Johann Ludwig Christ

Instructions on the most useful and pleasant beekeeping for all regions

1739 - 1813

Instructions
on the most useful and pleasant beekeeping
for all regions

in which, in a moderately good bee year
with 25 good beehives, 100 fl. [gulden] can be earned, and
in a really good bee year, 200 fl., and yet every hive remains
in good condition;

tested
and published for the common benefit and
enjoyment

by
J. L. Christ

First Pastor in Kronberg an der Höh, the Royal Churf.
Agricultural Society in Zelle Member Third

greatly expanded and improved edition.

..
With five copper plates
..
Leipzig, 1798

by Johann Benjamin Georg Fleischer.

Preface to the first edition

In the great book of nature, which preaches to us the profound wisdom and power of the adorable Creator, bees are certainly not to be found among the last letters. In the animal kingdom and among insects, we find many creatures that possess extraordinary dexterity and perform actions that seem to presuppose intelligence, which we must admire in irrational creatures. How artfully, for example, does the social beaver build its chambers and dwellings, its storehouses and special rooms? How artfully do they saw down the trees with their teeth, ram them down, and bring the earth and clay to the belly of one of their society, which four others pull along at its feet like a loop? How admirable, how wise, one might almost say, is the ant lion among insects in making its funnel to catch its prey? How regularly, how geometrically, and in accordance with its ultimate purpose does the much-despised spider spread its fine web and tie its knots, invisible to the unarmed eye, so masterfully to its thread that one can hardly help but marvel? But the skillful actions of these and other animals and insects, which we must admire, do not equal the wonders of the bee colony, where so many thousands of members are united for a single purpose, and where so many and varied actions come together that they reveal a kind of state constitution among these winged worms. The more one observes a beehive, the more admirable things one sees in it. We find there an unchanging principle of government and police: the deepest reverence and love for the principal person: a peculiar attention to her pleasure: the greatest vigilance in serving and protecting them; a constant love for their fatherland; brotherly harmony; an extraordinary zeal for work; an incomprehensible diligence in their tasks, which has no equal; the greatest selflessness combined with the greatest economy and thrift; the finest art of measurement, applied to the most beautiful architecture; an exceedingly

A lover of nature never tires of observing a bee colony, which is so orderly, wise, and beautifully organized in all its parts. Even after many years of attentive observation, he will always discover something new, special, and captivating. Indeed, he will find so many things incomprehensible that he will not be surprised why so many bee experts disagree with each other in many statements, and why one accepts and asserts what another rejects. Is not nature very diverse and unfathomable in its institutions? If our finite minds must lag so infinitely far behind in understanding the depths of divine wisdom in its most secret workings, even in the realm of nature, then surely many things will remain incomprehensible and insoluble to us even in the strange insect that is the bee, until the end of the world. Bonnet, the great and tireless naturalist who guides us through immeasurable worlds in his *insects*, and who can well be compared to Argus in the fable, says quite rightly that we must not imagine that we have already completely grasped the principles of the science of bees. At most, we have only reached the ABCs, for it is a very profound science. It is true that the smallest works of the great Creator become worlds to the philosopher, whose surface, or rather, whose outer shell he can only see. The smallest insect is an unfathomable depth in which all the acumen of the observer is lost. We can speak much more confidently about what we do not know than about what we do know. Our ignorance has no limits, and all our knowledge, of which small minds are so proud, can be contained in a small book in Vigesimo. Nevertheless, convinced of the inability of the human mind to fathom the greatness of God's works, we may still explore them, and the discoveries we make, even in this tiny creature, the bee, fill us with delight at recognizing and glorifying the wonderful God who is so great even in small things. Not only do bees provide us with the most excellent instruction in virtue, but they also often give us occasion for the most beautiful reflections. Whether we look at bees in themselves or in their activities, we see the wise, universal Creator who has given his creatures all kinds of abilities: to the irrational ones in such a way that they bring them into the world, to the rational ones

but that they acquire it gradually through much diligence and practice. As soon as a bee is only two or three days old, it knows as well as the old ones how to collect honey and wax, build its cells geometrically and precisely, keep watch, and defend its homeland. indeed, it knows how to help itself in situations that often do not occur in a thousand beehives and which truly testify to deliberation and judgment (insofar as I may speak of unreasonable creatures). Several years ago, prompted by a similar account by *Pluche* in his *Spectacle de la Nature,* I let a fairly large red snail crawl into a glass beehive that was not yet completely built so that I could observe everything clearly. I soon noticed a great commotion and movement among the bees running up and down the glass panes. I was very eager to wait and see how they would help themselves in this extremely precarious situation. The snail could not and was not allowed to remain in the hive: dragging it out would have been an enormous burden and therefore impossible for them, and they could hardly count on my help: they could kill it with their stingers, but then the rotting fumes and stench would have been so harmful to them that they would have had to abandon their home, honey, and brood and move away. However, they were not as helpless as one might have thought: for I soon saw that they had besieged the poor snail so thoroughly that it could no longer turn or twist (whether they had stung it to death, I could not tell because of the multitude of bees sitting on it) until they had built a mound of wax over it and walled it in, so that not the slightest vapor could escape, all of which was accomplished in a few hours. (*)

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(*) I must make a comment here, which is not relevant to the matter at hand, but is only intended to demonstrate the beautiful observations that bees can often inspire. Although bees are born with their skill and ability, humans, on the other hand, acquire their abilities (for which they do have natural predispositions) through years of diligence and practice, but also continue to develop them to ever higher levels. Nevertheless, bees, like all irrational animals, can never exceed the degree of perfection of which they are capable, even if they

would or could live for many thousands of years. Only the human soul continues to progress toward greater perfection without ever being able to attain it. If we think about this, we find in it no small proof of the immortality of the soul. How could one conceive that the soul, which is capable of such immeasurable perfection and can become better and better for all eternity, should fall into nothingness almost as soon as it was created? Would its abilities then have been given to it in vain? If the human soul remained in its present state of perfection, if its powers could reach their highest level, one might well imagine that it could pass away unnoticed and suddenly fall into a state of annihilation. But is it really believable that a thinking being, which constantly grows in goodness and progresses from one perfection to another, after barely glancing at the works of its Creator and discovering very little of his infinite goodness, wisdom, and power, should perish, as it were, on its first voyage and at the beginning of its investigations? How short is the earthly life of man! He does not seem to be born to enjoy life, but to pass it on to others and then depart from the stage. We observe this in animals, which can complete their tasks in a short life: when the silkworm has spun its day's work, it lays its eggs and dies. When bees come into existence in the summer, they perform their communal tasks at most until the end of the following summer, and then return to nothingness. But a human being has never been able to attain the full measure of knowledge, nor has he had time to overcome his passions and attain the perfection of his nature before he leaves this stage. Would an infinitely wise being create such magnificent creatures for such insignificant purposes? Could it take pleasure in bringing forth such premature intelligent beings, such short-lived rational creatures? Would it give us natural gifts that cannot be developed? Abilities that we can never satisfy? How can we find the wisdom of God, which shines forth in all his works, in the creation of man, unless we regard this world merely as a nursery for the future? Unless we

believe that the sexes of rational creatures, which arise and disappear in such rapid succession, exist solely for the purpose of receiving the first principles of their existence here and then being transported to a happier region where they may spread and flourish for all eternity, where the soul passes from one power to another, always adding virtue to virtue, knowledge to knowledge, and through new additions of glory become ever more excellent and resplendent for all eternity.

But just as beekeeping gives a lover of nature the most beautiful and pleasant observations, it also affords him many other pleasures; that is why it is popular from the throne to the plow, and one should not be too surprised that Aristomachus and Hyliscus, according to Cicero's account of Plinius and Aelinans, devoted their entire lives to the study of bees, the former studying their economy for 58 years, while the latter left human society and lived in the woods. Plinius and Aelianus, devoted their entire lives to the study of bees, the former studying their economy for 58 years, the latter leaving human society and retreating to the forests and deserts in order to observe them more undisturbed and safely. But as pleasant as beekeeping is, it is also extremely useful. It is not easy to invest capital that yields such a rich return as a well-established beekeeping operation. It is no exaggeration to state on the title page that 25 good hives can yield 100 to 200 florins annually. This should not be counted among the projects of those who calculate their profits on paper and in their imagination, but rarely find them possible in practice, and even more rarely in reality. In some years, I have had such beehives, only one of which yielded more than 20 florins, with some producing 12 measures of honey and still producing a young swarm, which also produced 7 measures of honey within 4 weeks, as well as 2¼ pounds of wax and the old hive yielded 2¾ pounds. And that is nothing special. A single good, populous hive in a magazine house can bring in 16 to 20 measures of honey in a rich bee area in a fairly good bee year. However, bees are also different and do not all breed equally well, which is almost always due to the queen. One may perform exceptionally well one summer but not the next, while another may be very mediocre one summer and excellent the next. In the meantime, the

very good, which is what the mediocre ones lack, and overall, the benefits are always very considerable. One should therefore pay more attention to this part of agriculture, especially since no large outlay is absolutely necessary, but one can start with 10 to 15 thalers, with which one can obtain, in 5 or 6 years, without the annual profits, (which I will deduct for the cost of the apiary and the bee hives), one can obtain permanent bee hives worth 100 thalers. Admittedly, there are also bad years when one can harvest very little or nothing at all, but that should not discourage us. By treating the bees wisely, we can not only preserve our capital and harvest at least some wax, but there are also more good bee summers than bad years. In 38 years, we have had no more than seven major bad years. These were the years 1740, 1751, 1756, 1763, 1768, 1770, and 1771. In other bad years, there is nothing general. In one place there is more driving rain than in another, in one area there is more honeydew than in another, and in general a good bee year makes up for a lot. It is true that not every area is exceptionally good for beekeeping; but since bees have a vast table laid out for them and know how to gather food from thousands of flowers and plants, there is hardly a region where bees cannot be kept profitably. However, the poorer the region is in bee food, the more care must be taken to organize beekeeping in the most advantageous way. However, beekeeping in ordinary straw baskets is of little value in such areas, and in a single bad year, all the bees can be lost. The so-called magazine houses, which can rightly be called permanent beehives, are so highly regarded by beekeepers that they would not exchange a magazine hive for three bee colonies in baskets. But even the straw magazine houses are uncomfortable in many respects, and besides depriving the bee lover of the pleasure of constantly seeing their inhabitants and their activities, we have to treat them in a haphazard manner. Several years ago, I therefore made another invention of wooden magazine houses, (*) each of which is no more than four measures in size and is equipped with at least one glass or pane,

and which, although they are pleasing to the eye, are little more expensive than the straw ones and last ten times longer.

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(*) It was a true and pleasant invention for me, as I had never seen or read about such a thing before. Several years later, I read something about similar bee dwellings, such as those of Mr. Palteau in France and the Vicatische, which Schirach describes in his general beekeeping book*, with an enclosure or housing, which mine do not need, and which are generally much more convenient for the bees and the beekeepers. It is also quite possible that one or the other may have been devised in the same way in distant regions, but the great usefulness of these bee houses and their improved design have never been fully explained and confirmed by my own experiments.*

These pleasant bee dwellings have not only made it much easier and safer for me to care for the bees, but have also provided many other excellent advantages, and all my good friends and other bee lovers who have set up their apiaries in this way are so pleased with them that they would not want any other. In order to make them more useful to the public, I have described their construction and arrangement in this non-profit treatise and illustrated them clearly in copperplate engravings. I have demonstrated their usefulness and advantages over many other types, and they have been proven by experience. My way of treating bees in order to obtain the greatest possible benefit from them is, as will be seen from the treatise, not artificial, but follows their nature. It is simple and easy. The principles on which I base my beekeeping are, among others, the following:

1) Keep large and populous hives.

Only with such hives can true benefit be derived, as will be shown more clearly below. Only such hives are safe from disorder, disease, and the collapse or destruction of the bee colonies. However, every reader will recognize how useful my method of magazine attachments is in making large and strong colonies even from mediocre ones, and any bee lover who uses them will be completely convinced of this.

2) Harvest your bees' supply of honey and wax without harming or destroying them.

This in particular demonstrates the advantage of my type of bee hives over other types. In many areas, bees are not killed, even if they are kept in straw baskets, but are instead cut or trimmed: in some cases, half is taken from one side one year and the other half from the other side the next year; in many cases, they are cut at the top. However, it is certainly easier to remove one, two, three, or four frames full of honey than to go to the trouble of carrying the bee colony away from its hive, subduing it with smoke, and then cutting it, not to mention that when cutting, one does not get pure honey as when removing the frames, but honey mixed with brood. Moreover, such treatment of bees is mainly suitable only for areas where bees find their main food in late summer and where there are many heaths, but where the magazines would certainly be much more useful and would provide a much easier way of beekeeping. In our regions, however, where the bees have to gather their supplies mainly in the spring and early summer from blossoms, flowers, and honeydew, cutting the bees, whether it takes place around Bartholomew's Day or later, is extremely rare and, on the whole, detrimental to our beekeeping, because the bees rarely replace the loss of their hives or are able to gather sufficient winter food, without which the colony is doomed.

Now, as in our economic times, attention is being paid to beekeeping in all countries and regions where bees are kept, and many books have already been written on the subject. However, not all of their instructions are useful in all regions. We also have many new and partly good essays on bees and beekeeping from our regions, whose value I do not wish to deny in this treatise, but rather owe a great deal to them thanks to my keen attention, reflection, and many trials and experiences: for not every eye sees everything, and not everyone can gain all experience. However, most of them presuppose a knowledge of bees.

and do not teach the completely inexperienced at the same time: many have conclusions and methods based on mere hypotheses, which I have found to be completely erroneous and disadvantageous in practice: some contain so much artificiality and laboriousness that a bee lover, especially if he does not have much time, and certainly the common man, becomes discouraged at first glance, and yet the benefit of all these efforts is quite negligible and purely speculative, such as selecting the queen bee from the swarm and confining her in a queen cage, etc.

I have summarized everything as briefly as possible and have prescribed nothing that is not reliable, proven, and confirmed by experience. I can therefore sincerely assure you, and experience will convince every bee lover to his benefit and pleasure, that there is no easier way to obtain the possible benefits of beekeeping than by following the instructions contained herein.

The author

Preliminary report on the third edition

The necessity of this new edition gives me, the author, renewed pleasure in the acclaim my treatment of bees and the beehives designed for them has received. I have now had the opportunity to share with bee enthusiasts several improvements I have discovered and tested over a number of years, which make the handling of bees more convenient. My attention remained focused on the economic aspects of beekeeping; in terms of physics, I left things as they were, based on the principles and hypotheses that had been generally accepted up to that point, partly because the newer hypotheses were not yet sufficiently established for me to be able to rely on them, and because my current leisure and circumstances deny me the inestimable pleasure of spending long hours in the sanctuary of nature's temple with this admirable and inexhaustible insect and continuing my previous observations to arrive at definitive conclusions, which I must leave to others. A completely new theory is beginning to emerge about the *genealogy of bees* and the mating of the queen bee, about the purpose of the drones, etc.
Mr. Lucas zu Nischwitz expresses thoughts on this subject that deserve special and closer examination in his treatise on beekeeping, Leipzig 1974, and mainly in his physical reasons for his treatise on beekeeping, Leipzig 1796. In it, he expresses the following opinions, among others, and attempts to prove some of them:
"The queen or bee mother (otherwise called the queen bee) not only lays the main eggs, from which all the brood that produces the worker bees comes, but also her own kind can be produced from her eggs, and she is thus a perfect female. However, since there are two other types of bees in a hive besides the queen, namely worker bees and drones, the perfect male sex, which must mate with the perfect female, cannot yet be easily identified, because in all observations to date, the queen has not been found with either of the two

species in the manner in which mating was imagined. However, the male sex must be found only among the worker bees. However, it would be impossible to assume that all worker bees were males, because otherwise only new organized bodies of one species would appear through reproduction; and that would clearly be contrary to the laws of nature if there were not just as many of the other species among them, even if they did not appear in perfect female form. The few queens produced annually in a hive could not be counted as constituting the female part alone; and, moreover, some years none would be produced at all.

"But since no other species of bees than young queens and worker bees emerge from the brood produced from the eggs laid by the queen bee (since the young bees must be completely similar to their parents), it follows that the queen mates with worker bees, and that the latter must be partly male."

“However, one would also have to be able to observe the mating of both sexes in reality, and this should be possible frequently and easily, given that the queen requires fertilization due to her high egg production. And this can be observed in the way they beak each other, as one can see how the queen is always surrounded by a circle of worker bees, which caress her and then beak her, offering her their tongues. These would be perfect males, which have their reproductive organs at the front, just like the queen. The sexual organs in the animal kingdom are very different: we should therefore not be surprised if we find them in animals unknown to us to be completely different from what we are used to and in a completely different place; and he believes that they are not located at the rear of bees, but of all similar insects that have a sting and a poison sac at the rear. (*)

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(*) Spiders, snails, etc. have their reproductive organs at the front: the latter on the neck, the former on the head, like antennae. But as for ants (which, along with bees and wasps, belong to the hymenopterans of Linnaeus's natural system with membranous wings, to the insects with four wings and a sting),

I once saw two winged ants flying up from an anthill after mating. I caught them together with my hand and was quite astonished to find two winged ants, which I had always thought were males, like the drones of Swammerdam. They were of the large black-brown variety, and one was about a third larger than the other. The mating was like that of beetles, flies, etc. They clung so tightly together that I had difficulty separating them. When I sat down in the grass with them to examine them more closely, they both escaped to my great annoyance.

Two hypotheses have once again been disproved by this phenomenon. "But since, apart from the male part of the worker bees, there must also be a female part, which, whether they

would not be completely similar to their mother, but degenerate, and because of the different upbringing (in terms of food and feeding, the narrow cradle, etc.) and the resulting unequal education, although not hybrids, they would become a small variant and degenerate: – nevertheless, they could not be completely infertile, since they were produced by two perfect parents: it would therefore be reasonable to conclude that these degenerate female worker bees were the drone mothers."

"These degenerate female worker bees would be produced at the beginning of the first brood in spring and would appear at the same time as the male worker bees: they would fly around all the hives in March and would be the small, elongated black bees known as "raiders," which, like robber bees, try to enter the hives. However, they would not be robber bees, but only starving young drone mothers recently hatched from the brood, which the male sex would not tolerate, partly because their brood, which they would soon produce, could not be used so early, but also because their own existence, since there was no honey pasture yet, would be detrimental to the queen and her fertility. They were therefore bitten off by the male worker bees in front of all the hives. Afterwards, however, when several broods had hatched and the honey pasture had become more abundant, etc., some of the drone mothers could remain in good and populous hives.

"One would then see in front of all the hives how the worker bees mate with each other. This mating also takes place in a very strange way, entirely by means of beak-to-beak contact; and from that time on, one also finds the beginning of drone brood in such hives, as one sees the beak-to-beak contact continuing in front of the hives."

"However great the fertility of the queen may be, the drone mothers have no (visible) ovaries; for they lay (presumably) only one egg at a time. Because of their low fertility, they are very similar to the bastards in the animal kingdom, but in the strict sense of the word they are not bastards, but only degenerate females or variants."

"However, because the mating of male and female worker bees is unequal (and, in comparison with the perfect bee mother, unnatural), since the male is perfectly formed and the female imperfectly formed, – the formative impulse of nature must take a much greater deviation from the natural direction in the fruit to be formed, and the drones must become a kind of monstrosity (namely, monstra per defectum) and their physique must be disfigured, since it is obvious that they have no sting, no poison sac, etc."

"Such creatures cannot be expected to possess a sex drive, much less a reproductive capacity, given their physical weakness. But what their actual purpose is in the bee republic is still unknown and remains to be discovered. (*) However, the fact that they are not the mates of the queen and the fathers of the worker bees is also evident from their lack of care for the young, as they allow them to feed themselves and do not concern themselves with the brood at all. And given their short life span of approximately four months, it would be unheard of in the whole of nature if the wisdom of the Creator had determined such laws for bees, and in particular for the male sex, according to which one perfect sex is wiped out for an imperfect one (the worker bees) and the drones always end their lives suddenly during mating."

(*) Certainly, the members of the bee republic are not without the wise intention of the Creator. But that Mr. Lucas supposes their purpose to be that, when

the old and young bees during the strong honey flow and accompany them seems entirely implausible, since the drones do not fly very far, and I have never seen a single drone in the fields during my many years of research and observation of wild bee species on the ground and elsewhere, and the buzzing and humming in the air on sultry days, when one would often think that a swarm of bees was flying above one's head, comes only from flies. Furthermore, the signal of the buzzing drones would be very confusing to the worker bees on the flower beds, and they could easily be misled in a completely opposite direction. For if every beehive had its signposts for the drones in this way, the worker bees whose dwellings face east would be able to follow the drones flying toward the west in the evening, because the sound of all the drones in flight is the same.
(**) Not at all! After a very short life, the silkworm moth lays its eggs and dies. It has fulfilled its purpose for being there. And so have many others.

As questionable and worthy of investigation as these claims are for the most part, there are many objections that can be raised against them. I have never seen the queen mating according to the old hypothesis, but I have seen her lay drone eggs—often, many, and unmistakably: not just one or two drone eggs, but a whole board full of drone cells, around 200 drone eggs in a row. I found the eggs larger and more yellow than the worker bee eggs: I saw the drone eggs still in their cells the next day, and I saw them again on the third day, already alive. It was impossible that the worker bees could have carried them all out so that other supposed female drones could have filled the cells again without missing a single one; and even if that had happened, it would have been impossible for the drone eggs to hatch on the third day and the worms to appear, as always happened throughout the entire board at once. Even at night, during the day, when I observed them a thousand times for four to five hours, I never saw a worker bee with its abdomen, like the queen, slip into a cell. But I never observed queenless colonies, and I do not deny that this could happen in such cases.

The fertility of the queen bee in spring, according to the old hypothesis without drones or males in the hive, caught my attention. One summer, a solitary wasp built a cluster of about 20 cells on the outside of an empty magazine shed in my apiary. I never saw a male with her. She filled the cells with eggs: I always saw her alone until the young were able to fly. The following spring, the mother wasp returned: I saw her alone. She cleaned and prepared the cells, laid eggs in them: I saw her during the day, I observed her at midnight with a light (as she was very tame and did not leave her nest): I always found her alone.

It is regrettable that no natural scientist in recent times, since *Reaumur* and *Swammerdam*, has taken the trouble to further develop the physical system of the mysterious insect, the bee, and its economy, since we are still so far behind in this area. How much could be discovered and corrected in a year if one member of the many bee societies were chosen who was up to the task and devoted all his energy and attention to it! Two or four glass houses according to Plate IV, together with two or four of Hüber's so-called book sticks, (*) in which very strong swarms could be caught, would provide him with sufficient material for a thousand observations and would certainly reward his inquiring gaze.

(*) A type of bee dwelling, which was very well designed by Hüber for various uses, and so named because they can be opened almost like a book from the back and in the middle. They consist entirely of frames similar to window frames. Six, ten, twelve, or more can be assembled and connected to each other. They are 12 inches high and 9 to 10 inches wide. The thickness of each frame or the width of the frame across is as large as the bees use for a brood comb, 1¾ inches. The outer frames are fitted with glass panels and sliders or shutters above them. – However, to ensure that the bees attach the wax panels as desired and build them so that they can be observed from two sides, a piece of wax cake is placed in the appropriate direction. – Each frame can now be separated from the hive and removed. The

queen can be found quickly and you can see which board she is sitting on. She can be removed, locked up for use as a queen cell, etc.

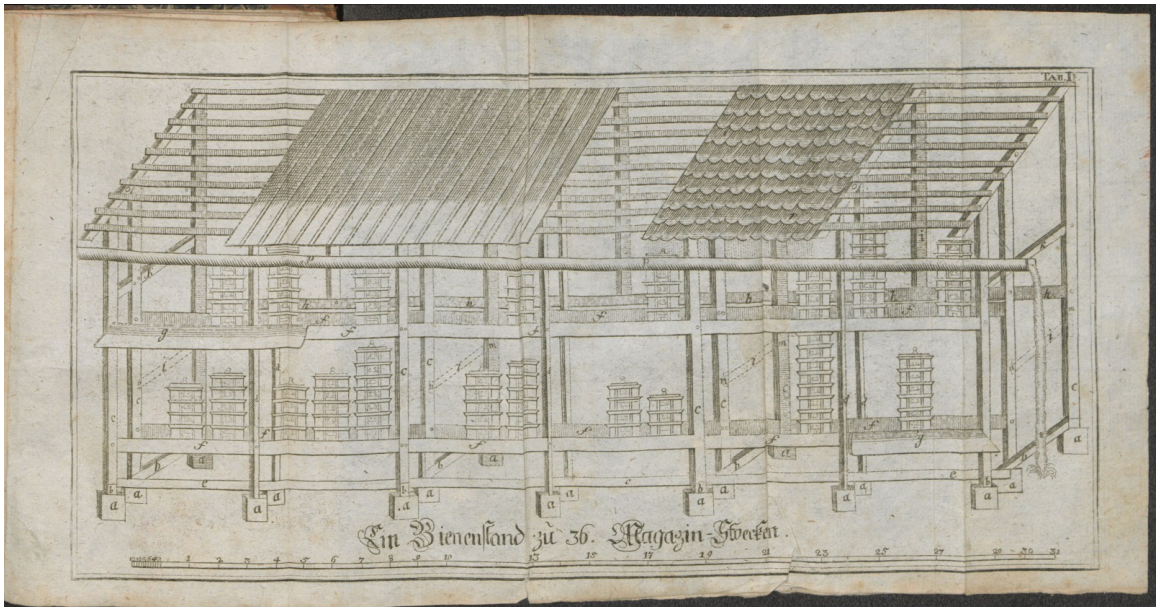
Good magnifying glasses for dissecting and examining a fifth beehive designated for this purpose at the time of egg laying should also be available. Such an undertaking would do credit to our age, and we would no longer need to parrot Reaumur and Swammerdam, who could often see whatever they wanted through their magnifying glasses and imagined it beforehand; nor would we need to quarrel about hypotheses or argue about them in vain.

Christ.

Preliminary explanation of the copper plates.

First plate

A covered apiary consisting of 36 magazine hives, some of which are visible. It has two floors with two rows of beehives, each row consisting of six compartments, each of which can hold three beehives and is designed so that there is space for eight supers for each magazine hive. The total length of the apiary is 31 feet, the width 3 feet, and the rear height 10 feet. A more detailed explanation follows in the second chapter.



Second plate

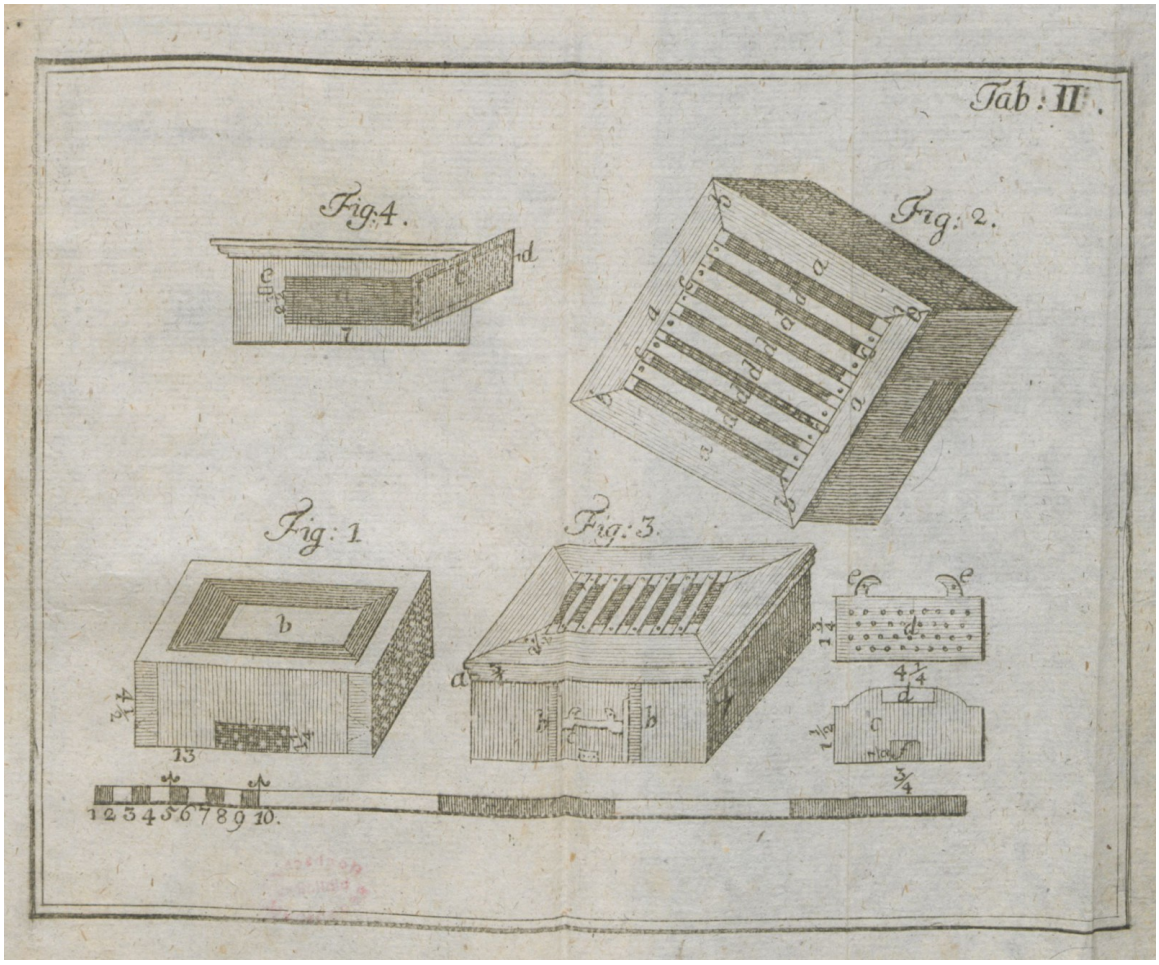


Fig. 1. The initial assembly and construction of a magazine extension. The length is 13 inches in a square. The height is 4½ inches. Lit. a. the flight hole. Lit. b. a hole for a glass pane in the rear.

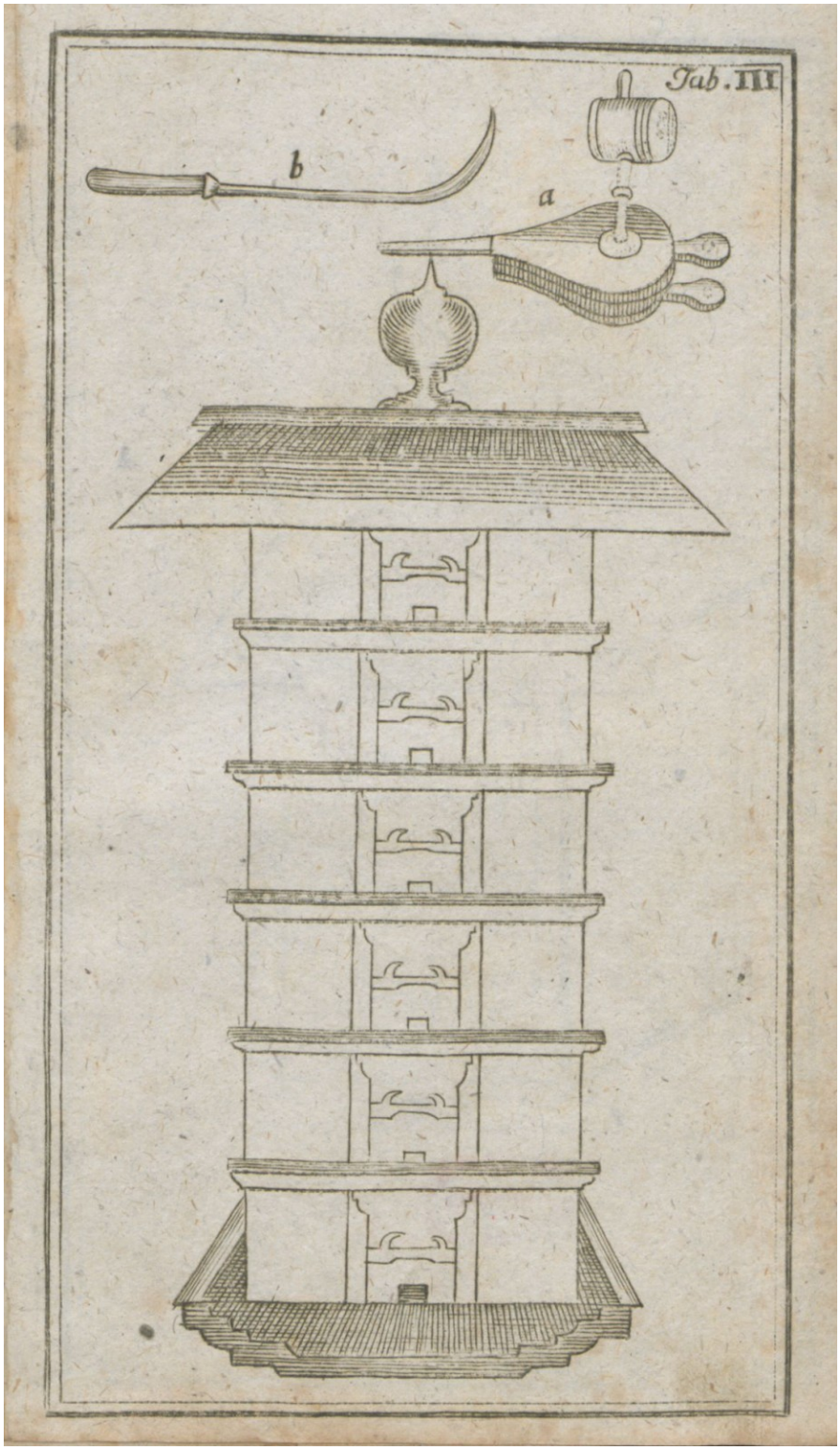
Fig. 2. The construction of the grate on each magazine attachment. Lit. aaaa four pieces of slats, which are joined together at the corners bb at an angle of 45 degrees. Lit. c.c. a small joint on the slats, which are nailed to the front and rear sides, in which joints 6 pieces of wood d.d., each 1 inch wide, are attached.

Fig. 3. Lit. aa shows how the aforementioned slats protrude ¾ inch on the outside and form a cornice. Lit. b.b. are two small strips at the flight hole with a small rebate, in which two metal sliders run. Lit. c. is the front slider, which has a hole cut out to half an inch to make the flight hole very narrow when necessary. At the top at g., the sheet metal is bent slightly to allow the slider to be grasped when opening

and down. Lit. d. is a perforated slider 1¾ inches high, which runs behind the aforementioned slider at e.e. and has two holes so that it can be pushed up and down with a sharp knife if necessary.

Fig. 4. The magazine attachment from the rear, with the glass pane Lit.a. inserted. At b.b., small pieces of wood are nailed next to the glass pane. Lit. c. is a small door or shutter in front of the pane to keep the bees' dwelling dark. At the front, it has a small hook made of wire (Lit. d.), which fits into a round wire at c.

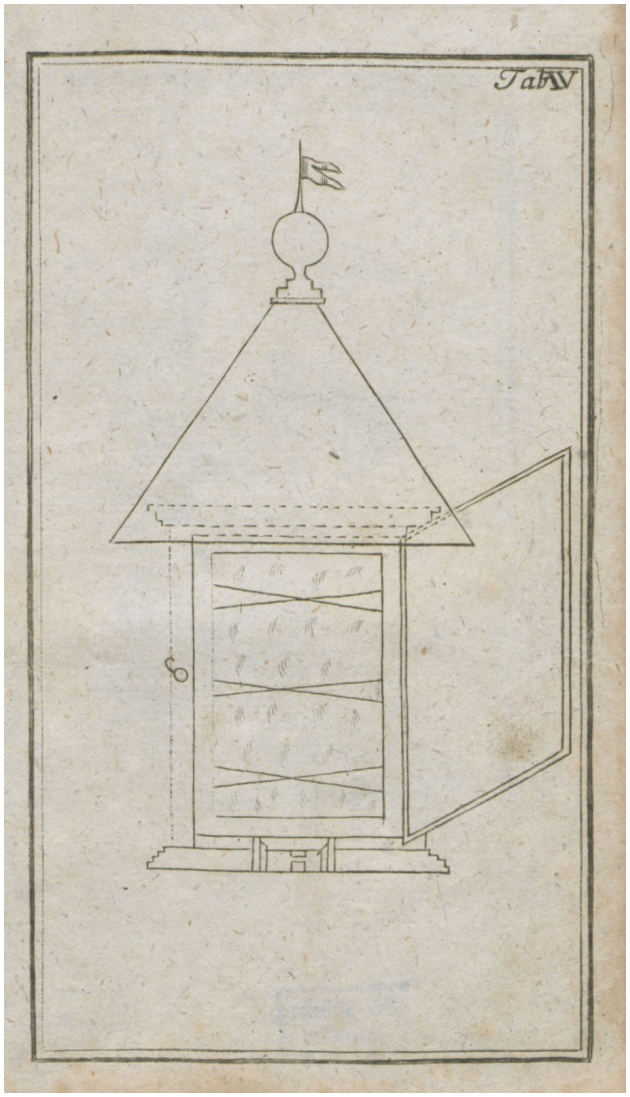
Third panel



Presents a composite magazine frame with 6 attachments and a special roof, in case you do not have a covered apiary and need to

beehives exposed. For this reason, a small board is attached to the bottom of each side so that rain does not remain on the base board and can run off.
Lit. a. is a bellows with a smoke capsule that is inserted into its valve, and
Lit. b is an ordinary bee knife with a curved, double-edged tip.

Fourth plate



Presents a simple beehive, particularly useful for pleasure and observation. Four large glass panels, set in narrow frames, form the four sides, each of which has a door or shutter to keep it dark when not being observed. The top has a square glass panel. The entire beehive, excluding the roof, is 1 foot 7 inches high and 1 foot 1½ inches square, and holds 18 measures. It is placed freely on a post dug into the ground so that one can stand or sit comfortably on all sides.

Fifth plate

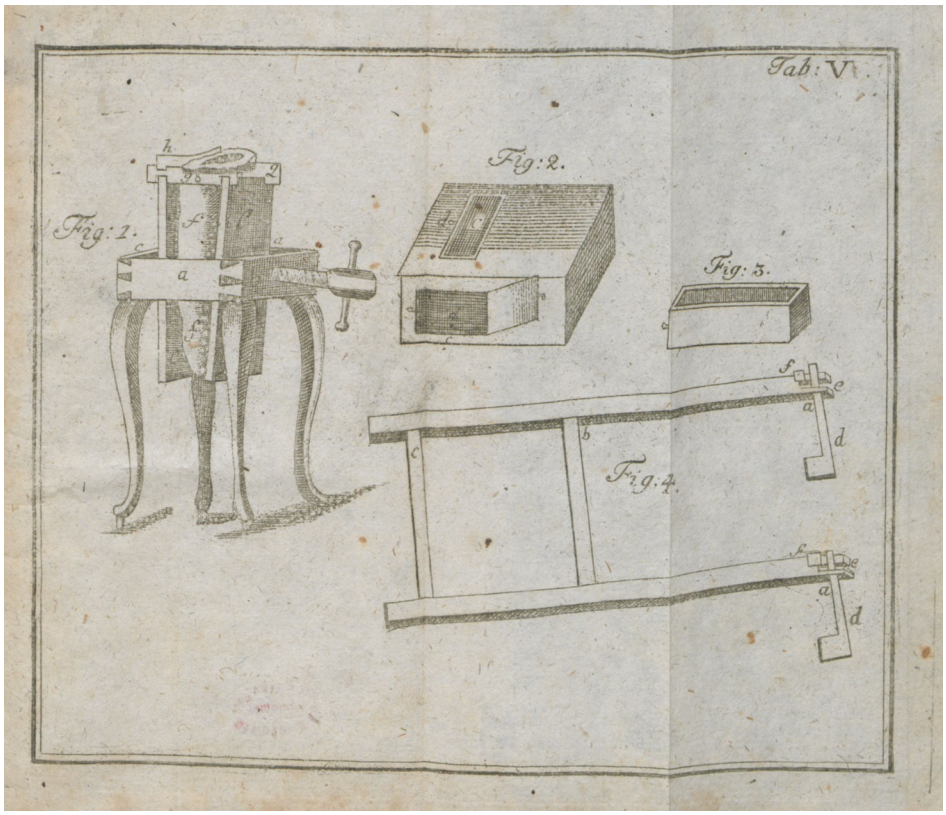


Fig. 1. A wax press, inside which the wax bag is suspended.
a.a. are the side pieces, 1 foot 4 inches long, 5 inches high and 2 inches thick. – b. c. the front and rear pieces, 23 inches thick. – d. the screw, 10 inches long and 2½ inches thick. In the middle, they each have a protruding insert strip. f.f. the wax bag – g.g. two pieces of wood with notches to hold the boards apart when the boiling wax is poured in – h. a curved piece of wood on which the hot vessel with the boiling wax can be placed when pouring.

Fig. 2. A feed box, 12 inches square. a is the small door through which the honey trough is inserted – b. the front ½-inch-high strip on which the honey trough stands. – c. a glass pane on the lid board so that the honey trough can be seen. – a hole in the lid of the box through which the honey is poured using a funnel.

Fig. 3. The feeding trough, 2½ inches deep, 10 inches long, and 1½ inches wide.

Fig. 4. A support, or machine made of pieces of slats, on which the flight board is placed when it is lowered, 3 feet 4 inches long.
b.c. are two brackets, 1 foot 3 inches long – which form a hinge at e.e.
f.f. are two small pieces of wood which act as latches to keep the hooks in a straight line when the template is to be placed or removed.

First chapter – About bees in general

§1 Of the three types of bees

In every beehive, there are three types of bees or individual bee species. The queen, or, as the ancients called her, the queen bee: the common or worker bees, which are also called the sexless bees, but this is only by chance, and the drones or bumblebees, or improperly called brood bees, the latter of which, however, are not found there at all times of the year.

§2 The queen and her fertility

The queen, who is rightly so called because of her shape, appearance, and advantages, is the most important, the principal person in a bee republic. Without her, the whole colony disperses and perishes. She rules the colony and is the soul of all work in the hive. She is the mother of the bees and so extraordinarily *fertile* that it is hard to believe how insects, which have such a short life, can reproduce so rapidly. In a quarter of a year, she produces more than 30,000 young bees. A single swarm, if it is strong, consists of
12,000 to 15,000 bees, and yet at the end of summer the hive is as full of bees as it was at the beginning of spring, even though at least a tenth of them have been lost during the summer, either through accidents while gathering nectar in the fields, or partly through being caught by birds, or partly through being blown away by wind and weather. Yes, a single, really good magazine hive, which is not allowed to swarm and is only ever reinforced, can grow to 30,000 to 40,000 bees. – One pound of bees is estimated to weigh 4,000 bees.

§3 Their appearance, characteristics, and voice

In addition to her exceptional fertility, the queen also deserves admiration for her appearance and other characteristics, and she is indeed an excellent creature among all insects. She smells like lemon balm. She is much

larger and more handsome than the common bees. Her head is rounder and her proboscis shorter than that of the worker bees, and her jaws and teeth are notched, whereas those of the common bees are flat, so that one can clearly see that the queen was not born to work, as she is unable to pull and work a single leaf of wax due to the structure of her teeth. They are rather designed and skilled to damage the superfluous queens and, according to the constitution of their wise economy, to kill them. Their eyes, like those of the other bees, consist of many thousands of small mirrors, which are square in shape, purple in color, and covered with hairs. Here, too, we see the admirable wisdom of God, who has formed the eyes of these insects in such a way that rays of light can enter from all sides. The bees can therefore see clearly in the darkness of the hive and build at night as well as during the day, even when the workers are surrounded by a whole cluster like grapes. The wings of the queen are the same length as those of the worker bees, even though they appear short in comparison to her much longer body; proof that they were not designed by nature for work or for frequent flights (which is otherwise the common business of their subjects). For this reason, their hind legs do not have the important hollow that can be seen in the worker bees, in which they attach their pollen sacs; nor do they have the many hairs that surround this cavity in worker bees, and indeed the queen is not as hairy as the common bees. Nor does she have the brush on her hind legs like the worker bees. As for their color, their upper parts are slightly lighter brown than the other bees. Their abdomen is almost as long as that of the common bees, also more pointed at the end than the others, and is not unlike polished black marble.

Furthermore, whereas the two large hind legs of the common bee are black, hers are a beautiful golden yellow, as is the entire lower part of her body, which is adorned with this shiny color, but under a magnifying glass reveals a mixture of colors that suggests something regal. (*) Her gait is also more majestic, slow, and upright.

(*) In addition to this type of color, there are also queens that are liver-colored, as well as completely black ones. However, they are very rare. The common ones with

yellow abdomen and feet are the most beautiful and are also considered the best. Incidentally, one must observe a queen alive if one wants to judge her actual size, as she bears little resemblance to herself when dead. The rings of the abdomen then contract and push into each other, whereas its long shape is mainly due to the fact that the rings expand to make room for the ovaries inside the body, but this causes its nerves to stretch the abdomen constantly while they are alive. It is particularly large and beautiful at the time of egg-laying. An ordinary queen bee of medium size, which is 10 to 11 lines long in life, is therefore only 1 line longer than a dead worker bee, which is 5½ to 6 lines long when dead, and at most 7 lines when alive and young. This is because an old or year-old common bee has already become smaller and shrunk.

It is very strange and quite extraordinary, both among bees and among insects in general, that the queen bee alone has an audible voice, which amazes observers. It can be heard particularly during swarming, when the queen gives her colony the signal to depart, and the day before, she sings "toot, toot, toot" as clearly and loudly as if she were blowing a horn, so that it can be heard very clearly six to eight steps away. I have often listened to her with amazement and watched how she strains her voice and her body. When she trumpets, she stands still and clings to the cells with her feet so that her body is rigid, and then she trumpets. The sound does not come from her mouth, but from the air holes (stigmata, called spiracula by entomologists), of which she has four main ones next to the sides of her chest, which have oval outer openings and through which she forces the air with such effort that it bursts out with force, producing the inarticulate and broken sound. She goes from one corner of the stick to the other and repeats it. (*)

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(*) I do not wish to attribute anything miraculous to the bee republic that is not there; but I cannot convince myself that this sound, which the queen makes, is merely the result of biting and chasing her rivals for the reign, as many bee teachers claim. Both the sound itself and the mechanism by which it is produced have always proved this to me. I have often seen the queen make this sound without being chased or pursued by other queens. Indeed, during a fight and biting with another queen, she is quite incapable of producing this regular sound, which requires the mechanism described above.
I therefore never heard him when I saw that the pursuer was close behind. But it is probably true that the pursuit of the other or the old queen drives her more to sound the signal for a quick departure; she does so even when there are no other young queens present. Yes, the clear proof that this call of the queen is a signal and a rallying cry to her people to depart or to follow her is indisputable: When a colony of bees is driven out of a full basket into an empty one, especially by drumming, one often hears the queen calling, as before swarming, and this happens when most, but not all, of the colony has moved into the empty basket. Which rival is pursuing her? Certainly not! Rather, she is calling her remaining people to gather around her, which then happens immediately.

