natural cycle is probably the most important element of a natural approach to beekeeping. By relying on this understanding, we can decide how to deal with the bees in our care, and work out the few operations that must be carried out in the hive during the course of the year.

This understanding allows us to grasp why the keeper of a multistory hive must constantly struggle with swarming, and how to ensure that the bees in our hives continue working calmly all summer, gathering honey and preparing for winter.

So your attention please! Here are the main facts about comb:

- Bees expend a great amount of effort on building comb. Calculations show that a bee will consume at least eight grams of honey in order to build just one gram of comb. Over one summer, a strong colony is capable of drawing up to 20 deep Langstroth frames (or 10 extra-deep frames[11]) of comb, but it can fill many times more frames with honey!
- Bees use comb multiple times; that is, in a given cell, multiple generations of bees will be hatched, and reserves of honey and beebread[12] will be stored on multiple occasions.
- Comb in which bee brood is raised gradually darkens and eventually turns completely black. The cell walls thicken and the cell diameter is reduced.
- Bees do not use old (black) comb, abandoning it in favor of fresh comb.

11. *Extra-deep frame*—here, standard-length frame that is at least 17½ inches deep. An extra-deep frame can have smaller dimensions in warmer climates: e.g., the Layens frame is 13 inches long by 16 inches deep.
12. *Beebread*—fermented pollen stored in comb cells; it is used for feeding brood and the queen.

- Bees are unable to break down black comb in order to build new comb in its place. Or perhaps they simply choose not to. In any case, it's just not done.
- A bee colony rarely uses old (last year's) honey reserves; assuming that foraging is available, they prefer nectar or fresh honey from the current season. Old, partially crystallized honey builds up in the hive as a kind of dead weight, luring any number of hungry creatures.

Thus, the big picture of bees' life in a tree nest looks something like this: the bees are constantly building new comb, taking full advantage of whatever empty space is available. The queen deserts the old comb to work on the new, and the black, exhausted comb, with its reserves of old honey, remains unused. And the result? The result is that a strong colony can fill a modestly sized hollow in a single season, and, having wintered in it, is in the mood to swarm come spring. This is perfectly understandable: when the flow[13] begins, all available cells quickly fill with nectar; the queen has nowhere left to lay her eggs; the young bees have nowhere to build; and, on top of everything, the overpopulated nest begins to overheat.

In a large hollow, bees will build additional comb, expanding downward and out to the sides, and gradually moving away from the black, exhausted layers. During the second and, perhaps, third years the bees are unlikely to swarm, as they grow their large and powerful colony (I'm speaking of the European dark bee). In time, however, having filled the entire space inside the hollow, they will begin to cast one powerful swarm after the other.

Consequently, the life of a bee colony in a tree hollow follows the same law of cyclicity seen in the universe in general, and in the world of living nature in particular. At the end of the cycle, whose length depends on the size of the hollow, the strength of the swarm that occupies it, the volume of the summer's flow, and other factors, the colony will abandon the nest, leaving its contents to the numerous

13. *Flow* or *honeyflow*—the availability of nectar in nature.

fanciers of apian delicacies, from wax moths to bears. Thanks to their efforts, the hollow will be cleared out within a very short time, and ready for a new swarm to move in.

Such, as I understand it, is the overall life cycle of a bee colony. But within this larger cycle is a smaller one that is no less important for our practice: the cycle a bee colony lives through over a given year, which brings us to our next topic.

A Year in the Life of a Bee Colony

We all know that each individual worker bee has a relatively short lifespan: around 40 days. During that time, it manages to live a full, productive, and vivid life, whose stages are described in detail in the professional literature. During various periods of its existence, it will be charged with cleaning cells, feeding the young, drawing (that is, building) comb, foraging, guarding the nest, and performing many other tasks, all to the benefit of its apian clan.

A worker bee dives right into its complicated and multifarious labor almost immediately following its "birth."[14] And here's the amazing part: no one teaches it what to do. It doesn't take any final exams and isn't assigned some work quota. At every moment, the bee itself knows exactly what it needs to do and how to do it.

This topic, of course, exceeds the scope of scientific research. Bee behavior has traditionally been explained by invoking all-powerful *instinct*—which is to say that it hasn't been explained at all. Of course, this is all to be expected, since here we've come to the threshold of the *spirit*, beyond which materialistic science is rendered completely impotent.

Meanwhile, if one looks carefully, one can see this spirit shining through in the life of any living creature, if one can only stop dismissing everything we've grown used to as being simple and obvious. But this is another topic for another day, somewhat tangential to our present study.

14. *Birth*, by definition, is when a fully formed organism emerges from the body of its mother, like in mammals. Bees are not born. Like birds, they *hatch* or *emerge*.

I'll refrain, as usual, from providing a full-blown description of the life of an individual bee, referring the reader instead to any conventional textbook. Instead, we'll focus our attention on information that can only be assembled bit by bit, from various far-flung sources.