If there are several young queens, the older ones can be clearly distinguished from the younger ones by their voices, which are always more delicate, and if four of them are present at the same time, each can be heard distinctly from the others. One can also hear the queen's voice, as it may be called, when there has been a heavy honeydew and her subjects are filling the house with honey. I have heard it often, especially in the evening, and it amazes me. She sometimes croaks, almost like a frog.

§4 On the production of the queen in the royal cell

The queen's superiority over all her subjects is evident from the moment of her creation and birth. The egg from which she hatches is laid by the queen bee in a special, royal cell, or is carefully carried there by other bees. This cell is prepared and decorated with great diligence by her subjects. It differs in shape from all other cells, which consist of small hexagonal tubes whose pyramidal base is constructed from three diamond-shaped pieces and are almost all horizontal. The royal cells, however, are completely different and hang vertically so that the opening of the cell faces downward. The structure of the common hexagonal cell testifies to the bees' admirable thriftiness with regard to wax, but they are wasteful when building royal cells. These are so strong and dense with wax that a single royal cell weighs as much as 150 ordinary cells. It is round and smooth on the inside and, in proportion to the queen's body, has a larger circumference than the common cells, whose excess size the bees fill with a more abundant quantity of better and tastier food pulp than for the other bees. However, this royal castle is never listed among other cells, but stands in a special place and hangs at the edge of a panel, where drone brood is usually also found, like an acorn almost a finger long; but if the hive is weak in bees, they hang the queen cell on a panel or rose in the middle of the hive for warmth and maintenance. They are constantly busy at such a cell as soon as it is occupied, showing the utmost care, and various bees do not stray from it. Some care for the young queen inside without ceasing, while others make decorations outside the royal cell, which consist of pure hexagonal surfaces that decrease in size towards the end of the cell. In every hive there is one such royal cell, in some two, three, or more. But when the young queen is hatched and leaves her cradle, the bees carry away most of the cell and use the wax for other necessary purposes.

§5 From what kind of egg the queen is hatched – As also explained by the drone indicator

This raises the question that has been written about and debated so much: from what kind of egg is the queen hatched? Is it a special kind of oak that contains the raw material for a royal worm, from which no other bee can develop except a mother bee or queen, since even with the best microscope only two branches of eggs can be found in the queen's ovary, which produce the drone eggs and the eggs from which the common worker bees develop?

Mr. Schirach, a pastor in Upper Lusatia, to whom we owe entirely new and useful knowledge about the *police of bees*, has shed light on this matter for us. Through his frequent experiments, he has proven that any worker bee larva, if only three days old, can become a queen. He cut open a board containing brood, eggs, larvae, and capped pupae, placed it in an empty basket with a sufficient number of ordinary worker bees, and each time these bees produced a queen. They built a queen cell around a three- or four-day-old larva, provided it with a more nutritious food paste (as they always do with queens), and raised it in this way. Since Mr. Schirach himself initially suspected, and others had also suggested to him, that he had, by a fortunate coincidence, found one or more queen eggs in the cells each time, i.e., eggs in which the raw material of a royal larva was present, which the bees could easily distinguish according to their natural instinct, (as many still claim that such queen eggs are available at various times, whereby the loss of the mother bee can be replaced if necessary;) he had twelve small wooden boxes made and at the same time inserted into each one a small breeding disc only four inches in size, made from a stick, containing eggs and worms, and added some worker bees; After three or four days, he found royal cells with their worms in all twelve boxes, and after 17 days, 15 beautiful queen bees had been raised. He repeated this experiment every month throughout the year and always obtained queen bees. He even obtained a queen from a single living worm that was lying in a common cell.

These experiments most likely prove that any common bee larva can become a queen, which has been confirmed by most of the colonies I have created using the Franconian method. Just take a square piece measuring 4 to 5 inches from any hive that is filled with brood, hang it in another empty hive and place it in the place of the other hive, and you will soon notice that the bees that flew out of it to gather honey will move into this new hive, build royal cells in it and obtain queens in the manner described above.

But if a queen can arise from this common bee worm, then it follows that: 1) external circumstances, such as the more nutritious food and the larger cell, in which the bee's germ threads have more freedom to develop, cause a bee queen to arise from a bee worm that would otherwise become a worker bee. 2) That all common bees originally belong to the female sex, that they are imperfect females, each of which, however, may be developed one degree further to become the queen and fertile mother of many swarms. (*)

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(*) Mr. Riem in the Palatinate goes even further and claims, contrary to Mr. Bonnet in his experiments of 1770, that his worker bees repeatedly laid several hundred eggs in a small hive in which he had placed empty rosewood panels, and in his Fundamental Laws for a Permanent Colony - Bee Care, pp. 76 and 153*, he explains that common worker bees only produced* drones*. However, just as Mr. Bonnet never saw a worker bee lay eggs in his glass beehives, I have never seen any in mine that were in the process of laying eggs, no matter how often and how many times I watched the queen, even when she laid drone eggs. (See preliminary report to the third edition.)*

A new experience relevant here was reported by Pastor Ramdor in the Gotha public weekly newspaper XX and XXI, 1782. He discovered drone queens in several beehives, which the worker bees had produced from drone brood in the absence of suitable brood and after the probable departure of the true queen and mother bee, and in

the same way they usually do when raising a proper queen: they built a queen cell around the drone larva, presumably fed it the royal jelly, and thus raised drones that had the same head, chest, and body as other drones, but were more handsome, larger, and shinier in color. Now, the observer did not dissect these drone sages to ascertain their internal constitution and similarity to drones, which is indeed regrettable in this rare event and beautiful discovery.
However, it is highly probable and reasonable to conclude that these drone guides were male. But since only drones were ever produced in these sticks, he intends to solve the mystery of drone production by suggesting that there must have been some worker bees among them that were capable of laying drone eggs. Yes, he believes that they do not only do this in weak hives, but also in good, healthy hives, and that they are mated by the drones, which explains to him the large number of drones in a hive.
However, the mystery still seems far from solved, and this obscure matter has been discussed in such a way that one could sign off on it without more detailed investigation and thorough experience. It would certainly be worthwhile to examine and search such a queenless colony, in which nothing but drone brood is found, not only to see whether there is a queen among the worker bees that is the same size as the worker bees as they are similar in appearance, and which must become smaller when the egg-laying is spoiled and most of the eggs that were to supply the worker bee brood have dried up. All the remaining worker bees should also be anatomically examined and investigated in detail to determine which or how many have an ovary, which would be impossible to hide at this time of year. == whether such characteristics of a small queen, e.g., the absence of the spoon and brush on the hind legs; a small proboscis; the different nature of the mandibles and teeth, etc., == and whether, at the time of the orphaned colony, the brood would really be given to the drones, and the complete absence of a queen would drive them to do so,

to pretend to be a stepmother: What characteristics do such individuals have that distinguish them from others?

and the like –

The objections raised in this regard and the doubts that remain unresolved at present are mainly as follows:

a) Where in nature do we find a known example of animals or insects that can only reproduce one gender of their species and never their entire species, male and female at the same time, especially since the former would be completely useless, which nature does not do at all?

b) Why have the greatest dissectors never been able to discover even the slightest trace of an ovary in worker bees? And why has no observer in glass beehives ever seen a common worker bee lay an egg, when we so often encounter the queen and observe her laying both the common worker drone brood and the drone brood?

c) If worker bees had the ability and natural instinct to produce drones in the company of their actual mother, what an enormous number of drones would constantly be found in the hives, even with a good and healthy queen?

d) If the common and worker bees produce drones, or bees of the male sex, lay their eggs, and thus provide the material and seed for this species, why does this never happen at times of the year when there are no drones, e.g. in early spring or late autumn, when they have usually already been eliminated, since hives can become queenless at all these times and often do so, especially at this time of year? Especially since new brood is already being raised in strong hives around Christmas, particularly in winters that are not very cold.

In general, a naturalist must exercise great caution in the difficult investigation of the laws governing living beings and refrain from judging the initial results of his experiments. What often seems to us to be completely contrary to analogy and the orderly course of nature is not so, especially in insects. On the contrary, we often think, or conclude from initial experiments that have not been sufficiently investigated or repeated and modified, that nature follows this or that path, and behaves

completely differently. I am therefore very skeptical in natural history and cannot immediately give my unquestioning approval without having conducted my own experiments or knowing that they have been conducted by several credible natural scientists.

By now, their sexual characteristics must be indescribably small or, more likely, completely extinct. For how could the ovaries of these bees have escaped the notice of the great Dutch naturalist and dissector Swammerdam, who described and illustrated the ovaries of queens so excellently, how could they have escaped Maraldi and Reaumur? However, the development of the sexual organs depends mainly on a specific diet and on a container in which they have enough space to expand in all directions; If these two essential conditions are lacking, the common bee is condemned to eternal virginity, or rather infertility, so that although they are true females, they are of a very special kind of female that cannot produce anything and could not produce anything, females which are not really females now, but which could have become so if they had had a different position and different food under their first form. (*)

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(*) This is certainly such a strange discovery in natural history that it should almost be considered an adventure, were it not proven by repeated experience. Indeed, it seems to contradict the external and internal structure of the bees' limbs. However, in recent years, such strange things have been discovered in natural history that reason cannot explain, even though experience proves them, and natural scientists are already accustomed to such paradoxes. The more one studies nature oneself, the more one finds that its supposed laws, which were considered infallible, often suffer exceptions.
There is a principle in natural science, long proven by conclusive experiments, that living animals cannot arise from mere inorganic matter, but it is one thing for something to arise and quite another for parts to develop. The latter is possible and happens quite often. Let us hear about this from the incomparable natural scientist Bonnet. In his entomology*, he has pointed out with sufficient reasons that the moisture in seeds is not only*

actual nourishment as a stimulatory sap. He has shown how such moisture can bring about the greatest changes in the inner parts of embryos. Consequently, it does not seem impossible that, by means of a certain superfluous nourishment, limbs can develop in bee worms that would otherwise never have developed. How many other occurrences do we have in nature that confirm this truth? One need not go into the cabinet of a polyp observer, but only remember the strange fact that one can graft a rooster's spur onto its comb, which can exhaust even the most skilled and experienced naturalist. When this spur is grafted into the double fold of the cut comb, it is not much larger than a grain of hemp; but it takes root there and grows half an inch within five months. After four years, it becomes a three- to four-inch-long horn, a real horn like an ox horn, and like an ox horn, it also has a bone-like core. It is connected to the head by a ligamentum capsulare and by bone ligaments and integrated into it. However, these connecting elements must presumably already exist in the spur and in the can in an invisible form, but with a different purpose than that which they subsequently acquire through grafting. For the rooster's head is a completely different environment for the spur than where it should have grown according to its actual purpose.

It is well known what changes the juices can cause depending on their properties, their abundance or deficiency, and that often the slightest injury to delicate fibers can affect the entire subsequent growth, altering its shape, proportion, and strength. Consequently, the horn-like substance of the spur, when combined with the fleshy matter of the comb, can also bring about new changes.

It is therefore reasonable to believe that the abundant and more nutritious food paste for the limbs of the future queen bee is a kind of fertilization that is designed for this species of animal and is just as effective as that by which the animal itself is conceived.

In view of the larger space that the queen has in her cell, the drones lend great probability to this theory, since those that are hatched in ordinary worker bee cells (in the absence of other cells designated for them) and are called humpbacked brood are noticeably smaller than

those reared in their own cells, which are one-third larger than the cells of the worker bees. For since the worm body is too confined in the former, it cannot grow to full size.

The fact that the queen bee has a shorter proboscis than ordinary bees, wings of the same length, and no spurs on her hind legs does not weaken the conclusions in any way. All these modifications can be attributed to the quantity or nature of the food given to the worms. They always retain their similarity; indeed, they are just as unchangeable, even though they arise from accidental causes: causes which produce their constant effects no less than those which produce the other parts of the bee's body. For they were included by the Creator in his plan when he brought bees into existence, and we must leave it to his infinite wisdom to explain how he gave the queen bee a voice that can be heard above the other bees. Incidentally, we find similar examples in other insects of the reproductive organs and ovaries of common worker bees becoming virtually extinct. Abbot Boißer det Sauvage, a great naturalist, tells of silkworms: he dissected them at the time when they eat most and when their intestines can be seen most clearly: he found an ovary in all of them and therefore found only females and no males. But if the female ovary is found without distinction in all silkworms, it is clear that it dries up in male butterflies, namely in those which, due to certain unknown circumstances, are more suited to one sex than the other. If, when dissecting bee worms, one were to find only a single ovary or only a granular thread with small nodules, one could draw the same conclusions about bees as Abbot Boißer did about male butterflies and claim that that the ovary dries up in worker bees, namely those which, due to certain unknown circumstances, have been determined to be more suited to one sex than the other, namely those which have grown large in a narrower cell and, because of their cage and less substantial food, cannot expand their physical parts as strongly and develop certain limbs as those which are able to do so in larger, royal cells.

§6 On the sting of the queen and the other bees

A notable feature of the queen's body is that, like other bees, she has a sting, which is slightly longer than that of the worker bees. The sting of bees is located at the very end of their bodies. It is hidden when the bee is at rest; when this outer part is pressed, it appears accompanied by two white bodies, which together form a kind of bush in which it is located when it is inside the body. This sting is similar to a small arrow, which, although very fine, is hollow from one end to the other. The sting can be confused with the horn-like sheath, which is already very pointed in itself: the sting protrudes through the outer part of this sheath and is expelled with force at the same time as the sharp and burning fluid. In fact, this sting is double: there are two of them, which emerge at the same time or at different times, as the bee pleases. The outer part of the sting is cut like a saw and has 15 barbs or teeth, which are curved on each side so that the tips point toward the root of the sting, making it impossible to remove from the wound without tearing it apart. Therefore, the bee must pull it back with all its might. If it does this too quickly, the sting breaks in two and remains in the wound, and as it separates from the bee's body, it tears the poison sac; part of the intestines protrudes at the same time, so that this separation of the sting is absolutely fatal for the bee, and the sting immediately takes effect. However, when one bee stings another, which can only happen between the rings on the abdomen, the sting does not remain stuck unless it is pressed by the horn-like part underneath it, preventing it from coming out quickly, which rarely happens; but the sting is always fatal to the bee that is stung. But even though the queen, like the common bees, is equipped with a sting, she never uses it lightly to cause harm.

One can hold her in one's hand for as long as one likes without any fear, and even if she is pressed repeatedly, she will not sting. One would have to make her very angry and provoke her for a long time before she would decide to sting. But this again shows the wisdom of the great Creator, who has arranged everything in nature so wonderfully and has planted in this little creature the ability to defend itself.

Stinging must be avoided. For, as has been said, every bee must die immediately after stinging, and the sting, as is usually the case, remains stuck in the victim, thereby injuring its entrails. Thus, if the queen were to use her sting in revenge, she would lose her life, which is so precious to the bee colony and so important to it, and consequently the entire colony would be lost, since it is well known that all its subjects no longer wish to live or can no longer survive if their leader is dead and they have no hope of obtaining a young queen. and consequently the entire republic would be lost, since it is well known that all its subjects no longer desire to live nor can they survive if their leader is dead and they have no hope of obtaining a young queen.

However, it is not believed that this remarkable appendage of the sting, with its so-called poison sac, was given to the bee by its creator solely for defense. It has another very important use and purpose, and in many ways replaces the function of bile in red-blooded animals. The caustic and burning juice contained in this sac is, as its smell indicates, a concentrated acid with many particles of fire, by means of which the raw juices sucked in from honey are dissolved into wax and prepared in the body of the bees, the harmful parts still present in them are separated, the fatty oil in the honey is separated from the essential oil, and thus the wax is produced from them. This dissolving power requires a sharp moisture with a large amount of fiery particles, and the burning pain caused by its discharge into the wound when a bee stings proves that it has such properties.

§7 On the reputation of the queen among her people

The esteem in which the queen bee is held by her people is extraordinary, and is based on these creatures' innate obedience and admirable high regard, reverence, and love for their queen. Their loyalty to her is so great that they not only give their lives without hesitation to defend and care for her, but even consider their lives worthless if they think that their queen is being harmed in the slightest; but if she is taken from them or dies by accident, and they have no brood in reserve to hatch a new queen, (*) they mourn so much that they neither work, fly, nor eat, and

either die of hunger, even if the hive is filled with honey, or they immediately abandon everything, scatter to other hives, or move together to another, and pay homage to another queen, or wander everywhere until they finally perish and succumb to the burden of grief. –

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(*) A single common bee worm can have the same effect as the presence of the queen. If they are assured that they can hatch a queen and have made even the slightest preparations for this, they will work as diligently, cheerfully, and well as if the queen had already taken up her reign.

If a beehive loses its honey and the colony is doomed to perish from starvation, they leave their queen enough to live on for a few days. The queen loves her subjects just as faithfully; if she is completely deprived of them, she mourns them to death.

§8 The queen's bodyguard

That the queen has her own special bodyguard is a fact, and it can be seen with the naked eye. However, it does not consist of drones, but of a number of bees equipped with stingers, which not only constantly surround her, but also lick her and accompany her everywhere she goes in the hive. She is mostly hidden in the innermost part of the hive, and it is not easy to see her, except at the time when she wants to give birth to her young in the cells, which usually happens in the morning until about 11 o'clock. When she does appear, she is always surrounded by a circle of bees, her court, which constantly licks her. The worker bees do the same when she passes them. This reverence goes so far that they lick the place and path on the glass or on the wax tablets above them. The queen is also very affectionate toward her subjects, often pausing to join her tongue with theirs as she passes by, (*) and generally showing such affection toward them that it must sound incredible unless one sees it for oneself, satisfying the curiosity of a lover of nature and its creator.

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(*) That bee teachers consider this kissing to be for fertilization is mentioned in the preliminary report.

§9 Of the drones and the nature of their limbs

The other species of bees, which are found in a hive, but not at all times of the year, are the drones, or bumblebees, or, as they are still called by some, brood bees, because it was once believed that they were responsible for hatching the young bees, but this is not the case. They are large and stronger in the chest and head than the queen, but their abdomen is completely different from hers and not nearly as long and pointed. They have a much rounder head than the other bees and no protruding teeth like those, but rather small, flat, and hidden, and thus easily distinguished from the teeth of the worker bees and the queen. Their proboscis is also much shorter and finer, but their eyes are larger and much thicker, covering the entire upper part of the head and forming a bulge on each side. The three small eyes (ocelli) on the top of the head are completely covered with brownish-red hairs. The antennae are shiny black, completely smooth and hairless, with a short base joint and 10 segments in their club-shaped tip. They differ significantly from the antennae of worker bees and queens, as the latter have a long base joint that forms an elbow, on which 9 segments in their club-shaped tip move. Two tufts of hair protrude from under the jaws, forming two beards. Long, bristly hairs stand out on the fourth ring of the abdomen, but the fifth and sixth rings are completely curved under themselves, forming a blunt abdomen. They have no sting, and nature, which does nothing in vain, has created them defenseless for this reason, among others, so that during the battle of the drones, when they are no longer useful to the state, they can be killed and driven out without the loss of many of the industrious bee race.

§10 The drones are considered to be the males of the queen.

The drones are considered to be the queen's males, and they fertilize the eggs of this queen bee. Although I have never had the good fortune to witness their mating, other naturalists, particularly Mr. de Reaumur and Mr. Riem, claim to have been eyewitnesses to this, both inside and outside the hive, although the latter is extremely rare. According to Reaumur's report, during mating, the queen mounts the drone, whose male organ springs upward like a bow, as can be observed in each individual when pressed hard in the middle of the body. However, it cannot retract, as it has two springs that prevent it from being pulled in, which is why every male must die after mating, and I have often found such drones dead in front of the beehive, as the matter appeared to me. However, to compensate for the loss of the male bees, nature has ensured that there are enough of them to carry out the necessary fertilization, with a bee colony of 15,000 bees having approximately 300 drones, and a colony of 30,000 bees having 700 to 10,000 drones. However, to ensure that there is not too much on the other side and that the queen does not perish in her harem of males, the drone is by nature very sluggish and cold-blooded and must be provoked by the queen to mate, whereupon it persists until it lies dead beneath the queen. However, the often large number of drones is not intended solely for the old queen in the hive, but also for the young queens that are to be placed in a hive, even though not all of them, and usually only very few, are hatched or left alive. (*)

(*) The opinion that the drones actually mate with the queen and fertilize her is strongly disputed by more recent naturalists (see previous report), even though the drones have both clearly defined reproductive organs and a large amount of seminal fluid. Pastor Schirach, among others, has had young queens hatch in the above-mentioned boxes, in which there were no drones at all, and lay many fertile eggs. The queens must therefore most likely be fertile without mating. It is strange enough that the queen bee remains fertile for several months without males, since it is known that from July or August to May there are usually no drones in the hives.

is found. In addition, the genitals of the drones appear to be completely disproportionate to those of the queen bee, leading the great naturalist Swammerdam to believe that the queen is fertilized by the odorous parts exuding from the males' bodies. However, Mr. von Reaumur commented that that this disproportionate ratio of the genitals did not seem as great to him as it did to Swammerdam. We were mistaken in judging the size of the males' genitals by how they look when we squeeze them out of the body. There may be moments when they are proportionate to each other on both the male and female sides, and I believe he is right, having once accidentally seen the queen laying eggs outside the cells and opening her womb.

Of course, it takes time for a newly discovered truth in natural history to become firmly established. The ways of the creator of nature are so admirably diverse, and the mystery of creation is so deeply hidden, that a healthy philosophy allows even the smallest doubts to remain. In general, there are many extraordinary things in the experience of insect reproduction that seem to contradict our certain knowledge of the regular ways of nature.

Whether the queen possesses a source of fertility herself, or whether and how she is fertilized by the drones, remains a mystery to us. However, it is not impossible that she can be fertile without mating, because we have perfectly similar and well-proven examples in nature. There are insects that reproduce with and without mating, such as snails and, in particular, aphids, on which Löwenhof, Gerstoni, Bonnet, and others have conducted experiments and found that they have reproduced up to the tenth generation without any mating.

However, since aphids, and indeed the same sex, give birth to young without mating, but do mate and reproduce through mating, I surmise that these tiny creatures can be fertilized by a single mating to produce many offspring. And so it may also be with the queen bee. Indeed, I believe almost certainly that the queen bee passes on the fertility she receives from the male to her daughter, her granddaughter, and so on, so that the queens of several sexes are fertile

and their future brood is well fertilized without the intervention of a male (which, however, is subject to much contradiction and needs to be clarified by further observation).

But if the queen bee were to be fertile without mating every time, what would be the secret intention of the drones? Why has wise nature endowed her with such a large supply of reproductive organs? The answer to this question may be very different from all our expectations, and the secret intention of the males may lie in something that we cannot conceive of with all our minds. The large quantity of whitish juice that the drones have in their seminal vesicles, and which must be not only an irritant but also a source of nourishment, cannot be superfluous at the time when most bees appear. Who knows whether the males do not deposit their seed in the royal cells, where there is actually an egg or a worm, and thus fertilize the queens while they are still worms, as the eggs of fish are fertilized? Who knows whether this seed, when mixed with the food on which the egg or worm lies, does not increase the effectiveness of this food and make it more suitable for the development of the ovaries? Who knows whether this seed does not penetrate the worm itself by means entirely different from those we can conjecture or discover? However, since in natural history we should not deviate from the usual ways of nature without clear examples that have been sufficiently proven, and since these usually promote the reproduction of animals through mating (except for those that reproduce by offshoots or by division, such as polyps and infusoria), I believe that my opinion expressed above may be the best, namely that the queen bee passes on the fertility she has received through single or repeated mating with one or more drones to her children and grandchildren, all the more so since clear mating has already been observed.

How much remains hidden from us? What an abyss is a beehive in the eyes of the wise? What unfathomable wisdom is hidden in this depth? Where is the philosopher who would dare to explore it? Bonnet says cheaply that bees are a very small object for dull minds: for those who do not know that nothing in nature is small, and that a

mosquito can exhaust all the imagination of the greatest genius. The smallest insect is a world for the naturalist. But in bees, I believe that many worlds converge, of which we touch only a few boundaries with our investigations.

§11 They can do no work

Apart from the ultimate purpose for which the drones exist, they can do no work, neither honey nor pollen (the latter task
their hind legs and feet are not adapted for this purpose and do not have spoon-like cavities), nor do they build or perform any other communal work.
They are very sensitive to cold and only fly in warm sunshine from 11 a.m. to around 5 or 6 p.m., mostly staying in the warm center of the hive, where the queen is usually found, so that the moisture in the seeds remains liquid and strong.

§12 The battle of the drones and their expulsion

The drones are usually hatched in May and then, towards the end of July and in August, in some hives even in September, generally only in October, especially if it is a honey-rich autumn, they are removed by the bees. If the weather is bad in spring and there is a shortage of honey, the drones are also removed from many hives, but new ones are hatched again when there is a better honey flow. In general, the queen stops laying eggs altogether when a period of famine sets in, which causes the hives to become very depopulated and many bees to die. However, it is not only the lack of honey to feed the young that causes the bees to take this sad step of discontinuing the rearing of the young brood, which is otherwise so important to them, but also the risk of foulbrood, which would cause the certain death of the young if they were left to starve in the event of a prolonged shortage. The bees partly bite and partly sting the drones to death, but mostly they drive them out of the hive and prevent them from returning, so that they fly away or perish in the cold of the night. The bees show such cruelty in exterminating the drones that, once the slaughter begins, they do not even spare the eggs and premature births of these

They do not spare the males, but tear them out and destroy them as well. However, this is done for a reason and with an intention that is very appropriate to their wise and beautiful constitution. A drone costs more to maintain in honey than two or three worker bees, and does not make do with less food than the worker bees, which also enjoy pollen and thus save a lot of honey. They would therefore be a heavy burden on the colony for a good six months and, as useless members who do no work, would consume what the others have gathered with sweat and toil from morning to night. Moreover, their fertilization of the eggs, however it may take place, is no longer necessary because few young bees are produced by spring.

It should be noted that some bees do not like to go to the drone slaughter and often tolerate it for a long time, even into October. In such cases, it is advisable, especially if the number of drones is large (which I do not like to see at all), to help kill them. To make them fierce, wound a few drones on successive days and let them run back into the hive, where the bees, which will not tolerate mutilated bees, will attack them and thus very quickly get into the habit of driving them out. If you help the bees kill the drones by pushing them apart with a small piece of wood, the bees that would otherwise be unable to feed will also gain some honey, which they suck out of the crushed bodies of the drones.

§13 Of the worker bees, their sex and physical constitution

The third species of bees that live in a hive are called worker bees because they have to do all the work themselves. They make up the vast majority and have their own alternating tasks and duties. According to the above remarks, they do not belong to any sex, even though they are basically female and could have become so if they had been raised in large cells. However, I will leave aside the conjectures and judgments of various naturalists who claim that some of the worker bees produced drones and that they were

the worker bees produced drones, and that they were therefore all either male or female (see preliminary report).

As for their limbs, their proboscis or tongue, which lies in sheaths, is very bright and has a chestnut color: its structure is very wonderful and too extensive to describe here. They use it to lick honey from the calyxes of flowers and, through all kinds of movements and shortening, bring it into the grooves of the sheaths toward their mouths and carry it to their throats, at the opening of which is the actual tongue, which is a fleshy tongue that takes in the food brought there and sends it to the stomach. For the proboscis is not pierced so that it acts as a pump when sucking up the honey, for otherwise the bee would not be able to catch and swallow pollen and the like through such an unspeakably narrow passage: instead, the proboscis is completely hairy and resembles a fox's tail. This enables them to lap up honey very quickly, so that a beehive is capable of carrying away four measures of honey in a day if it is left open. On their heads, between their eyes, they have two antennae that are very sensitive and enable them to detect any changes in the air. Yes, perhaps, and very likely, the Creator has given them one or more senses that we cannot name. At least it is extraordinary how keen their senses are and how far they can smell honey, since an hour's distance is not too far for them to smell honey or honey-rich flowers. They have four wings, two large ones covering their bodies and two small ones underneath, all of which display the different colors of the rainbow when the rays of light or the sun fall on them. Between these wings are two openings of the lungs through which they breathe, and they have four more on the sides of their thorax. Of their six legs, the two front ones also serve as hands. Each leg has two large and two small hooks, and the second and third pairs of legs each have a brush or a square part covered with stiff hairs, which they use to collect and deposit their pollen balls. The hind legs form a shovel on the outside and have a deep cavity in which they stick their collected supply of pollen and the like and carry it home.

§14 Of the same different activities inside and outside the hive and, among other things, of the preparation of wax

The worker bees have their communal and alternating tasks and duties, which they all know, but their organization is such that some are responsible for these tasks for a while, and then switch to others.

Some carry out their tasks at home or in the hive: some build the cells, others form chains, with one hanging onto the feet of the one in front of her, often remaining motionless for many days so that the working bees and those arriving can easily walk up and down them. They make these chains of all shapes and sizes in a position that often seems very uncomfortable to them, especially when they begin to build and the dwelling is still empty, because then the bees that come home loaded with honey and pollen feed both those hanging in chains and those working, and partly offer them the honey with their tongues, partly letting them eat the pollen from their legs. Others polish the cells and provide them with a cornice at the top; others clean the bee dwelling; others fill the joints and cracks in the beehive; Others stamp the bee bread or pollen into the cells, which is brought home and quickly scraped off the legs of the bees working in the field and placed inside. Others care for and feed the young, make and knead their food paste, others stand guard both inside and outside the flight hole, (*) and there are many other domestic bee tasks.

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(*) Just as their constitution resembles a well-organized police force, they also have a strict police force, so to speak. The guards not only prevent foreign bees from entering, but also exclude those from the hive itself that are considered foreign because they happened to be absent for a few nights. Foreign bees come with the intention of stealing, and the bees of a good and populous hive, to whom the guard duty has been entrusted, are very attentive to them. As the foreign bees initially hover despondently in front of the flight hole, those on guard often rise up toward them to catch them with their feet. If the

If the foreign bee does not retreat in response to this threat, one of the bees darts at it like an arrow and bites it, whereupon several others immediately rush to its aid. Their main weapons are their teeth, because their horn-like rings prevent them from reaching each other with their stingers, despite their best efforts. If the bee manages to escape from the tumult with the stranger, it takes her between its feet and flies a few steps away from the hive, falling to the ground with her. However, it does not leave her, but first bites off one of her wings so that it becomes like a thread, rendering her unable to return. Only then does it return. However, there are the following exceptions among them: If a foreign bee arrives that has lost its way and is laden with honey, either on its legs or inside its body (which a bee expert can detect), it is admitted without hesitation; or if a foreign drone arrives, it is also rarely bitten away, but usually admitted.
Something else strange can be observed among the bees standing guard. When day breaks and the dawn heralds a beautiful day, several bees stand inside the flight hole with their heads bowed and their wings spread, making a constant humming sound, while everything else in the hive is quiet. This can be called a kind of reveille, encouraging them to work. This strange buzzing continues uninterrupted as long as the morning coolness lasts and until the workers begin to fly out. Call it fantasy if you will, but it is strange and is not merely intended to pump in the morning air.
At the very least, it is an expression of joy about the upcoming good day for flying and an announcement of it, because it is not heard when the weather is unfavorable.

Others fly out and bring back partly honey, partly wax, partly propolis, partly water from streams or pools of manure, etc. They know their way through the air to within an hour, and if their dwelling is moved even a hand's breadth, they notice it and are confused. Even through the thickest fog, if it overtakes them unexpectedly, they find their way back. And who does not admire their natural skill? Who is not amazed at their architecture, which even the most skilled architect must yield to. According to the same

basic rules, yet with the most varied changes in more than one way, they know how to execute the most beautiful construction, whatever it may be, round or angular, wide or narrow, high or low. They know how to use and build on every angle in the most elegant way, always observing their unchanging rule of economy in wax and space (the latter mainly because of the necessary warmth), and everything is arranged in the most appropriate and clever way for their magnificent economy. Their artful construction of the cells follows the most correct basic rules of geometry. The floor of each cell is pyramid-shaped with three identical and similar rhombuses, which in turn form part of the floor of three hexagonal cells on the other side, all of the most correct dimensions. Each side wall forms a side wall of the six adjacent cells. And just as the dimensions of the narrower cells for the worker bee brood are precise and accurate, so too are the larger and wider cells for the drone brood. Everything is arranged in the most charming way with the greatest economy of wax and space.

Nature has equipped them with skillful limbs and extraordinary dexterity and speed for their tasks. They suck the honey partly with their proboscis and partly into their honey sac, where everything harmful is separated, especially the honeydew, which then goes to the sting and causes swelling when the bee stings, but they regurgitate the honey completely pure and healthy into the cells. However, the sweet liquid collected from the flowers is first prepared and cooked in the bee's stomach to become real honey, the oily and fatty substances are separated and transferred to the wax stomach, where they are processed into wax. The bees collect the pollen, which they use partly for food and partly to feed their young, with their mandibles or chin, at an incredible speed, then fly up a little and pass it to their front legs, which share it with the middle legs. The middle legs rub it onto the shovels or deep, broad cavities in the hind legs, all of which happens in an instant. They repeat this until their load is full, then return home. – Upon their return, they place it neatly in a cell, stretch the two loaded feet inside, and brush the two balls off the rear feet with the middle feet.

and leave them lying there like two lentils, whereupon another bee, busy with household chores, immediately comes to the rescue and kneads and stamps them with its mouth. – However, if it has rained, or if the flowers are very wet with dew early in the morning, and the pollen cannot be gathered on the spoons of the hind legs, the bee dusts itself with it, as it were, and covers the hairs on its entire body, head, chest, and legs with the particles of pollen, and then returns home completely yellow, or completely green or red, depending on the color of the flower, back to the hive, where they remove their prey themselves as much as they can, but mostly it is taken from another bee working at home and put away for storage. The bees collect the putty or pre-wax, which is different from wax and is actually a sticky resin, but becomes very hard after processing and especially in the cold, in a slightly different way. They bite it off the buds or young shoots of spruce = fir
= birch = elm and other trees and shrubs with their teeth and stick it to their legs, but not while flying, as with pollen, but while sitting. This is a slower and more laborious process. They bite off a small amount with their teeth and knead it, using their front legs to help shape it. They then take it from their teeth and pass it to their middle legs, which bring it into the hollow of their hind legs and pat it into place with three or four strokes. When they have loaded as much as they can carry, they hurry back. However, the bee cannot remove this putty itself when it returns home, but other bees tear off a piece with their teeth and carry it to where there is a crack to be filled. They process it immediately and raw, without it first becoming the raw material for wax in the bee's body, and do not store any of it in the cells. They use it to plug all the holes and openings in their dwelling, often covering all the walls with it and, in particular, using it to secure their wax panels. However, they do not neglect the precious time when they can gather honey and pollen in order to collect this putty; they do so only sparingly, in the early days when they have settled in a completely new hive, but more frequently in the fall, when they find little else outside and are preparing for their winter quarters.

They also fetch water, which they are not at all squeamish about, and lick it up from dung puddles, fresh earth, saltpeter-rich walls, etc., swallow it, and carry it home. They probably use this alkaline substance to feed their young at a certain age. Perhaps also to digest the pollen mixed with honey for wax production in their wax stomach. For what the bees carry home on their legs is by no means wax, but they prepare it in their bodies by digesting the honey and pollen, the latter of which they probably also use for this purpose. – The experiments are correct in that bees that are confined and fed pure honey build wax roses, but I cannot yet guarantee that they will not soon become exhausted and be able to exude wax in large quantities without flower pollen. Of course, they only extract a very small portion of real wax from the wax pollen. Most of this material serves as their food. (*)

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(*) However, the fact that bees cannot live on pollen alone is sufficiently proven by the fact that in hives where bees have died of starvation, one often finds large quantities of pollen.

They eat this wax flour (as can also be seen in their excrement) and it passes through their mouth into their first stomach, where it mixes with honey and then passes into the second stomach, where approximately one part is separated for food and the other part for actual wax, which is excreted through the six rings on their abdomen and appears between them as bright white flakes, which can often be seen clearly.
When the stomach, which has to make wave-like movements at the same time (as it has many rings), has warmed up properly, it sweats, and this sweat appears in very delicate leaves between the scales or rings that lie directly on the stomach. The bees then know how to pull these warm, delicate wax discs out of their fans with their feet at an incredible speed and use them to build their cells. For the most part, however, the bees working on the wax construction take the wax splinters they need from the rings of the bees hanging in chains. For when the bee building the cells has used up its small supply of wax, it goes under the pile and collects a new mouthful of wax splinters.

cells has used up its small supply of wax, it goes down into the pile and fills its mouth with wax splinters again. Incidentally, this digestion and preparation of the wax assures us, and experience confirms, that the wax is not unhealthy, but can be eaten without any hesitation or harm by lovers of unfiltered honey still in the roses.

§15 The origin of bees and their reproduction

As for the origin of the bee, it comes from an egg laid by the queen in the cell. The queen has an ovary consisting of a whole cluster of many vessels that spring from a very large fleshy vessel, all of which flow into a common canal and are filled with eggs during the laying period. These vessels extend toward the rear, and the eggs inside are larger the closer they are to the rear. These clusters form two ovaries, each of which opens into a large tube, and these two tubes enter the common canal, which is the uterus. In this canal is a small round body which supplies the sticky moisture and hangs in such a way that all the eggs that are to be laid are covered with this sticky substance, which keeps the laid eggs stuck to the bottom of the cell.

The egg-laying season begins in January in good, populous hives, even in not very cold winters, around Christmas, in others in February, and in weak hives in March, and lasts until September and October. The brood in winter is placed in the middle of the hive because of the necessary warmth, and is more for the propagation of the hive itself, but in spring it is for swarming, which is why more bees are produced in the two months of May and June than in the whole year.

When the queen wants to lay her eggs, she first enters the cell and checks that everything is clean and tidy, then leaves again and immediately slips back in with her abdomen and lays the egg right in the center of the cell, so that one end of the egg points to one of the six corners of the cell and the tip points to the opposite corner. This happens as described above.

accompanied by their court suite and bodyguards. When doing this, all the bees turn their heads toward the queen, flatter her with their proboscis and legs, and have a real celebration of friendship around her, which lasts for a short time until the queen emerges from the cell. She lays the eggs precisely in the cells that are designated for them, and must therefore know exactly what kind of eggs she is laying before she lays them, whether they are female or male. This is something extraordinary in nature, since a hen, for example, cannot know whether the egg she lays will produce a rooster or a hen. I have seen the queen lay eggs in the cells a thousand times, and have never observed the worker bees confusing the eggs and carrying them back and forth to other cells, although this may happen occasionally with individual eggs, but not with an entire panel. For I have seen the queen lay two or three eggs in one cell, and also, when there were no empty cells, drop several eggs onto the roses, which her attendants picked up with their mouths and seemed to eat, but presumably took to a suitable place and stored them there; but I have never seen them carry a bee egg from a common bee cell into a drone cell or an egg from a drone cell into a worker bee cell. If the queen does not find a sufficient number of ready cells for all the eggs she is ready to lay, and she lays about 200 a day, she sometimes lays two or three in a single cell. However, since only one bee can be hatched in a cell, the worker bees remove the remaining eggs and place them in other cells. However, it has not yet been observed that there have ever been several eggs in a queen cell, presumably because only the worker bees themselves select and carry them in. Even when the queen lays her eggs, she does not alternate between worker bee eggs and drone eggs, but rather disposes of the entire mature ovary of each species at once, one after the other, through the channel through which each passes. If, for example, she comes to a wax plate consisting entirely of drone cells, she lays one to two hundred eggs in them one after the other until her supply of mature drone eggs for that day is exhausted or the cells are occupied. And she does the same with the worker bee eggs.

The egg is extremely white, slightly smaller than a blowfly egg, and has the shape of a thin, smooth membrane filled with a whitish juice. The eggs from which the drones develop are slightly longer than those from which the worker bees develop, and also slightly more yellow in color than the latter, which are brighter white, but this is not very noticeable. The egg remains in its covered position for four days, during which time it grows and reaches its opposite angle, where it receives its first breath of life and then becomes a small white maggot or worm without feet, which appears to be composed of many rings and writhes around itself, forming a half-moon shape in the center of the cell, where it remains firmly attached by means of the juice. In this position, it not only grows until one end touches the other in the shape of a ring, but also until it is large enough to fill the bottom of the cell. During this time, the worm or larva of the bee-to-be is kept warm by the old bees and fed several times a day with a useful food consisting of a liquid, shiny mash made of honey and flower pollen, to which they also add water, salt particles, and a juice similar to that which sometimes flows from oak trees. Its components can be described as a fine extract diluted with honey and flower pollen mixed with https://de.wikipedia.org/wiki/Phlogiston water, which is prepared into an essential oil. It has a sour-sweet taste and is only yellow shortly before the worm is covered. This is because they adjust the food paste according to the age of the worm. In the beginning, it resembles a white paste, almost tasteless, like a flour paste. The older the worm gets, the tastier the food paste becomes; it then tastes more like honey or sugar and turns yellow. Very close to transformation, when the worm is so large that it fills the base of the cell, it has an even more sugary taste, becomes sour-sweet, turning greenish-yellow, and is completely homogeneous with this insect in its entire larval stage, and completely assimilated with the substance of the body, without any excretion of excrement. When the worm is seven to eight days old, depending on the weather, it is fully grown and ready for transformation. It then begins the second period of its life, changing its position, turning itself around with all its might, turning one end toward the entrance of the cell, but always so that the part facing the entrance of the cell is the part facing forward.

– The worm then no longer needs any external food, but the foster mothers, the sexless bees, seal the cell with wax, vaulted and tightly closed, so that it has the necessary degree of warmth, is not disturbed, and no adverse effects from the outside air can reach it. (*)

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(*) Such a perfect larva can survive for three weeks without food in a temperate place, but does not transform if uncovered. The admission of free air must be excluded in this great work of nature.

The only thing the worm does immediately after sealing the cell is to prepare a silken shroud, since it is now leaving its first life as a worm and is, as it were, going to its grave in order to emerge with a new life and a more noble body, with excellently arranged limbs, in accordance with its purpose and destiny. It lines the cell with a very delicate brownish-red bellows or skin, because it must not lie directly against the walls of the wax cell during its transformation. Its spinning tools are located at the mouth of the worm between the lips, with which it draws the finest threads around itself and smears them with a tough juice so that the web looks like a skin and sticks so firmly to the cell that it seems to be one with it, as if glued. However, it has not yet been determined whether this skin consists merely of a deposited mucus, which the maggot expels from its sucking tube shortly after covering the cell and uses to line the side walls, which then becomes a shiny skin through the heat and the addition of phlogiston.

Now begins the second period of its life, which is more like a sleep or, in fact, a purely internal life. During this period of 11 to 13 days, nature works to develop the parts of the bee that are hidden from our human eyes in the soft mass, without any help from the insect, as if it were asleep. A miracle of creation takes place in nature, as good as the resurrection. For in 13 days, and in warm weather even sooner, the transformation of the worm takes place step by step. It becomes

Three days after shedding the larval skin, a nymph or pupa emerges, i.e., one can gradually see the parts of the future insect; however, they are not yet firm enough for the insect to use them. They therefore lie on their chest without the slightest movement, covered with a soft, transparent skin that wraps itself so precisely around the surface of each of these parts that one can actually perceive their shape. In this new creation, the neck and head appear first, formed from the first five sections of the maggot, with the mouthparts extending down toward the chest. Then the middle part of the body begins to become somewhat thinner or smaller, and the thorax forms from the three sections of equal width that make up the body of the maggot in its thickness. Then, through a contraction of the maggot's body, the six legs develop, and finally the abdomen of the bee from the last six rings of the maggot's body. The wings, however, grow to perfection while the bee lives in the nymph stage. First, the large eyes turn brown, then the head, and gradually the rest of the body. Now a new life begins, and the young bee, formerly a worm, appears at the latest on the 21st day after its birth from the egg as a perfect bee. It pushes the wax cap open with its head, gnaws it off all around, and slips out. If the lid is a little too hard, the older bees sometimes gnaw at it to make room for her and help her out. In the first few moments, she seems a little sleepy and her hairs are slightly wet, so she immediately cleans herself and the older bees lick her. She can then be distinguished from the older bees by her color, which is slightly bluish for a while. At first, she is fed by the older birds for a day or two, just as birds feed their young, until she begins to fly out herself, which happens very quickly, within a few days, as they are already flying out on the third day, entering the nest, building, and performing all the artificial tasks of their species. (*)

(*) My bee friends will allow me to make a small philosophical comment here. We see here a very noble, artificial insect with admirable limbs emerging from a soft, unsightly worm without feet

whose entire mass appears to be an insignificant mush, from which one would hardly think that the germ of such a lovely little animal could lie. Does not the whole analogy of natural things lead us to the idea of a future development of the germ lying in our wonderfully and mysteriously constructed body into a transfigured body? And does not the miracle of creation described above prove, if not the probability, then at least the possibility of resurrection? Did not the Creator of nature, from the moment of creation, order all beings and originally enclose the plant in the seed, the bee in the worm, the butterfly in the caterpillar, the future generations in the present ones? Should He not have been able to enclose the spiritual body in the animal body according to its germ? – Where this germ is located and what it is, we cannot, of course, determine directly, nor can we think or say much about it. We know, for example, that the so-called life spirits in our body are something quite different from the soul. They are a certain fluid in the nerves, which, because of its subtlety, is not apparent to the senses, which transmits sensory impressions and causes the movements of the muscles. The terrifyingly rapid, even instantaneous propagation of these impressions, and some other phenomena, reveal a certain similarity between this fine and spiritual fluid, this nervous sap, and the matter of fire and light. It is well known that all bodies are filled with fire; it is even frequently found in food; from there it passes to the brain, and from there to the nerves. Should not the germ of the spiritual and transfigured body, which revelation contrasts with the animal body, this coarse shell, be composed of this life-fire, and that this ethereal machine, this germ of the spiritual body, through its future development (which will be the resurrection), attain a degree of perfection and receive new senses that will develop at the same time, multiplying man's relationship to that world, enlarging his sphere, and making it equal to that of higher intellectual beings? This question remains for us: How can such a frequent and profound mystery exist in a thousand natural things? Why did we want to explain everything in the most artificial miracle of our machine through the laws of the physical world, and because we cannot, prefer to deny the matter altogether?

The Apostle Paul touches on this when he speaks as a philosopher and says: Man is sown corruptible and rises incorruptible and in glory. The shell of the seed decays and is dissolved, but the germ remains and assures man of immortality. In himself, man is not what he appears to be. What we perceive externally in him is only the coarse shell under which he crawls and which he must cast off.

As soon as the young bee emerges through the opening it has made in the cell, two older bees arrive. One of them picks up the broken cell cap and kneads the wax from which it was made in its mouth, using it elsewhere. while the other repairs the cell, restoring its original hexagonal shape, securing it with a cornice, and polishing and cleaning it. Immediately afterwards, they carry honey into the cell, which soon comes out again, and the cell is occupied by another egg. Sometimes, up to five different batches of young bees are hatched in a single cell within six months.

Any of the young that are crippled or have a natural defect, either in their wings or feet or in any other way, are pushed out of the hive by the old bees without being killed, but they leave them outside to die because they are considered unfit for flight and for collecting honey, and thus out of concern that their preservation might harm the family and the republic. The hatching of the royal eggs, or the eggs destined to become queens, has nothing special about it compared to the common eggs, except that the cell is larger and hangs down; but the food paste is much better and tastier than that prepared by the bees for the common brood, and so abundant that the worm seems to swim in it. The nymph has its head turned downward and still has food paste under and around it, which fills the remaining empty space in the cell that the nymph does not completely occupy. It takes the finest nutritious parts of the food paste to itself, as it were through an umbilical cord, like young birds in eggs.

Just as hatching eggs is one of the most important tasks for bees, and they care for all eggs very tenderly as nursing mothers, so it is especially true for the royal eggs, which they incubate together with several drone eggs (perhaps

for mating or fertilizing the future queen) in their vicinity.
Those who do not yet agree with the highly probable opinion, already proven by ample evidence, that every three-day-old worker bee larva can become a queen, claim that the bees keep the royal eggs in the corners of the roses to prevent them from drying out, but only start incubating them when a new queen is needed, either because they have already lost the old one (in which case they can incubate a queen in January if the weather is mild) (*) or because there is a risk of losing them due to frequent egg-laying in spring, or when the number of bees in this fully built hive increases and the swarming season arrives.

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(*) At the beginning of the year, on January 3rd, I found a dead queen bee in front of the entrance to a beehive. She had no wings, but was otherwise beautiful and well-formed. I was quite sure that the hive was now queenless, and immediately placed it under a smaller hive. But the following night, its queen had been killed and lay dead in front of the entrance, which convinced me that a new queen had been installed before Christmas, or that the bees had brood capable of producing a queen.

However, this opinion that bees can store eggs for hatching at a later date is erroneous, as bee eggs are not like chicken eggs, which are surrounded by a hard shell that protects them from drying out. But mainly, bee eggs cannot be stored because they are always surrounded by a certain degree of warmth, which means that the embryo of the worm and the bee larva must develop immediately according to the laws of nature, and in this insect, this happens completely in a few days. However, because a queen in the nymph stage and when hatching from the cell can easily fail, they often lay several at a time, which often all succeed, but often fail, or only one succeeds if they lay only one egg. They take excellent care of the royal eggs, preferring to neglect the other eggs or place them close to the royal cells

if they cannot feed them all and keep the nymphs warm because of their small number or the cold weather.

§16 On the characteristics of bees and their natural language among themselves

We will mention just a few other admirable characteristics of bees. The orderliness of all their activities and tasks, both inside and outside their homes, is remarkable, beautiful, and captivating, and the instinct that their Creator has instilled in them to observe this orderliness also tells us, in the quietness of nature, that their Creator and ours is a God of order. But how could it be otherwise, according to the wise plan of creation? What can exist where there is no order, where there is no harmony? Their extraordinary thrift is equally great in regard to their two precious products: wax and honey. Just as they (instructed by the one who is independent wisdom) use the utmost economy of space and building materials in the artificial foundation and construction of their cells, so that even the greatest master builder and the wisest mind could not arrange them more precisely, more economically, and at the same time more purposefully, so they are equally prudent in their use of wax. They waste nothing; they use resin where the more precious wax would be superfluous, etc. Even with the greatest supply and abundance of honey, no bee consumes more than its daily requirement: even with the greatest quantity of honey, they eliminate the drones that are a burden to the community in winter according to their economic system and unbreakable state law, without mercy, and do not spare the immature ones, which they have previously raised with all tenderness. Their love and loyalty to their queen and mother is great and endearing, and just as much a part of the wise plan for their preservation as their harmony among themselves and their mutual defense and assistance. In addition to their assistance to the common good, which one is ready to render to the other at first sight, they always cleanse one another and comb out all the hairs on their bodies to remove dust and anything else that may be on them; they share honey on their tongues, defend one another most courageously, and stand ready to die for one another.

All for one, and one for all. Their love of cleanliness in their homes is unparalleled. As for their natural language among themselves (if I may express myself thus), a thousand observations prove it, and the sense of hearing is based on the fact that they have certain natural, uniform signs by which they can express their little passions, their needs, etc., to one another. Admittedly, this is only a very distant analogy to our language, since we are able to communicate and make known our feelings and concepts to one another through artificial signs (words). These purely natural signs are, of course, as far removed from our arbitrary, artificially composed words as the natural instincts of animals are from our rational conclusions as intelligent beings who can recognize themselves and ascend to their divine Creator. However, consider the expression of joy in a bee, through the vibration of its wings and the emission of certain monotonous sounds, when it first comes upon a vessel containing honey or makes some other similar discovery: how this causes several others to immediately rush to it and fly with it, how soon a whole cloud of bees gathers to lend a collective hand. – Note the angry hissing with which they buzz around the ears of an observer whom they believe to have offended them, how they call their fellow bees and inflame them with the same desire, and thus, through this sound, stir the delicate nerves of their brains and make such a strong impression that the concept of the thing or action associated with it becomes active in them. (*)

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(*) These and other secret inclinations and violent movements and desires, which upset the balance of the soul and drive it toward certain objects, had to be placed by the wise creator of nature in these small animated machines in order to ensure the preservation of the species. Probably, just as in us humans, the passions of animals have their origin and cause in the fact that the soul is moved in different ways by stronger or weaker impressions, which in turn act on the nerves, maintaining the vibrations within them and making them more lively and persistent.

§17 On the age of bees and their lifespan

As far as the actual age of bees is concerned, they do not live longer than a year, as is the case with all insects that are equipped with thin wings and reproduce rapidly. However, there is evidence that the queen can live for several years, which may be due to the fact that her domestic lifestyle does not subject her to the same amount of exhausting work as the common bees, and that she has a harder and more durable nature than her children: this is why she can withstand much more than a common bee in experiments and various treatments. How necessary this is, is easy to guess, since the life of the other bees depends on the life of the mother: – But the worker bee, which becomes young this summer, is old the following summer and usually dies before the end of August, at most reaching September. In June and July, one can see that the bodies of the old bees begin to shrink and become small. Their hairs turn gray, and the bee no longer has the appearance, size, and varnished sheen of a young bee. Their wings turn gray and are torn from the many hours of work and frayed at the ends. Not long after, some die at home, some outside while they are working, their wings having become so worn that they can no longer carry their bodies, especially when laden with honey. However, because of their short life span, they reproduce all the more frequently and never lack for numbers, unless they are reduced to a small number by frequent swarming to one's own detriment, or a time of famine befalls them, so that the queen considers it advisable to lay little or no brood, or the queen dies at an inopportune time, or her eggs are spoiled and there is no young brood available; which, however, rarely happens in a properly populated hive, where there is always enough warmth for the mother bee to lay eggs even in the middle of winter.

§18 The burial of the dead

The bees only skip warm rainy days to bury their dead, both the young brood that died in accidents and the old ones that passed away, because otherwise they can't work in the field

. During this solemn occasion, two or three bees sometimes gather around a dead bee and carry it to the flight hole, where another bee arrives, picks up the body with its front legs, and flies away with it. But if the weight is too heavy for one bee, two bees take hold of the corpse, one at the head and the other at the abdomen, fly away with it, and drop their burden 10 to 15 steps away from the hive. As soon as the sun comes out again, they leave everything lying where it is and go outside to do their more necessary work, postponing the rest of the work until the next opportunity. However, if it is urgently necessary, they carry out what is hindering and detrimental to them in the hive at night, out through the flight hole.

Incidentally, bees also have something excellent and valuable in this respect, in that they are extremely hardy and can live even in very cold countries, and in both they provide their excellent benefits, which cannot easily be said of other insects. They therefore have something in common with the nature of Europeans, who inhabit a temperate climate and can live in very hot and also very cold regions, which cannot be said of a Moor or a Greenlander.

Chapter Two – The apiary and its location

§1 The area outside the apiary

When setting up a beekeeping operation, the first consideration should be the area outside the apiary, in terms of how much food the bees can find, especially in years when there is little honeydew.

The best areas are known to be those where there is a lot of heather or buckwheat growing or being cultivated, (*) where there are many good meadows, where there are woods, chestnut trees, lime trees, etc., where there are many fields planted with summer and winter crops or turnips or rapeseed, with broad beans and the like, and where many of the best-known bee herbs grow, a list of which is attached below.

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(*) In buckwheat or heathland areas, a good hive can yield 50 pounds or more of honey in 14 days if the weather is favorable around the time of flowering. However, in such areas, which usually have few bee plants, it is very important that the weather is good at that time, which is limited to only a few weeks. If the flowers are ruined during this period, the situation looks all the more dangerous for the bees.

Nowadays, bees do not have to travel more than half an hour to find food, because otherwise they lose a lot of time. The closer they have it, the better. For even if they can smell honey or honey-rich flowers an hour away or even further, (*) they can hardly bring back a third or less of their daily harvest, and on such a long flight they are also in great danger of being killed by rain or wind or caught by birds.

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(*) How advantageous it is for bees to have nearby, or at least not too far away, bee plants, flowers, and plants that they can use, especially

This is because when a bee has a short distance to travel to find food, it can not only make more frequent trips back and forth, but also carry a much heavier load than if it has to fly a long way. I once made a remark about this that particularly amazed me about the intelligence and apparent deliberation of a bee (if I may express it thus). I saw a thick bush of goldenrod in bloom very close to a beehive, which bees, and especially wild bees, frequent very often. The tallest stem with flowers reached up to the flight board of the beehive. A bee from the hive was busy loading its legs with these yellow flowers. It began to gather them from the furthest stems and worked its way closer and closer to the hive until it was finally able to run onto the flight board and, without flying a hand's breadth, enter the gate of its city and deposit its booty. Whether they were clever enough to start collecting diligently in order to bring the increasingly heavy burden closer and be closest to their goal with the heaviest load, I will not say or claim outright. However, they collected such a quantity of pollen on their legs as I have never seen on a honeybee in my life, and they would certainly not have been able to fly fifty steps with this burden without sinking under the weight. – So the closer the bee plants are, the heavier the loads the bees can carry at once and bring back, and the more often they return.

It is even worse when the bees have to fly across wide rivers to get their food, as they are often blown into the water by winds that are stronger and more frequent near the water, especially when they return home laden with nectar. However, if the bees are not forced to fly over a nearby wide river, such an apiary is not harmful, especially if it flows northward. In forests themselves, bees thrive very well, if one has the opportunity to keep them there. Not only do the bees have their food nearby, and plenty of it, but they are also protected from the wind and can fly out and gather nectar when others in flat areas often have to stay at home. They are more airy, healthier, and less

disturbance than they are near houses. However, bees in woodlands are exposed to several of their enemies, especially hornets and wasps, and are often difficult to catch when swarming. But as far as this is concerned, splitting colonies is very useful, and in view of their enemies, more swallows, sparrows, and other birds swarm around houses than in the forest, which catch the bees.

§2 What should and should not be in the vicinity

However, small streams, and especially manure heaps and dung pits, are very beneficial to bees in the vicinity of the apiary, and the saltpetre particles they collect from these, as well as from fresh earth, walls, and often from unclean places, are almost indispensable to them. However, smoke from a bakery or brewery, smelter, or chimney is unpleasant and harmful to them. Stinking things, especially dead and rotting bodies, must not be left near the apiary. They must be placed away from mills so that no flour dust can settle on them, which would cause the honey to ferment and spoil.

§3 How to position the apiary and what is the most important factor in its warm location

The apiary itself must be positioned so that it is protected from the wind, especially from the north wind due to the cold, and, if possible, also from the west or evening wind because of the driving rain, by walls, buildings, or, where the location does not allow this, by fences, or by a back wall boarded up with boards or solidified with clay or baked stones or other means. However, care must be taken to leave a small passage behind the apiary so that the bees can be tended to from behind, which is almost essential, or at least makes the task much easier. Above all, however, when setting up a bee stand, one must ensure and check that it is in a warm and dry location. This is a key factor that contributes immensely to the success of beekeeping. This

However, a warm location does not mean that the sun is often in front of the apiary in summer, or that it faces south at midday, etc. All of this may be the case, and yet the apiary may still be in a cold, wintry, and possibly damp location, which is absolutely detrimental to the bees. The apiary may be located in a low-lying area and remain colder well into spring than it is 50 steps away, because the warm air is blocked by protruding buildings, walls, trees, etc. and cannot penetrate, so that the cold from winter remains in the ground and spreads to a certain height above it, which is why snow remains on such patches much longer than on the surrounding elevated areas. An apiary can be cold if it is on the side of a building or mountain.
and that a frequent draft, or constant air blowing onto or past the hive, causes even more cold when the draft comes from the northeast or east-northeast: thick, large walls immediately behind the apiary smell very cold in the spring, cause moisture, etc. Such cold locations are very detrimental to the establishment of a bee stand, and if they are also damp, they are completely ruinous. A friend in the neighborhood complained to me several years ago that his bees were not thriving at all, that they did not want to swarm, that his offshoots did not take off, and that most of them died. I examined his apiary, which was very well laid out and comfortable, but had a hidden cold spot. After moving it just 30 steps away, the bees have thrived and multiplied. The warmer the location of the apiary, the earlier the bees swarm and the better they thrive in every respect.
As far as the bees' flights are concerned, it is of course good if they can fly freely in front of and beside them as far as possible, or at least 20 to 30 steps, and return home; but if the location of the apiary does not allow them to fly completely freely, it does not do much harm if the bees have to fly over high walls and buildings to find their food; they do this voluntarily and without being forced to do so. In my case, they are surrounded by buildings and also fly over the church without any harm coming to them. The only thing is that they are more easily knocked down at height by a quickly developing thunderstorm wind. However, the ringing of church bells is completely harmless to them. For they do not lack the sense of hearing, since they navigate in the beehive by

Although bees can clearly distinguish between different types of buzzing, they are not greatly affected by air movement. However, they are extremely sensitive to vibrations in their hive or the ground on which it stands, and can feel footsteps approaching the apiary. For this reason, bees do not thrive near a paved road where many vehicles pass, especially in winter, and in summer they also dislike the dust that the wind blows toward them. In general, all places where strong vibrations of the ground are caused in the vicinity should be avoided for an apiary: for example, if the apiary is adjacent to a barn where the threshing of grain in winter disturbs the bees and causes them to consume more food. This is exactly what happens when the apiary is adjacent to a smithy, which can transmit its blows and vibrations to it. However, such proximity to similar workshops is only detrimental to bees if they are directly adjacent to the apiary and can cause actual movements inside it, as the sound and noise themselves have no influence whatsoever on bees.

Tall trees around the apiary are good if they do not block the morning sun, but they do weaken the midday heat and provide shade for the bees. They are also good in that swallows do not fly so strongly around them. but if you do not want to increase your bee population by means of splits, but rather let them swarm, tall trees near the apiary are a hindrance because the young swarms like to cling to them and are often very difficult and dangerous to catch. Low trees or dwarf trees and the like, however, make it easier and more pleasant to catch the swarms. I would particularly advise bee lovers to plant one or more quince trees in front of their apiary. I have noticed on many occasions that young swarms of bees are extremely fond of clinging to them, much more so than to other trees. The natural cause may well be that such trees grow very leafy and bushy, thus providing the bees that gather there with welcome cover and protection from the hot sun, which is exactly what they are looking for and need at that time. Furthermore, many bees belonging to the swarm may well be accustomed to flying to these quince trees because they find plenty of food there during the flowering season, and the quinces bloom every year and have frequent and honey-rich flowers: hence

They, accustomed to this flight, immediately go there and show the first ones the way to the queen and the rest of the swarm, and encourage them to join them. These types of trees, quince trees, are the most useful and advisable for a bee hive in the garden, partly because they do not grow tall and therefore the swarms are easy to catch, and partly because they can be pruned as desired and grown in such a way that they do not cause considerable damage to a vegetable garden with their shade, and because the fruit can be used in autumn for many economic and medicinal purposes, both for eating and for a refreshing cool drink in summer when the juice is boiled, but especially because the raw juice is extremely healing for sore throats, and because dried quince slices are very pleasant among other dried fruits. And who is unaware of the wonderful relief that quince seeds provide for burnt limbs?

First of all, a good beekeeper will keep the ground around the apiary clean, free of tall grass and bushes, and either cover it with a kind of solid pavement that can be swept frequently, or sprinkle it with a little dust. Keeping the area around the apiary clean is also very useful because it makes it easier to spot and find the queen during swarming season, when she often falls down in front of the hive and dies because she doesn't have wings, causing many swarms to return to the old hive, where they remain for another two to three weeks until a new queen is raised, during which time the bees remain idle and the new swarm arrives much later.

§4 The location of the apiary in relation to the sun

As regards the location of the apiary in relation to the sun, the area or place where the bees can be placed is of course decisive, However, the front of the apiary and the exit of the bees should not face west or southwest, or between noon and evening, and certainly not north or north-east. The best position is southeast or between morning and noon, but in any case where they have the morning sun until around noon. The morning sun calls them to work early

to work and warms the hive sufficiently so that the midday sun in spring does not dry out the honey and nectar. However, if they have to be placed there around noon, it is best if they are shaded by a building or tree during the hottest part of the day, as the intense heat not only greatly hinders the bees in their work and then work little when the others, which are in the shade at this time, are busy, but also because in very hot summers it sometimes happens that in a young beehive, whose wax structure is still very delicate and not yet very strong, the honey begins to melt due to the direct rays of the sun, causing the bees to perish and drown. Should this happen, as it sometimes does, one must quickly dip a sack or several into a tub of water and place them around the beehive, but first place the hive itself on an empty base. – In particular, young swarms that have been enclosed are driven out on the second and third days by the intense heat of the sun, when they have already built hand-sized panels and honey and eggs are already inside. This happens frequently, and the owners always say, without understanding the cause, that the bee had mischief in mind. – All this can be prevented by a covered, well-equipped apiary, where the roof must extend far enough forward to shade about half of the beehive when the sun is at its highest.
Incidentally, it is extremely convenient and beneficial if the apiary is positioned so that it can be seen from the window of the dwelling, especially from the front, although this of course depends on the location of the house and garden.

§5 Whether bees are best kept high or low

The question arises as to whether bees are best kept high or low. For handling the bees, for example, to transfer them or make splits, it is certainly more convenient if they are kept low, mainly because they are less affected by the wind and are less likely to be blown down in a storm; however, they should not be less than two feet above the ground; but they are also fine at a height

they are also fine, and if there is no other suitable place, they can even be allowed to fly out from the roof of the house or from the upper floor if the place is prepared for this purpose; however, one must then simply stick to laying them down and not allow them to swarm, and no disruptive activity may be carried out in such a house.

§6 Covered apiaries and their benefits

I now come to the apiary itself, which is also an important consideration. A covered and well-equipped apiary is an excellent advantage and benefit both for the bees themselves and for their hives. Of course, one can also build them completely free-standing, digging oak or pine posts into the ground for this purpose, the latter being preferable because they do not rot so quickly, and then attaching two double planks or other wide boards to them, but then also giving each beehive a separate roof that does not let water through. Regardless of this, however, driving rain cannot be prevented, which not only floods and dampens the flight board, which every beehive must have, so that it warps in the summer when the sun shines on it again and often has to be smeared again, and in winter easily causes mold, but also the beehives themselves or the attachments cannot last as long as when they are completely covered and always remain dry. Furthermore, in free-standing and unclosed apiaries, the bees are prevented from working at midday in high summer by the intense heat of the sun. For even if they do continue their extraordinary work in the fields at this time of year (except when honeydew appears), bees that have shade at this time of year are observed to be more industrious. Furthermore, in winter, the somewhat weak beehives in free-standing hives do not offer as much protection from the severe cold as in a closed or completely covered apiary: I am only referring to somewhat weak beehives (since they do not always become equally strong in terms of population, the cause of which cannot always be discovered, but only surmised

); for a hive with a large population and a rich supply of honey cannot easily be harmed by the harshest cold of our climate, (*) as both the honey and the bee colony itself can withstand it; only an excessively long period of severe frost can be detrimental to them, especially if they do not get any fresh air.

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(*) As true as this statement is, it is nevertheless possible under certain circumstances that even good beehives can freeze to death. This happens frequently in some winters in straw baskets, where the bees cannot breathe, or if this is neglected in magazine hives. In honey-rich and fully built hives, a large number of bees produce an extraordinary amount of vapour and mist, which (especially in straw baskets, which are smooth and glass-like on the inside) collects in droplets next to and above the hive, the stronger the cold presses down from outside. This moisture runs and drips down onto the bees and makes them wet: the bees hanging on the outer edge of the cluster freeze [from the cold]; (for it is well known what moisture can do in cold weather), these frozen bees block the access of healthy air from below, as they remain dead in their position: the evil continues to spread upward, the bees at the top can no longer move or help themselves and suffocate more than they freeze to death. And this happens so frequently in cold winters that often more than a third of the best beehives in an area are lost, and according to the usual expression, freeze to death. The proof can be found a hundred times in beehives that have suffered in this way, since those that, by a lucky accident, had an opening at the top remained alive and well, while their equally good and even more important neighbors perished. It is therefore a general rule to protect good hives from the effects of severe cold by providing them with air at the top so that the vapour and moisture can escape (which can be done in magazines by means of slides at the flight holes); less populated hives, however, even if they contain a lot of honey, and weak hives in terms of population and honey, should be protected against the penetrating cold, not by closing the lower flight hole, but by a well-covered bee stand, or, depending on the circumstances, by hanging sacks, mats, etc., especially so that there is not too much empty space inside the hive and no uncultivated bases.

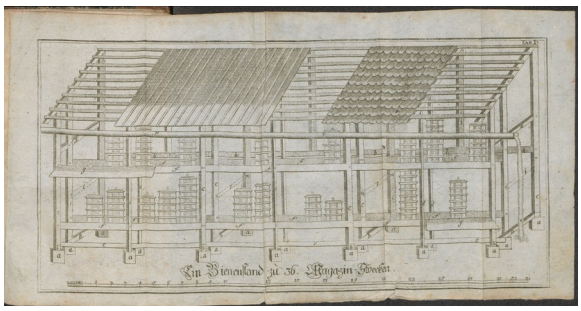
On the other hand, it is very beneficial and healthy for very populous and heavy hives to have 3 or 4 finger-widths of empty, uncultivated space at the bottom.

Honey is known to be of a very hot nature, and the bees, which huddle together in the middle of the hive, the colder it gets, create such heat and vapor in the coldest weather, partly through their exhalations and partly through their buzzing (for the colder it is, the more they buzz in a crowded hive), such warmth and vapor that in a glass beehive, when covered with it (which in winter should be replaced with a wooden board), the upper glass is covered with large drops, while the four glass panes around it are covered with flowers, as in a heated room, without harming the bees. Yes, I have found in the middle of winter in January, in various hives rich in honey and bees, that honey has flowed out of unsealed cells and dripped out of the apiary, so that I placed small vessels underneath to collect it. This was because there was a strong honeydew in September, of which the bees had brought in a lot, but had not sealed it with wax caps, partly because they do not build much so late in the year, but mainly because the cells were not completely filled, as it is their way to carry the honey from the upper part of the combs downwards and fill them gradually, starting with the uppermost ones, and then begin to seal the full cells i.e., close them with wax caps. Because this honey from the September honeydew remained uncovered in the middle and lower cells, it dripped out of the cells in drops the size of peas due to the warmth and vapors of the bees and fell onto the base board, where it was collected.

However, as little as the cold harms the honey-rich and populous hives, it is beneficial for the weak ones to be protected from the severe cold. However, carrying such hives into houses, chambers, or rooms is not beneficial, apart from the heavy load, effort, and danger involved; they are best kept in covered apiaries, which are very good for the reasons mentioned above and many others.

§7 Presentation and description of a covered apiary for 36 magazine hives, which can also serve as a model and template for others.

When setting up such an apiary, it is not necessary to go to great expense, but rather one can proceed according to the number of bees one has at the outset, or intends to acquire and keep, or according to the nature of the location, and according to one's budget. One can set up an apiary according to one's own liking and judgment, using wooden frames and frames with frames, and covering the roof with planks. However, anyone who wants to pursue beekeeping on a larger scale and reap the full benefits (which they will certainly do if they follow the instructions contained herein) would be well advised and more economical to make a slightly larger initial investment and build a permanent and spacious apiary, rather than changing it every few years and no longer be able to use the earlier investments. In the attached copperplate plate I have drawn and explained an apiary with 36 magazine hives, which can not only serve as a rule and standard in the main points if one wants to erect other and shorter stands, but which is also the cheapest, most useful, proven, and good if one wants to gradually expand one's beekeeping to this number.



It has a simple roof and is only 4 feet wide because it is designed to be placed with its back wall against a building or wall. However, if it is necessary to place it freestanding, it must be 6 feet wide due to its somewhat slender height, have a double roof, and the back wall must be covered with boards or otherwise closed off, at least halfway.

be; since then the first and middle installations remain, and only the inner passage becomes 2 feet wider.

The following items are now required for the aforementioned apiary:
Three pieces of wood, costing 3 fl.
Four ropes, each costing 36 kr., making a total of 2 fl. 24 kr.
Twelve double planks, each carefully selected at 10 kr., making a total of 2 fl.
The carpenter will need 5½ days to complete the work, plus his assistant, at a cost of 6 fl.

Explanation
a.a. are hewn stones, or a small wall on which the sleepers lie, and the posts stand half a foot above the ground.
b.b. The thresholds, 4 feet long, into which the posts are mortised.
c.c. The posts, hewn square to 4 inches. The front posts are 9½ feet high, without the tenons with which they are mortised into the sills and rafters.
The rear posts are 11 feet 3 inches high, excluding the aforementioned tenons.
The height of the middle post determines the roof pitch. The middle post stands 6 inches clear of the front post, into which the double planks ff are mortised, on whose edges the beehives are placed.
d.d. The posts that support 3 rafters.
They are cut from the double planks ff. 3 inches wide in length so that the 6-inch-wide double planks that support the beehives are cut into them and fastened with an iron nail.
e.e. Is a crossbar that binds the thresholds, cut into every 1 inch and fastened with a nail. The strongest rope can be used for this crossbar.
f.f. These are double planks that are 6 inches wide and support the beehives on their edged side. They are planed, inserted halfway into the posts c.c., and secured with a wooden nail.
g.g. These are simple planks that are attached to the double planks, just below the beehives, and protrude at an angle of 45 degrees so that the tired bees returning home can rest on them and do not fall under

the apiary. The upper ones also protect the lower beehives from driving rain and the sun's rays, and are generally very necessary and useful in all apiaries.

h.h. A passageway on the rear wall, onto which the beams supporting the rafters are mortised. It stands 4 feet high from the sill.

i.i. Are beams or supports for the rafters that do not extend down to the sill, but are only mortised into the middle passage h.h.

k.k. Two beams to hold the walls together; only the upper and lower side walls have such beams, but not the middle wall, as they would only get in the way when walking around the apiary.

l.l. These are sliding bars, 3 feet 1 inch high from the sill, which are not permanently fixed, but are only inserted when work is to be done on the upper magazine sticks, and a board is placed over them so that one can walk on them (*). At the end, each post of the rear wall has:

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(*) However, these arrangements can be dispensed with if a portable bench about 5 feet long is made and, instead of feet, a kind of gardener's ladder is attached to both ends, the lower rungs or steps of which are not only longer than the upper ones and thus run out,

etc. A hole for a grindstone, and the middle posts

n.n. a standard tenon hole for inserting and sliding in the aforementioned bolts.

o.o. These are the rafters, 6 feet 6 inches long.

p.p. A kennel, or gutter, which can be omitted if necessary, because such a narrow roof does not drip for long, and the bees can fly out in good time after the summer rain.

q.q. The roof is covered with planks, for which 30 planks are required, costing 3 fl. 30 kr.

When covering the roof with planks, it should be noted that the boards should not be laid along the entire length, but cut into pieces running straight next to each other, and a piece of lath nailed to each joint where two pieces of plank meet, so that the rain cannot penetrate.

For even if the boards laid lengthwise overlap by a few inches or run over each other,

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so that the bench cannot fall over, but also have iron spikes at the bottom that penetrate the ground so that the pieces of ladder stand firmly and one can work safely on the bench at height. These two pieces of ladder are also attached to the bench with a strap so that they can be conveniently folded together and carried out of the apiary when not in use.

During prolonged rain, water penetrates and runs into the apiary. However, cracks and splits caused by the heat of the sun are particularly unavoidable, as the water always passes through boards that run crosswise.
However, this does not happen with boards that run straight, even if there are cracks or splits almost a finger's width wide, because the water has a ladder along which it can run off and follow the slope. The opposite is true for cracks or splits that run crosswise. Incidentally, the additional amount of slats is offset by the fact that fewer boards are needed.
r**.r.** A roof covered with tiles requires 36 battens and 720 tiles, costing 5 fl. 30 kr. However, the best, lightest, and most attractive roof is covered with slate tiles, requiring 24 rejected planks and 6 Reiß slate tiles, and such a slate roof costs 12 fl., or 8½ fl. more than a tiled roof; but it is very durable.
If you want to make the apiary attractive and durable, paint it with any oil paint, the cheapest being Nuremberg red, which costs no more than 22 kr. per hundredweight pfennigs, no more than 22 kr., and only 4 pfennigs of paint and 3 measures of oil are required. I guarantee that, after a few years, a beekeeper will not regret the cost of such a bee stand.

§8 A note on setting up the beehives

When setting up the beehives, it is important to note that they must be slightly higher at the back than at the front, about half an inch higher, so that the water and moisture that runs down from the bees' droppings, especially in winter, can drain through the flight hole and does not remain, because otherwise mold will form on the wax boards and the moisture is generally unhealthy for the bees. This slight slope also makes it easier for them to remove their dead and other useless items, and everything should be made as convenient for them as possible.

§9 Moving the bees in summer and winter

As regards moving the bees, if this is done near the apiary, it must, except in an emergency, be done very early, either towards the end of January or at the beginning of February: for as soon as they have flown twice in fine sunshine, they already learn their location, and one suffers losses if they are moved too late, either because they fly to others if there are any standing where they were before, some of which are killed and cause much disorder, or they remain at their old place and die. Yes, I have observed that many still knew their first place on their first flight after winter and flew there. However, if the change of location is to a distant place, or an hour's journey away, the transfer can be done at any time of the year. The bees then notice the change very quickly and immediately familiarize themselves with the new area by flying around the apiary on the first day and making ever larger circles around it until they have found their correct flight, which they then never lose again. Even if they occasionally stray when the hives are close together, they immediately detect the unfamiliar smell of the hive and return to their own.

§10 Purchasing bees

When purchasing foreign beehives with the intention of establishing a magazine stand, one must first of all ensure that one buys as many young beehives as possible, which can be recognized by the whiteness and tenderness of their wax panels or roses. Young hives are preferable to old ones, both in terms of their internal structure and because of their greater industriousness and liveliness. They should be purchased from people who take good care of their bees, do not interfere with them too much or use medication, but keep them clean. Choose apiaries where the bees tend to swarm early.

The bees to be purchased should be lively, numerous, and heavy—that is the main thing. The heaviest basket is useless if it does not contain many bees. Yes, do not choose very heavy ones for breeding: the best ones are important enough, because if the cells are mostly filled with honey, the queen will find few in which she can start breeding early, and therefore such particularly heavy hives will either not swarm at all the following spring, or very late. For this reason, the most astute beekeepers who trade in straw baskets do best to discard the lightest and heaviest ones and leave the medium-sized ones for breeding. Incidentally, however, everyone will take into account the size of a basket when considering its weight, and will be able to tell from the time of year and the condition of the bees whether it is heavy with brood or even with moths.

However, the time for purchasing bees varies and does not always depend on our choice. Buying in the spring, towards the end of February and March, is the safest and best option, but also the most expensive, and it is not easy to obtain a large number because people very rarely leave bees for sale over the winter. In the fall, they are cheapest and most readily available. – If you wish to buy, examine the baskets (preferably around midday, as even in winter, when the weather is not too harsh, they can be lifted and turned over, and if they fly, they sting the least when handled gently). First, tap the basket with your finger and place your ear against it at the same time. If you hear a short, broken sound and a slight buzzing, the colony is weak; but the longer the buzzing lasts, the more populous the hive is. Blow into each

each beehive through the flight hole; those from which the most bees come out and gather in a cluster are the most populous, liveliest, and best. Then lift them up or bend them over and check their internal condition to see if they are heavy, if the basket is well built or full of rosewood panels, if these are not very black, thick, and very old, if there are no traces of moths, no webbing above, or black discharge from them below on the board or next to the side of the basket on the lower rosewood panels; whether brood is already visible, if it is already February or March, etc.

If the seller is to guarantee the quality of a stock until the apple tree blossoms, this must be stipulated and depends on the offer and price.

If sticks have actually been purchased, it is best for both parties that they be delivered immediately. If this is not possible, seal the top of the basket with a strip of paper or ribbon with two seals, as there are dishonest people who will cut the honeycombs at the top and then smear the lid again, thereby usually ruining the entire hive.

If you buy young swarms (which is most advisable if you want to buy bees from your own area), you should ask for the first swarms that fall before St. John's Day, and it is better to pay a dollar more for these than for the later ones.

Then give the seller 3 or 4 magazine boxes with their glass lids and flight boards for each swarm and let him put them in right away; if it's especially strong, use 4 boxes, otherwise 3 are enough. Then transport it right away on the first night and put it in its new place. However, if a swarm has been placed in a straw basket and transported during the first night, it should be placed on a white cloth at the new apiary with the magazine attachments in front of it, a piece of wood should be placed between them, and the basket should be pushed onto it so that the bees fall down all at once and, after the basket has been removed, they run into the magazine hive and move in.

§11 Transporting and shipping bees

When transporting and shipping bees, care must be taken to ensure that they do not come to harm and always have sufficient air. It is particularly difficult and requires extreme care to ship them in summer. They can or should only be transported at night, and if the journey cannot be completed in one night, they must be left in a comfortable place during the day to fly out, and then continue the journey with them the following night. If it is a fully built hive, give it a small empty base the day before you want to carry it away and prepare a carrying frame, like those used by salt carriers, or what some country folk call a reef, which is carried on the back and has no board at the bottom, but only two tightly tapped pieces of wood. The beehive is then tied securely with a simple stretched cloth, or, even better, placed on a board cut out and fitted with a piece of tightly woven sieve, tied securely to the reef and carried carefully. You must also take care that there are no openings where a bee can escape, otherwise there would be trouble, and it is nevertheless advisable to carry a bee cap and gloves with you in any case. I consider it very dangerous to transport bees on carts, however well equipped they may be, if only because of the inevitable jolts. In summer, this makes the bees extremely angry, and in winter the wax of the roses is brittle and breaks easily, so that the spice is not secure during transport. Simple baskets placed on the crown are a better option. However, carrying is the safest method.

Chapter Three – On the best and most beautiful type of bee dwellings

§1 A basic rule of beekeeping is to pay attention to the strength of the colony.

It is a basic rule in beekeeping that if you want to benefit from it, you must ensure that you raise hives with a large population. The mere quantity of beehives is not important; it is the internal quality and the large number of bees in a bee dwelling that bring the real advantage. A single hive with a large population is worth more and yields more than four weak hives. In 14 days, it will yield more honey than the latter often yield in 4 weeks. I estimate that a bee colony should have 20,000 worker bees; of these, 8,000 to 9,000 bees can fly out and gather nectar every day, but a maximum of 11,000 are needed to care for the brood, build the hive, and perform other domestic tasks. (*) ___

(*) Nature has wisely arranged that bees usually only fly out of a hive in thirds, so that the hive will not be destroyed if all the bees working outside happen to meet with an accident.

However, from three weak hives, each with 8,000 worker bees, no more than 3,000 bees can fly out each day to work, while the remaining 5,000 remain at home. These three weak hives together cannot only send out fewer workers each day than a single strong hive, but they also have to forego many other essential advantages. The weather could be like this for eight days, with such abundant honeydew that the strong hive alone could gather all its winter food, but the weak hives would not be able to gather more than a quarter of that amount, even with this good opportunity. If bad weather then sets in and there is no more honeydew, the strong colony is nevertheless safe, and the three weak ones perish in winter or have to be fed, which is associated with expense, effort, and many inconveniences

and yet often fails. Not to mention that the weaker colonies cannot defend themselves as easily against predators, moths, ants, etc., cannot keep themselves warm as well in winter, and many more freeze to death, all kinds of adverse circumstances, cannot breed as early as the stronger ones, and for this very reason are extremely rare and far less likely to become queenless than the weak ones, and there are many other advantages, including, in particular, that a strong colony is far more courageous and much more industrious than a weak one.

§2 In ordinary straw baskets, one cannot fully achieve one's ultimate goal in this case.

However obvious and well known the advantages of a populous colony may be, they cannot be achieved if bees are kept in ordinary straw baskets and, in accordance with the almost impossible to eradicate old habit of most country people, who in autumn slaughter and suffocate the heaviest and lightest colonies in an irresponsible and sinful manner, but also cause themselves a great deal of damage, since they could keep these noble creatures, these original examples of diligence, alive and gain ten times more in the process. I once saw a beekeeper slaughter a very heavy hive consisting of two young, strong swarms that had joined together in the spring, out of concern that the large number of bees would not be able to survive. Yes, a lout even burned his young swarms hanging from a tree with a lit straw broom because they arrived a little late. However, I do not wish to dwell on this misguided beekeeping, as it has long been criticized by all beekeepers and its disadvantages have been demonstrated. Furthermore, the instructions for far better beekeeping provided in this treatise, which have been tried and tested, refute it of their own accord.

§3 Magazine hives are convenient for this purpose, but wooden attachments with a glass pane are excellent.

However, if you want to attract strong and populous hives, you must first prevent your bees from swarming, namely frequent and untimely swarming, and then provide them with spacious dwellings, which must be made spacious gradually, otherwise the ultimate goal would be defeated if the bees were given very large dwellings right away, which would only discourage them from building even half of them, which would also cause many other disadvantages. However, these dwellings must also be designed in such a way that the bees can be handled comfortably and without harm, or even killed, so that their industriousness can be enjoyed and their abundance of honey and wax can be harvested. All this is now provided by the wonderful magazines, since the bees have their homes in connected attachments that can be increased or reduced from time to time as circumstances, time, and intentions require. They are usually made of straw (at least I have not seen any other kind) and, if not otherwise, because they are usually too large, they serve a very good purpose. However, various inconveniences (*) caused by these magazine attachments during my observations and handling of the bees led me several years ago to the idea of perfecting the magazines as much as possible, and to this end I made wooden square attachments from floorboards and inserted at least one glass in each of them, which, even though it costs only 1 kr., nevertheless provides excellent service.

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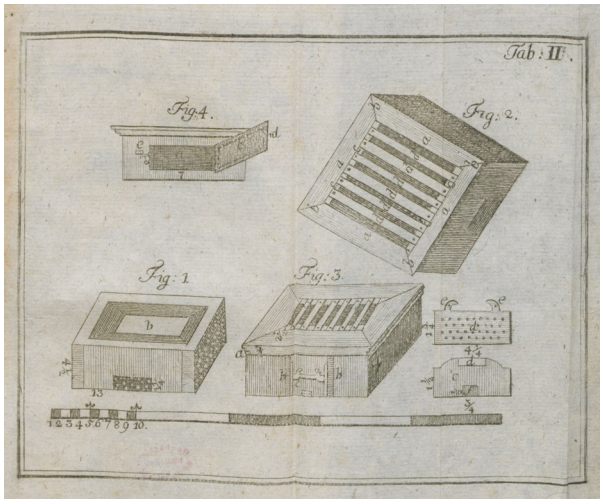
(*) Among the inconveniences of the straw magazines are, in particular: that one cannot see when it is necessary to replace them, and that frequent lifting of the sticks is not only very difficult, but also harmful, as some bees are always crushed in the process; that they do not stand firmly on top of each other; that the straw sticks attract many moths, which eat their way in from the outside between the straw rings and willow, and then spin themselves inside.

I also improved it until I found it to be the most useful and pleasant of all types. The samples, which I have not only tested myself

over several years, but also good friends, along with others who copied them, and the excellent service they have rendered, allow me to recommend them with complete confidence to bee lovers and to the public at large, especially since they are little more expensive than straw (if one wants them simple and inexpensive), last longer, are attractive and pleasant, and can be made anywhere, since there is often a shortage of people who can make straw bee houses.
One should not be deterred by the prejudice that they are too artificial for large-scale beekeeping. Just give it a try, and the prejudice will soon disappear.
I will first describe how they are made, then their general usefulness and their advantages over straw hives; but mainly I will give instructions on how to use them to the greatest advantage in beekeeping.

§4 Instructions for their manufacture

The second copper plate clearly shows how these magazine attachments were made.



Take a pure, square double plank, one of the thinnest, or a good single plank from which you can select the strongest pieces, plane them smooth on both sides, cut them straight at the top and bottom, and cut them in half lengthwise; it is important that there are no knots. The

width of these two half planks determines the height of the attachments, which is 4½ inches. Then cut them into pieces 13 inches long and join them together as shown in Fig. 1. However, if you are unable to join them together in the carpenter's manner, or if you find it too complicated, but still want to do it yourself and have the time, you can also simply nail them together with slat nails, which will hold just as well. The two side pieces must then be shorter than the two pieces of board at the front and back are thick, so that the box remains a square measuring 13 inches on each side. Cut a 4-inch-long and 1¼-inch-high entrance hole in the front. (*)

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(*) This flight hole, which is replaced by two sliders, is not so large that it can be opened completely for the bees to fly in and out, but its size serves to provide them with sufficient air when they are confined, or a beneficial draught when it is too hot in summer or winter, and also for other conveniences such as feeding, etc.

In the opposite rear side, a hole is cut or chiseled out in the middle of a glass pane, 7 inches long and 2½ inches high, as shown in Figure 4. However, if you want to insert glass panes on the two side panels as well, this is even better and more pleasant. Then, as shown in Fig. 2 above, four pieces of a slat, a.a.a.a., which should be selected to be somewhat wide and strong, are glued and nailed on top, after they have been fitted together in the corners b.b. at a miter, as carpenters call it, that is, at an angle of 45 degrees. However, they do not need to be joined together, but only pushed together. A small joint c.c. (*) is made on the front and rear pieces of slat for the grate, onto which 6 pieces of wood d.d., each one inch wide, are nailed with a small tin-plated nail for the top boxes.

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(*) These slats with gaps must never be nailed to the sides so that the grate is in a straight line from the flight hole to the rear side where the glass pane is located on all attachments. This is because the bees mostly build their combs along the six pieces of wood, allowing air to flow freely through all the panels and the flight hole. When nailing

These pieces of wood are also more useful because the slats can be planed again after they have been glued on, and iron nails, which sometimes number in the hundreds, can be replaced with wooden nails or pegs. These are also more useful because the slats are planed again after they have been glued on, and iron nails, if they are not hammered in deeply, can easily damage the plane.

These six pieces of wood and the nails must not protrude above the slats so that the wire does not get caught when it is cut (see below). It should also be noted that these four slats must protrude ¼ inch on the outside, as shown in Fig. 3, a.a., so that this projection forms a cornice for decorative purposes, which is finished with a carving plane, and also so that all the attachments fit together well and remain stable if one is ¼ or ½ inch larger or smaller than the other, although as far as possible, all should be kept to the same size. However, as far as the slats are concerned, insofar as they stand inside each other, they must not protrude at all on the two sides, but must run parallel to the side pieces. The slats on the front and rear sides, on the other hand, must only protrude inward as far as the joint to which they are joined, whereupon the pieces of wood are nailed to the grate. However, such a grate with six pieces of wood or braces is only necessary for the top box, so that the bees can start building their wax combs in this direction from the rear wall towards the flight hole, which is what they usually do. The remaining boxes, however, as many as there are below the top one, only need two pieces of wood, which protrude from the back to the front in the same direction and in the same way as shown in Fig. I, Table II. More than two are now partly no longer necessary because the bees continue to build their wax panels in the direction in which they started at the top: partly because the fewer wooden slats in the lower frames are more useful and beneficial to the bees than a whole frame with six pieces of wood, for three reasons: First, the bees remain closer together and more connected in a cluster in their winter quarters. Second, not as much of the chewed wax debris and other waste remains in the middle of the hive on the wide pieces of wood, but instead falls

through the roses onto the floor, where it can be easily removed in the spring, and the bees do not have as much work carrying it out and cleaning the pieces of wood; and finally, the bees can come and go more easily in the summer than when they have to slip between the pieces of wood. – However, to ensure that the wax panels filled with honey are held securely in place so that they cannot break off and no roses fall off when the full honey panels are removed, each box must be fitted with a cross made of two pieces of wood, one on top of the other, directly above the flight hole. To do this, holes are drilled in the corners of the box, into which two flexible round willow sticks or hazelnut branches are inserted.
Small strips (see Fig. 3) are glued to the cut-out flight hole so that they touch the top of the cornice, and each is nailed in place with two half-inch nails with fly heads. If the nails go through, they must be bent back inward so that the knife is not damaged when cutting out the wax boards. It is best to hammer them in at an angle so that they sink into the wood. – However, a small groove two knife backs thick must first be planed into these two strips, in which two tin sliders can run, but these grooves must not be too wide and must not give the sliders too much space, so that they do not close by themselves and seal the bees without anyone noticing, which could be a great disadvantage. To be on the safe side, a thin piece of wood or something similar should be placed in the two corners of the flight hole so that if the rear slider should become loose due to changes in the weather, such as wet or dry conditions, it will close by itself (which is not likely to happen if the grooves are made properly) and the bees will not be unexpectedly trapped.
Then cut two sliders c.d. out of white sheet metal. (*)

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(*) Look for the thinnest sheets of white sheet metal from a tinsmith or plumber, which can be easily cut with scissors.
There is no need to worry that the bees will harm themselves on the sharp edges of the sheet metal. I have never found the slightest trace of this. The notched wings are due to the age of the bees; they may have been damaged by wooden, straw, or tin

They enter and exit flight holes. Their tongues are not damaged when they come into contact with the sharp edges of glass or metal. They do not process the wax and putty with their tongues, but with their chins, which are hard and horn-like.