The idea that a beehive is a kind of box containing a certain number of bees is fundamentally flawed. The life of a bee colony is always in flux. The number of bees in that colony depends on the queen's laying rate and can fluctuate dramatically over the course of the year. In the spring, there are very few bees; they behave lethargically and allow the beekeeper to calmly carry out his inspection of their nest. During this period, the winter bee still predominates; its task is simply to survive the winter and raise the new brood that will replace it once spring arrives.

The queen already begins to lay her eggs in late winter, but lays very little at first, gradually increasing her egg production. However, as soon as the first flow begins, her laying rate rises dramatically, and some time later a large number of young bees begin to appear in the hive. This is easily seen: each day the youngsters emerge and take flight; forager bees, marked by the bright spots of their pollen pellets, are constantly swerving into the hive entrance, and a friendly, joyous buzz is heard throughout the beeyard.

In Russia's deciduous forest belt, the springtime buildup stretches from mid-April to mid-May, and this is the time to tackle your spring inspection—the only operation in the entire year that requires you to disassemble the nest. The best time for it is early May, when the early flow has already stabilized, but the bees haven't yet reached their peak of strength. If you wait until the end of the month, you'll be making your life more difficult.

But we're getting ahead of ourselves. So by late May (don't forget to adjust the time frame based on your latitude) the bee colony has gained considerable strength. Around this time, it will face a fairly short period with almost no flow, when the springtime nectar plants have finished blossoming, and the major ones haven't started yet. During this period, a colony with sufficient space in its hive will continue to grow, and those who are feeling a bit cramped may cast a swarm.

A natural beekeeper who is looking to expand his apiary may easily take advantage of this natural mechanism. Following the spring inspection, he can stop adding frames to the hive (or, in order to produce the very earliest swarms, not inspect the hive at all) and seal the gap beneath the division board walling off the empty space (details on hive structure will be provided later), thereby limiting the colony's ability to grow. Once they've cast a swarm, you'll need to reopen the gap, move the division board, and add some frames.

This simple procedure can generate as many swarms as necessary, and at the best time for swarming—early summer. Robust swarms installed during this period will not only have time to prepare adequately for winter, but will also manage to yield at least some honey.

If you don't need any swarms, then all you need to do is make sure that the colony always has some fresh foundation to build on, and room for growth. If that's the case, then there's an 80–90 percent probability that our local race, the European dark bee, will not begin swarming, preferring instead to grow, over the course of the summer, by filling out the entire space at its disposal.

That is, each spring we put the bees in a situation resembling a large, empty tree hollow (of which we spoke earlier) free of old honey reserves and old black empty comb, and with plenty of space and possibilities for growth.

This is what taking advantage of natural mechanisms is all about.

The primary honeyflow comes in June and early July. Anyone who's been in a beeyard during that time knows what an unforgettable spectacle it can be. The entire yard hums like a single, giant hive. In an uninterrupted line, the bees fly headlong from the hive entrance and, returning with their heavy load, alight laboriously on the landing board. When darkness falls, the flights come to a halt, but some bees remain stationed on the landing board, fanning—driving out of the hive warm air filled with the wonderful aroma of honey.

During August, the colony's activity level gradually falls, and the number of bees in the hive dwindles. Here again, a question occurs to the curious observer: how does the queen, during the thick of such a bountiful harvest, realize that the honeyflow will soon decline? After all, she has to know this ahead of time (by three weeks) in order to reduce her egg production! Science claims that the bees, conspiring among themselves, begin feeding her less. But remember that a worker bee only lives for a little over a month—how, then, could it be aware of annual natural cycles, especially since these cycles may shift by a week or two in any given year?

My sense is that a bee colony that has lived for generations in a particular area constitutes a small part of that area's natural environment, and therefore simply "knows" what the weather will be like at least half a year in advance. Not that there's anything surprising about that—after all, scientists have discovered many plants that prepare for winter differently based on whether or not the winter will be harsh or mild.

This observation directly relates to a later chapter that will deal with bee races; it also relates to certain recommendations found in beekeeping publications.

One such recommendation calls for "helping" the bees grow their colony in time for the main honeyflow. To this end, one is advised to insert electric heaters in the hives in early spring, or to engage in stimulative feeding, or to take other such steps. There's no shortage of methods! As for the results—you'll hear about them from time to time, from practicing beekeepers who aren't embarrassed to admit their mistakes (see pp. 48–52).

For example, let's say you artificially increase the bee population. Then you have a protracted spring, or rains set in. The major honeyflow is postponed by two weeks or so, the bees are in a bad way—and the polemics rage in the beekeeping magazines: what went wrong? Yes, you should have increased the population, but you should have done so a bit later, and using some other method! Beekeepers read the magazines and resume their experiments. Does it sound like I'm exaggerating? I'm not. Just read some old issues of *Beekeeping* magazine (Russian: *Pchelovodstvo*)—it's all there.

So by late August or mid-September (the time always varies!) the queen stops laying eggs, and three weeks after that, the final brood emerges.

Bees that hatch in the fall no longer participate in the work. Their task is to survive the winter and raise the spring brood. They live several times longer than summer bees because they move very little and don't work themselves to death by foraging.