The slider is 1¾ inches high and has holes made with an iron punch, like those used by tinsmiths and locksmiths, in order, among other things, to provide the bees with a draught, which they often need, or to be able to lock them in without suffocating them. It should be noted that the holes should not be made too large, i.e., not so large that a bee can get its head through. For if they have to be closed, for example to keep out robbers, the bees gnaw and work at the holes in the sliders and want to get out, forcing their heads through but unable to pull them back again, and they die. This perforated slider is placed behind the front slider c. and has two small holes e.e. at the top so that it can be pushed up and down with a sharp knife or other pointed instrument, as it must not be bent for gripping due to the front slider running over it.

A small square hole f. is cut out in the middle of the front slide c. at the bottom, half an inch wide, so that in early spring and late autumn, during the robber season, the bees' exit can be conveniently reduced. However, this small cut-out is not absolutely necessary, as it has to be blocked again when the attachments are placed on top. Two pieces of brick can be placed in front of the slide to make the flight hole small. At the top of this slide, at g., the sheet metal is bent slightly so that it can be easily grasped and pushed up and down.

However, it is up to the beekeeper to cut and arrange these two metal slides so that they can be pushed back and forth from the side, and then to nail a small strip b. across the entrance hole, which is also convenient and prevents the doors from ever closing by themselves.

If you want to save on the sheet metal, these slides can also be made of wood, preferably from box bottoms, and their

cut edges, where they run into the groove of the next one, with soap.
To insert the long rectangular glass pane shown in Fig. 4, nail a small piece of wood b.b. into the hole cut or carved into the rear board on both sides, against which the glass will rest, and hammer two small iron pins in front of the glass to secure it from the outside. However, if the glass does not fit well and there is too much opening at the top or bottom, nail a small piece of wood like the one shown next to it at the top or bottom, or block it in some other way, e.g. with wax. It is better, however, to leave a strip ¼ inch high and just as thick when chiseling out the inside. A small door or shutter (*) must be placed in front of this glass pane, as it is well known that bees, when they have constant light, smear the glass with wax and putty and make it completely opaque. but if there is a shutter in front of it most of the time, they keep it quite clean, and you can leave it open all day and watch them go about their business without them wanting to smear it.

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(*) A sliding door is not as convenient because it not only requires more work, but also swells in damp weather, making it difficult or impossible to install.

This little door, or shutter, is fastened on the outside with a ribbon made of sheet metal and held together with wire, or simply with wire, according to your own invention, making sure that it is strong enough and, in particular, that the shutter opens wide enough, fitted at the front with a small piece of wire, and with a round piece of wire inserted at e., into which the small piece of wire fits.
With less effort, however, and saving the sheet metal strips and tin nails, you can make a trap door in front of the glass pane, a shutter that falls back down by itself when you lift it up. A small board is sawn a finger's breadth longer than the hole to the glass pane, so that a round peg or two protruding ears can be made on both sides, each in a round bent wire, which is drilled at i. or the hole to the glass pane

and bent into it, so that the door can open and close as if on a hinge.
Finally, on the top of a beehive assembled from upper and lower parts (*), similar to the third copper plate, a lid is made, either from a similar pine board, or a square hole is made in the middle for a glass of any size.

(*) I hardly need to point out that by bases I mean nothing other than the attachments that are at the bottom, because they are usually only ever placed at the bottom and can generally be called boxes because of their similarity to them.

However, because a board made from a single piece always warps in the heat and usually cracks, it is best to use a square piece of glass, either 6, 7, or 8 inches square, or an oblong piece of glass 8 or 9 inches long and 6 inches wide, in 4 slats, or pieces of board, as in a frame, in the manner of glaziers, through which one can also see many useful and pleasant things. – In order to have the necessary number of such glass covers in stock, one can calculate one glass cover for every 6 or 7 attachments and have them made. – Those who do not like to deal with smudging these glass covers when they are in place can use small screws, such as those used by gunsmiths, or any other screws that can be screwed through a glass cover at any time, after first drilling a small hole with a nail drill.

However, these glass lids must be removed at the beginning of winter and replaced with either a board or, even better, a thin lid woven from straw (*), which should be weighted down or held in place at the four corners with nails hammered in.

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(*) Roll straw into thumb-thick sausages, wrap them with willow strips or twine, and string them together with twine of the same length so that they lie next to each other.

This is because large drops of condensation form on the glass in cold weather and fall back onto the bees, which can be harmful to them. But with straw, the moisture is absorbed. If there is a risk of mice gnawing through the straw and making their way into the hive, a board of the same size can be placed on top of the straw cover. If you do not want to use glass covers, you can leave these straw covers on throughout the summer, and the glass covers are not necessary and can be dispensed with.

The magazine attachment is then ready except for painting with oil paint, which is very useful not only because it looks good, but also because it makes it much more durable. Stone paint is the most durable and inexpensive (*).

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(*) To make a good varnish for painting:

For 2 kr. silver glaze; for 2 kr. white vitriol; for 2 kr. Osla Cetae, or burnt fish bone; for 2 kr. lead sugar, and 1 measure of linseed oil. The oil is boiled in a two-handled pot, or more safely in a jug or kettle; when it begins to boil, add the above ingredients and let it boil for a short time until it throws up bubbles. To test whether it is cooked enough, hold a pigeon feather in the boiling oil for several minutes; then test the feather to see if it breaks apart; if it cracks in two, the varnish is good and can be removed from the heat.

This varnish is used only for the final coat, to save money, for those who are not familiar with painting with oil paint. The magazine covers are painted in stone colors as described above, which is the most durable, best, and cheapest method.

A little English red is mixed with lead white. However, because lead white is heavy and, after containing other useful colors, expensive, the base is made only with Nuremberg red. Under 1 pound of this paint, a few kreuzers worth of silver polish is rubbed in, and then it is painted over with old linseed oil. When this base is dry, this paint is applied once more with pure linseed oil, and then the stone paint with varnish, which also gives it its shine. The corners and the pieces of wood that form the cornice, as well as the two strips at the entrance hole where the metal sliders run, can be painted and edged with Nuremberg red for decoration; and if you want to make it even more decorative, you can paint the strips with cinnabar, which is very inexpensive and costs barely a guilder for 200 pieces. In general, however, old linseed oil must be used for oil paints, as fresh linseed oil takes a very long time to dry and often sticks for half a year; old linseed oil mixed with silver glaze, on the other hand, dries completely overnight.

These magazine attachments and bee hives are not as expensive as one might think, even if you cannot make them yourself. The cost of 10 such magazine attachments is as follows:

For 10 pieces you will need:
2 double planks, cost – – 20
kr. 5 slats, – – – – 10 –
Large and small nails, for 20 –
10 glass panes, each costing 1
kr. – – – 10 –
A sheet of white metal, – – 6 –
1 cup of linseed oil – – 12 –
½ cup of varnish – – 6 –
8 ounces of white lead – – – ½ –
Half a plank to the little shops
in front of the windows– – 3½ –
Wages for the carpenter – 1 fl. – –

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2 fl. 30 kr

Such calculations depend, of course, on the price of goods in a particular area and on the demands of carpenters; however, according to this reasonable calculation, a piece costs no more than 15 kr., and 12 kr. is charged for a cover woven from straw, which does not last long, looks poor, and has many disadvantages.
However, anyone who has a covered apiary also saves quite a bit on the above wooden magazines, as they can use single planks instead of double planks, for which the strongest ones must be selected. Yes, the common man in the country, who finds the manufacture of the above too complicated or even too expensive, and who does not care about beauty, can nail together planks himself or have them knocked together by a carpenter, who can make 18 to 20 of them in a day; He can leave out the slats and insert the pieces of wood into the floorboards at the top and nail them in place to form the grate. Instead of the tin sliders in front of the entrance hole, he can make similar ones from box bottoms. However, a glass pane on the rear board is almost indispensable. Instead of nailing the small door with a ribbon, or instead of the trap door described above, he can make a small board with two round pieces of wood inserted, which he can pull out and thus remove the board to check on the bees. In this way, 10 attachments cost no more than 54 kr., or 1 piece at most 6 kr. The floorboards must at least be planed down on the inside, which saves the bees a lot of work and time that they would otherwise have to spend biting off all the slates and pegs, and it is quite wrong to believe that bees cannot run up and down smooth wood, as their claws are so sharp that they can run perfectly well on glass, just like a fly.
However, do not regret the effort and expense involved in building their dwellings, for they will repay you richly for the small houses they live in and will repay your outlay with great interest.

§5 How to obtain the purest honeycombs from bees throughout the year without disturbing them in the least

But before we leave the construction and manufacture of these useful, convenient, and beautiful bee dwellings, I must mention a pleasant and kind practice that is familiar to many bee and honey lovers, which I often use to obtain the finest, purest honey from the bees throughout the year without them feeling it in the slightest or being disturbed in any way when they have to give it to me in the middle of summer or at any other time. Instead of the glass lids described above, I often use strong, dry boards made of oak, lime, or other wood to cover the top box. I saw one, two, or four round holes in them, depending on the size of the containers I need to place on top. These can be either in shot glasses or in slightly wider and more spacious ones, which are somewhat lower and can be found and selected in all kinds of varieties at glassware stores: or also from porcelain vessels and small bowls (which, however, have the disadvantage that you cannot see when they are full unless you have another glass next to them by which you can tell). Since bees do not tolerate empty space, especially at the top (if they have good pasture for honey and wax), they build these jars and containers with the most beautiful white wax and fill these cells with the purest, most excellent honey. With newly enclosed swarms, you can place the jars on top of them immediately, and they will fill them in the first few days. They do not start building at the top, as they do in wood or straw, and are too shy, or rather too clever, to entrust the weight of the honey to the smooth glass and start at the top: instead, they build it up from the bottom. They extend the wax panels started at the top of the frame, building them up until they reach the top of the jar and the sides with their wax roses: (as they do this sitting down, you can enjoy watching them work with pleasure). When they have reached the bottom and sides of the upturned vessels, they attach the finished and extended cells to the glass as firmly and beautifully as they would to wood and straw, and fill each and every cell with the purest honey and cover them. One then cuts

Using a silk thread or very thin piano wire, remove the glass or porcelain vessel from the edge and from the honey roses at the bottom, and place an empty one of the same width on top. These glasses, filled with honey roses, are extremely beautiful and pleasant for dessert or other occasions, and for those unfamiliar with them, they are something to admire, as human hands, art, and wit would be incapable of accomplishing such a thing. Despite their heavy weight, the jars can be turned upside down as often as you like without a single rose falling off or breaking away from the sides. They can be kept in such jars for many years, and eventually the honey inside turns into pure white sugar. If you have just one slightly larger glass in the middle of the lid, you can make a round case or cover out of cardboard and place it over the top to keep the light out and prevent the glass from moving until it is sealed by the bees at the bottom. However, if you have placed two or four jars on top of each other, you can place a box made of strong cardboard of the appropriate height over them, covering all the jars, on top of which the roof can also be placed if special roofs are required. – Such jars can also be placed on top of the old bees during a good honey flow, which they will also fill. These honey jars can be removed several times throughout the summer, but care must be taken not to disrupt the hive too much, and in general, the weather, honey flow, and size of the jars should be taken into account. Such jars full of honey are also very useful if feeding is necessary in the spring, as they can then simply be placed on top of the hive.

§6 On the usefulness of magazines in general

The benefits of magazine hives are far greater than those of beekeeping in simple baskets, and in terms of annual yield alone, the ratio is five to one. When considering the overall advantages of beekeeping in magazines, the latter pales in comparison. How easily an apiary full of simple hives can be destroyed in a bad year, but magazine hives are extremely rare, since, due to the large number of bees they contain, they yield at least as much in the few good days.

can obtain their winter food. – All kinds of adverse circumstances weaken a beehive, e.g. poisonous mildew, predators, cold winds in spring, which exhaust the bees working in the fields, driving rain in summer, hailstorms, etc., can be more easily withstood by strong colonies with large populations, which can quickly replace their losses through breeding, but weaker hives, such as those commonly found in simple baskets, are depopulated and often become diseased due to such a sudden loss of population; at the very least, they are often unable to recover properly for months or even years. – A magazine hive rarely becomes queenless; I have had very few examples of this, because such a populous hive begins to breed as early as January, even December, and because of the constant warmth inside, it is set up in the middle of winter, so that if the queen should die before April, a new queen can always be bred. – With magazines, you can harvest the finest supply of honey and wax without having to kill the useful bees, without even cutting them, and without exposing them and yourself to all kinds of danger and discomfort. – In straw hives, the best hives are often ruined by frequent swarming, but with magazines, this can be prevented in most cases and the bees can be completely weaned off this habit. – In magazines, the beehives are rejuvenated almost every year, and even if a beehive has been standing for 25 years, it is never an old hive, as almost every year new bases are built and the old rose panels are removed by the upper attachments. The roses therefore do not turn black and the cells do not become narrow, as in old beehives, because each young bee leaves its nymph skin hanging in them, and eventually such cells become completely unsuitable for the perfection of the brood, which is why a bee in a straw basket that is 5 or 6 years old and always keeps its old roses can no longer swarm easily. – Because of this renewal in magazine hives, however, one does not obtain old, sugary honey from them, but the purest and most beautiful honey, since, on the contrary, honey cut out of old baskets or made by suffocated bees is contaminated with brood, dead bees, the smell of sulfur, and the like. – And what is most excellent about magazines is that you always have bees in them, which are not at all difficult to care for, but rather very enjoyable.

§7 On the particular advantages of wooden magazine frames with glass or panes

As has long been proven, beekeeping in magazines is the best and most advantageous method. The attachments I described earlier, made from planks and fitted with a glass pane, and the bee houses assembled from these attachments are indeed the best and have significant advantages over straw magazines. I will not mention the decorative effect and extremely good appearance that a large number of such similar painted bee houses give to a garden or apiary, which is not entirely insignificant to a person of taste and a bee lover; but how advantageous, easy, and at the same time pleasant does the small glass pane, which costs only a penny, make the handling and maintenance of the bees?

Not only do I enjoy watching their work inside, observing them in summer and winter, and sometimes having the good fortune, especially in May and June, to see the queen with her bodyguards and witness their brood rearing and other activities, whereas with straw baskets I can only observe their industriousness from the outside and watch them fly, but I also find this visible representation of their internal structure and of the bees themselves very advantageous and necessary. I can see how much they have built, and this is, as will be seen from the sequence, extremely important when harvesting honey, making offshoots or swarms, placing frames and other treatments. When I remove the upper supers filled with honey, I can see how many of these supers I can take away without taking too much from the bees and depriving them of their necessary winter food. – I know and can calculate how many measures or pounds of honey, how much wax each beehive has, and even how much 50 magazine houses have together, since each super has the same measure and experience has proven to me that such a full super, which holds 4 measures when empty, yields 2 measures of honey and 1½ pounds of wax. However, with straw magazine attachments, since I cannot see anything, I have to weigh such a heavy basket with great difficulty and no small amount of risk, and then take it off at random, wondering whether I have taken too much.

Furthermore, if I want to prevent a bee colony from swarming completely or from swarming a second time, I have to give it a base at the right time, d.
i. as soon as he has built the lowest one a little over half full or at most three parts full. I can see this at any moment in my magazine houses; but with straw magazines, one must bend the magazine stick with great effort and danger and much embitterment of the bees to look inside, and if it already weighs 70 to 80 pounds, this is completely impossible. And if a straw magazine has only three attachments and you want to bend it over, an attachment can easily fall off if they are not connected in an expensive manner with iron hooks. – In many cases, it is impossible to see and examine the internal condition of each super, especially when making splits, so that one knows where to divide, whether each one, both the old and the split (i.e., the upper supers that are to be removed and the lower ones that are to remain), has brood and the like. – Clean and smooth glass and planed boards are also very beneficial and pleasant for the bees. Not only do they save time and work that they would otherwise have to waste in straw magazines, where they have to bite off all the protruding points and fibers, even if they are already burnt out, and drag them out of the apiary, time which they could better use for their most important and necessary harvest. Furthermore, they are not in danger from moths, which, as is well known, not only eat their way in from the outside, but also find it very easy to settle in the cracks of the straw, from where they cannot be easily removed by the bees.
Furthermore, with the instructions shown, which are to place the frame in a magazine attachment in a straight line after the flight hole, the bees are almost forced to build their panels regularly, they not only rarely block the glass pane, but mold also does not form so easily in their combs in winter or early spring in damp weather, because the air can circulate through all the attachments via the flight hole and, if necessary, can pass through the boards. (*)

(*) It is not only this freer airflow and the facility for regular building for the bees that makes the grate far superior to a board with a round square hole in the middle, through which the bees continue to build, but also

This circumstance led me to abandon these boards in the early years and choose the grate instead, because the debris from the scraped wax, which contained the honey that was their winter food, and all kinds of winter debris remained on them, and not only was it difficult for the bees to remove it from all the supers, but it also provided food and shelter for moths. In addition, in many supers, the irregular construction and crosswise frames obstruct the glass panes so that only one frame can be seen.
In addition, the alternating damp and dry air will cause a board to crack and warp, which is very unpleasant and also harmful if one does not notice it in time.

With this arrangement, you can also provide bees with great relief on muggy summer days by pulling up the sliders in front of the perforated sliders, allowing fresh air and drafts to enter, which is sometimes extremely necessary, especially in large hives. Even in winter, during prolonged periods of severe cold and when the hives are buzzing with bees, you can provide them with the necessary air.
Furthermore, my wooden magazine houses are sturdy, fit together perfectly, and I have never seen one blown over by a strong storm, even when they are standing completely free of each other. But how often do the straw magazines stand crooked, becoming bent and bowing under the weight of the honey?
What devastation mice can cause in winter in straw bee houses! But with wooden ones, their efforts to get in are futile.
Ultimately, however, the straw magazine attachments are usually too large and therefore prevent many advantages. With these, it is easy to take too much honey from the bees, if not too little, considering that honey is more expensive in one year than in another. However, even if a beehive were left with two winter supplies, little would be lost, as the following year the harvest would be double, and the bees would not consume a drop more, but rather more sparingly.
However, it is beneficial to take their surplus in a reasonable manner and to reap the profits from the capital in the apiary annually and use them again

– When placing large magazine baskets underneath, I cannot always time it so that the last base is added before winter, and this excess space is very detrimental to the bees, both in winter because of the cold and in late autumn and especially in spring because of predators.

In general, however, my small magazine attachments have many advantages that can only be fully appreciated and understood when working with bees. They allow you to harvest even in very mediocre years. You can provide small, medium-sized, and large swarms with entirely adequate housing and give them three or four attachments, as needed. You can always enlarge them as long as there is food in the field: In autumn, in the middle of winter, in spring, and if you want, you can help other bees that are short of honey by giving them one or two supers with honey from rich magazines or from supers that have been removed and kept in reserve: At any time of year, with the least effort and in a few minutes, you can join 2 or 3 weak hives together, place a queenless or weak hive under or on top of a good one, and save it from destruction in an instant. If, by chance and against your will, a strong swarm arrives very late and you do not think it necessary to join it with the old hive or another hive, and it has not had enough time to provide itself with sufficient winter food or to grow completely, then before winter you can take a super with honey from another magazine hive and place it on the young, strong swarm, so that next year you will have the best magazine hive; and if it does not yet have enough building material, you can give it a base with empty wax roses from another hive. And there are many other advantages of this kind, which experience will convince everyone even more.

§8 Of the straw magazine attachments

However, the attitudes, intentions, and circumstances of bee keepers vary greatly. If the common farmer finds the construction of wooden hives too expensive, and if he has the opportunity to have straw hives made nearby at a very reasonable price, or if he can make them himself, as is often the case, it is nevertheless much more advantageous and advisable that

he should use straw magazines for his beekeeping rather than the usual straw baskets. It is therefore necessary for him to know how the straw magazine attachments should be constructed in order to be able to use them advantageously and conveniently.

The straw magazine attachments or wreaths (as they are often called, especially the round ones) are either square or round. The square ones are best and offer the most advantages of wooden magazine boxes. If necessary, they can also be fitted with a glass pane at the back, which is not possible with the round ones. To make them, the farmer uses a block or square piece of wood six inches high and eleven inches wide. He weaves all the magazine tops onto this in the manner he is familiar with, so that they are all the same height and width: The flight hole is always cut at the bottom, 3 inches long and one and a half inches high, and a wooden or metal slider is attached in front of it in the same way as those used in wooden boxes, which are inserted from above and allow a small or larger opening as desired. If a glass pane is to be inserted, it is fitted into a wooden frame, the necessary opening is cut out in the rear wall of the straw attachment, the glass pane is tapped in, the cracks are smeared on the inside, and a small board is made on the outside to cover the glass pane and keep out the light by means of a few pegs. The interior of each straw magazine attachment consists of two parallel brackets or inch-wide pieces of wood inserted into the top ring, running from the rear wall to the front wall where the flight hole is located, so that the bees are guided to place their panels in a straight line from back to front and build a regular structure. Next, two round pieces of wood, as is customary in straw baskets, are inserted crosswise to secure their wax structure. For three such straw attachments, a square straw wreath is kept ready, which is attached to the top attachment each time with sufficient wooden nails that can be removed again, and smeared underneath. Each of these straw wreaths or lids must have a hole in the middle for inserting a plug, approximately 2 inches in size, which is important so that in hot weather

create a draught and also in winter, as well as for feeding the bees if necessary, using the feed box described below. However, if you only want to make round magazine straw attachments, use a circular block that is 6 inches high and 11 inches thick to shape them, and otherwise adjust all dimensions to the size, width, and height described above, and with regard to the flight hole of the upper two bars and the crossbar, just as described for the previous square ones.

§9 How to use magazine articles in beekeeping

All of this already provides some insight into how these magazine articles should be used in beekeeping. If you want to catch a young swarm, and if the swarm is very strong and arrives early, place four such supers (*) on top of each other, leaving them completely free, without connecting them in any way; just smear them with clay where they do not fit exactly on top of each other, and catch the swarm inside.

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(*) When enclosing a swarm, you must not use too few or too many attachments. If you use too few, they can easily fly out again the next day after they have been enclosed and the sun's heat comes, because it displaces the heat; but if you use too many attachments and the space is relatively too large for their number, they become discouraged and do not build. – For a swarm from an ordinary straw basket, 3 supers are usually sufficient. A few years ago, in my absence, two equally strong swarms arrived two hours apart and were caught, one in three supers and the other in four, because they were standing on top of each other. The former not only built its three supers, but also a fourth, which I placed on top at the right time: the other, which had four supers right from the start, stopped building altogether when the second was full. I left it standing like that for a whole week; and since it did not want to build any further, I took the fourth one away, whereupon it immediately began to build again, and also completed the fourth box, which I placed underneath it again, until autumn.

If, after two or three weeks, the fourth base (if four are used) is more than half or three-quarters full, add a few more so that the bees do not start to swarm, which is not only useless but also very harmful. When the fifth base is full again, add the sixth and so on until the bees stop building, which is usually in August.
Immediately after adding each base, it is necessary to close the upper flight hole completely after two or three hours, otherwise they will not easily continue building. The same is done with old hives that you do not want to swarm or from which you do not want to make offshoots. In April, when they have enough bees (because they do not build earlier) and they find plenty of food, the robber season is over, and the bees can begin to build according to the degree of warmth, give them a base. Giving them several at once is not helpful.
On the one hand, the bees prefer to build in one rather than two that are empty; on the other hand, the bees that bring in food spend too much time running up and down, and they cannot properly guard the flight hole and therefore cannot defend themselves properly against robbers, ants, moths, etc. Once this base is more than half full, give them another one, and so on. I always do this early in the morning when the bees are still quiet, especially if the morning is a little cool. Place a magazine base on a board (*) and stand in front of it with your assistant.

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(*) I usually call the following the base board, but it could also be called the flight board. Half a shoe is left in front so that the bees can fly out, rest, and sunbathe comfortably. They find it extremely unpleasant and uncomfortable if they do not have enough space in front of the flight hole. The base board should therefore be 1 foot 8 inches long and 1 foot 3 inches wide. At the front, it can be cut into a decorative curve or simply rounded off using a printed template. Due to the considerable width of these flight boards, I experienced many years of inconvenience due to them constantly being pulled, thrown, and jumped on. For a long time, I used oak boards, but these, especially when cut from the whole trunk, i.e., through the core of the trunk, would often become very heavy after

rain and subsequent sunshine, and the thicker they are, the more they warp, because they can withstand the weight of the stick standing on them better than thin ones. I then placed boards only half an inch thick underneath, which could no longer warp because they were pressed too much by the weight of the beehive and could not withstand it; but they then cracked and sometimes broke apart completely. Finally, I found that ordinary fir boards were best, which were glued together in the middle along their length and doweled, that is, joined with wooden nails or pegs, as coopers or benders make floors. However, they must either have a slightly wide insert strip across the middle, or two narrower insert strips, one toward the front at the bow cutout and the other toward the back.

The one at the back lifts the stick up, while the one at the front quickly pulls away the first support board (*) and places the empty support under the new flight board; All this must be done quickly, and agility is essential when working with bees. It is therefore also necessary to prepare everything carefully in advance so that nothing is missing during the operation.

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(*) The old base board must be removed because bees usually sit on it, and many of them would be crushed if the base were placed on top of it or slid underneath it. These bees remain sitting on it in the morning and often die if the sun does not revive them later. The board must therefore be placed next to the beehive, if there is space, or in front of it on a chair, so that the bees can return to their hive. If it is raining, they should be returned to their new flight board with a fly swatter immediately after being placed there, so that none of them are lost.
When handling the bees, and especially when placing them in the hive, it is very helpful and beneficial to leave enough space between the beehives so that one hive can fit between them. Place the empty base with its board in this space and then lift the magazine hive onto it.

and then put it back in its place: this is the quickest way and ensures that no bees are crushed. However, if there is not enough space between the beehives, it is also helpful to place the empty base with its board under the magazine stick the evening before, under the base board, so that the next morning you can lift the stick slightly off the board and your assistant can quickly pull out the board with the bees on it, while the other person immediately places the stick on the empty base, which again protects the bees and ensures that none are crushed.

It is also necessary to wear a bee cap, gloves, and boots, especially when it is warm. However, over the years I have discovered a much better, very convenient and desirable method of placing the hive, which requires almost no protective equipment, rarely causes any bees to be killed and does not disturb the hive in the slightest. This method of placing the hive should be carried out in fine weather around midday, or when the bees are at their most active. At this time of day, it is very easy to handle them if you treat them gently and do not kill any. They are busy and industrious, gathering pollen and nectar, and you will be amazed at how calm they are. Furthermore, not a single bee perishes, partly because there are so many in the field, and partly because those in the lowest box remain at their work of building and do not fly out, and even those on the flight board soon fly away and cannot return. Incidentally, the procedure is as described above. If there is enough space in the apiary to place an empty base with a flight board between the bees, the task is much easier. And anyone who wants to set up their apiary at their leisure must place their bee colonies at such a distance from each other that five hives occupy a space of ten feet. If you then move one to the right, close to its neighbor, and the other to the left, closer to its neighbor, you can conveniently place a third one in between. To do this, move the one you want to replace so that you can put the empty base with its flight board in its place. Then lift the

Remove the flight board from the hive and place it gently but quickly on the empty base. If there is not enough space between the rows of hives, place a chair or similar object behind the hive to be moved, approximately the same height as the bee bench, place the empty base with the flight board on top and lift the hive onto it. – As for the base board that remains after the hive has been lifted, there will always be many bees on it. At this time of day, when it is warm, they will soon fly away and return to their home. However, since there is sometimes no suitable place immediately available to put the board aside, and since making the offshoots must be done in the morning, which causes even more inconvenience, I had to think of a simple device to make this task easier. It consists, as shown in Fig. 4, of two small slats, the length of which from a to c is determined by the length of the flight boards; if these are, for example, 1½ feet long, the slats from a to b must be 1 foot 10 inches long; The remaining length is 1½ feet, and thus the total length of the machine, which can appropriately be called a template, is 3 feet 4 inches. b. c. are two brackets on which the removed flight board with the bees is placed. The width determines the width of the flight board; if, for example, it is 1 foot 2 inches wide, the brackets must be 1 foot 3 inches long.
d.d. are two wooden clamps or hooks, which are fastened by means of a wooden nail at e.e. and are attached to the lower support beam of the bee stand with a wooden wedge inserted underneath, or without it. For this reason, the length of these hooks up to their notch must be determined by the thickness of the support beam on the beehive. If it is 5 inches thick, the hook must be a good 5 inches up to the notch so that it can clamp itself in place, in which case no wedge is necessary.
f.f. are two small pieces of wood nailed on, which can be turned around to keep the hooks in a straight line when you want to place or remove the template.
This template is placed so that the flight board with the bees on it can be placed immediately as soon as it is lifted. The advantage of this very simple machine, which costs hardly 4 kr., is that, especially at a height and on the upper level of the apiary, as well as on the lower level, one immediately has the

most suitable place in front of you to place the flight board with the bees on it, so that the bees, because they can immediately return to their old dwelling, neither become restless nor fall down half frozen and perish when the weather is cool.

If you want to leave a few good hives to swarm in order to increase your bee population, do not give them a base in spring until they have swarmed. However, you should then give the person who disturbed the swarm an empty base immediately, or the following day when the bees are flying most actively, and continue to do so from time to time so that no secondary swarm, or so-called afterswarm, occurs, which is completely useless in regular beekeeping. I have very rarely encountered bees swarming after I have given them their bases at the aforementioned time, nor have the others swarmed a second time when I have given them bases after the first swarming; and I have never had to worry about virgin swarms with this treatment. However, it does sometimes happen that the magazine hive swarms with the base still empty, especially at the beginning, when it is not yet accustomed to the magazine treatment and was previously accustomed to swarming, or that a second swarm occurs. In this case, either allow the young swarm to build and collect as much as it can, provided that the old swarm is not too weakened by this, and then combine the second swarm with another hive in the fall and place it on top of or underneath the same hive; or you can place the young swarm in the apiary the next morning after it has swarmed, between two chairs in a sieve, place a cabbage pan with coals underneath, into which you throw puffballs (*), whose smoke will stun the bees after a few minutes so that they mostly fall down as if dead, but this is completely harmless to them, and you can then handle them as you wish.

(*) Bovist is a type of earth fungus that grows particularly on pastures where cattle are grazed. It is brown in color and emits a strong dust when pressed or torn. It is also very useful for stopping bleeding. Its smoke is unpleasant, but has a wonderful, yet harmless effect on bees.

bees. This fungus is almost indispensable in beekeeping and is available in all pharmacies at a reasonable price.

Meanwhile, the queen is selected and removed, and the swarm is placed in an empty magazine attachment under the old one, where the bees will come back to life in half an hour and remain with their mother colony.
You can also place the enclosed young swarm in its new magazine house under its old mother comb and place this with its flight board on top, leaving the flight hole open for a few days. The bees that fly out of the mother hive all go down to the young swarm and exhaust themselves completely, so that they immediately kill all the young queens, if there are any left in the swarm, and prevent further swarming. On the third day, remove the flight board from the mother hive and the lid from the young swarm, and close the flight hole at the top of the mother hive, which will then be open. The young swarm will immediately climb up, reunite with the old swarm, and kill one of the two queens, after which they will immediately begin to work together. The empty bases are then removed, leaving only one.
Late or small swarms, if they occur at all, can be helped somewhat by placing an attachment with empty wax boards from another magazine on top of them so that they immediately have something to build on and can lay their eggs. This gives them 10 to 14 days, as if they had swarmed that much earlier. It is therefore not a bad idea to keep such attachments with empty wax roses in stock, even though they are often easily spoiled by wax moths. If you do not have them and want to take some from the apiary that have brood and also some honey, you will be doing them a great favor.
If you want to join two weakly developed hives together, or a weak one and a strong one, in summer, and you notice that they are becoming restless and biting each other, which often happens in summer but rarely in autumn or spring, blow a little of the bovist bush into the flight hole, which will humble them and give them the same smell, or

put a little honey under them, and they will soon make friends and forget their hostility.
Sometimes it happens that one has to cut down, even though there are still many bees present. However, in this case, there is no need to worry about replacing the frames with the best of results and without alarming or harming the bees, provided that this is done during the heaviest flight and most of the bees are in the field. Care must always be taken not to crush any clumps of bees that may remain hanging, but to place the magazine frame skillfully on the empty support.
The base boards are always smeared where the magazine attachments stand, if they do not fit very precisely, using a mixture of half clay and half cow dung, which is prepared like dough with a wooden spoon. This mixture does not come off easily, but can be removed immediately with a knife when changing the boards or lifting the attachments.
If you have had your magazine boxes painted with red oil paint, you can mix a little so-called house paint or Nuremberg red, finely ground, into this clay mixture, as it will often need to be smeared on here and there. This will turn it red and will not look bad if you need to cover joints and openings with it.

§10 How to transfer the bees from straw baskets to the aforementioned magazine attachments

Now the question arises as to how a bee lover who would like to make use of this incomparable type of hive should transfer his bees from the old straw baskets to the hive frames. The easiest and most practical way to do this is as follows: If, for example, he has 12 bee colonies in straw hives, he should obtain at least 50 of the magazine attachments described above before spring. From his 12 bee hives, he should leave 6 good, strong ones for swarming, immediately place the young swarms in the magazines, take 3 attachments for each swarm initially, and treat them throughout the summer by replacing them in good time, as shown above.
As soon as a straw basket has swarmed, he should immediately or the next day at noon give it a magazine base; and because the round opening of the straw basket does not fill or enclose the grate on the base, he should place a board over the grate,

cut out almost as wide as the frame of the straw basket, and smear the flight hole on the straw basket the following morning so that the bees have to fly in and out through the base, which will encourage them to continue building in the magazine base. The flight hole is most easily closed when the bees are present by gradually moving a ball of moist clay from one side to the other and then pressing it down. When placing the straw basket underneath for the first time, it is important to check the position of the wax panels in the basket beforehand. This is because the boards often do not run from the flight hole towards the rear, but are positioned crosswise. If the basket were now placed on the magazine base so that the flight hole was at the front, the bees, which are accustomed to continuing to build towards the upper boards and in their direction, would build their new combs in the magazine box not along the length of the frame, but crosswise. The basket must therefore be positioned so that its wax frames are aligned with the length of the frame, even if the flight hole on the straw basket is on the side.
Once half of the magazine box has been attached, as can be seen through the small window, place another box underneath and push the upper flight door or slider completely closed. Continue placing the bottom board in this manner as long as they continue to build. If the summer is favorable, the swarm may fill three magazine attachments and one of them with honey, which would already constitute half of their winter food supply. The other six straw baskets, which are not to swarm, are given a magazine attachment in April, when they have food and have begun to fly strongly, in the manner shown above, and this is continued from time to time. If the summer is good, one can fill 3 or 4 magazine supers and, in addition to his straw basket, fill 1 or 2 more supers with honey. According to Bartholomei, when the bees' food in the fields is about to run out, each beehive is checked through the small windows to see how many supers have been filled and filled with honey. If one has filled 3 or 4 and filled 2 with honey, it has its winter food of 4 measures of honey and adequate space. On a fine day around noon, when there are many bees in the field,

a brass piano wire, 0.5 feet long, is taken 0, one cubit long, make a small piece of wood or a toggle at both ends so that it can be held firmly and pulled easily, and use it to cut the straw basket from the board on which it stands, or rather the roses that have been built through it, carry it (while the assistant immediately places a lid on the opening of the top magazine attachment) 15, 20 or 30 steps away from the apiary, open so that it can fly out as it pleases, and place it between two chairs, with a pan of coals underneath, on which linen rags are thrown; Immediately break open the top lid of the straw basket and place two magazine attachments over it, or one double attachment, that is, one that is the entire width of a floorboard, the width of which can be specially made and kept ready for this purpose. A board with a hole the width of the lid of the straw basket (*) is placed between the open straw basket and the magazine attachment, and smoke is blown strongly onto it, so that the bees, together with the queen, if she has not already remained in a support on the stand, are drawn into the empty magazine attachment.

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(*) It does not matter if the opening remains and not everything fits perfectly. As soon as the bees see that they are out of their hive, smell smoke, and realize that they are lost and face their master, they become so tame that none of them even thinks of stinging, and they do not even fly away. but because of the other bees, and especially because of the first operation, until they have been removed from the hive, it is absolutely necessary to arm oneself and equip oneself well with a bee hood, gloves, and boots.

Once this has been done, as can be seen clearly through the small window, the driven-out bees are carried back to their former hive and placed underneath it, where they will soon move into their upper, fully built supers, and the empty base can be removed the following morning or the next evening, and the straw basket with honey can be put to good use. Instead of smoking out the bees as described above, you can drum them out if you find this easier.
However, the most leisurely method is to remove the straw basket with its bases from the apiary, or at least to raise it to the top of the apiary, so that

drive the bees out of the basket into the fully built bases using smoke, either with a bellows or, if this is not available, with a short tobacco pipe. The bellows described below is very convenient for this purpose, as it allows the smoke to be blown between the wax panels, forcing the bees to leave the basket. – If the height of the beehive and lack of space prevent the use of the bellows, which must be held up, take a curved sheet metal tube that fits into the straight tube of the bellows and insert it, so that the smoke can be blown into the basket while holding the bellows low. – If you do not have a bellows, you can achieve the same end with a tobacco pipe, only it is not as leisurely and laborious, and tobacco is not to everyone's taste. Fill two short tobacco pipes, light one of them, and when it is burning well, put the bowl to your mouth, but cover it with a small piece of cloth so that you do not burn yourself, and blow the smoke through the tube between the roses, which will also drive out the bees. If one pipe is not sufficient, use the other one.

However, if another straw basket has only two magazine bases filled, or no honey at all, it is driven out of its old straw basket in the manner just described, and one or two supers filled with honey, as much as they can spare, are placed on top of the young swarms in the magazines, thus providing them with food for the winter. However, if the supply that can be taken from the young magazines is not sufficient to provide for the old bees that have been in the straw baskets for the winter, you can help yourself by either cutting a straw basket in half crosswise and placing the upper part on a magazine that is lacking, so that it can be easily removed again the following year, or you can cut out the honeycombs from the removed straw baskets, place them in empty magazine attachments, secure them with small pieces of wood and pegs, and then place the missing ones on top, which I have often done with the desired result. I have made a perfectly good magazine with only a single base attached and no honey in it. I inserted one or two attachments with honeycombs and then set them up for the bees. If the bee colony was strong and needed more space, I took a magazine with empty roses attached

in the fall from the after-honey, of which I placed several more on top or underneath and let them carry it into the cells. Yes, if all else fails and the year in which you want to transplant your bees has been bad, you can place two magazines on top of each other, so that they are immediately united, and such a reduction in the number of beehives will certainly cause no harm, but the result will replace them twice over and abundantly. Enough, with this type of magazine attachment, one can help oneself in almost all possible cases, as one wishes and requires, and that without danger or much effort.

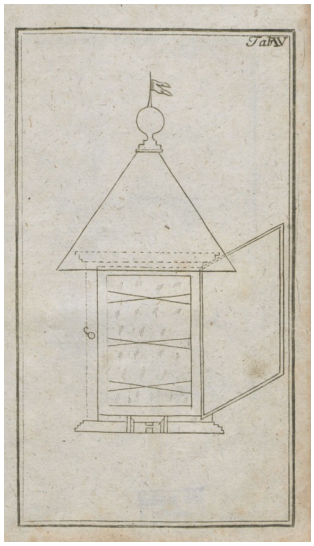
However, since there are rarely such honey-rich bee years that a straw basket, especially if it is large, can be built up in the lower boxes during the summer to such an extent that the straw basket can be removed at the top, but rather the entire bee colony remains in it, and the beekeeper nevertheless wants to have his straw baskets moved to magazines, he can make the necessary arrangements in the spring, especially for those hives that he does not allow to swarm, in the following manner: When the bees begin to feed, around the end of April or beginning of May, remove the straw basket from the hive after first closing or smearing the flight hole and securing or tying it so that no bees can escape. Place it on a low chair. Draw a circle around the basket with chalk at about one-third of its height, then cut the basket precisely along the circle. Then open the top, or if there is no top, make a hole large enough to reach in with the smoke capsule and bellows. Blow into the hive with rags and some mixed beech leaves so that the bees retreat partly into the middle and lower parts of the basket. Then cut off this third part of the basket with a sharp knife (preferably a curved garden knife): take the aforementioned wire and cut through the inner honeycombs, continuing to blow smoke into the basket: lift off the cut-off part of the basket and place a lid that has been kept ready for this purpose on top. Then place the bee back in its position on the two empty boxes provided there, in the correct direction, leaving the bottom flight hole open. This reduced space will encourage it to build more strongly in the lower parts, and the rest of the basket can then be removed more easily in the fall. However, because

not only is the first brood in the middle, but the queen also usually stays there, one should not cut off more than a third of the basket. And because further honey stores are usually found at the top, the cut-off section should not be sold or consumed immediately, as bad weather may still set in during the flowering season, and the honey removed can be put to good use in the roses to support the bees.

If you want to help a deficient beehive by placing a full honeycomb box underneath or on top of it and you want to prepare it for winter, you must observe this important rule: do not place the honey-filled box underneath or on top of another box containing honey without first inserting an empty box between them. I have learned this the hard way. If, for example, a magazine hive had three supers, the two lower ones being empty and only the top one containing honey, and you wanted to place the intended super with honey underneath, the bees, which are accustomed to feeding from the bottom up, would move downwards before winter and gradually empty the bottom box and live off it. But if it is still cold and the bees do not disperse, and they cannot find honey immediately above them, they will remain in the second box, which is empty of honey, and starve, even if there is still plenty of honey above them. It is therefore necessary to always place the boxes containing honey on top. This must also be carefully observed when two hives with little honey are to be joined together before winter and placed one on top of the other. Each has its honey at the top; if one were to simply place them on top of each other as they are, one box with empty combs would be followed by one with honey, the third would again have no honey, and the fourth at the top would be full. The bees would then feed in winter until they reached the third empty box and then die of starvation, even if they still had surplus food in the fourth box. It is therefore necessary to remove the boxes with empty combs each time and place them at the bottom, while those with honey are placed on top, in a direct sequence on top of each other.

§11 A type of square bee house with large glass panels for enjoyment and observation

When describing bee dwellings, I must mention another type that I particularly enjoy observing, but of which I only have a few, even though they are very useful, albeit expensive. They are simple square bee houses with four large glass panels forming the four sides, each of which has a door or shutter with a latch, as shown in the copper plate in Table IV.



I have designed them so that the bees do not need to be killed when harvesting or when a young swarm is to be caught again, as there is a glass lid on top that can be lifted to allow the bees to fly out. The bee house is 1 foot 1½ inches square, 1 foot 7 inches high, and holds 18 measures. Each of the four fir posts is 1¼ inches square, with four crossbars at the top and four at the bottom, which are mortised into the posts. The glass panes are attached to these and the posts in frames that are as narrow as possible, fitted by a glazier and fitted with several small pins on the outside, which hold the panes in place and can be removed so that the entire pane can be taken out if necessary. Inside are three crosses to which the bees attach their roses. The top cross must be placed at the very top, because they do not like to start building on the glass. On top of this is placed a roof made of planks of any kind with a strong and heavy finial so that it cannot be easily moved by the wind, and painted with any oil paint. Such a glass house must be placed freely on an oak post, 3 feet high from the ground, so that one can comfortably walk around and sit next to it.

can. To this end, the floor is also sprinkled with coarse sand. Such bee houses are extremely pleasant for observing the bees and their activities. In two years, one can observe more inside them than in baskets in 20 years. Because there is so much to see, one can see the queen more often. The bees are not disturbed in their building and work if you leave the shutters open for half a day and watch them. At first they are shy about building on the glass and attach the first roses to the crossbars, but they soon extend these upwards and next to the glass panes, and can then build the wax as firmly to the glass as to wood or straw. They keep the glass completely clean, and if it gets a little smeared in the fall from caulking the joints and securing the heavy honeycombs with pre-wax that they extract from the resin, they clean it very thoroughly again in the spring.

Because young swarms are best for observation, as they first have to build their home, every 3 or 4 years, in a good bee summer, the bees are driven out of such a glass house and transferred to a magazine, in the same way as shown with the straw baskets. I have often transplanted a young bee from such a glass house into a hive in the fall, and in 16 days it not only filled the entire house and filled it completely with honey, but also added half of 8 measures, which it immediately placed underneath and supported, and carried in enough honey that I harvested 7 measures of honey and 2¾ pounds of wax from the entire glass house that I removed from the top, and the transplanted bee was again the best hive the following year; Of course, because the house is large right from the start, you have to put a fairly strong swarm in it. However, the driving out must only be done in a good bee year, and if the driven-out bees do not have enough time to build up, you can help them in the fall with a full super filled with honey from another magazine, placing it on top or combining it with a small hive. Also, if you plan to drive them out around Bartholomew's Day, you must do so early in the spring and place a magazine box under such a glass hive in good time, or, because it is difficult to lift, place two under it at once if you do not want it to swarm. This is only done after the young bees have flown away.

§12 Expelled bees, as well as those that have been joined together, are the best and most industrious.

It is remarkable that the expelled bees, especially when two different colonies are united, are the best, boldest, and most industrious, which I have consistently observed. This observation has already been of great benefit to me. If a bee colony does not seem particularly industrious during the summer, or if it has produced a large number of drones, I often place it in the middle of summer, autumn, or spring on top of or underneath another colony, even if they could have remained as two separate colonies. The doubled diligence and special goodness of this united magazine colony then more than compensates me for the reduction in the number of beehives, and I therefore think very highly of this union, especially since it is so easy and involves so little effort. If you want to unite and combine two hives in autumn and before winter, and one consists of four supers, two of which are filled with honey and the lower two have empty frames, while the other also consists of four supers, take two empty lower frames from the one that has the most honey one or two days beforehand, or if there are still too many bees in them, take the bottom one on one day and the next day, when they have moved further up, take the next lower frame, then remove the lid from the other one and place it on top of the first one. After a few days, when the bees have gathered together and settled among themselves, you can reduce the number of supers to four and, if you do not want to leave them with too much honey, keep one or two full honey supers. The glass pane will soon tell you which and how many supers or bottom boards you should and can remove. However, according to the reminder given earlier, you must ensure that, if you join two hives together particularly late, the full honey boxes remain and no empty boxes filled only with wax panels remain in between.

I would like to mention another great advantage that can be gained in autumn and before winter from the beekeeping practices of others who use straw baskets. A philanthropist sincerely wishes that magazine beekeeping would become widespread because of its great benefits. However, since it is very difficult and often a

It will take quite some time before the stubbornness of many rural people to depart from the ways of their fathers and ancestors is overcome, and in arbitrary matters, where they cannot be compelled by laws for their own good, they can only be convinced by the tangible benefits they can see with their own eyes; it is quite permissible to derive a benefit from their stubbornness, which consists in buying from them, at the time when they slaughter their heaviest and lightest bees, as they call it, and suffocate them, one buys only the bees for a very reasonable price, and those who are reasonable would rather give them away for free and spare their lives than kill them. Once these bees have been driven out of their straw baskets in the manner described in §10 above, using smoke, into a double or two magazine boxes placed one on top of the other, they are placed under the magazine sticks, and the next day, after the bees have united with those in the hive, remove the empty magazine boxes and thus considerably strengthen your magazine sticks with bees, from which you will derive a very unusual benefit in the following year, as they will not only bring in a great deal because of their strength and large number of workers, but will also show excellent diligence and goodness, as has just been noted at the beginning of this section.

Chapter Four - On the multiplication of beehives.

§1 The propagation of beehives is an essential part of beekeeping and occurs partly through natural swarms and partly through artificial splits.

As little as one can hope for the true and certain benefits of beekeeping if one is only eager for a large quantity and number of beehives, whether they are good or bad, it is natural to desire the propagation of one's beekeeping, since 20 hives yield as much as 10, and 40 twice as much as 20. Indeed, even if one already has a certain number of hives that one can set up, one often combines two together and makes only four or five instead of thirty. One also wants to cut out a few bowls full of beautiful white and appetizing honeycombs during each harvest in the fall and save them for a honey lover. Not to mention that once you have tasted the delightful and genuine pleasure of beekeeping, you will easily find yourself wanting to expand your apiary every year, and you will hardly be able to get enough. The increase in the number of beehives is therefore an essential part of beekeeping. Mother Nature has provided abundantly for this, as no creature is more concerned with the propagation of its species than the bee. However, since nature can be guided by art for our greater benefit, human ingenuity has made many good discoveries and useful experiments in this field, especially in our more enlightened times. A new republic and household of bees, arising and established from an old one, is usually called a young swarm, a word chosen by the ancients because the young bees, when they separate from the old, depart with an extraordinary swarming sound, never heard from them otherwise, and with violent swarming and flying among themselves, and go to a new dwelling.

The young swarms are partly natural swarms, where nature is allowed to take its course as to how and when they separate from the old hive, but partly artificial swarms or offshoots, which are the work of the wit and diligence of bee experts. Both types have their advantages, and I will show both of these, as well as give the best instructions on how to deal with them and how to make the latter the easiest and most advantageous.

§2 The different types of artificial swarms or offshoots, and which is the best and easiest type

The artificial swarms or offshoots are produced in various ways. The great and famous naturalist Swammerdam, who also rendered outstanding services to the study of bees, shed light on the art of making offshoots in the last century, (*) and Pastor Schirach, who broke new ground in more recent times, wrote his own treatise on the subject. However, all of his methods of making offshoots are very laborious and complicated. They therefore find few enthusiasts, and I do not recommend them, since we now have an easier and better method of doing this. However, because they do illustrate the actual nature of splitting colonies, and because many bee lovers are eager to know about them, I will first describe some of his methods in brief.

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(*) see Bible of Nature, p. 177

The first Schirach method of making offshoots is to cut out some brood cells from suitable combs and place them in small wooden boxes, which are made in advance for this purpose. Towards the end of April or beginning of May, on a fine morning, take a comb with a large colony from the apiary, carry it, after first subduing the bees with smoke and driving them upward, at a distance, place it upside down on a chair or table, and cut out several hand-sized roses with brood in the middle, or where the most brood is, which must consist of eggs, small worms, and capped pupae.

These will become worker bees, but not drone brood, as this is unsuitable because the bees cannot breed a queen from it. These roses and brood boards are pinned into the wooden boxes with small pieces of wood and pins, in the same position as they were in the old hive, with the upper part at the top and the lower part at the bottom, leaving the bees on the brood undisturbed and placing them in the boxes. Full honeycombs are placed next to the brood frames, if these can be obtained from the old hive, and empty wax combs if these are not available. Then take a few spoonfuls of bees from the old hive, as many as you think are necessary for the brood frames to hatch, and place them in the box. The old hive is then returned to its place, but the box is closed with a perforated sheet of metal or a piece of wire mesh, after first inserting a small trough with honey, if no honeycombs have been inserted, and carried to a temperate, dark room or chamber for several days, where it is kept quiet and there is not much noise. The windows can be opened from time to time to let in fresh air, and when the weather is fine, place it on a stand during the day and open the flight hole, so that the bees, which will immediately begin to build a queen cell and hatch a queen, can fly in and out and bring in honey. However, if there are cold nights and harsh weather, it is better to leave them in the room or bring them back inside in the evening. If, after 16 days (during which time you must not forget to feed them), you notice that they have a queen, bring the nucleus colony, or as many as you have made, to completion and add more bees.

It is easy to tell whether such a colony has successfully produced a queen, because sometimes the bees cannot wait until their queen is mature and bite her out prematurely, especially if they are checked frequently and disturbed before the time is right. It is therefore very good and necessary that these nucleus boxes have one or more glass panes, like my magazine attachments, so that one can see everything without disturbing them further than by a brief flash of light. Through these little windows, one can now see whether the queen has emerged properly, namely when the queen cell has a round opening at the lower hanging end. For if such an opening is located on the side, it is a sign that she has been bitten out prematurely.

In general, however, you can see that the bees have a queen when they carry out dead queens. They often install three, four, or more queens, of which they keep the most beautiful and kill the rest, carrying them out of their dwelling. Finally, however, you can clearly recognize the presence of a queen when the bees are lively, busy gathering, and building on the box. If one is convinced of this and there is sufficient food for the bees in the field, one takes an empty hive on a warm and fine day, attaches several clean wax and honey roses to the top, then looks for the queen in the brood box, locks her in a queen cage, places this in the hive and drives the remaining bees into it. (*) Then, around midday, when the bees are flying out most actively, take a hive with a large colony from its place and put it in the apiary, replacing it with the new hive containing the imprisoned queen with her small number of bees and a few wax and honeycombs. The bees that have flown out of the hive that has been moved from its place and continue to fly out of it the following day will return from the field laden with honey and enter the new hive, attach the wax and honey frames that have been inserted, continue their work, and make a good beehive. After a few days, when the bees are accustomed to the queen, who has been fed by them during this time, she is released among them, and they immediately begin to lay eggs and increase the hive.

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(*) With my type of magazine attachments, none of these precautions would be necessary. You could simply leave them in a box of the dimensions shown, then provide two empty bases and allow the foreign bees to move in. If the offshoot is allowed to fly out for the first time before it is complete, it is advisable to place it above the hive from which it is to be reinforced, so that the few bees do not fly away during the transfer. If this is not possible, it should at least be placed in the spot where the old hive is to be moved, from which it is intended to populate the new one.

The other method of making splits is to exchange an empty hive for a good, well-populated one, and is similar to the first method of splitting, except that the queens are not reared in brood boxes beforehand. In February, before the bees fly out, a good colony from which you intend to make a split is placed on its own in a special place; (because if other hives are next to one from which a colony is being made, the bees that have flown away will not go into the empty hive when it is moved, but will spread out to the nearest hives and cause a lot of disorder in the apiary).

As soon as there is plenty of food in the fields in spring, place an empty hive under the full hive intended for laying for several days so that it attracts the scent and the bees become accustomed to it. On a fine day around noon or at 10 o'clock, when most of the bees are out in the field, remove the full hive from its place and place an empty one in its place so that the bees coming in from the field or flying away can gather there, turn the full hive upside down, and drive the bees back with smoke so that you can see where the brood described above is located. Then cut out some roses from it and skewer these pieces of brood together with some empty wax panels and honey roses, if you can get them, into the empty frame that was placed underneath, so that the bees can occupy them and brood them. To this end, you must fasten various sticks and pieces of wood of different lengths between them, along with a few across them, so that the frames can rest on them, as the matter itself will teach you. When all this has been done, place the frame filled with brood frames in the place where the old hive stood, and return it to its place among the other bees. The bees that have gathered around the empty hive, as well as those that return from the field during the day, will occupy the brood frames, raise a queen, and establish a new colony. At first, the bees are very restless about this change, because of the empty hive and the absence of their queen. They run in and out and fly into the air more often than if they wanted to fly away, but since they do not know where else to go, they soon settle down to start a new household and raise a new queen, and until the

In the evening, everything becomes quiet. However, if you find that the bees that have gathered are not enough to form a strong colony, you can drive a number of them out of the old hive and let them fly away so that they can also move to the new hive to form a colony. If bad weather sets in soon after, the colony must be fed until it can bring in food again, otherwise it can easily be lost, just like the young swarms if they are not fed in bad weather.

There is another way of making offshoots, which consists of drumming half of the bees, including the queen, out of a full hive. However, this method, like several others of its kind, is very laborious and difficult, as are the two methods described above, which are also inconvenient because the bees are confined and costly because of the long feeding period. Many bees, and often the queen, are lost in the process: the good hives are weakened, their honey production is set back by several days and impeded, and this is a great disadvantage in fine weather and when the honey flow is abundant. The process of cutting out the brood and honeycombs easily attracts and causes robbers, and in the end the offshoots are weak and need a considerable time to become strong, so that the best season passes them by: indeed, without being shown the tricks of the trade, it is difficult to succeed.

However, the best, easiest, and safest way to make offshoots is by dividing a magazine or a bee colony consisting of several supers. This is particularly easy, convenient, and safe with my type of magazine supers. The procedure is as follows: The best and most populous magazine hives, consisting of 4 or 5 supers, are selected for splitting, and the windows are checked frequently to see whether they are well filled with bees and whether there is brood in the three lower supers, or at least in the second and third supers, so that the colonies are ready to swarm. In some of the best hives, this is already the case towards the end of April and beginning of May, but in weaker hives it is towards the end of May until around St. John's Day. If the magazine hive consists of four supers and you find that

the second section contains not only honey but also some brood (since there is already enough brood in the two lowest sections), then choose a nice day, (consulting the weather glass to see if good weather is to be expected) between 9 or 10 in the morning and 2 in the afternoon, and divide the magazine. Scrape away the clay between the second and third supers, if there is any, that is preventing access, insert a knife or chisel there to ventilate the supers a little, then gently pull through the wire, which can be No. 0 or No. 1, as used on a piano, and blow on it after loosening the attachments a little with the chisel, blow a few strong puffs of smoke from the tobacco pipe to subdue or drive away the bees (however, this is not absolutely necessary if it is too difficult under the bee cap or if you do not have a bellows with a dipping capsule at hand). Meanwhile, an empty base with its board is kept ready on a chair or small table close at hand, or even better next to the beehive to be removed, so that the nucleus can be lifted onto it immediately if there is enough space in the apiary; and while the assistant lifts off the two uppermost supers and immediately places them on the base standing in front or next to it, the other places a lid on the two open bases that remain standing, which now form the young nucleus colony. The removed bee or the old offshoot is then carried with its empty base to another place in the apiary, (*) or, if possible, placed right next to it.

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(*) It should be noted here that the colony with the most brood and honey should only be moved to another location. The weaker one, however, must remain in its usual place so that it can be reinforced by bees flying in for a few more days and does not suffer from a lack of honey. If you want to move the weaker offshoot, it must be fed for several evenings until it is strong enough to fly, regardless of the weather.

If it has the strongest part of the bees and the middle flight hole is closed, the other remains calm and is immediately or the

the following noon, and the middle flight hole is also blocked. (*) The latter will now not be concerned about the previous change, will continue its work in everything, and will produce a new queen from the abundant brood in reserve, unless a queen cell has already been built or a young queen has already emerged.

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(*) It is very good to check your beehives immediately after winter, before the bees fly out, to see which ones you want to use for laying, which you can judge by their strength and good condition; Then place and arrange them so that there is enough space next to the hive to be separated so that the new hive can be placed right next to it, which is not only very convenient but also, as will become clear below, extremely advantageous.

The bees from the removed hive will not like this separation at first, and they will fly little for several days, both because of the new location, which they must learn to fly to, and especially because of the loss of many bees, until new brood has emerged and they have regained their strength. But make no mistake, they will soon be all the more industrious. – As soon as these two new hives have filled three-quarters of the given bases, give each one back, and so on, so that they do not swarm, which would not be in accordance with regular beekeeping. – It is also possible to make two offshoots from a good hive, the first at the beginning of May and the other around St. John's Day: however, it is actually more beneficial and yields a richer harvest to stick with one offshoot.
Under the aforementioned circumstances, it is unlikely that the division will not be successful. For even if the queen has remained in one or the other hive, those who lack her will almost always have brood to replace her. However, since it is not always possible to see the brood in the upper supers, and since it is often located in the middle, with honey on the sides, and one nevertheless wants to make a split, the separation must be carried out early *in the morning*, because outside the period when she lays eggs, the queen does not easily stay in the lower levels

but usually in the second from the top. From 9 a.m. to noon is usually the time when they lay their eggs, so it could happen that the queen is found with the brood in the lower combs, but there is no suitable brood in the upper combs, and thus the split would be pointless and futile. If this unexpected situation arises, it can easily be detected within the first eight days by the bees' sluggish and listless flight and lack of industriousness, as they neither build nor carry pollen on their legs, nor are any to be found at the flight hole, where in warm weather they turn their heads toward it and fan their wings. Then both hives must be reunited and the removed one, without the empty base, must be put back in its previous place.

If you want to make a split from a magazine stack with five supers, proceed as described above, but leave the top three supers together, because the upper ones can be larger than the lower ones, and the lower ones are still more populated, have more bees, and also have more brood, and the bees that are in the field will also gather there.

If you want to make a split from a magazine with three supers, leave only the bottom one and give it an empty base. This is a safe way to preserve the queen and can turn out just as well as a swarm from a straw basket, but there will be no strong magazine hive this year. Magazines with 4 and 5 supers are best for making splits.

Two or three different magazine frames provide a completely unique type of offshoot, which I use most often. As previously demonstrated, cut off the bottom full box with brood and bees from two good magazine frames using wire, place them on top of each other, and place an empty base underneath. The procedure is as follows: stand on a chair with an empty box and its flight board or base board ready, and at the same time place an empty box with a board next to the magazine frame from which you want to take a base for the offshoot. Cut off the bottom box with the wire, after sliding the metal slider over it so that no bees can escape, then quickly lift the magazine frame onto the empty box standing next to it, and just as quickly, the assistant standing nearby places a lid on the cut-off box.

Take the box with the brood and place it immediately on top of the empty box on the chair. Then move on to the other magazine rack, which contains the second box with brood and bees. Carry the chair with the half box to the rack and repeat the procedure. Place the removed box on top of the one standing on the chair after removing the lid, or leave the lid in place and lift the box with the glass lid from the empty box and place the second split box between them. – Of course, this cannot be done without crushing a few bees, and you must be well armed for this delicate operation. However, smoke can be used to good effect, and the small loss of bees is often replaced in no time. – If you want to take another base with brood from a third colony, the offshoot will be all the better. The loss to the hives is not very significant and is quickly replaced, and yet the best offshoots are obtained in this way. – There is no need to fear that these bees from different hives will bite and kill each other. Not only do they get along very well with each other at first, but they immediately start working together and are even more industrious than bees from the same mother.

If one were to object that, in making only one offshoot from several hives, one would lose an offshoot, it should be noted that in 14 days one could make another equally good offshoot from the same hives without weakening them as noticeably as if one were to take away half of their dwelling and population.

This method of making offshoots is excellent and the only one that can be used when the beehives still have very full honey supers left over from winter and it is unlikely that there is any brood in the upper boxes that would have to be left in place.

If, after the split, one or more of the hives placed in a new location appear to be too weak, at the time of day when the bees are most active, place the weakened hive where the strong hive stands and move the strong hive to the place of the weak one until evening, when the bees that have flown out of the strong hive will reinforce the weakened one.

offspring will reinforce the weakened one; or you can also reinforce it by placing another hive rich in bees from the apiary in its place until evening, and then placing it in its place, thus reinforcing it.

There is no need to worry that this method of reinforcement, whereby the weak hive is moved to the place of a hive with a large population, will cause the bees to bite and chase each other; neither will the incoming bees do so, because they cannot quarrel over a queen, nor will the bees already native to the hive defend themselves, because they are not only weak, but it is also their maxim to allow strangers laden with honey and provisions, and therefore not hostile, to enter unhindered, and they are especially welcome to them.

The methods of making offshoots described above are undoubtedly the best, easiest, and safest, and therefore surpass all other methods of offshooting, which are difficult and uncertain, mostly only recommended, but little, and sometimes not at all, practiced and tested.

However, there are still some important rules to follow when making offshoots. First of all, you should not make offshoots too early in the year, not before a beehive is well populated and has sufficient brood, and therefore not before there is plenty of honey pasture and bee food available. Otherwise, you are interfering with nature and causing damage. We can guide nature, but we cannot master it. Some ruin old and young offshoots by separating them too early. For if the bee colony does not have many bees and therefore little brood, nothing can come of either. Even if one produces a queen, it is still as weak as the other that still has her, so that both need the whole summer just to recover a little, or even perish if the summer is bad: at least no benefit comes of it. One must therefore wait until the beginning of the swarming season before making splits: and just as one hive swarms earlier than another, so the flight of the bees and the glass pane on the magazine supers reveal whether there is enough colony and brood to make a split sooner or later, and whether there is enough of it for the colony to repopulate itself quickly. It also goes without saying that there must be plenty of food for the bees in the field and warm weather, otherwise they cannot continue building.

Secondly, when laying down the splits, one must consider which of the two splits, the upper or lower, should be left in its usual place. The one that remains in its old place usually becomes the strongest, because many of the bees from the split that has been placed aside fly back to their old flight hole. Therefore, you must always leave the weakest colony, especially in terms of brood, in its old place. If, on the third day, you observe that too many bees are returning to the old place, either swap the two colonies or, better still, place each one halfway between the other if they are next to each other, i.e., move both one up and the other down, very close together, so that each occupies half of the first place and one is as far away from the point of the former flight hole as the other. In this way, the incoming bees divide themselves and occupy both hives equally. – That is a very convenient method of dividing the bees. – After a few days, when each has become accustomed to its dwelling and has its flight, you can move each stick 1 to 2 inches every day until they are back in order.

If you want to know whether the young colony has a queen that has already emerged or is still developing, or whether it has neither, and the queen cell is located in the upper supers that have been left behind, observe the bees after a few hours or the following day: If they are calm and continue to work as if nothing has happened, especially if they stand in front of the flight hole with their heads bowed and flapping their wings, then they already have a queen, or at least one to expect in a few days. But if they are restless, running in and out, even flying into the air with a swarming sound as if they want to take off, then they have neither a queen that has left nor one that has already been established. However, they soon return from the air, calm down, and immediately set about obtaining a queen from a common worker bee egg or a similar young worm that is a few days old. As soon as they have made preparations for this, they continue to work quietly, as if they already had a queen, and their joyful buzzing can be heard outside the flight hole. Meanwhile, the young colonies immediately drive out their drones to get rid of the superfluous eaters until they have properly strengthened their population again: they do this even if they already have a queen that has emerged.

Incidentally, do not think that you will ruin your bees by splitting them, as many beekeepers are too despondent to engage in this useful business: if the hives are only slightly populated and have good brood at the bottom, you can split them with confidence; after 14 days, when you look at them again, you will certainly have no regrets.

§3 What are the benefits of splitting, and under what circumstances is it most advisable to do so?

The main advantage of offshoots is that they can be obtained several weeks earlier than swarms, but especially that one is spared the trouble of watching over the swarms, which sometimes take a long time to form, and often have to be caught from tall trees, with the risk of injury, and that they cannot escape or fly away. In areas where bees swarm late or rarely, offshoots or artificial swarms are excellent. They are also ideal for those who have their apiary in a location that is not very warm and shady, who do not have time to be in the garden during the swarming season, or who do not want to hire a keeper. those who do not want to deal with catching swarms and have tall trees around their apiary, or those who have set up their bees in the upper floor of their house, would be well advised to opt for laying. Furthermore, the splits have the advantage over natural swarms in that the latter perish in heavy and persistent rain if they are not fed, whereas the splits, which already have honey and food in the boxes, can withstand long periods of bad weather.

However, since natural or voluntary swarms also have certain advantages, indeed, as I must honestly admit, several advantages, and there is also some pleasure in catching them, especially when there are low trees around the apiary or they hang in suspended tubs or baskets, they also find many enthusiasts; for this reason, it is necessary to provide instruction on this subject.

§4 On natural swarming and how it occurs

When the bees find plenty of food in the fields in spring, they follow their instinct, which the Creator has placed in nature, and think about multiplying and, above all, about raising their young and establishing their own household. Accordingly, when the hive is soon numerous, a young queen is hatched as the future mother and ruler. They then wait for a beautiful day, when, having hastily stocked up on honey from the mother hive for their new household, they move out, or, as it is commonly called, swarm.

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(*) How wisely arranged by Providence! How easily could bad weather set in a few days later, preventing them from gathering anything? In this way, however, they are provided for a few days. But the idea that bees then also pack wax and take it with them in their stomachs is unfounded, since they sweat it out and have it stored inside themselves, and there is no unprocessed wax in the hive. They never bite off any of the built cells to take with them, nor can they process it into a coherent and durable structure. As for the honey they pack for their new hive, it is not insignificant, since a swarm that would weigh barely a few pounds with empty stomachs then weighs 6 to 8 pounds. which explains how detrimental the many swarms or secondary swarms are to a hive, and why so many previously good hives starve in the spring or have to be fed with damage, and mostly in vain.

If the weather is dry, they like to wait for rain, and then fly out the following day when the sun comes out again, often even on the same day if it is not too late and there has only been a morning shower. They particularly like to swarm when there has been honeydew the day before, all out of wise instinct. It is a real pleasure to watch and observe them when they actually swarm and fly out. They rush out as if with such vehemence as if they were being whipped.

are driven out, tumbling over one another, which often lasts for 6 minutes when the swarm is strong. When half of the swarm is out, there is suddenly space behind the flight hole, and the queen then comes out alone (for she does not receive her bodyguard until she reaches her new home, unless the old queen moves out with her, which often happens; indeed, many claim this happens in most cases), with majestic steps, runs up and down the flight board once or twice, looks back at the vanguard, and then joins the swarm, some of which has already attached itself, while others are still flying around in the air. Then the other half of the swarm follows, also forming a cluster after amusing themselves in the air for a while. Often the queen arrives at the same time as the beginning of the swarm. During this ceremony, the bees make a very distinctive sound, which they do not make otherwise, even when flying in large numbers during the strongest flight. During this departure, it is usually possible to catch the queen with your fingers, as I have done many times, but this must be done carefully so that she is not squeezed or injured. If you hold her between your fingers and walk toward the largest swarm, it will quickly attach itself to your arm without the slightest danger of being stung, as you can then gently shake them off in front of the new bee dwelling. You can also catch the queen on the flight board and, as soon as a few bees have gathered around her, let her run into the new dwelling, and the whole swarm will follow her in of its own accord, and you will have no further trouble with it. This is because the bees know the scent of their queen very well. However, as already mentioned, the queen must be handled with extreme care so that she is not damaged. To this end, she should be caught with a woolen glove that is slightly elastic.

§5 The usual time and hour of swarming

The months when bees usually swarm are known to be May, June, and July, although the latter month is not nearly as good as the former or the others, and even in good late summers, they are far ahead of the latter. However, the time and hour when bees swarm

are uncertain, so it is necessary to be diligent in the bee garden during the swarming season, when it is not raining or cold, or to have someone keep watch. For when the bees have swarmed, they do not remain hanging for more than half an hour, especially if they are exposed to the sun's rays and are not sprinkled with fresh water, but fly up again and move into hollow trees or openings in high walls, etc. – Sometimes, but rarely, the bees remain hanging for two hours, but if they are caught in a rain shower, they sometimes still hang on the tree the next morning.

The swarms usually arrive between 9 and 12 o'clock. However, I have also seen them arrive before 8 o'clock in the morning and at 5 o'clock in the afternoon. The late swarms arrive in the afternoon between 12 and 5 o'clock; it is extremely rare for one to fly off in the morning.

§6 The different types of swarms and their names

Everyone knows that a pre-swarm or main swarm is the one that a colony of bees produces for the first time in the year. After-swarms or secondary swarms are the second, third, and fourth swarms that come from the same old colony of bees, depending on the weather conditions and how the beekeeper treats them. A late swarm is also the name given to a swarm that sometimes leaves an old colony. The first late swarm usually arrives on the seventh or ninth day, but if the weather has been unfavorable, it may not arrive until the fourteenth or seventeenth day. After that, however, no more follow, and the late swarms have united as a result of this delay. This is why such late first swarms often have 5, 6, or more queens, whereas the early swarm has only 3, at most. A maiden swarm is the swarm that comes from the first and main swarm and is also to be regarded as its main swarm. A maiden swarm is also the swarm that comes from a young colony. It usually occurs in the morning and generally not before 40 days after the first and main swarm has been captured.

After 7 days, when the maiden swarm has flown away, another swarm often follows from the first and main swarm and is called the secondary swarm from the main swarm.

Emergency swarms are those that return very early.

They arrive either in April or early May, from a hive that has a large population but little honey, and is sometimes not even fully developed. However, an emergency swarm comes even later and in greater numbers (sometimes even in autumn), because several queens have been established and hatched due to the departure of the old queen. But since, according to bee custom, all superfluous queens are killed, one is pursued by the others and the weakest is forced to leave with part of the colony and swarm. Usually, one can also hear the queen's signal to depart or her buzzing. Finally, swarms of hunger or begging swarms occur when the entire colony leaves a fully built hive with its queen because there is nothing left to live on. Such swarms of hunger rarely settle down and usually move straight to another hive that is rich in honey. However, it is not only a lack of honey that causes some swarms to leave their homes in the spring and move to another hive, but also, more often, an excess of moths, which have spun themselves into the beehive and filled it with their webs, which resemble cobwebs. For then they are also forced to leave their home and settle permanently with others. However, because they come uninvited, but do no harm, they may well be called beggar swarms.

§7 The various signs of imminent swarming

The signs that a swarm is about to leave are usually very unreliable and never completely infallible, but they are usually indicators. Such signs include the calling and trumpeting of the queen. This is rarely heard during the first and main swarm, but always during the subsequent swarms. This is otherwise the most reliable sign that the swarm will come tomorrow, unless rainy weather sets in; but if this happens, the calling continues until the third day, when they leave, provided the weather is only slightly inclement, as they are not as delicate as the main swarms; However, if they cannot swarm on the third day, all the young queens are killed and the bees remain together. As common and indicative as this calling of the queens is, it does happen occasionally that even in fine weather

the bees do not want to follow the queen blowing the signal to depart, but remain with their old ruler, while the young queens are killed.
The frequent presence of bees, as they often hang down like a large cluster, is also a further sign that they will soon swarm, and proves their large numbers and the warmth in the hive caused by their quantity. However, they sometimes lie there for many weeks, even the whole summer, and swarm and lie there little or not at all. However, since remaining in the hive for a long time is harmful to the hive and to beekeeping in general, as bees that remain in the hive do not work or rather cannot work, (*) this problem must be remedied, and as soon as the good swarming season is over, i.e. by St. John's Day, a base should be placed under such a hive so that the bees can continue to work properly and bring in honey.

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(*) I cannot hide that I find it repugnant and also completely unfounded in the nature of bees when so many bee books describe bees that remain in the hive as lazy and idle. They are indeed not lazy, and if they do not work, it is the beekeeper himself who is to blame. They cannot continue working because the hive is full. Just give them more space, and you will soon find that they are not lazy. They prove this often enough by growing roses either at the bottom of the protruding flight board or outside between the baskets when there is not enough space inside, and filling them with honey. As long as a bee can work, it certainly does not celebrate; even if it cannot bring in anything in the very early spring, and there are only a few mild days, they are busy in the hive, cleaning the panels, and always have something to gnaw on, something to repair, or something to add. Only occasionally in summer does one see a bee lying motionless on its back in an empty cell for several hours, as if dead, which is a state of extraordinary rest for them. Their diligence is so great that in spring, when the honeydew is flowing and the weather is very favorable for bees, they fly out into the field as soon as day breaks, which I have often observed with great amazement.

However, the long period during which the bees remain without swarming is usually due to the fact that, at the time when the bees should soon be swarming, the old queen has died in the hive, but the young queen belonging to the new swarm has remained as regent in the absence of the old queen in the mother hive, and there is no other queen available. It takes another two or three weeks for a new queen to be hatched, and by then they often decide not to swarm after all. However, if they have been lying dormant for a long time and finally swarm, the reason is that the young queen was installed a little late, and sometimes she may have been rejected by the bees too early and met with an accident; in which case, some time passes until a new one is hatched.

A more certain sign of their imminent departure on the same day is when the bees coming in from the field do not shed their trousers, but run around with them inside the hive or attach themselves to the pile in front of them. They save this supply for their new home and thus already know that they are to begin their journey on that day. This is also proven by many of the bees that come from the field and belong to the hive that has swarmed. If the swarm is still hanging from the tree or has already been caught, they do not go to the old hive, but straight to the young swarm, and also keep their collected booty for it.

If the drones fly in and out a lot in the morning, this is also a sign that the bees will soon swarm.

A sign that the swarming is about to begin is when the bees in the hive start to move into the comb. This is when they gather provisions for their departure and pack up a supply of honey. You will therefore hear a loud buzzing and humming inside the hive, caused by the bees running back and forth gathering provisions.

Finally, a sure sign that they are about to take off is when the bees start running restlessly up and down the flight hole, as if to announce to the others that the decision to leave has been made. Soon more arrive and fly into the air with their battle cry, whereupon the bees already present immediately fly off and those in the hive rush out so violently that most of them fall on top of each other and then fly off, which

is indeed a most amusing spectacle, which a lover of nature would not exchange for the most beautiful opera.
However, it is not only young bees that fly away with the swarm, but also a few old ones, not as if they were to teach the young ones how to build and so on, as the old ones had dreamed, for they are born with their skills and a bee can do the same work as an old one when it is only one or two days old. Those who leave with the young queen decide voluntarily to follow her, just as those who remain behind do not wish to go with her. However, not so many will fly away that the hive will be left too bare. In particular, none of the bees that have to care for the brood on the day of swarming will go with them, for caring for the brood is one of their most important duties and an inviolable law.

§8 What to do when the bees actually leave, with regard to the flight hole

But when the bees actually leave and swarm, one must not, as some people mistakenly do, open the flight hole very wide or even stick something under the beehive so that the swarming bees can come out everywhere and very quickly; but you must not make the flight hole too narrow or move it, because otherwise the queen will easily lose it, get lost in the hive, and be left behind, and then the swarm will return to the old one. Instead, leave the opening as it is, as they need it for a normal strong flight. It then takes long enough for the first half, which is tumbling around in the air, to become somewhat tired and soon settle down and wait until the queen is together with the whole colony; otherwise, they can come out all at once, easily rise up, and fly away. For the landing has no other reason than that they all want to gather together and wait for those who are in the field. If they have rested for some time, at most an hour (*), and no new dwelling is assigned to them that is suitable, or if they are not sprayed well with water, they leave the bee master behind and all take their leave.

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(*) If a thunderstorm or rain occurs during this time, they will probably remain hanging for half a day or even overnight.

§9 What should be made of the so-called scout bees?

The idea that bees select a hollow tree several days before swarming, using scouts or so-called scout bees, where they want to build their home when they pass through, or if one hesitates too long to catch them, is in fact pure speculation. One often sees a few bees flying in and out of hollow trees or baskets placed nearby, cleaning and tidying them, and then, shortly thereafter, the entire swarm moving in. I once saw this myself at a friend's house, where one of his beehives had glass panels and was full of empty wax roses from a bee colony that had died the previous winter. Several bees came and cleaned and tidied it up, and we were eager to find out whether a young swarm would move in. and this indeed happened three days later, when a foreign swarm of bees moved into this apiary at midday. It is also known that swarms driven by hunger only move into hives that have a lot of honey. However, anyone who has already observed such a move and watched it closely will find it very likely that the bees in distress may have chosen such a hive beforehand through scouts (which are not, of course, a special type of bee). They do not spread out over several hives, but come with the entire colony to one and the same hive. They certainly smell the honey, but this investigation and selection must have taken place before the swarm arrives.

§10 Spraying at the right time is the most useful thing to do when swarming, but ringing does not help them to stay.

However, as soon as half of the swarm has left its hive and is in the air, the best thing to do is to spray it with pure water, which initially encourages the bees to settle, as

their wings become wet and heavy and they tire more quickly, and may even think it is raining. However, this should not be done too soon, not before you see or suspect that the queen has already left the hive or is about to do so. If she returns and sees wet bees, she will think it is raining and stay behind. At the very least, care must be taken to ensure that no drops fall on the flight hole, as this will deter the queen from flying away. This spraying cannot be done properly with a watering can, because it is rarely possible to spray as high as the bees fly. However, a hand sprayer made from a small shotgun or pistol barrel is most convenient for this purpose and can easily reach two or three stories high. Stand at a slight distance from the swarm and spray over them so that the drops fall beneath them. Otherwise, the force of the spray will harm them. Ringing and clanging with scythes and the like does not help, unless it is done to avoid confusion with a neighboring bee colony and to indicate that the swarm that is actually leaving and may attach itself to the neighbor's territory belongs to this apiary. Even if bees hear well, they do not ask for music or shooting.

§11 Why bees do not always swarm all at once, and why the swarm returns

As soon as the swarm is in the air, observe its flight and its sound. If the bees fly in a circle and draw closer and closer together, and if their voices and sounds are bright, then they have the queen with them and the swarm will soon settle. But if their flight is scattered, and their voices are quiet and not as joyful as can be clearly perceived, then the queen is not among them, but has either remained behind in the hive or fallen to the ground. The swarm will then not stick together, and even if a cluster of bees has already formed here and there, it will soon fly away again and join the swarming bees, and then approach the mother hive again. If it happens that the bees do not all want to attach themselves and some of them wander around, look for the queen in the area around the hive, as she will be on the

They will lie on the ground because they are either very young and not yet able to fly, or because they have a defect in their wings (*), which often happens, as they sometimes have no wings at all. They can be found quickly if you pay attention to where there is a cluster of bees.

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(*) The bees do not tolerate cripples among their colony, and any bee with even the slightest defect in any limb is carried away. But the queen is such a sacred figure to them that her prestige protects her from this general law. Only then do they kill them if it is not in accordance with their constitution to let them live, and in order to prevent the disruption of their republic. For if they let all the queens live, there would be constant rebellion in their state. Either the rivals for the throne would kill and mortally wound each other until they finally had no mother and ruler left, or one after the other would acquire a following, and each would separate and want to start her own household, but finally, due to the weakness of the people, they would all merge together. Because of the extraordinary fertility of the queens, no more than one can remain in a hive, because there are not enough cells for several to build their brood.

These cover the queen lying beneath them. They are then lifted up and placed in front of the flight hole of the new dwelling, into which they hurry, followed soon by their people. If it happens that the swarm is already about to return to its old mother hive because one has hesitated too long in selecting the queen, one should quickly remove the mother hive and place the new dwelling with the queen found in its place, where they will soon move in happily.
Sometimes the bees return to their old hive because the queen has remained there. Sometimes she becomes indecisive and may turn back from the flight board, but this rarely happens. If this does occur, the swarm will either follow on the same day or on the third day. If not, the queen has paid with her life and has been killed.

. You can then safely place a support under the hive, because it is unlikely that another swarm will occur.

§12 What to observe when the swarm is hanging and how to catch it

If all the bees have attached themselves (*) and are calm, my method is to gently sprinkle the cluster with a dustpan or broom (for which you can also use a piece of straw or a handful of green twigs), which has been dipped in clean, fresh water and shaken to remove any large drops before sprinkling the bees.

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(*) It is strange in such a cluster of bees, and deserves closer investigation, how the bees hanging at the top, sometimes attached to a thin twig, can carry such an astonishing load for their small bodies without tearing their limbs apart. The front legs of several hundred bees, with which the uppermost bees cling, sometimes carry a weight of 20,000 bees, and a single bee holds a load more than 100 times its own weight with its two front hooks. A human being weighing one and a half hundredweight has to carry two hundredweight. Here, the bee carries a load that is 100 times heavier than itself. This must require a great deal of elasticity.

They are then easier to handle and do not fly away so strongly when shaken off. However, they should not be made too wet. Once this has been done, the new dwelling for them is prepared and placed with its base board on a white cloth spread out under the tree or near the swarm, so that the front of the bee house, where the flight hole is, is open by one or two fingers' width, with something placed underneath, so that the bees can walk in leisurely. The best way to prepare the bee dwelling so that they will readily move in is as follows: Check each super to make sure there are no spiders, ants, or other insects, sweep it clean with a feather duster, and coat the frame of each super with honey diluted with water, using one or

several feathers tied together or a brush. This is the best and most natural makeup. Bees love honey above all else. I don't like rubbing the sticks with all kinds of herbs, as this only makes a mess and sticks the dust or cobwebs that sometimes hang in them. The thin honey, however, must only be spread on the grate and above it, and not below, because otherwise the bees will linger to lick the honey and will not climb up for a long time. Once this preparation has been completed, hold a sieve with small holes, or, if you don't have one, a light tub or basket, close under the swarm and shake it with your other hand, or, if you have an assistant (who is often indispensable), shake the branch vigorously so that the bees fall all or most of them into the sieve, then quickly pour them in front of the new beehive and sprinkle them immediately with water so that not so many fly back up. If the queen was among the bees when they were first shaken, she is, so to speak, the first to hurry into her new home, and it is then a delight to see how her faithful subjects follow her in swarms, marching after her in rows and columns. It is a pleasure to watch the order, joy, and jubilation with which this colony moves into its new home. Since they are poured out in large numbers in front of the flight hole, they lie in clumps on top of each other: only those at the bottom do not move at all and let all those running to the outside pass over them, and only when they no longer feel anyone running over them do those at the bottom set off and march after them, always with the upper ones first, so that not the slightest disorder arises. A large number of bees stand around the flight hole, all with their heads toward the gate of their city, in a line, in a position with their heads down and their bodies raised, and they all make a unanimous cry of joy with their wings, which is never heard from them in this way otherwise. The rest are then fetched from the tree and poured in. The few that remain hanging and fly up again join them of their own accord, or, if desired, they can be driven away with a smoking fuse, or wormwood, if available, or chamomile, placed next to them, or the place can be rubbed with it, so that they fly away because they find the smell extremely repulsive. However, you must not rub the place where the swarm hung with these herbs they hate

herbs if it was a convenient place to catch them, because other swarms will readily attach themselves again where others have been before.

§13 How to proceed if it has wrapped itself around a log or post

If they happen to gather around an entire trunk, or a post, or elsewhere where they cannot be shaken off, they must be swept into the sieve with a flywhisk, which is admittedly more laborious and makes the bees somewhat angry. And to get them to move one or a few strokes, drive them closer together with smoke or, even better, with a handful of wormwood. However, if the beehive can be conveniently placed or tied to a branch close to the swarm, the swarm can be easily driven into it with smoke.

§14 What to do if it is hanging from a small branch

If the swarm is hanging from a small branch that can be easily cut off, place it in front of the new hive and there is no need to shake it off. However, the branch must be removed without any sudden movements, otherwise the bees will fall to the ground and fly away again.

§15 How to attack it when it is hanging from a tall tree or has crawled into a hollow tree

But if it happens that the swarm hangs on a tall tree and you cannot reach it, have a long pole ready with an iron hook attached to it; tie a tub or basket to another pole, or a sack made for this purpose and stretched with a small hoop, and hold it under the swarm; The assistant shakes the branch with the hook, and in this way the swarm is brought down.

If a swarm has settled in a hollow tree or hollow branch, the circumstances will dictate how it can be captured. If

the branch can be sawn off, it is advisable to place the opening in front of the flight hole of the empty stick into which it is to be placed, and drive it in by means of a sack, while tapping continuously against the branch in which it is located, or to force it in with smoke driven in from behind; or drive it out through a hole made or drilled with smoke so that it sticks to it and can be caught. – In such cases, however, the bellows with the smoke capsule are most useful, as it is often difficult to get sufficient smoke in through the wick alone, but with the bellows it can be blown in at leisure.

§16 What to do if it is scattered in different clumps

Sometimes the swarm has split into different clusters, which is a sign that there are several queens. Leave them all alone and protect them one by one in front of the new dwelling;
the next day, the bees themselves will choose a queen and kill the superfluous ones.

§17 A means of driving away a swarm that surpasses all others

In the meantime, it is not possible to list all the cases in which bees often behave when swarming. The nature of the circumstances must teach each person how to proceed and how to help themselves. Water, and especially smoke, are most effective in extraordinary cases. If the swarm is hanging in such a way that it cannot be caught, it should be driven away with a smoking fuse so that it has to attach itself to another place, and if the bees are still stubborn, a lock of human hair should be woven into a fuse, which is usually made of linen rags loosely tied together (*), This can also be used to chase them out of a hollow tree if it is not possible to drive them out by steaming or other means. However, because the bees are very attracted to the scent of the queen, they will readily return

Place it where the first swarm had attached itself, and then coat the places where they had attached themselves with wormwood and nettles, or chamomile and other foul-smelling herbs, or place them on top. They particularly dislike wormwood, and you can use it to drive them away, as if with smoke. It is very useful to have a wormwood plant growing in the garden some distance from the apiary.

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(*) The most convenient fuse, which burns most easily, is made by tying and wrapping a tightly compressed sausage of kottune [kottun, also kattun, cotton fabric] rags around it. –

§18 How to behave when the swarm is enclosed

But let me return to the swarm enclosed in the white cloth. It often happens that half the swarm settles around the outside of the new hive, and sometimes the queen joins them. These bees remaining outside, especially when they are in large numbers, must not be allowed to remain there, but must be gradually swept into the apiary with a fly swatter, using water to sprinkle them. Otherwise, the outer bees may be tempted to rise again with their battle cry, and then they will all follow and disappear from view. This is more likely to happen when the sun's rays are beating down on them. It is therefore very important that the beehive in which they are kept is not placed in the shade, but covered with branches, a shutter, or something else to provide shade. And this must also be done for several days afterwards if it is not covered and the heat is very intense. I once experienced this necessity to my own detriment when the heat of the sun drove out a swarm that I had enclosed the day before, even though it had already built several roses and laid honey and brood.

§19 It should be carried immediately to its place in the apiary

But if the enclosed bees are calm and have all entered (for a few may not be turned away), the hive is placed neatly on its flight board and then not left in the same place until evening, as many do, but immediately carried to the place in the apiary where it is to stand this summer. For if it is left until evening in the place where the swarm had gathered, many bees will learn the flight there and remain there for three to four days. Moreover, they will carry in on the very day they are placed in their place and immediately begin their economy.

§20 Selecting and confining the queen

I do not think much of selecting and imprisoning the queen to ensure that the swarm does not escape, which many praise, and I would find it far too laborious. And what bee lover would willingly subject his eyes and fingers to the tedious task of searching for the queen among thousands of bees in each swarm, selecting her, disturbing her again, and setting her free? Not to mention how easily the queen could be harmed, which would mean the loss of the entire swarm? Even if one swarm out of 50 should escape, it is better to miss it than to have done such laborious work 50 times. However, they do not easily fly away once they have been caught, and they do not leave before they are caught. Just keep your new beehives clean, protect them from contamination by mice, cat hair, and the like; for if they find uncleanliness in them, they will not remain in such dwellings.

§21 A good and natural means of preventing a captured swarm from leaving its dwelling again

I believe I have found a very good and natural means of preventing the bees from moving out again, by taking some of their pre-built wax [propolis], which they use to seal cracks and openings in their dwellings, melting it over charcoal in a tin spoon, and using it to coat some corners of the

revitalize new beehives. This is the natural and pleasant smell of their dwellings. In general, however, they like to stay in my wooden and clean magazine attachments, especially when they have already been used, are well sealed, and have their pleasant smell. Therefore, if you already have a few empty magazine attachments in stock, you can take one that has already been used and resin-coated and place it in the hive where you want to catch a young swarm. The bees will then enter it more willingly and stay there more readily. The wax mentioned above can be collected from an old straw basket and scraped out of the joints or knocked out like tartar from a barrel. It can also be used as well as mastic for incense.

§22 Attaching swarms to suspended tubs or baskets

I must also mention a way of making the task of catching swarms easier, which is particularly useful in apiaries where there are few or no trees. If one places one or two baskets or tubs on 8-foot-high poles at a distance of 15 or 20 steps from the apiary, the departing swarm will readily settle in them, and once one has swarmed in, the rest of the swarm will usually follow. In some years, almost all of them have swarmed into such a tub, but in others they have not. The capture is then very easy, and you only have to take down the tub and pour the swarm into the new bee dwelling. It goes without saying that the tub must not be attached or tied to the pole, but only hung freely on a nail driven into the ground or a protruding broken branch. Nor should the tub be hung on a post or anything similar that is immovable, because often half of the swarm will hang on the pole and will then have to be pulled out of the ground. In some areas, the swarms are immediately placed in beehives and covered with a cloth. In addition, however, since the pouring in front of the bee dwelling is usually just as leisurely, there is no other way to do this with magazine sticks.