When the daytime temperature outside falls to 50°F (10°C), the bees all but halt their flights and begin to gradually form a cluster. Just ahead is the most difficult time of the year: winter.

A Word or Two on Wintering

Strange as it may sound, fairly little is known about the life of a bee cluster during winter. If you walk up to a hive during winter (needless to say, my bees spend the winter outdoors) and press your ear up to the entrance, you'll be able to hear the humming of the bees—the colder it is outside, the louder the humming becomes. By causing their chest muscles to vibrate, the bees closest to the cluster core help raise the temperature inside it. Based on this humming sound, one can judge how the colony is wintering.

In order to generate the energy necessary for heating, the bees slowly consume the honey set aside for the winter. The classical literature claims that the bees are constantly changing their positions within the cluster, moving from the periphery to the center, or upward toward the honey (to replenish the reserves in their honey stomachs), and back again. Today, these ideas are changing a bit. It turns out that the wintering process begins with bees of various ages, and that the older bees—better adapted to lower temperatures—form the "crust" and protect those inside the cluster from the cold. Once the weather warms up, the crust bees die off rather quickly, while those in the core remain able to work for a while longer.

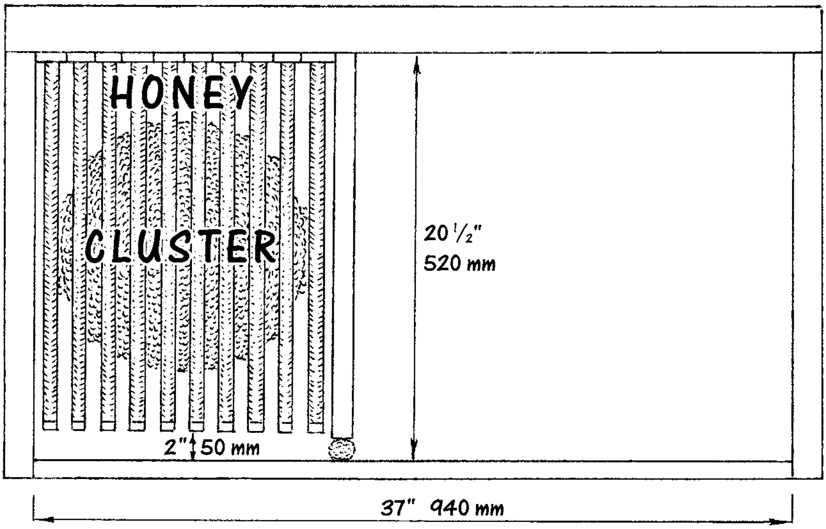


FIGURE 1. Position of the winter cluster in a horizontal hive.

That's the picture, more or less. How accurate is it? I don't know. After all, the devil's in the details. For example, a bee cluster is intersected by combs—how do they cope with this? How does the queen behave? Does she keep her retinue during the winter? And so on and so forth. But let's leave these questions for the researchers, and take a moment to thank them for what they have managed to learn—all of which is of great interest to us.

As usual, we'll stick to a few points of special importance. After all, we have our own agenda: to avoid interfering with the bees' preparations for the most difficult stage in their lives.

So without further ado, *here's the important stuff*:

- Bees do not hibernate during winter. Even during the harshest cold, a cluster's interior maintains a temperature of at least 68°F (20°C), and as much as 95°F (35°C) in late February to early March, when the brood begins to appear.
- Bees obtain the energy needed for heating by consuming the honey located directly above the cluster. In the process, the cluster moves gradually upward at a rate of approximately one millimeter every 24 hours.

- Bees are unable to use the honey stored in the outer combs. It is only of use in the spring, when the weather outside grows warm and the cluster breaks up.
- The cluster forms in the fall on empty (!) comb, near the lower part of the hive, leaving as many honey reserves as possible up top.
- Since the cluster takes the shape of a sphere, the least amount of honey will be left in the central comb, a bit more on the adjacent combs, and so on. And, surrounding the cluster, there will remain good frames full of honey and beebread that will fuel springtime growth.
- The preceding point, which reflects the classical understanding of the distribution of winter reserves, needs some qualification. The fact is that bees, as practicing beekeepers have observed, may leave a share of their reserves in the back of the hive (far from the entrance), or leave a comb filled with honey in the center, or leave a portion of beebread inside. They have their own idiosyncratic considerations—more complicated than ours.
- A cluster can be up to ten inches (25 cm) in diameter.
- In order to pass from one comb to another from within the cluster during winter, the bees leave gaps and round openings in the comb.
- At least 50 pounds (25 kg) of honey should be left for a large colony for the winter. It will consume around 30 pounds (15 kg), leaving 20 pounds (10 kg) in reserves, without which the bees will grow terribly anxious.
- Honey gathered during the main honeyflow is best suited for use during wintering. During the dearth period, bees will "manufacture" honeydew honey that could lead to their deaths during winter. Therefore, the bees ready their winter reserves ahead of time, at the peak of summer—a fact exploited by industrial beekeepers as they add and later remove a super.
- During the winter, the bees are unable to chew a hole through the comb, move honey, or seal any gaps that appear with propolis. All of these things must be done ahead of time.