§23 What to do when two swarms attach themselves to each other

Sometimes two swarms from two different colonies come together and attach themselves to a lump. If you can prevent one from attaching itself before the other arrives, tie the first swarm with a cloth; if they do come together, catch them in proportion to their size and place them in a larger hive with several magazine attachments. They often divide themselves up, in which case they can be separated again; or if they remain together, there is no loss, for such a strong swarm brings as much or more benefit than two that are only half as numerous.

§24 In any case, one should be equipped with a bee hood, etc., when catching swarms, along with a description of a very convenient type of bee hood.

When performing these tasks, it is advisable to arm oneself and wear a bee cap, or better still, boots. Of course, this would rarely be necessary if one knew in advance how the swarm to be caught would behave. One often catches half a dozen swarms and is not stung by a single bee; but one is bound to encounter one that is vicious and from which one cannot escape unarmed.

This is why the usual bee cap is the most uncomfortable thing to wear, as one can soon suffocate in it, because this work always takes place in the greatest heat, and the vapors cannot escape freely but are trapped inside. I have therefore invented a new bee cap that serves its purpose incomparably well. It is made entirely of fine wire and resembles a round basket with a flat round lid, also made of fine wire. The accessories can be purchased from sieve makers, who have such pieces in stock for millers, who call them "Abreiter" (sifters). They are 1¼ cubits long and one and a half quarters of a cubit wide, which width gives the height of the bee cap. A piece of wire sieve of the aforementioned length gives the circumference of the bee cap: however, it is somewhat narrow, and it is advisable to add a hand-wide gusset at the back from an old

Wire mesh, the kind these people always have, is inserted so that the cap is slightly wider at the mouth than at the top. For the lid, these people have a round piece that fits into a small sieve. These two pieces are bound together with a ribbon and then sewn together, but at the bottom there is a half-foot-wide strip of fine cloth all around, which is tied together at the neck with two ribbons. Under such a basket-like bee cap, one can breathe freely and it does not weigh heavily or disfigure the bee catcher, as the usual monstrous bee caps do. You can also make a small hole in the front of the cap near the mouth and sew it shut, and hang a small piece of cloth from it so that, if necessary, you can stick a short tobacco pipe through it to have smoke at hand, which is often needed when working with bees. This bee cap is very useful and comfortable.

§25 Young swarms must be fed if bad weather sets in during the first few days.

If, after the day on which a swarm is captured or several days thereafter, rainy weather sets in and the bees are unable to fly out and gather nectar, it is essential, as already mentioned above in connection with the splits, to feed such young swarms, otherwise they will perish. It is unfortunate if the young bees do not have good weather right from the start and during the first 8 to 14 days, as this sets them back for the whole summer, and a swarm that arrives 3 weeks later but immediately has good weather for gathering nectar will be better than the early swarm that encountered bad weather right from the start.

§26 How many and what kind of hives should be allowed to swarm or be used for splits

As pleasant and charming as swarming bees may be for a bee lover, and as beneficial as it is when it occurs regularly and remains within limits, disorderly, frequent, and late swarming is harmful to beekeeping. This is well known, but the desire to only

Having many beehives tempts some people to ruin both old and young bees by not setting proper barriers for the swarms. If a hive is allowed to swarm more than once, it is to its disadvantage; not only does it lose the honey that the young swarms take with them as dowry and pack up, but it is also depopulated and consequently cannot bring in much due to a lack of strong bees, and if the late summer is not good, the late swarm also perishes, especially in areas where there are no heaths. But supposing they all succeed, even the third swarms, which obviously destroy a mother hive, one can be assured that a good bee stock that has produced only one swarm or only one offshoot is better and more profitable both for the same year and for the future, and is worth more than a hive that produces only one offshoot or swarm, and a weak one should not be allowed to swarm at all. It is true that sometimes the second swarms and the virgin swarms are successful, and at the same time the old hives recover their population and are rich in honey in the fall; but this happens extremely rarely, and only in the best years, which also have the most favorable weather in late summer.

However, this cannot be known in advance and often happens only once in seven years. It is therefore not wise to risk something six times with the possibility of loss, when it may only happen the seventh time, especially since I have the advantage of preventing frequent swarming as much as possible, even if a desirable late summer follows a favorable spring.

At least in most areas where there are no wild heaths, it is a necessary rule for those who want to increase their bee population through swarming that, as soon as St. John's Week is over, they give new bases to the hives that have been left standing for swarming and do not wish for any more swarms after this time. Even if a hive has been strong for several weeks without swarming, give it a new base, even if the swarming season is not over. This will give work to thousands of bees that are idle and would probably remain idle for several weeks, and if a queen is then ready to swarm, they will still swarm if they already have a base.

However, how much should be set aside from even the best colonies for offshoots or swarms depends on the beekeeper, how many hives he can set up, and how many bees he wants to keep or is able to wait for. If he still has a small number, he can set aside half for splitting or swarming, and must then temporarily balance the increase in his bee population against the gain of a more abundant honey harvest, which he can hope for all the more in subsequent years. Once he has made progress in this way, he devotes only a third to this purpose. First, however, he must make his estimate and ensure that he has a sufficient number of the magazine attachments described above. These only need to be purchased once, and then they can be enjoyed with great benefit and pleasure for a lifetime. For a magazine colony that is not intended to swarm or produce a split, eight supers should be calculated for the summer, if the summer is good; and six supers for a young swarm. An apiary with 10 colonies, 4 of which are to swarm, therefore requires approximately 100 supers, including those already in the colonies, but of these, around 40 will be empty again by autumn and can be stored for the following year. Those magazines that are not to swarm are given a base plate (*) as soon as the new bee food is available in the field, in the manner already described above.

(*) It would certainly be easier to place them on top than underneath, but this is not possible. Bees naturally build from the top down and continue where they left off. They are very reluctant to build in spaces that have been placed on top of them and therefore rarely do so. This can also be seen in the small baskets (covers, caps) that country folk place on straw baskets. Among 10 bee colonies, hardly one or two will build inside, and only if it is a particularly honey-rich year; but even then, many prefer to build outside rather than in the placed baskets. But with bases, the empty space, which they dislike and always have to pass through, reminds them to build on and fill it.

It is not advisable to use supports earlier in the year because the bees are vulnerable to attack from predators in the early spring if there is empty space, and they cannot occupy the flight hole as well if there is a lot of empty space below. It is also

This is unnecessary, as they will not start building until it is warm and there is plenty of food in the fields. However, once this section is three-quarters or half full, start again as described above, and immediately close the upper flight hole, leaving only the lower one open. – And so the placing of the lower section is continued until August, each time when the last lower section is more than half built. If one waits too long with placing the lower section, especially in May and June, and they have built everything, then they will introduce a queen and prepare to swarm, in which case placing the lower section will not always help, but they will often swarm anyway. If it is such a good year for bees that the hive becomes too heavy to lift and give it a base, then early on a fine morning, cut through one or two of the top supers in the manner shown above with a wire and lift them off. The few bees that are in them are knocked out at some distance from the apiary, and those that hide are removed when the honeycombs are cut out.

However, no base is placed under the hives that are to swarm, either at the very moment they have swarmed or on the following day when most of the bees are in the field, in order to prevent a second swarm. If this base is also three-quarters full, it is replaced and so on. If, however, a second swarm should occur, which is rather rare, it can either be reunited with the old one eight days later and placed underneath it, or, if it is not very weak, this can be done in the fall. At this time of year, when it is already beginning to get cold, this reunification takes place without the bees biting each other in the slightest or becoming restless; in summer, however, this sometimes happens, although rarely in my magazine attachments. As soon as this is noticed, blow a little cow parsley into the lower and middle flight holes with a bellows, and they will soon be subdued and remain calm. Similarly, each time the young swarm has built its first frames, place a new frame underneath it to prevent the formation of a so-called virgin swarm, which is even less useful than the subsequent swarms.

Thirty to thirty-six magazine hives, all in good condition, from which no more than 5 to 8 swarms are allowed to swarm each year, or which are designated for laying down, is already considered a respectable beekeeping operation and is worth more than an apiary of 100 hives in straw baskets. Each good and populous magazine colony is worth eleven guilders.

Chapter Five – Care for the bees

§1 Tireless care and attention are required in beekeeping

It is a completely erroneous and harmful opinion held by many inexperienced country folk that bees should be left alone, without being looked after, except to sweep and clean them in the spring and examine them in the fall to see what is good and what will not survive the winter. Such beekeeping is certainly not long-lasting and yields poor results. Rather, bees require *tireless care*, which they well deserve. However, this is not a laborious occupation, but rather a pleasant and enjoyable activity. It is not limited to certain times of the year or months, but a careful beekeeper will check on his bees from time to time and often several times a day. A single glance sometimes reveals an important circumstance that can have consequences. For example, one evening in August, I walked past my beehives and saw a whole cluster of drones in front of one of them, completely blocking the entrance hole as if they were wedged in. I opened the shutters, because it was a glasshouse as shown in Fig. IV, and saw the bees in astonishing motion and confusion, and would have stood there a few moments longer and they would all have suffocated. Because the bee colony was very strong, it had driven out almost all its drones in a single day. Towards evening, many of them returned to their mother hive, but they were not allowed back in and finally lay completely motionless, partly inside and partly in front of the flight hole, grafting themselves together and completely blocking it so that the bees inside could hardly breathe. I hurriedly cleared them away and stuck a piece of wood under the bee house, where the bees frequently rushed out and recovered, which showed me clearly that it was high time to help them. Soon after, they returned and everything was quiet again. Thus, sometimes a single glance can save not only a few bees, but entire

colonies. Indeed, a true beekeeper will not let a single bee perish if he can save it, especially in spring, when one bee that has survived the winter is worth more than four or five in summer.

§2 In spring, a general inspection and cleaning of the bee hives must be carried out.

In spring, supervision and attention are most necessary for bees, both because of their enemies, which cause them the most harm until mid-May, and because of their various needs.

In the very early spring, before the weather becomes mild and the bees can fly out, you should check each hive carefully to see if the flight hole is blocked with dead bees and debris, and carefully remove all debris, or, better still, replace the base or flight board with a fresh, dry one. Many beehives are ruined in this way, and the bees suffocate when they try to fly out and the flight hole is blocked. Sometimes in winter the bees sit mainly on the front side, so that not only the debris from the wax caps of the half-eaten cells falls straight down in front of the flight hole, but also the dead bees, and the dew and moisture flow over it and everything freezes together, completely blocking the flight hole, which then causes adverse consequences when mild weather sets in and the bees want to fly out to clean themselves, unless it is cleared beforehand or better prevented by a fresh flight board. A careful beekeeper will therefore, in the middle of winter, when mild weather often sets in and the bees can fly out and clean themselves, remove the damp, dirty base board and replace it with a dry, clean board, as even lifting the hive provides the bees with healthy cleaning and fresh air.

However, around St. Peter's Day in February, depending on the weather and whether the first signs of spring arrive early or late, it is essential to carry out a thorough inspection of all your beehives and clean them thoroughly at the same time.

On a mild day, check (and how easy is this with my type of magazine attachments with glass panes?) whether and how much honey is still available, whether the bees and their combs or their roses still look good, etc., so that you can take appropriate measures. – If the bees are beautiful and have a shiny color, as if coated with varnish, they are healthy and well. – By cleaning, I mean partly cutting out and removing any moldy lower wax roses, (*) and partly sweeping or removing debris and crushed wax, dead bees, and all the rubbish that has accumulated in the apiary over the winter, mostly on the base board.

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(*) Since moldy roses cannot be cut out of magazine boxes that are stacked on top of each other by turning them over, the bottom moldy box must be cut off and replaced with an empty one. However, if only the outer edges of the panels are slightly moldy, the bees will clean them themselves. In addition, the cut-off and removed box can be put back in place if it has been cleaned and is still usable for the bees.

However, this is quickest and easiest if, as mentioned above, you place newly planed, dry, and clean base boards underneath and remove the old ones together with the debris lying on them. This mixing up of the boards is much more advisable than simply sweeping away the old boards, because it is not only much quicker, but also because the latter are wet and very damp from the winter weather and especially from the swarm of bees, and often moth larvae have burrowed into the wood, and they cannot be cleaned as thoroughly with a broom as freshly planed boards. (*)

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(*) Simply placing the bees on a bench, as many are accustomed to doing, without giving each hive a special base board, is useless and is a reprehensible and harmful sloppiness, as well as being very hindering in the handling of the bees.

The bees do clean their dwellings themselves when they are strong, but this small effort not only saves them a lot of time and work, but also prevents maggots from crawling into the cells of the roses until they get a good day to clean, which would give the bees twice as much work or even be very harmful.
The old base boards that have been removed are cleaned by hand, dried, and kept for further use. However, the debris that has been lying on them is not thrown away, but carefully collected, as it is the best wax and can be compressed (*) and kept until more wax has dried out.

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(*) If you have empty wax roses or scraped wax and debris, it is best to boil and press them immediately, or at least pour boiling water over them and then press them together firmly; otherwise, they will not keep very long without deteriorating and becoming infested with mites and moths. However, if the roses are not pressed together at all, after a few weeks, especially if they are left uncovered, an astonishing number of moths or cockroaches will appear, which will eat them completely and consume all the wax, reducing it to dust and nothingness. It is precisely these moths or cockroaches that ruin the equipment and woolen items. The butterfly that lays these hairy worms, which belongs to the moth family, is white-gray, just as dusty and smooth, and half as large as the one that lays the smooth maggots in beehives. These cockroach worms also spin themselves in the same way when the time comes for them to turn back into butterflies. These cockroach moths are also often seen near beehives; however, there is not the slightest sign that such hairy moth or cockroach worms emerge or hatch from them when a beehive is still inhabited, no matter how much they go after the unmelted wax. None have ever been seen being carried out by the bees. Once the wax has been boiled and melted together, it always remains intact and is no longer touched or eaten by any insect.

After the fresh boards have been fitted, the sticks are smeared with clay again at the bottom if they do not sit properly. However, if you find that some of the magazine sticks have unnecessary bases with empty wax roses, these must be removed. You must use your eyes to determine how many attachments each stick should retain. A stick that is still populous and has two full honey attachments should be left with no more than four, or at most five, attachments. Two bases with empty roses are enough for breeding in the first spring. However, these must also be available if they can be filled quickly. In particular, the lowest ones must be removed if they are not fully built or have become slightly damp or moldy from the winter. Otherwise, the bees do not like to continue building on them and often bite them off halfway before building again. Removing the bottom frames with empty wax roses is not only advantageous because of the gain in wax, but also for the bees and their entire structure. In this way, the hive is also rejuvenated from the bottom up.

§3 Feeding the bees

During the aforementioned inspection and main visit, it is also necessary to check how much honey is still available. For one should not believe that one has now gained anything when the bees have managed to survive long enough to fly out for the first time. At the beginning of March, they must still have at least half of their winter food, even if they sometimes find flowers in April and also enjoy honeydew. In spring, they often need as much in eight days for their brood as they do in eight weeks in winter. In the cold, they consume little, and I have often found that a good beehive consumes hardly a measure of honey or five pounds in weight in eight to ten weeks. But one should not think that a bee colony can be sustained so easily. Before winter, it must have two boxes full, that is four measures or 20 pounds of honey, even if it has little or no surplus, which it should have, if the spring is poor. For once a hive has completely consumed its supplies, it is already difficult to feed it immediately. At the beginning of March, it must therefore still have two measures of honey, which, according to my magazine articles, is a full sealed

A super containing 10 pfennigs or 2 measures of pure honey. If a bee colony does not have this much, and cold weather and bad weather still occur in April or May, then one must simply make do with feeding at certain times. Of course, this is not the job of a proper beekeeper, who would rather leave his bees with excess supplies than take too much honey. However, anyone who does not want to feed at all has not yet had many beehives, among which circumstances sometimes arise in one or the other that, despite all caution and regular treatment of the bees, one must sometimes feed them and come to their aid, even if only out of caution. I have sometimes fed them even though I could still see sealed honey in the hive. For with strong brood in particular, one must not allow the bees to consume it, otherwise the disadvantage is certain and sure, even if the colony itself does not perish. Indeed, anyone who boasts that they have never fed their bees has certainly not experienced any bad years, which are precisely the years of learning. Sometimes there is a spring that is so disastrous for the bees that you have to feed them around Pentecost, or even around St. John's Day, when persistent north winds consume the sap of the flowers and prevent all honeydew from forming; in such cases, a hive may have consumed 4 to 5 measures of honey stored from the winter. One may also try this occasionally in the fall with one or two hives, or if some other opportunity arises. Would one then neglect a hive and leave it to chance for the sake of a measure of honey, or to have a frame, never to feed it? However, if you find yourself in the position of having to feed one or two colonies and you do not have full supers to take from others or in stock, this does not mean that you should only add a few spoonfuls of honey every day, which would also be very laborious and not economical. For bees feed much less wisely on a little than on a lot that they can carry into their cells. Therefore, give them at least a good half pint at a time until they have a supply and until they find good food in the fields. To this end, feed troughs are kept ready, which are adjusted to the width of the flight hole after the sliders have been fully raised and which, according to my magazines, hold ¾ of a pint. They are very convenient and you never have to ventilate or lift a stick. If the base is fully built up so that you can

If the feed box cannot be pushed in, place an empty base underneath, or, if you prefer, you can nail together low bases with wide flight holes so that you can insert a pint or half a pint of honey at a time without having to lift the apiary. The most convenient and best way to make such feeding troughs is from box bottoms, nailing the two side strips and the narrow front and back sides together with small nails and pouring melted wax into the corners inside, or coating the inside completely with hot wax, which keeps these dishes very clean and is pleasant for the bees. Whatever size the feed troughs are inside, make lids from very thin boxwood, which float in the honey when the troughs are full, and make holes in these lids the length and width of a bean, through which the bees can suck the honey and none of them drown. The honey is melted over hot coals, where it becomes liquid, even if it is sugary, and then one-sixth part water is added and both are stirred well together. The water keeps the honey liquid so that the bees can enjoy it better and more quickly and can easily return it to the cells. For the honey that the bees bring in from the flowers and honeydew in the fields is initially as liquid as if a quarter of water had been added to it; but it thickens much more quickly through the separation and preparation in the bee's stomach than honey in a vessel to which so much water has been added. Indeed, honey mixed with water turns sour in 14 days in the warmth; but the honey that is given to the bees for food and placed by them in the cells remains good and never turns sour, which suggests that it is purified immediately in their stomachs. I have been told by a reliable bee lover that sour honey is not harmful to bees and that he has used it very successfully to feed them in an emergency.

If the bees are sitting high up and do not want to come down to the honey quickly, you can safely place the honey in a slightly warm place; this will not harm them, and they will smell it immediately, as they can smell warm honey from an extraordinary distance.

Feeding takes place in the evening when there are no bees flying around. If you want to feed during the day, you must do so in rainy weather when the bees are not flying, and then close the sliders to the bees that have been fed.

However, in order to be able to feed at any time and throughout the day, and also with greater convenience and advantages, I have devised a feeding box, which has proven very effective in trials, and which is placed on top of the beehive. Due to its usefulness and versatility, I have presented it on the copper plate in Figs. 2 and 3, and will describe it here briefly.

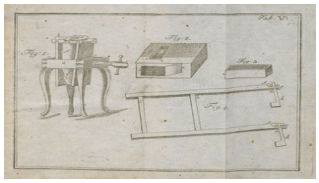

Fig. 2 shows the feeding box, which is the size of an ordinary magazine box, 12 or 13 inches square and half a board high. Above it is a whole piece of board with a glass pane in it.

a. This is the door through which the honey trough (Fig. 3) is inserted.

b. The front strip, ½ or ¾ inch high, is on the inside of the box, onto which the feed trough is inserted and on which it stands, with the other strip located at the back, opposite the front one. A thin board is inserted lengthwise into these two cross strips so that the feed trough runs onto it when inserted.

c. This is a small glass pane that allows you to see into the honey trough from the outside to check whether the honey is overflowing when being poured in, whether the feed honey has been consumed, etc. This glass must be covered with a small lid with a knob.

d. There is a hole in the top of the lid of the box next to the glass, through which the feed honey is poured into the honey trough by means of a funnel, which is also secured with a finger-length peg. This peg can be tied on so that it does not get lost.

Fig. 3 shows the feeding trough, which can be made of fir, lime, beech, or other wood, but not oak. It can be carved from a single piece or nailed together from five pieces and then filled with wax in the corners. If it is 2½ inches deep, 10 inches long, and 4½ inches wide, it will hold about half a measure, or 2½ pounds of honey. On top of the honey, place shavings from box bottoms or whole pieces with holes

so that the honey is completely covered and no bees can drown in it.
The feeding box described above has several significant advantages. Not only is it convenient to feed the bees by pouring the honey in from the outside through the funnel, but it can also be used at any time, even when the bees are flying around a little. The feeding trough can be left in place day and night without attracting predators, because the honey is well sealed at the top and cannot be smelled from outside, and at least no bees can get to it from outside. It is much more convenient to place and attach the feeding box at the top than to feed at the bottom, especially if the bottom magazine box is full of roses and you have to lift the beehive to put an empty one underneath, which has to be repeated several times. Moreover, when the bees need feeding, they always sit at the top and smell it immediately; because, on the contrary, if it is only a little cold, they do not go down and often starve to death with the honey below. If you want to feed them, remove the lid from the magazine frame, place the feeding box on top, push it back with the feeding box, and leave it on the top super. If you want to reinforce this or that beehive with late honey in the fall, and there are many bees sitting at the very top when you remove the lid, so that you have to prevent them from flying out, blow some smoke into it with a tobacco pipe or a bellows and drive them back. If you have several hives to feed, you can either do one after the other, or, because it cannot always be delayed, it is a good idea to have some feed boxes made or nail some together, which requires little effort and expense.
As for feeding itself, do not believe that feeding bees or leaving them a large supply of honey will make them lazy. No! Quite the opposite is true. The more a bee colony has in store, the more industrious it is, and also the more courageous and bold it is in defending its stores, as its sting convinces those who approach it carelessly or put it to the test. A beehive, however, that has little or no stores is despondent, both in its work and in its defense.
As soon as it is fed, however, and its hope increases, so does its

diligence and courage also grow. This can also be observed with honeydew. Bees never sting more easily than when there has been honeydew. But their sting is also at its worst at this time. Feeding or giving honey is sometimes, and under certain circumstances, not unhelpful even in a hive rich in honey, and I am sure that this encourages a swarm to fly away sooner.

When feeding, always proceed with caution so as not to crush any bees or attract robbers by smearing honey. It is also important to ensure that the honey used for feeding is pure, unadulterated, and does not contain stale or dead bees that still had brood, etc. Polish and other barrel honey is also dangerous, even if it has been boiled down to a third of its volume over a low heat and well skimmed, because in this process most of the curds are thrown into the honey kettle and mixed in. It is therefore a necessary rule for a wise beekeeper to always keep a supply of honey in stock, as one can never know in advance what the following year will bring, and never to take too much from one's bees. People usually do not believe this until they have experienced a really bad year, and then they can suffer astonishing damage. Just as one is generally prone to swarming when one first starts beekeeping, one easily becomes greedy for honey and prefers to take too much from one's bees rather than too little. The many artificial bee feeding methods that have been invented, using boiled, foamed sugar, syrup, sweet milk cream, juniper juice, beet juice, plum juice, mulberry juice, birch juice, etc., are not only very unsuitable, but also clearly harmful in some cases. In extreme distress, bees do consume all kinds of sweet juices from vegetables, just as humans do when they live on roots during times of famine or bake bread from acorns, etc.

Such famine is usually followed by death, and this is also true for bees. For them, years of famine are usually also years of death. Artificial, artificial feeding can be beneficial for a while: but if it lasts too long, if it has to be started too late in winter, if honeydew or pure honey food is not available soon after in a favorable and early spring so that the bees can clean themselves in time, then they are in danger. Among emergency feedings (which I have never had to resort to, and which are extremely rare in magazine beekeeping), I consider the best, if good honey cannot be obtained in any way, to be

prepare honey from the juice of good pears and mix it with a little bee honey to feed the bees. The method of preparing this artificial honey is as follows: Take the best sweet pears (the so-called apothecary pears, known in various places as sugar pears or Bons Chretiens, are particularly suitable for this purpose); before pressing them, leave the pears to stand for 8 or 10 days in an airy room or chamber so that they become tender and lose all their harshness. The must is then immediately boiled in a new glazed earthenware pot and skimmed until the juice is completely clear and bright. When the must has boiled down considerably and the pot is about half empty, it is transferred to a smaller pot, otherwise the juice will take on an overly brown color and a burning taste. In this smaller pot, it is boiled again until about a third remains and the juice has the consistency of thin honey. When it has cooled a little, pour it into clean earthenware, stone, or glass vessels, seal them well, and store them in a cool place. Such well-cooked juice will keep for many years, and it is a good idea to make a supply of it in good fruit years, especially as it is very useful in the household and not only saves a lot of sugar and other good honey in all kinds of dishes, but is also excellent for making mustard (*).

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(*) The bees themselves taught me that such emergency feeding should not be completely ruled out. In an extremely hungry spring, I heard a tremendous buzzing of bees on a cherry tree that had early and good black cherries. I investigated whether a swarm was hanging there; but in the weather at that time, swarming was as impossible as honeydew could have been found on the tree. I took a closer look and found that the leaves were sprinkled with the sweet juice of the cherries, as if honeydew had been left on them by the birds, who were very fond of the cherries. The bees licked up this sprayed juice, but despite my best efforts, I was unable to determine whether they carried it into the cells and deposited it there.

Meanwhile, this bee syrup is not available every year, especially where wood is expensive or when the fruit is not good. The particularly damp weather that prevailed almost everywhere in 1780 for bees made me decide to investigate and test artificial bee feeding at various apiaries to find out which method was good and could be used everywhere, at any time, and cheaply, and could be produced in large quantities. This is prepared from barley groats and, if beer is brewed anyway, can be obtained without any special cost or effort. We find the preparation of this feed described in various beekeeping books, where wheat malt is prescribed; but since wheat beer is not brewed in our region, barley malt can be used as a substitute and has already proven itself in many apiaries. – If you brew beer anyway and have mashed 2 bushels (weighing 300 to 330 pounds) barley malt (air malt is preferable to dried malt because of its sweetness) has been mashed, then, if a lot of bee feed is required, you can pour boiling water over it until you can tap 12 quarts (48 Frankfurt measures) of wort, which you can then use to make your home brew.

Boil these 12 quarters of wort for a good half hour, then leave to settle, and clarify until clear and bright, so that 10 quarters remain, i.e. half an ohm, or 40 measures of clear wort. Add 20 pounds or 4 measures of honey and boil down to a syrup, skimming constantly, which is very similar to liquid honey when the mixture has cooled.

However, if you do not have so much good honey available, and it is difficult to obtain, add 9 pounds of white sugar and 5 pounds, or one measure, of honey to the above bee wort and boil the wort, skimming constantly, until it is reduced to two-thirds. Although this syrup is somewhat more liquid than the first, the bees still like to eat it. If you have to feed the bees long into the spring, it is particularly important to keep this syrup in a cool place or in the cellar so that it does not turn sour. If the weather is cold when feeding, it is a good idea to warm the feed slightly before giving it to the bees: they will then smell it more strongly and go to it more readily. In particular, however, it is good to give the bees half a measure at a time when the weather is mild, so that they can carry it into the cells.

However, if you want to prepare this bee syrup outside of beer brewing season or in smaller quantities, take a heaped simmer or 42 pounds of barley malt dried in the air, grind it coarsely and moisten it, i.e. (for those unfamiliar with beer brewing) pour enough lukewarm water to make it into a porridge or thin dough, which must be stirred diligently but gently and worked through until there are no more lumps in which moisture has not penetrated. When this is done, pour 8 quarts, or 32 measures, of boiling hot water onto the mash, which can be poured into a mash tun or a vat with a tap, then cover and leave to stand for one or one and a half hours. It is then tapped and poured into a vessel, where it must be left to settle. The wort is then clarified and boiled as is customary in beer brewing, in this case for about an hour. Once this has been done, the wort is poured into a container where it can cool and settle, and then strained through a woolen cloth so that all the flour particles are left behind. It is then placed back on the fire, and as soon as it begins to boil, two measures of wort and one pound of honey (or, if there is not enough honey, 12 ounces of sugar and 8 ounces of honey) are added to the kettle, and both are boiled down to two-thirds under constant skimming.

§4 How to advise your bees in years of famine and misfortune

But what is to be done if such a year of famine and death should befall the bees (may heaven preserve us from it!), so that their considerable number of bee colonies cannot be provided with sufficient winter and spring food? Magazine hives that are heavily populated very rarely fall into such a state of decay, and it has been shown above how quickly they can provide for themselves for the whole winter in a few good weeks if necessary. However, should such a sad case occur in an apiary, the best advice is to combine 2 or 3 hives together. (*) Place two poor hives on top of a better one, gradually remove all the superfluous empty magazine frames and bottom boards from all of them, and give each one as much honey as you can; just make sure that all the honey is placed at the top.

(*) This union can also be carried out with good results in the middle of summer, and under certain circumstances it is then most advisable, as in my type of magazine nothing is easier and can be done in an instant. If the spring was poor and some of the beehives have become weak, as is usually the case when there is no honey flow, very few young bees are introduced and hatched, while many old ones die or are lost. or some hives suffer some other misfortune that prevents them from thriving, so one places such a weak hive under a stronger one, or two weak ones on top of each other. This union makes them strong and full of courage, and if only 8 or 14 days of favorable weather and honeydew fall, they soon become heavy and good to everyone's amazement, whereas if each weak hive remains on its own, each will be a weak, poor hive by autumn, and both will become a burden or even perish. But if they are united at the right time, there is a very good colony that is worth far more than four such starving colonies. Such a union in summer and soon after St. John's Day has always been a great advantage to me. And how welcome they are to the bees themselves can be seen from the fact that they never bite or chase each other and none are killed, as is still the case with their social structure, one of the queens, which I usually find still alive the next morning outside the hive. The sudden union, when the bees are together for a moment and acquire the same scent, also stops them from chasing each other, which mainly happens when foreign bees gradually enter the hive through the flight hole or a narrow communication hole.

It is better to make ten or fifteen good colonies out of thirty than to have them all in obvious danger of perishing. A single good bee year makes up for everything. Do not think that what a large colony of bees can live on in one hive is enough to sustain them in three hives. Experience and the nature of things teach us that a less numerous colony of bees does not consume more in winter in proportion to the number of bees than a strong colony. A colony of, for example, only

90,000 bees may consume as much as a colony of 15,000 bees. This is because fewer bees cannot keep each other warm as well as a large swarm. The fewer bees must therefore consume more in order to protect themselves from the cold. In addition, bees do not reproduce as strongly in a bad bee year as in a good one, and in a bad year they melt away in August to everyone's amazement when the old ones have gone the way of all creatures. Bad years are years of learning, and those who love beekeeping should always keep a dozen full honey pots in reserve. The honey is never lost and can be worth ten times as much in such a bad year as in a previous good bee year.

§5 What to do if mold is present

During the main inspection in spring, you should also check whether there is any mold on the roses. Even in the best beehives, mold can sometimes develop if there has been a lot of rain and little dry cold weather and the hives are standing alone. In areas where the bees sit in clusters, mold cannot develop, but only in the lowest section. If the mold is not severe, the bees will clean it themselves when it gets warm and they start to fly. They often bite off half the roses and rebuild them. However, if the base is badly affected by mold, it should be completely removed during cleaning.

§6 How to recognize and remedy the absence of queen bees?

When inspecting the beehives, particular attention must also be paid to whether each one still has its queen. However, the absence of a queen, which is most dangerous in spring and autumn, cannot be detected easily or reliably at any time other than when the bees are able to fly out and gather pollen. At this time, bees that have lost their queen will run around the flight board alone and timidly, flying out and in very little, neither defending themselves bravely against predators nor readily stinging. They will not come back from the field laden with pollen and, when you knock on a

hive. Nor will bees be seen in front of the flight hole making the special gesture of turning their heads toward it, raising the rear of their bodies, and making a continuous buzzing sound with their wings (which is otherwise the clearest sign of a hive in good condition, as is the case when there is a slight dew, as the common man expresses it, and a dampness is perceived in front of the flight hole, as if it had dewed a hand's breadth in front of the flight hole, which comes from the swarm of bees, and is a good sign that the hive is populous and healthy). – In a queenless hive, you will also not see or find any young brood, which is also a sign that the queen left some time ago and not just recently.

The causes of queenlessness are varied. The queen has a longer lifespan than ordinary bees because she is not weakened by so much work and changes in weather conditions, but also because nature has set her a longer goal. Eventually, however, she dies of old age, and if there are then brood and common worker bees, or if young queens have already been placed in their cells, the departure of the old queen goes unnoticed and cannot really be called queenlessness. However, if the young queen that has been placed in the hive fails, or if several of those that have been placed fail (as the bees often bite out the young ones prematurely out of a great longing for a new queen, since the opening is on the side and not actually on the lid), the aforementioned signs soon reveal that the hive is queenless, in which case there are no other three-day-old worker bees from which they can breed a new queen.

Sometimes, and especially in spring, when the young bees often summer in front of the flight hole in pleasant sunshine, as it is customary to call it, because they fly up and down vigorously and seem to be playing, it happens that the queen also takes in fresh air and usually leaves the hive accompanied by many other bees, where she is easily caught by birds, but all the more easily because she is not used to flying, she gets lost and enters another hive, especially if the beehives are close together; in the foreign hive, however, she is killed. That is why in the evening, in such

hives that have been very active in the evening to see whether the bees are calm or running anxiously back and forth on the flight board, searching for their queen in fearful longing, which makes it possible to be very clearly and certain of this circumstance on the first day.

Some bee teachers claim that during swarming season, bees often kill their own queen by mistake and in their eagerness to eliminate superfluous queens, wounding them all and causing the right queen to die after several days. However, based on numerous observations and perceptions, it can be concluded with certainty that worker bees never kill a queen under any circumstances, but that the queens strangle each other. (*)

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(*) I conclude that the superfluous queens are not killed by the worker bees but by the old mother herself, who is extremely jealous of her rivals, because the bees show the greatest respect and love for all queens, even foreign ones and even those that have been strangled. If a queen gets lost and enters a foreign beehive, she is never attacked by the guard bees, but is welcomed by them with willingness and joy, just like any queen that is brought in and allowed to enter. Furthermore, if a young queen has been killed in the hive, the worker bees carry her out, because they do not tolerate dead and useless things inside: But who could ever have observed this without paying attention and seen anything other than that they lick the dead queen brought out of the flight hole and lying on the flight board, stay with her, walk around her, and show the clearest signs of their love and esteem, which would certainly not happen if they had killed her themselves. From this I conclude that the young queens are strangled by the old ones, because they are always killed at night. During the day, there are many bees in the field and at work, and consequently there is room in the hive for the persecuted queen to escape and flee; but at night, when they are all at home and the hive is often crowded, she is prevented from escaping and must finally succumb. Then, if there are several young queens in a hive who are to be killed, only one is killed each night, the next night the other, the third night the third, and so on.

This is further proof that it is not the worker bees but the old queen who carries out this revenge and executes her own death sentence; otherwise, the multitude of worker bees would be able to strangle twenty young queens in a matter of moments. But the long pursuit of a young queen and the slow strangulation exhaust the old queen so much that she cannot easily kill several in one night. Moreover, the queen is equipped with a sting and two special pointed teeth, which nature seems to have provided her with for this purpose. Finally, since I have observed such persecutions several times in a glass beehive, the young queen has been pursued with all ferocity by the old queen alone, but the worker bees were all quite calm and made way for each queen as she ran through. However, in view of the murder of the queen by worker bees, I exclude the case where robber bees attack a beehive in its center with complete fury.

Therefore, it can happen, and indeed does happen from time to time, that the old queen becomes so exhausted and injured from her frequent fights with the young queens that she falls ill and dies, or that she is wounded by one of the young queens defending her life, and then has to pay with her life, as sometimes happens in a duel. If there is no suitable brood available to hatch a new one, the colony becomes motherless or queenless. Although there is always brood available at that time, it can happen that either the bee worms are already too large or are already in the nymph stage.

The quickest and easiest remedy for this queenlessness is to place the hive under a good hive that has its own queen. The weakest hive can be chosen for this union, as it will now be considerably strengthened. However, if you do not wish to do this and would rather keep your numbers the same, take a magazine extension from a good, populous hive in which brood can be seen and place it on top of or underneath the queenless hive, but preferably between the extensions where the bees usually gather. This will help the queenless hive and it will soon have a queen. If, however, there is no such super available, you can simply take a piece of a board full of young brood, including bee eggs,

Cut it out and insert it into the queenless hive. If there is not enough space in the lower box, find a suitable piece to cut out and insert or stick it in; the queenless hive will not resist violently. – However, the aforementioned union of a queenless bee colony with a good one is far superior, easier, and safer, and nothing is lost in the process. For what is lost in the number of hives is replaced by the quality of the united bee colony.

§7 How to revive bees that have become stiff and appear dead in the spring

In spring, bees are extremely eager to go out in search of food. They do so whenever they can. However, it often happens that many bees freeze in the cold winds and the still somewhat harsh air of early spring. When they return home from the fields laden with food, they remain sitting on the flight board to rest due to exhaustion, or hang themselves on the outside of the hives, or fall to the ground in front of them. They fare in many ways, like travelers and especially drunkards in great cold, who want to rest on the way and finally fall asleep without waking up again. Such bees freeze and become stiff. However, even if they appear to be completely dead, with only their tongues still in their sheaths (which is otherwise a sign of their actual death), they can be revived and restored to health, even if they have been frozen or lying in the snow for a whole night. Just as the righteous have mercy on their cattle, so does a bee keeper, but also because of the value of a bee that has survived the winter and in consideration of the benefits it provides. The frozen bees are collected in a glass, covered, and carried to a warm room, but they must not be placed on a hot stove. Immediately, they will first move their antennae and after a few minutes they will come back to life and become lively. However, they must not be left in the jar for too long, otherwise they will work themselves to death and then it will no longer be possible to revive them. As soon as they can walk on the top of the jar, they must be allowed to fly out. Take them to the apiary and let them fly away, as they will distribute themselves to their hives, or, if the sun is shining, let them fly away.

is to fly out of the window, as they will soon find their way. However, if you collect the frozen bees in the evening and there is no longer enough time or suitable weather to revive them and return them to the hives, leave them frozen in the glass until noon the next day, when they can be carried into the warmth. However, they must be left in a cool place overnight, as they will not begin to revive until the right time. Those that have been frozen for two nights will not come back to life, or at least not with enough strength to fly back to their hives. If only a few are collected in front of the apiary, they can be placed in a small box and put in a pocket or bosom, or warmed with repeated breath. In general, a true beekeeper will not let a single bee perish without necessity or cause it to come to harm.

§8 Necessary supervision during the winter season

Supervision and attention to the bees must not be completely neglected, even during the winter months. It has already been mentioned above that it is most beneficial for the bees and their internal structure to be left in the apiary throughout the winter, and that the harshest cold does not harm them if they are rich in honey and bees and if the apiaries are, as usual, protected from the north winds. In modern buildings and chambers, the wax roses mold due to a lack of fresh air; the bees are easily disturbed by vibrations or noise, consume more food, and must be enclosed, which, as will soon be shown, is also harmful to them. One should believe even less that there is any benefit in burying the beehives in the ground. Out of 10 beehives, hardly 2 or 3 will survive, and these will emerge weak and miserable due to lack of the necessary air, and will not be able to recover for a long time, if ever. The maggots and moths will take over and nest, the roses will mold and rot, and with all this great loss and danger, one will gain a few pounds of honey. Certainly! A poorly understood and dearly paid profit. During the actual cold winter months, when the bees can only be buried, they consume the least; but in early spring, they go

First, they start to consume their reserves. In 14 days, they use up more honey than they would in 5 weeks in cold weather. Let them have their winter food, which they so richly deserve. Even underground, they consume their reserves if they are lucky, although they consume less than they would above ground. For the bee is not an insect created for this purpose, like a mosquito, wasp, or the like, which spend the winter in a state of insensitivity and special sleep, or rather death, and consume nothing, their nervous spirits and concentrated juices being preserved according to the plan of the wise Creator until they become liquid again through warmth and begin to move. Even the natural instincts of bees refute the idea that they could survive the winter without food. For why do they rush to gather such rich stores for the winter, almost insatiably, if they did not need food during that time? Insects, on the other hand, which spend the winter without any perceptible life, do not gather provisions for it because they do not need them. What such insects gather in summer is only for the rearing of their young brood.
I have had various experiments carried out by bee-keeping friends, and found, first, that most of the hives are destroyed, while few survive; second, that the bees which remain alive do not consume as much as they would in the hive, because the air is of the same temperature; but that what is saved in honey is lost again, partly through mold on the wax combs and partly through the rotting of the hives; thirdly, that the buried bees did not lie in so-called hibernation, but lived normally, because I found brood that had already been capped when I dug some of them up.
I conducted another experiment with regard to hibernation, and filled an earthen vessel with bees, stunned them with boletus, covered them well, and buried them in a dry place; but in the spring, as I had already anticipated, they were dead and moldy.
One will achieve even less of one's miserly intention of saving a lot of honey by burying one's bees in the ground in the stubble. In mild weather, they will consume more than they would in the hive and will not escape the harmful effects of trapped air and many other discomforts, and will also be constantly disturbed by mice. A good colony of bees remains

healthiest and best on its stand, and a bad one is useless, whether it stands in the air or is buried.

But even on the stand, in winter, when there is snow on the ground, one should not completely block the flight hole for the bees, even if it is already covered with a perforated slide. This is not suitable in any case, and I have had the most convincing proof of this. There are sometimes very mild days in winter, which can often be called warm, when the bees fly very frequently, as if it were summer. In such weather, it is impossible to keep the bees locked up without causing them great harm. They come to the flight hole and want to get rid of their waste. If they are locked in, they either contaminate the roses and their entire dwelling, which causes an unhealthy odor and a mess that is so unpleasant and sticks hard to the wax boards that they are very reluctant to gnaw it off for a long time; or they hold back their waste, causing their own death. In addition, the bees work and gnaw at the perforated slider all day long, as long as it is warm, thereby not only causing a mist that makes the roses sweat, become moldy, and turn black, but also causing hundreds or even thousands of bees to die, working themselves to death and freezing. Therefore, allow them to fly freely, even if there is snow on the ground. It is true that bees freeze the moment they touch the snow. However, even this loss can be prevented. Firstly, when they are standing high up, the bees do not easily approach the snow. Secondly, you can lay a few bundles of straw on the snow in front of the hive, or scatter them around. But it is even better and more convenient to lay old boards on the snow, which can be easily turned over when it has snowed again, thus always covering the snow with fresh straw.

Thirdly, as mentioned briefly above, the frozen and stiff bees can be revived; and finally, if all this were not the case, I would rather lose a few bees in the snow than allow the bee hives and wax panels to become so dirty, tarnished, and moldy, and see ten times as many dead bees.

Among other things, in winter, when the weather is mild and damp, especially in very crowded hives, care must be taken to pull up all the front and unperforated sliders on the upper attachments so that the bees

can get some fresh air through the small holes in the perforated sliders, which is certainly beneficial and healthy for them and noticeably prevents them from consuming so much food, and must be more pleasant for them, as they do not come into direct contact with the air, and also allows the air from the flight hole to draw some draft, protecting the roses from mold.
However, as good and beneficial as this moderate air is for the bees in mild winter weather, it would be harmful to them if, in cold weather, one wanted to do anything else with them without extreme necessity, thereby removing the entire hive from its base board. Such a severe chill is not good for the bees, and they should not be disturbed at all in winter, especially when they are quiet. When opening the sliders, care must be taken not to bump against the hive or shake it in any other way. This causes many bees to separate from the cluster, run down to the bottom and to the outer roses, where they get stuck and freeze to death.
In severe frost, it is necessary to check frequently that the flight hole is not frozen shut. Sometimes, the droplets from the bees' flight trail cause the water to stick to the flight hole and freeze. If debris, dead bees, and snow from outside accumulate, the flight hole becomes blocked and freezes over; therefore, it is necessary to check and clear it occasionally. There is no danger of mice in these wooden hives, as they cannot find an entrance, since the flight hole is not pushed open far enough in winter for a mouse to crawl in. In beehives made of straw, there is more to fear in this respect, as sometimes a single mouse can destroy the most beautiful bee colony.

§9 On the diseases of bees

I now come to the diseases of bees. But do not expect a long list here, as I am fortunate enough not to know of any real bee diseases and find all quackery in relation to bees abhorrent. Their simple diet of the best nectar from plants and flowers protects them from disease. Only poor treatment by their owners and unclean feeding often cause them

An evil that no pharmacy can remedy. Just keep strong and populous hives and always provide them with a plentiful supply of honey, and you will remain a stranger to bee diseases and their cures, to your benefit and satisfaction. If you do something wrong to a hive, combine it with good, lively bees; that is the quickest and best remedy, which always helps. The loss of one hive will, as has often been mentioned, be replaced by the goodness of the other; and it is certainly more advisable to have a strengthened bee colony than to struggle with a weak one that will not thrive, or even to destroy it with all kinds of uncertain and often harmful remedies. I think little or nothing of all medicines for bees. The only thing I can approve of, and which I have seen have good effects, is honey mixed with a little good old wine, and especially, if available, Spanish wine. Honey itself is the bees' only universal remedy, as it is their main food. They immediately become more lively when it is given to them, and the wine also strengthens them. If you have given a suspicious bee pure honey mixed with a little good wine and it does not become lively and industrious, simply combine it with another hive. There is little cause for concern with this combination, as it is usually the hive that is weak. At least, I have never seen a strong and populous bee become sick or listless.
However, if you suspect that all your beehives may have suffered from harmful and poisonous dew, give them the aforementioned honey with wine, and they will become livelier, and at least you will not have to fear that you are giving them dangerous medicine.

§10 On dysentery and where it may come from

In the meantime, we must consider some of the diseases, some of which are alleged and some of which are real, that afflict some bees, but mostly only weak and poor bees.
The Ruhr, which I am not familiar with, is mentioned in many, if not most, books on bees and is described as a disease that can be recognized by the reddish discharge that distinguishes it from their usual, more yellowish

excrement and by the reddish impurities they drop on roses and next to the hive, since they otherwise dispose of their usual excrement outside the hive in free flight. This disease may mainly result from the confinement of the bees in winter, as their air becomes contaminated by the complete obstruction of pure fresh air, and as they either retain their waste for too long or thereby soil their dwellings and themselves, infecting them with a pungent moisture. The same evil is sometimes caused by a long period of cold weather in winter, with often no mild day in six weeks, during which the bees can clean themselves outside their hives.
Such cold winters are not conducive to beekeeping, and it is a mistake to believe that bees consume less during cold winters than during warm ones. Incidentally, the treatment of bees in severe and prolonged cold weather has been discussed above in Chapter II, §6 of the Necessary. As a remedy for dysentery, however, honey with wine and a little white sugar and a little grated nutmeg is recommended.

§11 Weakness and stiffness from cold

The weakening and stiffening of an entire beehive due to cold only occurs in those that have few bees and therefore usually little honey. If this is noticed at a time when other bees are flying, the hive must be carried into a temperate room, closed with a perforated slide, and provided with lukewarm honey mixed with wine. When the weather is mild, the hive should be returned to its place, but only when there is sufficient honey for the bees to carry into the cells, and this should be done at the right time and several times. The best thing, however, is to always try to obtain strong hives.
The main signs of this exhaustion, however, apart from hunger (which naturally makes it difficult for the body to protect itself against the cold and stay warm), are the very quiet, long, hissing buzzing sound they make when you tap the stick with your finger, followed by the poor appearance of their thin and emaciated bodies, which they slowly contract when touched, or when they slowly raise their abdomen and sting

, which they cannot hide again for a while. However, if the bees suffer from shortage and famine in summer due to persistent rain or dry north winds, etc., they first tear out all the drone brood, consume its juice, and kill all the raised and adult drones: The queen stops laying eggs, and finally even the worker bee brood in the cells is often removed, although it is unlikely that they do this with the same intention as with the drone brood, simply to get rid of them, for their love for these young bees, as their fellow bees, is too great. Rather, the young worker bees that are removed are already stale due to a lack of honey to feed on, and if they were not removed, their decay would cause the complete destruction of the hive. But one must not wait too long to feed them, and it is already high time to start killing the drones.

§12 Foulbrood, bee pest, and mad disease

When severe and affecting entire combs, foulbrood is the worst bee disease and accident. It consists of the death and fermenting decay of the sealed brood and can be recognized by the fact that the caps of the sealed pupae appear low and depressed instead of raised and domed. If this foulbrood is not frequent and is only caused by incorrect turning, as the mature worm plunges into the cell and instead of coming out with the part that is to become the head, turns it toward the bottom of the cell and therefore dies and rots in the nymph stage because it cannot come out due to its incorrect position, this is nothing to worry about and is not detrimental to the bees, as they bite out such rotten brood, carry it away, and clean the cells. Such rotten brood is often found in almost all hives, even the best ones. However, if the rot develops in the entire hive or at least in the majority of it, and specifically in the young brood that is in its proper position in the nymph stage, then the hive is doomed. This is because, when the quantity becomes excessive, the bees are unable to complete this extremely unpleasant task and are either driven by

the putrid and foul odor either driven to leave the hive altogether or perish.
This evil arises partly from the unclean and harmful honey that is given to the bees, or from what they come across and feed to the young brood, which then dies, as happens when they come across honey mixed with brewer's yeast, which many people use to kill robber bees and sometimes display publicly. partly the foulbrood comes from the young bees catching cold, either by chance when a large part of the bees are suddenly lost from the hive, for example, if it has been raided and the remaining bees have been given food so that they forget to return; or a sudden hailstorm has arisen during the bees' strongest flight, killing those in the field, which, however, does not have such a destructive effect on the larger number of bees remaining at home, unless many others have already left, so that there are not enough bees to occupy, warm, and feed the brood: Beehives become particularly depopulated when, on harsh days in spring, a few rays of sunshine are followed by cold and strong winds, which cause the bees that have flown out in search of food to freeze. This disaster may also sometimes be caused by the young brood being suffocated and killed by excessive smoking during an operation.
It is not uncommon for foulbrood to arise from spoiled flower meal when the bees use it to prepare food for their young.
There is no more effective and reliable remedy for this calamity, whatever its cause, than to drive the bees out of such a foul-brood-infected hive, unite them with a good, healthy bee colony, and then give the bees the honey found in it, which is harmless to them, unless the foulbrood was caused by unclean and harmful honey, which must be ascertained. However, this honey must not be squeezed out, as this can easily cause foulbrood, but must be placed in the roses so that the bees can select it and leave the bad part behind. This merging of a colony that has been affected by foulbrood is the only remedy to be used in this case, and neither medicine nor starvation will help; do not let anyone convince you otherwise; do not bother trying all kinds of remedies and

experiments, unless the evil comes from introduced, rotten pollen, which should be diligently cut out from time to time.
I am not aware of any historical instances of actual bee pestilence or widespread bee deaths, where entire colonies and populations of bees die out after falling to the ground with swollen abdomens!
One type of this, but not common, is said to be the so-called mad disease of bees, as they also develop a distended abdomen and fly around the ground madly, somersaulting and suddenly dying. It is mainly caused by poisoning by predators with beer yeast, etc. – If such a thing is noticed, the beekeeper who caused the poisoning must be found, identified, and ordered by the authorities to compensate for the damage, even if the bees themselves were the predators, because his use of such a harmful substance has caused great harm to many apiaries.

§13 The so-called horn disease

What is also associated with the name of the horn disease in bees is the similar shape of the tufts that grow on the bees' heads between their antennae. Initially, these tufts have only 1, 2 or 3 branches and are greenish in color, but after a few days they develop into a whole yellow tuft, on which I have often counted 48 branches, and they have the shape of a flowering bouquet. Under a magnifying glass, one can see that it is a light yellowish moisture enclosed in very subtle membranes, and the root that extends into the head has a distinct blood vessel. The yellow flower, as it can be called, and which has the complete appearance of a flower, is seed dust that attaches itself to these so-called horns when bees slip into the calyxes of the flowers. These horns or bouquets can be found from May and generally during the swarming season on various bees from the most populous hives. After St. John's Day, however, they are very rarely seen. The cause of this peculiar phenomenon is still very much unknown, and all the conjectures made so far are mostly self-contradictory. It cannot be called an actual disease. After the time of maturity, the bees throw off this

excess, together with the innermost blood vessels: they bring it between their mandibles and bite it off: but mostly they bite it off each other, and often before it is ripe. I have sometimes seen one bee tear off such a bouquet from another with great force and effort, while the affected bee patiently allowed it to happen, and in the process the inner moisture, like a very delicate hair, was drawn out a finger's length; but despite all my attention, I have never been able to discover that a bee died either from this violent surgical cure or from this growth at all, and I have not seen a single dead bee that had this tuft on its head. It is very likely that it does them no harm, because such bees are lively, fly out and gather pollen like the others, even though it may be quite uncomfortable for them.

§14 On bee lice

Just as almost all animals and insects have lice, bees are also sometimes afflicted by this pest, especially in very dry and lean summers. These reddish vermin sit on their backs like grains of millet and sometimes remain motionless for a long time, but they can also run very quickly. The bees often try very hard to get rid of them, but this is usually in vain unless they are removed by others. When the bees are bitten by these lice, they make very violent movements, which shows that it must be very painful for them.

The origin of the bee louse is still largely unknown. However, as unnoticed as it appears, it disappears just as easily. Some believe that they are wood insects that the bees bring with them from oak trees and sometimes remain attached to them; however, this opinion is highly unlikely and is refuted by their occasional reproduction in a beehive. I have also often looked for this type of louse on the bark of oak trees, especially in the rotten wood dust, which is the same color as this louse; but apart from various other species, I have not been able to discover this

insect called the bee louse. One often finds one or two of these lice on the best and most populous hives, and sometimes two or three, and even the queen is often not spared, as a bee lover brought me a queen that had seven lice on her. However, they are of no significance in populous hives and do not easily gain the upper hand there. I have never seen a strong and honey-rich bee colony that has been frequently plagued by them. But in poor and weak hives that are nearing the end of their life and soon face misery, this evil can become widespread, and then good advice is hard to come by. Who would want to combine a lice-infested beehive with a healthy one? If you want to bathe or drown such bees, many lice will indeed be removed, and the bees will come back to life within half an hour. However, since it is necessary to drive the bees out, either by smoke or by drumming them out, then revive them between two sieves after they have been bathed, and then return them to the hive, this treatment is not only difficult, but also ineffective, because many lice remain attached to the bees and revive with them. It is more advisable to revive them by feeding them honey and wine, so that they can rid themselves of the lice more easily. In general, however, one should only keep good and populous hives, and then one will have little trouble with bee diseases and other evils.

§15 On the enemies of bees

The size of the bee colony in a hive is also the best means of protection against their frequent enemies, as a strong bee colony is not significantly depleted because its losses are quickly replaced. Nevertheless, one must always keep a watchful eye on anything that could be harmful to the bees and their enemies, especially in the spring, when they are not only most numerous, but when the loss of bees is also most detrimental. Some of these enemies of bees consume them themselves and consider them a delicacy; others rob them of their honey, their only source of sustenance; others destroy their hives or their wax structures; and others do both at the same time. They are therefore called enemies of bees, not because they harm them out of genuine

aversion, but because they are mostly only overly fond of bees and their honey, thereby causing them harm and loss.

§16 Of robber bees and a very useful means of dealing with them

Among the most dangerous enemies are, first of all, robber bees, which are not a special species (*), but are usually the best bees, which sometimes appear to rob by chance, but are partly induced to do so by spilling and spilling honey, partly by untimely or careless feeding, but mostly by their own shortcomings.

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(*) The fact that robber bees sometimes look blacker than others is simply because they often hatch in and out of the honeycombs and become glossier from the honey.

However, it may well be true that bees can be turned into robbers at will, although fortunately this is very rare and there is usually another reason for robbing. However, it is very distressing to have predators attacking your apiary. Not only do they steal the honey and sometimes empty an entire hive, which is enough to destroy it, but the hive is weakened by the fighting and biting, and often the queen is killed, whereupon the robbed bees join forces with the robbers, follow them away, and even take their remaining honey with them, abandoning their former home. Once such a robber bee has finished with one hive, it usually moves on to the next one and can often destroy many hives. Bees from other apiaries often join it, and soon there is widespread robbery, which can destroy an entire apiary in a few days. For this reason, particular care must be taken to watch out for such thieves in early spring and late autumn, when there is not yet enough food for the bees in the fields, or when it is running out. They usually attack only weak and sluggish hives, because they encounter the least resistance there, especially hives without a queen, which cannot defend themselves at all because they have no queen;

Strong and lively bee colonies, however, are less vulnerable at first and defend themselves immediately, causing the robbers to abandon their attack.

Can you tell early on if there are robbers at your hive? At first, they fly up and down shyly at the entrance, looking for a way in, sometimes even venturing under the guard. If the guard gets mixed up with the robber bees, others take the chance to get in. Once a few of them are inside the hive, they are rarely pursued. They then fill themselves with honey and hurry back home. Immediately, several more of them come to the hive to be robbed, as if they had informed each other. And this really happens, as I have clearly observed and can be proven every day: if you place some honey in a container in front of the flight hole or at a distance, and a few or even a single bee comes to it, it will quickly fill itself up and immediately hurry back to its hive; but before it deposits the honey in the cell, either under the flight hole or further inside, it makes a special sound and buzzing that causes several bees to appear in an instant and finally emerge in waves to follow the message it has received.
If several robbers arrive, the battle becomes more serious. Here you can see a cluster of bees hanging on a robber bee and biting at it, and there a small group, while others continue to fly into the hive. But now it is time to avert disaster. First, narrow the flight hole so that only a few bees can come out at a time, but do not make it too narrow, depending on the size of the colony, otherwise you may frighten them. In such a narrow passage, the bees of a hive can defend themselves very easily. For this reason, during the robber season, namely in early spring and late autumn, when there is no more food in the fields, the flight hole must always be kept narrow. I have therefore cut a small square piece out of the outer metal slide of my magazines as described above, so as to avoid the trouble of blocking it with stones and to have everything conveniently arranged (*)..

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(*) Two open flight holes on a beehive are fundamentally useless for this reason, and give the robber bees an advantage. This is because the bees mainly defend and besiege only the lowest flight hole, and even if they want to ward off the invading robber bees at the middle flight hole at the same time, they cannot overcome the latter, which dare to attack now below, now above, and always manage to get through in numbers.

In the evening, the hive that has been attacked by the robbers is closed, and the perforated slider is pushed forward. Once the bee colony is strong, several air vents can be opened at the top the next day to allow sufficient air to enter, which is all the more necessary the warmer the weather is. The following morning, the robbers will return early (*), and one must not get rid of them immediately, because one does not know whether they are from one's own bee colony.

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(*) It is quite extraordinary how eager bees are for honey, and how particularly eager a robber bee is for its prey. It is hardly daylight yet, and she is not afraid of the morning chill, returning again and flying back and forth even as night falls. That is why a honey-rich hive can be emptied of its nectar in two days by such bees. Once they have successfully entered and exited, they no longer fear danger, nor the stings or teeth of the guards, and display true lion-like courage. The guards are soon reinforced, but once the bees are overwhelmed, they become discouraged and no longer defend themselves, allowing the robber bees to enter and exit unhindered, and finally, when all hope is lost, they go with them.

The first thing to do when different robber bees have gathered in front of the closed flight hole of the hive is to sprinkle them with crushed white chalk or ash (*), as this makes it easy to see which direction they are flying in and which hive they belong to. If you see that the robber bees are from your own hive, you move the hive that is being robbed and place it in the furthest place from the apiary, or in a remote and suitable place in the garden. This change not only causes the bees

They need several days to learn their new flight and cannot leave the hive, so they forget about robbing, and the problem is successfully prevented. This colony of bees is also weakened somewhat, so that it loses the courage to rob. For those bees that do not immediately notice the change and either fly into the field or return to the hive they were robbing, cannot find their home and either go to the neighboring hives where they were before or to the hive they wanted to rob. It happened to me once before Easter that one of my very best hives, which still had at least three measures of honey in reserve, took it into its head, without the slightest provocation, to rob its nearest neighbor, which was in no way inferior to it in terms of population or honey.

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(*) Sprinkling the bees with flour is not a good idea, because even if only a little gets into the cells, the flour makes the honey sour, and all flour must be kept away from the beehives.

I proceeded as described above, sprinkled the robber with crushed chalk to identify him, and moved him ten steps away to another bench, where he stopped robbing, and both this hive and the other one he wanted to rob did exceptionally well that year.

However, if the robber bee is not from your own apiary, you should follow it, if possible, or investigate in front of the other hives, if there are not too many in the area, to find out who it belongs to. If it can be found, the best remedy is to buy the robber from its owner and immediately place it on its hive in the place of the robbed one, and the robbed one on the hive in the place of the robber. Then the robbing will soon come to an end, and at the same time the robbed one will be helped by many bees. For those bees that flew out to steal will fly back to their old place, join the one who was robbed, and stay with him and strengthen him.

However, if the owner of the robber does not want to agree to a reasonable settlement and does not want to sell his hive, he must remove it or move it to another village an hour away, which the authorities in all places are obliged to enforce. If this does not happen, or if the robber bees cannot be found

and there is a danger of losing his entire apiary, I will here reveal the most advisable means of ridding oneself of the robbers, (*) which is not contrary to the love of one's neighbor. One obtains white hellebore from the pharmacy for 2 kr., crushes it finely, and mixes it with diluted honey.

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(*) It is very useful, when there are signs that robbers are approaching, to make your bees, and especially the hive that is to be attacked, courageous so that they defend themselves bravely. This is done by giving them some pure honey mixed with good wine in the evening, or, if this is not available, with a little brandy. This food makes them very bold, strong, and alert, so that they defend themselves fiercely.
It is also effective against robbers if the attacked hive is covered with a cloth, but the cloth is raised slightly in front of the flight hole so that the bees can fly in and out. This modified shape of the beehive confuses the robber bees somewhat. However, it does not work for long. It is also useful to cover the straight entrance to the flight hole and make a blind in front of it by drilling a piece of wood at an angle and attaching or gluing a stiff piece of paper in the shape of an arch in front of the entrance.
However, if this helps only occasionally, the robbers will move on to neighboring hives, and one will always have to keep trying until one finally finds the shortest way to make them forget about robbing altogether.

All beehives on the stand must be closed with the air baffle when placing the mixed honey for the robbers. (*)

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(*) It is important to remember to remove the mixed honey before evening and then allow the bees to fly out for another hour. This can often be done earlier, as the robbers usually arrive around midday in the warm sunshine and join forces at that time. This is because being locked in during sunshine makes the bees very anxious and they long for fresh air like fish long for water. In the process, some of them often work themselves to death at the lower flight hole.

at the lower flight hole. However, this minor inconvenience must be preferred to the greater evil.

However, to prevent other bees from being attracted by the mixed honey on display and being killed by the robbers, the contested hive is temporarily moved to another location and replaced with a similar empty hive, with the mixed honey placed under the empty hive. As soon as the robber bees taste it, they become stunned and can no longer fly out of the bee garden, usually remaining in front of the hive. This departure weakens the colony of robber bees to such an extent that they cease to rob, and yet the owner's colony is not completely ruined, nor is the honey in the hive spoiled. However, this is achieved by mixing the honey with beer yeast (*), which people usually put out for the robber bees to kill them. For they bring this honey home, carry it into the cells, and not only die themselves, but also the other bees in the hive that eat it, and all the honey in it ferments, so that the entire colony of bees, together with the honey, is destroyed. And even more irresponsible are those who leave this honey mixed with yeast uncovered and freely accessible, thereby attracting other bees that are not intent on robbing, and thus easily destroying many hives. This is extremely imprudent, and the former is also too harsh and a violation of the love of one's neighbor, especially since it is rarely his fault that his bees go raiding, and it is often the best bee colony that goes astray in order to enrich its home.

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(*) I will not even mention the mixing of fly stone, poison, aqua regia, and the like, which could cause the greatest harm to humans when the honey is consumed, and which no one would resort to as a terrible measure.

For the most part, however, robber bees arise through the negligence of others, and the owner cannot be blamed if his neighbor is so careless with honey.

avoid attracting bees for robbing. Therefore, do not leave honey or honey-coated vessels open and close to the apiary, but at least, if you must do so, at a considerable distance where they will find it soon enough. Do not keep weak hives, which are of no use anyway, but combine them with good hives, the advantages of which I cannot praise highly enough. In spring and autumn, do not leave your bees with overly large flight holes, and certainly do not leave them with two flight holes, as the upper one is useless and encourages robbing. Check diligently to see if a board or plank has been thrown down or if there is any other unguarded opening in the hive. Never leave a feeding trough or anything that smells of honey or is smeared with it under or near the hives. Do not leave the bees with an empty base from below, leaving a lot of empty space during the robber season.

However, if one notices that one has a robber among one's own bees who is engaged in this forbidden craft, a righteous beekeeper will take no pleasure in it, but will dissuade him, and if this does not help, have him taken to an acquaintance in another village for a while, but conscientiously compensate the neighbor for any damage suffered.

However, the surest way to recognize that you have robber bees that steal themselves is when many bees fly in and out quickly and with a singing sound in the evening, when others are already sitting quietly. But one must not mistake them for foreign bees that have been taken from another hive. This can be recognized both during the day by their biting and defending behavior, and especially late in the evening when many of them fly out and do not return, for these are robbers who have gathered their spoils and are returning home. Many of them stay overnight in the attacked hive and only return home early in the morning. However, it is not only reasonable not to keep robber bees knowingly, but caution also requires this, as other hives can easily join in and rob them, and eventually rob each other.

Robber bees also include nectar thieves, bees from foreign hives that come alone and sneak into this hive or that, wherever they can, to steal nectar and fill their stomachs. They fly

around everywhere, very timidly, until they can sneak into a flight hole somewhere. Although these nectar stealers do not cause any considerable damage, they are nevertheless true scoundrels among the bee colony, for they lie in wait especially for the bees returning home laden with honey. These often rest at the apiary for one or two minutes before flying to the flight hole and laying down their burden. If a forager encounters such a honey-laden bee some distance away from its comrades, either on the ground near the apiary or on the flight board, it attacks it, drags it around and gnaws at it until it sticks out its tongue and gives the honey from its stomach to the predatory forager. Only then does it let go of her and fly away.

§17 Of the moths or maggots of night butterflies

Other very harmful and dangerous enemies of bees are commonly known as moths or maggots. These are nothing more than a type of smooth, white, sometimes blackish caterpillars with brown heads, which emerge from the eggs of certain moths that are white and gray in color with slightly thick bodies, and are the larvae of these moths. These moths are more common in some areas and in some locations of apiaries than in others, and also more common in some years than in others. They are sometimes found sitting very still during the day in covered places of a beehive, but at night they fly and, when it is time to lay their eggs, they boldly fly into the flight hole, often even through the strongest bee guard; partly because they are very slippery and smooth, partly because of the dust on their wings and bodies, which makes them difficult for the bees to catch. They then settle in the hive, either in corners and crevices, or hang themselves on empty wax combs that are not occupied by bees, and often lay their eggs there. (*) These eggs are incubated by the warmth of the hive and the caterpillars grow until the twelfth day. They feed on debris and wax waste, and also on honey if they can get it, but then they begin to become really harmful to the bees by gnawing through the wax panels, hollowing them out, spinning themselves in, and turning into pupae. In this state, the bees can do little to them

can do little harm to them and cannot reach them because of the web. They even pull this web so that when it becomes excessive, they leave it behind and often leave behind the most beautiful stores of honey, which happens frequently with straw baskets, but rarely with wooden magazines, even if they were not very populous.

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(*) I found such cocooned caterpillars and maggots in empty roses that I had cut out and wrapped in paper for six months, which had previously appeared to be completely clean. These had undoubtedly been produced by moths that had been inside the roses and had crawled out. This convinced me that they lay their eggs in the cells themselves. but in the absence of such an opportunity and in densely populated hives, they also lay them in the cracks of the beehives, and even in straw baskets, if they cannot do otherwise, they lay them on the outside between the straw rings, where the worms that emerge from them eat their way through the straw and into the inside of the basket.

They remain as pupae only until spring, if they are laid very late in the fall; but in summer they transform in a few weeks, when this species of moths emerges again and lays many eggs.

You can see very quickly whether there are maggots in the sticks by the black waste they frequently drop, which looks like the excrement of silkworms and is very recognizable. This disaster only affects weak sticks, which the lower roses cannot besiege for long, and which, due to the small number of bees, do not find these caterpillars or maggots in time and drag them out of the hive, and are often overlooked by negligent bee owners when sweeping and cleaning, or rather when placing fresh flight boards underneath. Strong hives, however, do not tolerate a single caterpillar and cannot easily allow their eggs, from which they hatch, to be laid in the bee cells. Indeed, if such a caterpillar has hidden itself in a crack in a strong hive, or between the edge of the glass pane, if it does not fit exactly and the bees cannot reach it,

several bees stand guard, often for a whole day without moving from their spot, until it comes out and they can catch it and drag it out to the flight hole, which they do with obvious anger and fury.

If one wishes to avoid the aforementioned accident, it is empty consolation and a futile effort, as suggested by some books on beekeeping, to place lights burning in front of the apiary for several nights so that the moths fly into them and burn themselves. Who would make beekeeping so difficult for themselves that they would spend whole nights sleepless? Moreover, such a measure is not actually directed against the moths, which mostly lay their eggs on the bees and are therefore called moths or large harmful caterpillars, but against very small white moths, called light flies (Lampyridae), which are a kind of small cockroaches or moth butterflies and do no harm to the bees, but only cause a lot of trouble for the guards at nightfall until around midnight by repelling them with a singing sound and pushing them away from the flight board. However, if you want to be sure of avoiding the harm caused by moths or maggots, keep your hives well populated and do not be stingy with your bees at the wrong time of year or when the bee season is poor. However, a stick that has already been spun by moths cannot be helped by cutting it out, which is difficult and tedious anyway, but it is best to join it to a good stick or drive it out in the manner shown above.

§18 Earwigs

A somewhat similar, but less common enemy found in some apiaries is the earwig, which lays its brood, which also causes some spinning, in the cracks and debris of the hives, and which finds its food in the wax. It is therefore necessary to keep the hives and cracks well sealed from the outside and to check them diligently.

§19 Birds that are harmful to bees

Bees have many enemies among birds, as they are a delicacy for all those that feed on insects. Some are able to catch them more quickly and skillfully, namely those that feed exclusively on insects; others, however, that also feed on fruit, such as sparrows, are not as adept at catching bees. Many are snatched away in the fields and from flowers, and often even more at the apiary if such bee thieves are harbored. Among these are mainly swallows. They cause the greatest damage to bees in rainy weather, as they always fly around in the lower air and around houses, catching mosquitoes and bees. For this reason, none of their nests should be tolerated on neighboring houses or in stables near the apiary, but they should be destroyed as much as possible.

Even worse are redstarts and wagtails, the latter of which include a species that nests near dwellings and in cracks and walls. All of these are professional bee thieves. The former sit boldly in front of the apiary, returning every few moments to feed their young with bees, if they can catch them undisturbed. The wagtails are also very skilled at catching bees at dung heaps and puddles. These birds cause the most damage until May, especially in rainy weather, but afterwards, when the weather is warm, they lead their young into the fields, where they find a plentiful supply of food in various kinds of insects. Nevertheless, their nests must be destroyed as much as possible. The best thing to do, however, is to shoot them with a bird gun wherever possible and permitted.

The sparrow is often a rather insolent visitor to beehives. Sparrows not only encounter the young drones and bee worms in front of the hives, which one would gladly allow them to eat, but they also catch the flying bees, even sitting fearlessly in front of the flight holes and eating their fill of bees, feeding all their young with them, so that sometimes a beehive where they take their flight is so depopulated that it perishes if measures are not taken in time. It has been observed that two sparrows need 3,360 caterpillars in a week to feed their young. If such a pair now comes across a beehive and feeds its young with the sweet honey flies (as they

they like to do, especially in rainy and cool weather, when other insects are not very visible), it is easy to calculate that a single pair of sparrows could destroy and depopulate an entire bee colony in two weeks; I have often made similar observations, especially with beehives that are located in barns or under the roof, since this bird usually sticks to *a* beehive once it has taken flight, and that is closest to its nest. They are very careful because of the sting. They first crush the bee with their hard beak, lay it down again and check to see if it is dead, and then swallow it. They are not easily driven away by scaring, throwing, or using string or paper, but return quickly. They cause particular damage to beehives in spring when the weather is cold and harsh, as they cannot find any other insects and there is no fruit in the fields. However, they often continue their troublesome work for a long time once they have become accustomed to flying to the beehive. A handful of shot is the best way to rid the beehive of such harmful visitors. If shooting is not possible, they must be caught with a kind of cage or with snares or loops made of horsehair, or a bell must be placed in front of the apiary and rung frequently when they arrive, which will scare them away at first. Their nests in the vicinity of the apiary must be destroyed as much as possible.

The tit, which is dangerous to bees in some gardens in autumn and winter and pecks at the flight board in front of the beehives until the bees come out, can easily be caught with tit boxes containing nut kernels, pumpkin seeds, suet, or mealworms. However, the best way to deal with birds that catch bees in the fields is to keep strong and populous beehives, which do not suffer any losses and are replaced abundantly and superfluously by the brood that emerges daily. Among these birds that are harmful to bees, I must also mention the stork, which one would not think such a large and otherwise harmless bird would take pleasure in catching the small bees. But just watch it as it walks slowly through the grass, snatching the poor bees from the flowers as they busily gather nectar, now on the right, now on the left.

. Such birds and others like them that are harmful to bees may be killed without any superstitious qualms.
The woodpecker is mainly dangerous to beehives in woodlands. Not only does it stick its long tongue into the flight holes and pull out as many bees as it can, but it also pecks holes in the beehive if it is made of straw, thus destroying an entire colony.

§20 Spiders

Apart from birds, spiders also cause bees considerable damage with their webs, which they spin mainly to catch flies and mosquitoes, but in which many bees also perish; and when the spider has grown large enough to overcome the bees, it catches them too.
At least, the sharp claws and hairy body of the bee easily become entangled in a spider's web, and it dies a miserable death. It is therefore necessary to check the hives diligently, especially in spring, and to sweep away the spider webs, but also to seek out and kill the spiders themselves, which are easiest to find in the evening.

§21 About ants and how to keep them away

Finally, there are a few minor enemies of bees which, although they do not cause them much harm, often frighten them greatly and must therefore be kept under close watch. These include garden ants, which not only prey on dead bees and, in particular, the young brood, but also attack the honey and sometimes severely damage weak hives. This happens most often in May. When May is over, the ants disappear from the beehives. They like to crawl in at the bottom edge if it is not well coated. They flee from hives with large populations. Bees cannot stand ants at all; they do not easily grab them with their teeth, but drive them away by flapping their wings. It is not enough to seek out their nests and piles and kill them and their eggs with boiling water, as they are not found in gardens anyway.

Not only is it very useful, but it is also a very good way of keeping them away from the apiary if you coat strong strings with dead or already smelly fish and tie them around the posts of the apiary. This is because ants cannot stand dead fish, and if you place them in their piles, they will scatter and be driven away. They also do not like to walk on dry ash, and it does no harm to sprinkle it on the ground around the posts. Coating the posts with ship's tar or cart grease also works well; the ants cannot walk on it and get stuck. However, a stiff piece of paper must be tied over the circles so that no bees get stuck to them, and the coating must be repeated after three or four days because the tar dries out in warm weather.

The light flies mentioned earlier, which often gather in front of the flight holes in the evening and at nightfall on sultry summer days, are of no significance and only give the guards something to do in driving them away.

The frog, the toad, and the lizard are also lovers of bees, when they can snatch them away; but they are not considered because they not only catch a few, but also because a good bee keeper will not tolerate grass in front of his apiary, or will keep it low so that such vermin cannot stay there, and for this reason one should not place one's beehives too low.

More dangerous in June, July, and August are wasps, especially hornets, which often cause great harm to bees, particularly in woodlands, snatching them from the apiary like highway robbers or taking them from the flight hole and eating them down to their wings and feet. There is nothing one can do against such bee killers except watch them from time to time and kill them, destroying their nests with boiling water or fire if one can find them. The small wasps, however, which are only after the honey, can be caught with an ordinary bottle with a long neck, if you fill it halfway with beer sweetened with a little honey and sugar, or with honey water, and place it on the beehive, as they crawl in and drown, but the bees do not go in. If you pour

the drowned wasps out of the bottle, they must be crushed, otherwise they will dry out in the sunshine and come back to life.
Mice are only dangerous to straw baskets in winter, and apart from the woods, there is nothing to fear from weasels, martens, and similar animals that love honey and chase after it.
In many areas, dormice also cause great damage to beehives in gardens, and must be caught with traps or otherwise deterred.

§22 Harmful coincidences for bees, with regard to the weather

In addition to their many enemies, bees are subject to various adverse weather conditions. Fog spoils the flowers, so that they can collect little or no honey, unless a hot day follows, when the heat of the sun causes honeydew to form.
Prolonged drought and dry weather are also detrimental to flowers and honeydew. The flowers lose their sap and honey, and if the air is not occasionally warm and humid, there is no honeydew.
Prolonged north winds cause just this. The flowers dry out; there can be no dew, and honeydew is out of the question.
In general, strong winds quickly dry up the honey juice and pollen so that it cannot be collected by the bees and cause the flowers to wilt.
Driving rain or heavy rain driven by wind damage the flowers and kill the bees if they are caught in the field, unless warm sunshine returns before nightfall and they can revive.
The weather, when there are frequent thunderstorms, is the best time for bees to make honey. This is because the air is warm and humid, which causes the sap of the flowers to flow most freely and honey to be produced, as can be seen when there are thunderstorms or when the bees fly out after a thunderstorm. (*)
However, since lightning itself causes harmful fermentation in the blossoms of fruit trees during the flowering season, often spoiling them in a matter of hours so that they look like brown, burnt stumps, this spoilage of apple blossoms is detrimental to bees in terms of their food supply at this time of year, when

region where the main food source for bees in spring is apple blossom. Lightning does not have this harmful effect on many other flowers. Pear blossom does not suffer as much, and stone fruit blossom even less.

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(*) I have always noticed that this is the best weather for bees, and that they gather the most when the barometer is low and the weather is fine, for example when the barometer is variable or about to rain, but it is still warm and sunny. This is because the warm air contains vapors and moisture, and the honeydew in the flowers is abundant and flows freely. Likewise, a desirable time for bees is when there is occasional warm rain and the sun shines again soon afterwards, but especially when there are glimpses of sunshine during the rain: for then it rains honey upon them, as it were.

Warm, wet winters are just as bad for bees as cool summers, because in the former they easily get mold in the roses, and in the latter there is rarely any honeydew. As for warm winters, most beekeepers believe that bees consume the most during these, and the least during cold winters. However, this is incorrect and in fact the opposite is true. With regard to their winter consumption, it is mainly important that winter does not last long into spring, but that the bees can find something to feed on in good time, fly out and bring it back to the hive; for they consume most at the end of winter, when they need much more than usual because of the brood they have already started.
Cold nights in summer are not good for bees, because they make the flowers useless to them, and without warmth little honey is produced, so there is inevitably a shortage of wax. Indeed, without very warm weather, bees cannot build, nor can they excrete wax or process it.

§23 On bee stings, their nature, prevention, and a proven remedy

I must also mention something about bee stings, their nature, prevention, and treatment. Such a terrible thing is the bee sting

Although this is the most common type of tumor, it is not so frequent that one needs to fear it as much as some people do, and therefore dislike bees and beekeeping. One just needs to be a little careful around them and observe a few things. Bees do not sting outside the area where their home and their mother colony are located. If a bee enters a room and lands on a person's face or hand, they will certainly not be stung unless the bee is squashed. If you chase a bee away from one flower to another, it will sting you no more than bees disturb each other during their work and gathering, even if completely foreign bees come to the same flower. Bees are not malicious by nature. They usually sting only near the hive, out of concern that someone will come too close to their queen or endanger their food supply or their colony. However, their sting can easily be avoided by taking various precautions. For example, one should not stand in front of the entrance to the hive so as not to disturb their flight. However, they do not sting because of this obstacle, as they adjust their flight accordingly, but because it seems suspicious to them and you immediately catch the eye of the guard. You can stand safely next to and especially behind the bee hives. Furthermore, you should not approach them immediately if you are sweating heavily, and especially not with your skin exposed. They cannot stand sweat on humans. One must also be courageous with bees, but always handle them gently. If, for example, one wants to remove a bee from the cluster at the flight hole with one's fingers, one must grab it courageously, but not move too quickly or pull one's hand back. Even if a bee is buzzing around your head, you must not pull your head back quickly, but very gently, and if you see that it is flying up and down your face in warning, hold both hands in front of your face and gradually move away if the bee does not want to leave. If you try to chase it away and swat at it, you can be sure you will be stung. The only time there is no time to lose in moving away is when it is coming at you like an arrow or has already landed on a covered part of your body.
If you are being pursued by one or more bees, stick your head in a green bush or shrub if you cannot escape quickly, as the pursuing bees will soon leave you alone. If a bee gets into your hair, where it can easily become entangled and thus irritated and enraged, you must

Leave the apiary immediately, because their angry buzzing will attract other bees. If there are other people around, they can quickly make room for you so that you can leave. However, if you are alone, you must keep your distance and let the bee help itself; it will not easily land on your skin, but will fly away. A loaded bee will not sting; it is only concerned with bringing in its prey, and there is nothing to fear from such bees. If the weather is not very warm, or if the bees have flown a long way from the field, they will rest a little at the apiary or on the flight board before landing or emptying themselves. They will often land on your face or hands. But even if there are half a dozen of them sitting on your face or eyes, you need not worry about being stung. They will sit there very still for about two minutes, catch their breath for a while, and then fly away again. Therefore, remain completely calm or gently move away from the apiary until they take off again. Only at midday in intense heat, especially when there has been honeydew, are they most dangerous and must be approached with great caution at such times. However, if you do receive a bee sting, retreat immediately if you do not want to be stung again, as the other bees will immediately detect the sour smell of the torn venom sac and come to you.

The bees that are visited frequently become much tamer and do not sting as readily as those that are high up and rarely approached, or those that are not visited as often. These attentive little creatures learn to recognize their masters, who can take much more liberty with them than a stranger.

If you have something to do with them, you just have to be very bold with them. They immediately notice that you are not afraid of them and become tame. But as soon as you flee from them, you cannot do anything with them unarmed, or show yourself to them. It is particularly good, if one has something complicated to do with them, to take them away from their hives and then deal with them quite boldly. They immediately realize that they have lost and do not try to sting, especially if they have been given a whiff of smoke

. However, you must always approach them from behind; therefore, locations where there is no passageway and sufficient space behind the beehives are not suitable.

Some people find them more dangerous than others. Some cannot tolerate them at all, which probably stems from the same difference in body odor that distinguishes us from them: just as bees cannot stand the smell of dogs and cats and immediately show these animals the way back when they come near the hive. However, the sting of bees is also more effective and painful for some people than for others, which is due to the nature and composition of their blood. In some people, it does not swell at all, in others it swells a little, and in others it swells a lot, and sometimes bright blisters full of yellowish water appear on the sting and the area around it, which are very similar to the blisters caused by Spanish fly plaster and are almost identical. The sting itself is also sometimes worse and more poisonous than at other times. It is worse than at other times when the bee has been very angry, or when it is very hot, or when there has been honeydew. Usually, the swelling then increases for 48 hours and, until it disperses, falls and disappears completely, sometimes taking up to four days. However, it has no harmful effects on health afterwards. However, it could be life-threatening to be stung inside the mouth near the throat: for this reason, an assistant should not keep their mouth open when shaking and catching a swarm from a tree, as people who have not been educated sometimes have this habit and open their eyes and mouth at the same time when looking up. One must also be careful not to let children with bread spread with honey walk around in the bee garden or near the apiary. Incidentally, a bee sting is not such a bad thing that one should make such a fuss about it, as some very sensitive and fearful people do. The pain is very sharp and intense, but it is very brief and lasts only a few moments. The most annoying thing, however, is the swelling, which, because the sting usually occurs on the face, disfigures the person considerably and confines them to their home for a few days. However, this swelling can be prevented or at least reduced within a few hours. It is futile to look for

the bee books mention a general remedy for bee stings. For neither vinegar, nor fresh earth, nor parsley, nor crushed bees, nor scorpion oil [?] and the like prevent the swelling if the sting and the nature of the body are such. However, I have found a remedy that has always helped me and, even if swelling was already present before use, immediately dispelled it. This consists of ordinary Eau de Levante [lavender spirit, as explained later]. The better it is, the better it works. Moisten a small piece of linen cloth folded four times with it and apply it to the affected area. If the cloth becomes dry, repeat the process, moistening it again thoroughly. As soon as it begins to burn a little on the skin, any swelling that has already developed will disappear and be dispersed. I have found sal ammoniac, which is prepared with quicklime [unslaked lime] and is also praised for bee stings, to be far less effective than lavender spirit. However, I cannot guarantee that it will help everyone, as people's bodily fluids vary greatly. Some people are helped by *Spiritus alcali volafilis*, others by *Spiritus falis ammoniaci dulcis* mixed with a third of water and shaken well; others by sweetened sal ammoniac, *Spiritus nitri dulcis;* and others by linseed oil alone.

Take great care to ensure that no beehive is accidentally knocked over, as this could cause great harm and misfortune to humans and livestock. In such a case, the overturned beehive must be immediately returned to its previous position and the angry bees must be offered some honey to appease them. Any animal attacked by bees must be led into a dark stable with a single opening to the outside, where the bees will find their way back and leave the animal alone. The animal can be moved more quickly if it is heavily fumigated and if there is time to do so. But if a person happens to be involved in such an accident and cannot escape quickly enough, he should lie flat on the ground with his face down and remain still until help arrives or the bees leave; he should also use his handkerchief to cover the uncovered parts of his face as well as possible.

How wise and good it is, by the way, that the Creator has arranged that bees do not sting outside their district and near their dwellings! Would we not have to exterminate them instead of caring for them and tending them in order to benefit from them, if we were not safe from their sting anywhere? What worker in the field would be able to survive, and how badly would the cattle in the meadows and pastures suffer? == And behold, everything was well done.

Chapter Six - On the Harvest of Honey and Wax

§1 Of the bees' collection of honey from flowers

The main purpose of beekeeping is to obtain honey and wax. In some years, bees bring us honey in very abundant quantities, depending on the weather and the area where the apiary is located, which is more or less rich in flowers and plants that are beneficial to bees. For honey is produced either from flowers or from honeydew.

Almost all flowers, some more than others, have a sweet juice at the bottom of the calyx, which is called the nectary. This juice is most abundant in the flower when it begins to bloom. For at that time it is at the height of its perfection, and the juice has been digested and purified in its filtering tubes by the sun and air. From then on, it gradually begins to decline. The plant juice, which is very fluid, is consumed again by the air, and even more so by the wind, all the more so as the flower is no longer closed. That is why the north winds, which are the most drying, are very detrimental to honey and bees, and most of the bad years, which are not frequent, are caused more by the north winds than by the heavy rain. For the north winds not only prevent honeydew, but also consume the juices of the flowers very quickly and prevent the night dew from refreshing the flowers, so that the sweet juice that should enter their calyxes remains in the pith of the tubes. They also cause the flowers themselves to wither before their time.

Because the sweet flower nectar is liquid, like water, it can be quickly lapped up by the bees and easily transported to their honey sacs. There, they transform it into healthy honey. They then feed it to their young, or use it to feed the queen, or use it to feed the bees working at home, which also often feed the queen, in their cells, still very liquid but slightly thicker than before, which they then regurgitate, as it is then solidified by the bees' saliva and becomes honey.

young bees or the bees working at home, and often also to feed the queen, back into their cells. It is still very liquid, but somewhat thicker than before. Through gradual evaporation and the warmth of the bees, it soon becomes denser and, especially when it is a year or more old, completely hard and sugary. But then the bees can no longer enjoy it, and because of the lack of liquid, they cannot lick or suck it up and bring it into their stomachs for digestion, but they must die of hunger, no matter how much of this sugary honey there is, if they do not have liquid honey. But in order to prevent this thickening and saccharification of the honey in the cells for as long as possible, the wise Creator has given these little creatures the instinct and placed it in nature that they cover the honey storage cells with a wax lid so that the heat in the hive does not immediately remove the watery moisture in the honey and cause it to thicken, but remains liquid and edible for as long as possible. However, the honey gradually thickens so that it initially forms white grains that are dry inside and resemble white sugar, but eventually the slightly liquid honey surrounding them also turns into grains and, over time, becomes hard sugar. However, if the honey has been left out and has become hard and sugary in dishes (which is proof of its purity and quality), it can always be made liquid again for a while by simply placing it in the warmth or melting it over a fire.

In the case of bees, I have often observed an admirable precaution they take with regard to the sugary or grainy honey that remains in their wax combs from year to year. When there is plenty of honey for them to eat, they bite open the cells containing old sugary honey from the previous year, carry the liquid honey they need to other cells, throw out the sugar grains, and then gradually fill the emptied cells again with fresh liquid honey. It is remarkable how they immediately set about this task with unanimous agreement. I have sometimes seen hundreds of them gnawing at such a year-old honeycomb and emptying the cells. I could not immediately understand why they were doing this. I saw that they were not robbers, but bees from the hive. I saw that they were not doing this out of necessity or hunger, because they had a lot of open cells filled with liquid honey; until finally, to my amazement, I discovered their clever intention and

was convinced of it. They carry out such tasks at a convenient time, when they cannot work much in the field, towards evening or at night, when it is raining, etc.

§2 Of the different types of honey

The honey (*) that bees collect from flowers is indeed the most delicate, tasty, and best, especially that collected from linden blossoms; however, at least in areas where there are no heaths, it does not usually provide the abundance that bees gather in most years.

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(*) There is a noticeable difference between honey collected from all kinds of flowers and that collected from heaths. Even the tame heaths, or buckwheat, give a dark, brownish honey, while wild heaths produce an even browner honey with a pungent, fiery taste. But honey collected from other flowers is a beautiful yellow color, delicate and exceptionally pleasant in taste, and one can often recognize the different types of flowers from which it was collected in the taste. In some years, when it is left out, it looks completely white, but if you want to give it a golden yellow color, you should only let it melt in a pot over moderate heat. However, the white honey is preferred in pharmacies, and its color is usually also proof that it has been collected from fine flowers, whereby the taste is the main deciding factor. This is because the delicacy of honey depends on the spiciness of the plants from which the bees collect it.

It is therefore indisputable that the Narbonese honey, which pharmacists sell at high prices, is the most delicate and sweetest, because the bees collect it only from the wild rosemary and its flowers that grow there. For this honey retains much of the characteristics, at least the scent, of the flowers from which it is extracted. If, for example, one wishes to collect excellent honey in areas where there are many lime trees, one should either take the top box of honey from the young swarms of bees that frequently swarm during this flowering season when the lime trees are in bloom, or place an old, populous bee on top of an empty box, or place several of the aforementioned [above-described]

jars, and in good weather they will fill them with this noble honey. This is what I usually do here when the chestnut forest is in bloom around St. John's Day, when a very delicate and pleasant honey can also be collected. Virgin honey is the name given to honey that is allowed to run out of the uppermost white, freshly built, and purest panels or slices, in which there is no pollen, no young bees have been produced in the cells, and the wax structures have not been browned by the long, persistent swarming of bees. However, with this pure, so-called virgin honey, it is important to know from which flowers, which are more or less spicy, it has been collected.

They get their most abundant honey harvest from honeydew. This honeydew is of two kinds. One is known as honeydew, which seems to fall on the leaves of various trees, flowers, and plants, which is why Pliny calls honey the sweat of heaven and a juice that purifies the air; and the other comes from aphids.

§3 Of the honeydew that seems to fall from the air and exudes from leaves, flowers, and plants

The first type seems to fall from the air on warm days, not only when it is very hot, but only when the air is warm and humid, most frequently in May and June, and very easily when a warm rain is falling and the sun is shining beneath it; but most of all when there is high smoke, a subtle mist in the air that resembles smoke and consists of the finest vapors that descend from the higher regions of the air and always indicate fine weather. This refined mist condenses the plant sap so that it can no longer circulate properly and pass through the filter tubes. It therefore emerges through the stomata of the leaves as a sweet sap, especially when the warm rays of the sun drive the sap and cause it to ferment. This is exactly what happens when a fog rises in the morning in summer and the sun shines warmly on it, almost always resulting in honeydew. The moist, cool fog also condenses the sweet and thicker juices in the flowers, leaves, and plants, and the

the sun's heat falling on them causes them to ferment so intensely that they sweat (*).

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(*) It seems, and most people believe, that honeydew really falls from flowers or from the top of leaves. This is especially true when clouds cause an increase in heat by refracting the sun's rays toward the earth. Ordinary heat causes only the most volatile juices to evaporate from plants and flowers, whereas higher temperatures squeeze out the thicker and more viscous juices, which include this honeydew. In some plants, it often pours into the pith, as in sugar cane and Turkish kort, or into the flesh of fleshy fruits, whose juice, when ripe, is sweeter the more this honey juice is inhibited or developed by other causes. In this way, manna springs from ash and maple trees in Calabria and Briançon. As long as there is air, like a mist or subtle rain, and only certain species of trees and plants attract it. But it is nothing more than a sweating or evaporation of the sweet sap. Abbot Boisier describes the phenomenon in the Journal de Savants of July 1773 as follows: When the honey-like sap has circulated with the other plant sap in the remaining parts of certain plants, it separates from it and sweats, completely prepared, either flowing down from below in liquid form, often dripping from the leaves and trunk of these trees; but if it becomes thick, it takes on the coagulated form in which it is commonly consumed.

If honeydew fell from the air like a gentle rain, it would have to spread indiscriminately over all kinds of bodies, and not just certain plants, and even only certain parts of them, as we can see that it does not fall on stones, wood, or all kinds of trees and plants. And again, honeydew is often found on grape leaves, on the leaves of young shoots of plum trees, etc., which are grown against houses and partly covered by the roof, so that such leaves cannot be touched by rain. If honeydew did not exude, but only fell from the air, none could be found on such covered leaves.

Sometimes honeydew appears as early as April, and especially during the tree blossoming season, but this is detrimental to the fruit. I have also observed that it has appeared as late as September, when the nights were warm and the weather mild. It is often so thick that the honey drips from the leaves.

With such honeydew, 25 bee colonies can easily collect 100 measures or 500 pounds of honey within 8 days, unless heavy rain immediately washes the honeydew away. The bees are then so extraordinarily industrious that they not only fly out at daybreak and continue gathering until nightfall, but also go out in greater numbers than usual for this harvest. For whereas usually two-thirds of them remain at home and only one-third goes out to work in the fields, after the honeydew has fallen, hardly half of them remain at home. One can also tell immediately from their flight when there has been honeydew, as it is not only more frequent, but also much more intense, faster, and busier, and accompanied by more noise and commotion than usual. On such occasions, one cannot get enough of watching their industriousness, and one is amazed at how much these honey flies can gather with their unanimous zeal.

This honeydew is particularly abundant on the leaves of oak trees, mulberry trees, elder trees, linden trees, grape leaves, and especially on all plum-like trees and on all kinds of flowers, to which honeydew is usually harmful if it is not licked up by bees, which is why bees are also very useful animals in an area. Among other things, honeydew is often found in large quantities on ears of grain, especially those that are still green and have no kernels, so that clothes become completely sticky when one walks through them. This extraordinary fermentation in the stem and ear of the grain then gives rise, if the honeydew is not licked off by the bees, to the so-called ergot, the large black protruding kernel and germ, which, however, when frequently ground into flour, is unhealthy and is said to cause scabies. In general, the honey that has sweated onto the leaves is harmful to humans and animals due to the disorderly, violent fermentation. If you test this by licking various leaves with honeydew, you will experience stomach cramps.

In cattle, frequent consumption of such violently fermenting plants causes cattle plague and lung rot: only the nature of bees has been arranged in the wise plan of creation in such a way that they collect the harmful substances in the sting, in the so-called poison sac, or more accurately, the gallbladder, but the bee releases the honey from its stomach in a completely harmless, even healthy form for our enjoyment.

§4 On honeydew, which comes from various species of aphids

The second type of honeydew comes from aphids, a small and seemingly ugly insect that is commonly referred to as vermin in these parts; namely, it is their excrement, which they expel from their rear end, but which is a very good, tasty honey, and as such is diligently collected by bees and brought to us. (*)

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(*) Thus, the despised insects that we abhor and kill are often our benefactors.

There are almost as many special species of aphids as there are known genera of plants, and they all live in communities and clusters in various places on the same tree or plant, some with wings and some without. The large, thick aphids, which also mainly distill the honeydew that bees collect, are blackish and do not have horns like the smaller ones, but instead have a black knob in this place on the cluster that shines like agate. They live mainly on oak trees. They hold their abdomen, which is twenty times thicker than their head and thorax, constantly raised, and from it emerges a small, transparent, amber-colored sap tube, which they throw a few inches away from themselves. The small droplets then fall onto the leaves and are licked up by the bees and especially by the ants. Sometimes such droplets fall onto your hand when you stand under the tree. Many such aphids also live on linden trees, which are therefore also popular with bees outside the flowering season.

. However, the bees do not go so close to the aphids that they lick them, as the ants do when they run around on them.
It is a type of aphid that mainly lives in colonies on the young shoots of pear trees. Its body is structured very differently from that of ordinary aphids. They are completely flat and, with their wings lying flat against their sides, look exactly like half-grown bedbugs or wall lice, which are all too familiar in some houses. Their color is partly sea green, and they have reddish-yellow stripes and various spots on their backs, which under a magnifying glass create an incomparable appearance and the most pleasant mixture of colors. Others are browner in appearance and, under the microscope, display the most magnificent colors mixed with gold and silver. Others resemble a turtle from above and have a magnificent and evenly patterned shell. They are much livelier and run faster than ordinary aphids. The latter species produces the most honey, especially those with thick bodies. They are therefore constantly covered by ants, which are always busy licking their sweetness. However, they do not throw the honey as far away as the common aphids, and the frequent visits of the ants are therefore all the more beneficial to them, as they would otherwise stick together constantly.
The honey that comes from aphids is already purified because it is prepared in their intestines. In contrast, honey from honeydew that has fallen or rather sweated out is only purified in the body of the bees, and without purification, as mentioned earlier, it would be harmful.

§5 On the different times for harvesting honey

The time when the honey collected by the bees in so many ways and with such diligence and zeal should be harvested, or when the honey-filled supers that are not needed should be removed, is usually September and October. Of course, one can also remove it in summer, and is often forced to do so when the magazine hive becomes too heavy from the amount of honey to be conveniently lifted for replacement. However, this is somewhat more laborious because of the bees still inside, which must then be driven away from the hive and knocked out, partly

but you have to move away from the honeycombs you've cut out. The angry bees that rush out when you separate the supers also make the work harder, and they easily attract foreign bees if a little honey is spilled, which is often unavoidable. But in September or October, when the nights are already cool, the bees gather together in the middle tiers, and you can often remove two supers without finding ten bees in them, even if the hive is quite populous. And by the time they notice the reduction in their stores and come up, everything is back in order and the lid is smeared.

Harvesting honey in the spring would always be safer, especially if you don't have glass panes on your hives and have to judge by weight alone how many honey supers you can remove. However, since a wise beekeeper must leave the bees more than a frugal supply for the potentially long spring, even in autumn, it is also possible to harvest some of the honey in October. However, as mentioned above, due to the uncertainty of a favorable or unfavorable spring, each beehive should be left with ample reserves, and only as much of its surplus should be removed as if one wanted to take a reserve at the beginning of the honey flow in April or May. If the spring is favorable, this gain will not have been lost over the winter; but if adverse weather sets in, your caution will have gained you perhaps ten times as much, and your hives will be in good condition, whereas otherwise they would have suffered a severe decline, often leading to complete destruction. However, the reason why some of their excess honey is removed in autumn is mainly because the honey at the top sometimes becomes very grainy and sugary during the winter, and some of it is lost if it is left until then, as this leaves a lot of sugary, hard honey in the wax combs. If it is already used for another purpose and forced to flow over a strong fire, there is still some loss of pure honey. In addition, the bees gather again early in the spring, and at this time the loss of ten bees is more significant than the loss of fifty at other times. If it is then cold, this chill from above is particularly harmful to the bees and their brood, and if the weather is suitable for flying,

robber bees are more easily attracted than in autumn. However, with the necessary care, all this can be avoided, and the main honey harvest in spring always remains the wisest and safest.

§6 How the honey-bearing supers are removed

The method for removing the upper honey-filled supers has already been briefly mentioned above. After carefully checking how many supers are filled with honey and sealed with wax caps, first close the flight hole so that the bees cannot escape and disturb the work. A spare lid, which can be made from a smooth board or a small piece of straw woven into a flat shape, is kept handy and the wire is pulled through the super that is to be separated from the others in the manner described above. However, the wire must run along the length of the roses, and therefore be inserted first at the front corners where the flight hole is, and pulled back towards you. If you expect a lot of resistance from bees rushing in during warm weather, when you want to remove the frames for some reason, you can also pull the wire through the evening before and quickly remove the super the following morning when the bees are completely calm again. Once the supers have been removed and the lid put on, the supers must be turned over so that the open part is facing up, otherwise a rose will often break off during transport and fall to the ground, causing honey to be lost and wasted. If the supers cannot be turned over and there are too many of them, place them immediately on a support board or a wide, flat dish at the apiary and carry them away. This should be done on a bright morning when a nice day is expected, as such mornings are usually the coolest and the bees are the quietest. This can then be done quite comfortably at the apiary, and there is no need to carry the frames away, which is often impossible with large hives and which also disturbs the bees and causes them to come up too soon. However, it is not possible to do this without helpers.

§7 How much food should be left for the bees in winter and spring?

One important thing to remember here, as has been mentioned many times before and just now, is not to take too much honey. Since, according to the above standard of my type of beehives, each full super yields two measures and a half pint of extracted honey, (*) it is possible to determine how much honey to remove from a beehive and how much to leave in it by looking through the glass pane, without having to carry out a laborious and inconvenient examination of the beehives by weighing them.

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(*) This justifies the benefit of 25 good magazine hives indicated on the title page, which can amount to 100 fl. in moderately good years and 200 fl. in very good bee years. How easily can a magazine hive yield two supers full of honey? These four times 25 measures of honey, calculated at only 1 fl., amount to 100 fl., without taking into account the wax, which also amounts to 10 pounds and 8 fl. in money, and also without calculating the after-honey for vinegar or other useful purposes. And how often do we have such bee years when one hive yields twice as much as another? I have sometimes found that a single good magazine hive alone has yielded 8 measures or 40 pounds of honey in 3 weeks.

Less than two full supers should not be counted as winter food for a colony with a large population: but then it should keep one more in reserve, depending on the size of the colony, unless there is still a lot of unsealed honey to be found, as is usually to be expected. In winter, they usually consume barely half of it, but spring often comes a little late, and the bees consume more because of the brood. If spring comes early and is favorable for the bees, what remains of the honey will not be lost in the least, and a more abundant harvest can be expected in April or the following autumn. However, in a completely bad year, which fortunately is rare, at least never widespread, one cannot leave the bees any honey reserves, otherwise one would never be able to harvest. For this case alone, a wise beekeeper must always keep a honey harvest in pots in reserve.

If you want to select a few magazines to rave about and set aside in the fall, and not leave too many essays in them at the end, and remove a base with empty wax roses, you must make sure that you do not leave too many honey-filled essays in them. Otherwise, in spring, especially if it is a good one, they will often lack empty cells in which to start the young brood. If the young swarm arrives a little later because of the greater space, the swarm that arrives 8 or 14 days later will more than make up for this time due to its size. This can be clearly seen in somewhat lean hives, which in spring had not half as much honey left, but were nevertheless well fed, that these often swarm first and best, although feeding contributes most to this.

§9 How to extract and handle the honey, together with a description of a very convenient machine for this purpose

This honey is the purest and best, with no pollen, brood, or other impurities mixed in, which is why it can be extracted very cleanly and keeps for many years, eventually becoming like sugar. To extract the honey, I had a potter make me a machine according to a certain design, which I found much more suitable and convenient than a press. It consists of three pieces: a long rectangular dish, a sieve, and a lid. The first piece resembles a frying pan, as it is called and frequently used by the country folk in our region. The long side is 6 inches wide, 10 inches long, and 4 inches high, and is coated on the inside with a common glaze. In the front center is a round hole with a spigot, under which a pot is placed to catch the honey that flows out. This hole must be flush with the bottom so that the honey can drain out completely. A sieve is made for this dish, which has the same shape but is 6 inches high.

It is 1 inch smaller on all four sides so that it can stand in the aforementioned dish and no honey can drip out. It has four feet, which are 4 inches high and thus as high as the lower dish in whose corners they stand, and has a glaze inside and outside and a

The holes in the bottom, through which the honey drips, are as thick as a common nail, and a lid fits onto the upper edge of this sieve, which has a rim three fingers high so that charcoal can be placed on it as needed to liquefy the honey if there is not enough to warrant heating the oven.

A lighter and more elegant version of this arrangement can be made using a small basket woven from willow instead of the sieve. Depending on the size of the earthenware vessels, bowls, or frying pans that you have or wish to purchase and dedicate to this purpose, have baskets woven from white, peeled willow, simple and slightly perforated, and insert five feet made of strong willow into them so that they can stand comfortably in the vessels. – It goes without saying that these baskets must be 1 or 2 inches narrower than the earthenware vessels in which they are to stand, so that no honey can drip out. – The earthen vessels should be large enough to fit in the door of the oven, or, if you do not have a large amount of honey to drain, some of them can also fit in the oven pipe of the stove.

When the honeycombs are placed in the baskets or in the earthen honey machine described above for draining, they must first be cut up and stirred. They are then placed either in the small oven of the heated stove or, depending on the quantity, in the baking oven. However, it must not be so hot that you cannot keep your hand in it. If it is hotter, not only will the wax melt and clog the holes in the sieve and the openings between the willow, but the drained honey will also become too brown and unattractive.

However, if you want to make the first honey, known as virgin honey, select roses or honeycombs made of white wax that have not been used to raise young brood and do not have pollen at the bottom of the honey cells. Cut off the wax caps with a clean, sharp, and slightly long knife and peel them off so that the honey can run out. However, it must not be exposed to heat, nor placed in a heated room or oven, nor squeezed, but only collected as it runs out by itself, as this is the purest, most beautiful, and finest honey. If it is not liquid, perhaps because it has been in the cold, it can be placed in baskets or earthenware containers in a heated room, or else in a warm but not

placed in a warm place. – However, anything that does not flow out of these honeycombs by itself is cut up and stirred, and added to the other honeycombs, which are left to stand in the heat of the oven, etc., as described above. – The small amount of wax that runs through the holes with the honey into the lower dish and into the pot can be skimmed off the top with a spoon the next day. The honey that remains in the wax shells and in the dishes is then extracted in a different way and used for various purposes. Pour warm water, but not too much, over the treier and Treber, just enough so that they float, and add the honey water used to wash the dishes and utensils, as well as the wax skimmed off the filled honey pots, and let everything soak for 24 hours, stirring well several times during this time. However, if the honey water to be extracted is intended for mead or honey wine, those wax and honey slices which have no capped honey cells, but only open ones here and there, with many cells filled with pollen in between, (which are set aside when cutting out the honey and not mixed with the pure honeycombs in order to extract the honey properly) are not placed in warm water, but only in cold water (so that the wax and bee smell does not extract so strongly) and left to soak for 24 hours. Then everything is poured through a wicker basket placed on two pieces of wood over a tub or other container and used for various purposes, which will be discussed later. The small pieces of wax that run through the basket can be skimmed off the surface of the tub with a disc and added to the wax supply to be drained.

The pure honey is stored and kept covered with paper in stone or new earthen pots that are glazed on the inside. It is best kept in dry rooms. However, it must be protected from mice by placing a small board or lid on top of the paper, as they are fond of honey. In some houses, ants are also found to be very fond of it. In this case, sieved ash must be sprinkled around the pots so that they cannot run over it. One can also make one or more boxes for storing honey according to the height of the pots, and keep them well.

Seal it tightly, as it is a delicious treat and can easily be spoiled by messy snacking, even if only a little at a time. Breadcrumbs quickly sour the honey: do not dip anything into the honey pot, not even a knife, at least not if it has bread stuck to it. All flour must also be kept carefully away from it. No water or anything else should be mixed with it, otherwise it will soon turn sour and start to ferment. Honey that has been heated too much over a fire turns brown and loses much of its pleasant floral flavor.

Even if the supply of honey is still large, you must use what you cannot spare carefully and economically, and not let anyone else have free access to it. Honey is quickly consumed, and once you start using it in all kinds of dishes, it will soon disappear. In most dishes and hot drinks, sugar is cheaper and sweeter than honey, which does not give many dishes, except cooked fruit, a suitable flavor. Honey is not suitable for tea and coffee, for example, because its floral taste makes it unpleasant and unnatural. Only those who drink very little sweetened beverages can use it instead of sugar, as it sweetens without being noticeable. However, it is known to be very useful for many other purposes, especially in medicine, and is a pleasant and healthy food for most people. For it resists decay, dissolves thick mucus and is extremely beneficial, soothing and healing, especially for coughs, sore throats, lung congestion, shortness of breath, etc.: it has a balsamic quality and strengthens the stomach. For external treatments, it is known among country folk as a very good remedy that heals tumors, draws out ulcers, and is an excellent remedy for wounds and bruises.

§9 How to use the honey left behind in the wax capsules, etc., and how to prepare a drink from it, among other things, but especially good vinegar.

The water honey or residual honey mentioned earlier, which is squeezed out of the wax casings and the rinsed-out frames, is also very useful.

useful. It can either be placed under beehives that do not have excess reserves, and if it is too thin, some pure honey can be added; or it can be used to make a good, healthy honey wine, a drink called mead, or good vinegar.

If you want to feed it to animals, you must not leave it for more than 8 or 10 days, otherwise it will turn sour. However, it is good to leave it for a few days because it becomes thicker and also purifies itself; but if it is boiled down thickly, it will keep for almost a year.

If you want to make a good and long-lasting drink from it, mix all kinds of good spices into this honey water. Cinnamon, cloves, nutmeg, saffron, juniper berries, and the like, as you like, and let it boil down to two parts and skim it off diligently. A more complete description of how to make real mead, which is rare in our country but, as it is sweet and healthy, sometimes finds a lover who wants to make it at least in small quantities, is as follows: Take 1 measure of honey and 6 measures of good well water, or as much as you want to make, always six parts water and 1 part honey, and let it boil in a kettle over a low heat until a third or a little more has boiled away. – But if you have the collected honey water in the kettle, (in which case you cannot be sure of the exact ratio of honey to water, but must judge by taste, based on how sweet it is), you must boil and reduce the mead until a freshly laid egg floats in it so that you can see the surface like a penny. However, the taste is the best indicator of whether and when the mead mash is sweet enough. The sweeter it is, the better the mead will be. When the mead begins to boil, add a few handfuls of good hops in proportion to the quantity, tied in a piece of linen with a washed pebble so that the hops are held down to the bottom, and leave it in until the mead is ready. The foam must be skimmed off with a slotted spoon until the slightest trace of it can be seen. Then take cinnamon, cloves, grains of paradise [Guinea pepper], nutmeg and mace, ginger, galangal, pepper, whole saffron, juniper berries and any other spices you like (*), tie them in a cloth and leave them to boil in the kettle for half an hour.

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(*) Many mead brewers use the following ingredients in these proportions: for ½ Ohm or 40 measures:

3 handful of hops (which is boiled with the first brew) 1½
handful of dry sage
6 lot of oregano or marjoram [the same]
3 lot of betony
1 Ounce of benedictine root
1 Ounce of white tansy
1 Ounce of yellow tansy
1 Ounce of resin or resin
1 Ounce of coriander
1 Handful of flaxseed

Add the cloves and coarsely ground cinnamon towards the end of fermentation, wrapped in a small cloth with a small stone, through the bunghole in the middle of the barrel.

Then remove the mead from the heat, pour it into a clean wooden vessel, and when it has cooled, pour it into a small barrel, or, depending on the quantity, into small or larger vessels, which are more suitable if they have previously contained wine. Hang the cloth with the spices in the vessel, place it in the cellar, and leave it to ferment for 4 to 6 weeks, after which it can be drunk. However, it improves if it is left to ferment for a year, especially if the impurities have been removed. It can also ferment for 12 weeks. If you want to cork it, you must first remove the cloth with the spices, squeeze it well into the small barrel, fill it completely, and leave it for a few more days to see if it wants to expel any impurities. You can also put it in bottles or jugs and store it in a cool place for a long time. However, this should not be done too early, but rather after three quarters of a year, otherwise many bottles will burst. It is very beneficial to the wine and makes it even more wine-like if it is decanted several times and transferred to another barrel. This can be done the first time after the right time of fermentation, when a spiritual smell and a certain pungent taste are detected.

fermentation, when a spirit-like smell and a certain sharp taste are detected.
Then it is drawn off from the barrel, filtered, and returned to the same barrel after it has been burned out. After 4 to 6 weeks, it is drawn off again, and the sediment still on the bottom is filtered out, after which it can be left in the barrel, well sealed, whether full or not.
This mead or honey wine is a very healthy drink; it is a true medicine for consumptives, and in Poland, where it is drunk frequently, pulmonary consumption is extremely rare. Under such circumstances, however, hot spices must be omitted from its preparation. (*)

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(*) Since this mead has been particularly well received in Saxony, I would like to add here in this third edition how, in the English style, this mead wine can be given a champagne-like character and sparkling quality (a wine merchant's secret that can also be applied to several other beverages to give them the effervescence of foreign wines).
When the fermentation of the mead, which is in a barrel that is not quite full, is nearing completion, take an elongated glass that fits through the bunghole of the barrel and can hold about 4 ounces of water, put chalk into it, crumbled into small pieces, to fill a quarter of the glass, and pour in a quarter of water, then tie a string around the neck of the glass and hang it in the bunghole, and do the same with the other glass: Then pour in about a quarter of the weak vitriol spirit that the glass can hold, and immediately lower it deep enough into the barrel so that none of the liquid can run into the glass with the vitriol spirit. To this end, hold the string tightly until the bung is driven in, so that the glass does not slip down; and when the bung is to be removed again, take care that the glass does not fall into the drink, and hold the string tightly for this purpose.
The fixed air produced in the glass by the vitriol spirit will now gradually be drawn into the drink, not only refining it and removing the unpleasant sweetness that is often characteristic of mead, but also giving it the sparkling quality of champagne and preventing it from souring. After several months, the drink can be bottled. The

The specified quantity is sufficient for 9 gallons, four English measures or jugs, and is therefore equivalent to the intended quantity. (The measure of honey used for mead according to English custom is three and a half pounds of honey for every gallon or measure of water.)
Incidentally, since vitriol spirit is often prescribed for medicinal purposes, it would always be harmless if some of the vitriol spirit rose with the fixed air or otherwise accidentally entered the drink.
The wine color can be given to the mead by adding raspberries, gooseberries, and the like preserved with sugar or honey. If an appropriate quantity of this is added to the mead at the time of fermentation.
The sweetly tart taste and color of Pontal can be imparted by the juice of ripe sloes; the color alone can be imparted by blueberries; and the taste and color of claret wine can be imparted by elderberry juice.
When fermenting mead, it should be noted that it is best to stop the process as soon as the mead takes on a wine-like consistency. If it has fermented too much, it will begin to turn sour; if it has not fermented enough, it will become cloudy and unpalatable and will not keep. To promote fermentation, make sure that the barrel is not shaken, kept warm at all times, and protected from both air and light. The bunghole must also be only lightly covered. However, if it ferments for too long, a little sulfur thrown onto hot coals and placed under the barrel can remedy the problem immediately, as with any other fermenting liquid.

However, the vinegar that can be made from pressed honey water without any special skill surpasses all fruit vinegars, and if it is left to stand for a long time, it becomes similar to wine vinegar. If 25 measures (125 pounds) of honey have been extracted, one ohm (80 measures) of vinegar can be made from the leftovers. The sweeter the water, the faster it turns to vinegar. If you want to make only 50 to 60 measures of vinegar from the leftover wax shells from which 25 measures of honey have been pressed and from whatever else you can gather from the dishes and utensils smeared with honey, it will be all the better and turn to vinegar all the sooner. This honey water will sour on its own in a few days, especially if you put it in the sun or on a warm stove. However, you can speed up the fermentation process

Acidity is added through sourdough or other ingredients suitable for vinegar production. However, the best method is to add a piece of mother of wine vinegar or, if this is not available, good wine vinegar, and keep it warm at first. If you want to make vinegar from the resulting liquid, there is no need to squeeze the husks with hot water. Simply place the wax husks and the rinsed honey in a container with clean water and leave the honey to infuse for several days. When the water is sweet enough, pour it through a thin cloth, which will retain the wax husks, into the barrel or container where it is to be turned into vinegar, and leave it to ferment in a warm place or in the cellar with a little wine vinegar or vinegar mother. This is the best use for the honey residue.

§10 How to prepare the honey left in the hive for use as a sweetener in food

However, if you want to use the honey or honey water on its own, instead of good honey in food or drinks, it should be boiled and thickened as required. However, you must then remove a certain unpleasant and disgusting taste by the following treatment: As soon as the juice is removed from the heat and poured into a pot, freshly burned charcoal powder is wrapped in a clean cloth and placed in the pot for a while, which absorbs the unpleasant taste of the honey. Linden charcoal is particularly suitable for this purpose. It is heated again and extinguished in a pot with a lid. It is then ground warm in a mortar, wrapped in a cloth, and hung in the juice.

§11 How to extract wax in the best and most useful way

Another very useful product of beekeeping is wax, whose value is approximately six times that of honey, as four measures of honey usually yield three quarters of a pound of wax. (*)

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(*) This calculation is correct if, as is the case here, only sealed combs and full honeycombs are pressed. However, if there are other empty combs, as is the case with driven-out bees, there will consequently be more wax. Thus, two driven-out beehives (as in some years my observation greenhouses) usually yield me 14 measures of honey and 5 pounds of wax. An older beehive also yields half or a quarter pound more wax than a one-year-old one.

However, most beekeepers do not make the best use of the wax, partly because they squeeze it so poorly that a fifth of it remains in the lees, and partly because they sell half of it unpressed to Jews who trade in it. If you want to get the most out of it, you must not leave empty wax roses or squeezed wax shells lying around uncooked for long. The former become infested with mites and are severely damaged, especially if they are not pressed tightly together, while the latter become moldy and mildewy and also suffer losses.
To press the wax, you need to sew together a strong but not tightly woven hemp cloth, which is wide at the top and sufficiently widened at the bottom by two inserted gussets for easy pouring, but tapers to a round or pointed shape at the bottom. Two boards, preferably made of oak, are made to approximately the same length, between which the wax in the bag is pressed. The press with a good screw can be any design, but I have found it most convenient to have one in which the wax bag is screwed in so that a tub or other container with cold water can be placed underneath it to catch the wax. The front or rear clamp on a carpenter's workbench can also be used for this purpose if only a small amount of wax needs to be pressed out. The wax sleeves and empty wax roses are boiled vigorously in water in a kettle or other convenient and safe container. However, the kettle must not be full, as the wax boils over very easily, like oil or fat. When the wax has been boiled thoroughly and stands on top like melted fat, it is carried to the press and poured into the container over the half-full tub of water. However, the sack must first be placed in the water, along with the boards and everything else that the hot wax might come into contact with.

It should be washed with water beforehand and made wet, otherwise the wax that sticks to it will not peel off but remain so firmly attached that it cannot be removed except by cutting it away with a knife. Once the kettle has been emptied into the sack, it is tied up and squeezed between two boards. However, this one-time pressing is not enough. The pressed husks should be returned to the kettle, brought to a boil again with a little water, and then pressed a second time, which usually yields another fifth or sixth of the original amount. The pressed wax, which floats on top of the water, is removed, squeezed well, and formed into balls. Many small balls of wax float on top of the water, which cannot all be removed with a slotted spoon or by hand; instead, the water must be poured through a cloth, so that the wax remains in the cloth and nothing is lost.

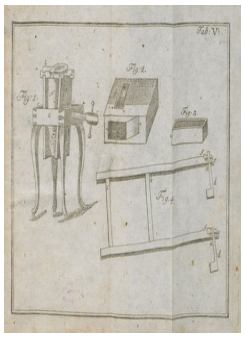
All the wax is then melted gently with a little water in a bowl that is wider at the top than at the bottom and coated with a little oil or tallow so that the wax comes away easily. However, it must not be allowed to become too hot, otherwise it will lose its beautiful yellow color and much of its quality and strength, becoming brown and unattractive. Do not pour cold water on it to make it hard quickly, otherwise the wax disc will shrink and will not be nice and smooth. Once the wax has melted, remove any foam that remains on the surface with a wet spoon and leave it to stand overnight. However, take care not to place the hot wax where the bees can reach it. They can smell it from far away and mistake it for honey, whose smell and origin are so similar. They will come frequently, and if the wax is still hot and liquid, they will drown and burn. The next day, remove the wax discs and scrape off any impurities that have settled at the bottom with a knife until it is completely clean. Save the scrapings, which are still good wax, until you press wax again, and then add them to the wax shells. Throughout the year, people also collect whatever wax they find when cleaning out the beehives or elsewhere, and use it sparingly. The wax discs should not be stored in warm places

, as they dry out under their own weight, and those who sell the wax quickly gain some weight, as it becomes lighter over time. – If you want your melted wax discs to be nice and smooth on top and bottom, melt the pressed wax in a pot or other container with a little water and let it sit for a while until all the impurities have settled to the bottom. but before it starts to set, pour it gently into a bowl that has been greased and warmed slightly, but not all of it, only as long as it runs completely clear, leaving the rest behind and saving it for when you press wax again. – This is a very useful way to make the most beautiful wax discs.

§12 Description of the most convenient wax press

However, since a good and convenient wax press is desirable, I have presented one on the fifth copper plate, fig. 1, and will explain it here piece by piece.

The wax press consists of four pieces of beech wood, which are joined together and have four feet mortised into the corners, making the press 2 feet 9 inches high, so that it can be easily screwed together and worked on while standing.



The feet can be made a little more decorative from walnut wood, because a table top can be placed on the press and used as a table when not in use in the bee garden. It is also a good idea not to glue the feet, but to fasten them with a wooden nail that

can be removed so that the feet can be lifted and the press conveniently folded, packed, and transported.

a.a. The side pieces are 1 foot 4 inches long, 5 inches high, and 2 inches thick. They have two strips on the inside on which the hanging boards run.

b.c. are the front and rear pieces. They are both the same height as the side pieces, 5 inches. However, they are 1 foot 6 inches long and 2¾ inches thick and can also be 3 inches thick, because the front piece b in particular holds the screw nut and both have to withstand the greatest force. All four must therefore be very carefully and precisely joined together and the joints must be made strong.

d. The screw is 10 inches long and 2½ inches thick on average.

The screw must be made of good dry hornbeam or other hard wood and not too tightly fitted, otherwise it will be difficult to work with and may become wet and swell during pressing.

e.e. are strong oak boards, between which the wax is pressed out in a sack. They are 2 feet long, 11½ inches wide, and 1½ inches thick. In the center of the length (so that they hang in balance), two wide insertion strips are attached, which run on the inner strips mentioned above on the side pieces like a fold when screwed together. However, the insertion strips must not be cut deep into the boards because of the force to be exerted, but must protrude and remain thick. The screw presses on the center of the insert strip of one press board, and the insert strip on the other board rests against the rear piece.

Between these boards hangs

1.1. The wax bag. Because it needs to be strong, it is best made of coarse hemp cloth. The two pieces from which it is assembled depend on the width and length of the boards; it must not be wider than the boards so that it does not bulge out and leave part of the wax roses unpressed. – The bottom should not be pointed, but rounded. At the top, it must have two gussets so that it is wide enough to be filled easily. Two strips of fabric one cubit long are sewn on a hand's width from the hem. – A finger-length strip of fabric is sewn onto each of the four sides at the top, half a hand's width below the hem, each with a ring for hanging the bag.

At the end,

two pieces of wood with notches, which not only hold the two pressing boards apart until the hot wax has been poured into the bag, but also have a protruding nail with a head in the middle, to which the hanging ring on the bag is attached. (The two other nails for the two other hanging rings on the bag are located at the top of both boards.)
b. is a curved piece of wood with a notch, on which the hot vessel with the boiling wax can be placed so that it can be poured into the sack easily without blackening it or burning oneself.
When the wax roses are boiling well over the fire, place a tub half full of water between the feet of the press, or lift the press over the tub; remove the boiling kettle from the fire, place it on the curved wood at the front and empty it into the sack. Then remove the rings from the nails, hold the sack up high, and tie it closed with the ribbons. Set aside the two pieces of wood with notches, which held the press boards apart and in place, and screw them back on. – And so that one does not get splashed by fine wax, two small curtains made of linen cloth (which have been dipped in water beforehand so that the wax comes off again) are hung on the open sides of the pressing boards.
Once it is well pressed so that the sack is only a thumb's thickness and cannot be screwed any further, the sack is immediately unscrewed so that it does not cool down, folded in half, and pressed again. After that, the wax combs are taken out again and boiled and pressed a second time as before.
Of the many types of other presses, I have found this type of hanging wax press to be the most convenient and best, with the least amount of wax being lost or smeared and nothing being ruined in the process.

§13 How and where the wax is produced, and how it can be restored to its original white color or bleached

Wax is a gift from nature, a true fat from plants and their honeydew, which we only get from bees. As funny as our age is,

and as rich as humans are in all kinds of inventions, they have not yet learned to imitate bees' wax, at least not in such quality and usefulness. It has already been mentioned above that bees excrete wax through the rings of their abdomen, where it emerges in very delicate and small flakes, which they pull out with their feet in an incredibly swift manner, work in their mouths, keep soft and warm, and then use for building. Sometimes you can see these fine wax splinters protruding between the rings of their abdomen, but often they lie at the bottom of the flight board inside the hive at the beginning of a new construction, which sometimes fall off the working bees. The wax is thus separated from the honey in their stomachs and intestines and prepared mainly by means of the acid in the clear liquid in their poison or gall bladder, for which the bees require a certain degree of atmospheric warmth, so that this fat, separated from the honey and then combined with phlogiston or combustible matter, can penetrate the outer parts of their artificially formed bodies between the rings as delicate scales and they can, as it were, sweat it out, while at the same time kneading it to the necessary toughness and flexibility and working it into their structure. It is quite obvious that honey is the main source from which bees produce wax. For without abundant food, they do not build, and bees that are confined and fed only pure honey build at least a few pieces of wax roses. However, it cannot be ruled out that the pollen they carry on their legs (*) and consume partly themselves and partly, in particular, their young brood, also contributes to this, or that they need the alkali and saltpetre they collect from fresh soil, saltpetre walls, and other places where such substances are found in order to produce wax.

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(*) At least it can be observed that bees frame the edges of old wax roses with a kind of coarser wax mixed with a paste of pollen and resinous matter. It is likely that they do this either because they lack the necessary degree of warmth required for the internal and external preparation of the wax, or because they lack better honey, which does not contain as much phlogiston as many other flowers. For the

The nature and type of flowers and blossoms often make a striking difference in honey. This alone must explain why some waxes are sometimes difficult to bleach, which is something that wax bleachers sometimes complain about. This is because the resinous substance, together with the combustible material in the flower pollen found in this coarse wax, does not separate when the wax is melted, but combines with it very precisely and retains its yellow color.

If we cannot detect any wax particles in the pollen, we can detect them just as little in the sap of the flowers in their calyxes and nectaries, as botanists call them. It is therefore quite plausible that some flowers provide bees with more material for wax than others, especially those that produce a slightly sticky moisture, such as sunflowers, etc. Experience and the nature of wax also prove that bees need warm weather for the wax particles to mature on their bodies and for them to be able to exude, process, and build with them: there must be a temperature of at least 15 degrees on the Reaumurian thermometer so that they can have 12 to 22 degrees in their hive and dwelling due to the increased heat. (*)

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(*) I placed a Reaumurian thermometer in a free-standing glass beehive facing north and allowed the bees to build around it so that I could observe the temperature every hour. I found that the temperature inside their dwelling was usually 6 to 7 degrees higher than on the thermometer in the shade in moderately warm weather. However, the amount of heat in their dwellings depends greatly on the size of the colony, the location of the apiary, and other circumstances. When the temperature on the thermometer is 17˚, it is between 23 and 24˚ inside a densely populated hive. If it is 20˚ outside, it is between 28 and 29˚ inside, and so on in proportion.

They also process wax in the middle of winter by sealing the cells in which the first young bees of the year are placed with small wax caps, or if there is a need to seal something or cover it with wax.

. However, at this time of year they do not sweat out the wax, they do not extract it from the rings of their bodies, but only gnaw off what has already been processed and use it as needed, as they also do in autumn and at any time in cool weather, because the sealing of the young bees close to the nymph stage cannot be delayed, but must be done at the right time if they are not to perish. However, even in warm weather, the bees have their own time and order for building. Towards the end of summer, they no longer build, or at least very little, when they already have honey, flowers, and hot weather.

So even if bees can reprocess wax that has already been processed and soften it in their mouths to make it usable, they are still unable to make regular, durable cells or a whole piece of their type of structure from it. This previously processed wax remains far too brittle. It also retains its color as it was bitten off, because it has not been reabsorbed into the bee's body and reprocessed, but only softened in their mouths.

The fact that the wax is originally completely white and pure is proven by the appearance of the freshly built roses, which have not yet contained honey or young brood and have not yet been moistened by the bees' breath. Such roses, when carefully dissolved in warm water immediately after they have been built, yield white wax without any residue. For the residue that is otherwise present when wax roses are boiled comes from the impurities of the bees, which have mostly evaporated, and especially from the husks and skins of the young bees, which they have left behind in the cells where they grew up. However, the honey, the evaporation, and the vapors of the bees cause a yellow color to permeate these delicate and thin wax discs and sheets, which, like cloth, can be removed from the wax by the heat of the sun and frequent sprinkling, as is done in wax bleaching factories. Anyone who would like to try this experiment themselves and obtain some white wax should melt the yellow wax with water over a moderate fire. When it has melted, take thin slices of wood, which you must carve beforehand, wet them in water, dip them in the melted wax, pull them out quickly and hold or throw them into cold water so that the wax that has stuck to them comes off in thin slices.

Continue until all the wax has adhered to the wooden discs. When it has detached from the discs or can be removed by hand and appears as thin sheets, place it on a damp cloth or wet board, or on glass panes that are slightly hollow so that water can remain on them, place it in a place where the sun shines all day, and sprinkle it often with water, turning it over frequently until it is bleached as white as you want it to be. Then melt it back together in any shape you like over a low heat. If the bleaching can be done in a place covered with grass and free of dust, this is much better. If this is not possible, care must be taken in windy weather to prevent dust, sand, or other impurities from getting onto the wax. In such weather, the wax must be kept wet at all times, but at the same time covered with wet cloths. If, when the leaves have melted back together, the wax is not completely white, melt it again, make thin sheets, and bleach it again. However, melting the wax too often is not good for it, as it becomes brittle and is reduced by the heat of the fire.

Chapter Seven - On the equipment and tools that are necessary or useful in beekeeping.

§1 For what purpose a somewhat extensive list of equipment has been made here

A bee lover should not be alarmed if he finds here a large list of various implements and tools that are useful in beekeeping. Everyone will be able to judge for themselves what is absolutely necessary or dispensable, depending on the nature of their beekeeping and other circumstances: what is convenient and useful to them; whether they intend to increase their bee population through splits or swarms; whether they can obtain this or that from a good friend nearby in case of need, and so on. Nor is it necessary to purchase everything at once at great expense. One can acquire things gradually without great expense, just as one sometimes acquires one's bee colonies gradually. However, I would advise that, as is the case with all matters of economy, if one wants to be a good manager, one should procure what one purchases and has made good, durable, and convenient, and to spend a few pennies more on it than to have it remade soon, or to have to look at it with annoyance every time you use it because of the botched workmanship, which is excused by the very low price.

§2 What equipment is necessary and useful for swarming

I consider the following to be partly necessary, partly convenient, and useful equipment for beekeeping, and it should be kept handy, especially when swarming, in the bee garden, or elsewhere:

1) The bee cap. This is not only necessary for catching swarms, but also for many other purposes. It is often possible to catch different swarms completely unarmed

, but since you cannot know in advance whether it will go so well this time, it is safest to arm yourself, especially if the swarm is hanging badly and must be brushed off. However, since bees behave differently when treated differently, it is E. If an assistant is required for setting down, joining, lifting, etc., two bee caps must be provided, or the second must be readily available. However, it is well known how uncomfortable ordinary bee caps are in high temperatures. I have therefore described a very convenient method in the fourth chapter, §24.

2) Woolen gloves, preferably somewhat thick or lined with fleece. Woolen gloves are best for bees because their stingers do not stick in them so easily, whereas leather gloves cause many deaths because the bees cannot pull their stingers out of the leather, and the stingers themselves penetrate the skin if the leather is not thick. There is another reason for this with regard to thick leather, such as that used for shoes and boots. Bees cannot and do not like to sting through such leather, and gloves made of this thick leather are very useful and preferable to woolen gloves, as they are very durable and can be easily cleaned if they become stained with honey or other substances. Moreover, they are not as warm as woolen gloves and are thin and comfortable for touching and handling things. A kind of sleeve with two ribbons must be sewn to the gloves so that they can be tied above or below the elbow. It is even more convenient if only one ribbon is sewn onto each bee glove and a small piece of crepe is attached to it with a strong, curved pin, so that the ribbon can be hooked in when the arm is tightly wrapped with it. In this way, no assistant is needed to tie the gloves, and one can manage with one hand. This is a small advantage, but it is a convenience that sometimes prevents a bee sting. You will also need to provide a few gloves for an assistant.

3) A fuse. This is made from linen or cotton rags, which are loosely rolled together and tied. You must also keep a fuse ready, with a lock of human hair tied to it, which can be used in accordance with §17 of the fourth chapter to drive away a stubborn swarm from an inconvenient place or even from a hollow tree. – Fuses that

are made of cotton rags on the outside and a sausage-like structure on the inside, burn best and do not go out.

4) A long ladder to bring a swarm down from a tall tree; and

5) A shorter ladder.

6) A double gardener's ladder. This is often very useful for catching swarms, especially when the bees have attached themselves to an outer branch that cannot be reached with a simple ladder and is too high to reach on a chair. You can easily make such a ladder yourself. Take two strong shutter staves or ram's legs, which are usually 11 feet long, and saw them in half lengthwise so that you have four sturdy shutter staves or four very strong slats. Plane them down and drill holes for the nine rungs so that each is 1 foot apart. The rungs are 2 feet wide at the bottom of the ladder and taper to 10 inches at the top. The rungs must be made of young oak wood so that they do not break, especially as the lower rungs tend to wobble a little due to their width. At the top, the two ladders are joined together by a locksmith with a hinge, and at the bottom they are fitted with four spikes so that the ladder cannot move.

7) A hand sprayer. This is used to keep the bees under control when they are swarming so that they do not easily escape. It can be made from a pistol or shotgun barrel.

8) Two long poles. These are necessary when a swarm has attached itself to a high tree, specifically to the outer end of a branch, where a long ladder cannot reach or the branch cannot support the weight. A basket, tub, or sack stretched with a hoop is tied to one end of the pole and a hook is attached to the other end, which is used to shake the branch so that the swarm falls into the basket or sack below.

9) A sieve, basket, or tub to catch the swarms and bring them to the empty beehive to be poured in, along with a white cloth to place the beehive on top of it; also a swarm bag, which is stretched with a hoop and hangs movably between two forks of a pole, to catch a swarm from a tall tree.

10) A broom and flywhisk, the former to sprinkle the bees comfortably, and the latter to brush the swarms when they cannot be caught in any other way. However, in an emergency, this can also be done with a bunch of green twigs.
11) A water bucket, watering can, or other container filled with water must always be available in the bee garden, as it is often needed unexpectedly and in a hurry.
12) Some pure honey to coat the new bee dwelling above before trapping the swarms, so that the bees will readily move in.
13) Clay for smearing the sticks and cracks, which must always be available and not too soft. Clay mixed with cow dung works best.
14) Some putty or wax from an old beehive to give the new bee dwellings their natural and pleasant smell, so that the swarms will stay there and not move out again.

§3 What tools are necessary and convenient for other bee treatments

In addition to the equipment and tools used for swarming, there are various others that are necessary, convenient, and useful for other bee treatments. These include:
1) The bee knife. See Table III, Fig. b. It is made entirely of iron so that the front tip, which is double-edged and fairly narrow, can be bent as much as required.
2) A chisel, which is somewhat thin and is often needed.
3) A brass or well-annealed iron wire, approximately two feet long. A small piece of wood or knob is attached to each end so that it can be held comfortably when separating the attachments from each other, either to make offshoots or to harvest honey.
4) A bellows with a smoke capsule according to Table III Fig. a. It is often necessary to subdue the bees with smoke. With this tool, however, it is easiest to blow Bovist or other smoke into the flight hole or drive it down from above. The smoke capsule, which has an air hole with a flap in the lid through which the air flows, must be attached to the upper opening of the bellows with a tube at the valve.

bellows, at the valve. This capsule is very simple to make from white sheet metal, as if a lid had been made from a small sheet of metal.

However, the capsule or box does not need to be soldered together, but only grooved on top of each other so that nothing can melt. – When you want to use this tool, place a lit and smoking fuse in the box.

5) Several sponges Bovist, as described above, which are often very useful.

6) Crushed white chalk to sprinkle on the robber bees and locate them.

7) Finely crushed white hellebore to remove the destructive robber bees from the neck if necessary.

8) A weather glass. This can be extremely useful when making offshoots, as it allows you to choose the best weather conditions for the offshoots to continue working and settling in; however, if bad weather sets in immediately, they must be fed if they do not have honey, which is rare. At the very least, this will prevent them from building.

9) An earthen honey machine, or a basket made of white peeled willow for draining the honey, as described in the previous chapter, §9.

10) A press or small wine press for wax, as well as for honeydew, as mentioned above.

11) Some feeding troughs and feeding boxes, the most convenient type of which is described in Chapter 5, §3.

12) A supply of honey, or a good supply of pure honey appropriate to the number of bee colonies. A wise beekeeper takes this precaution for a bad year or all kinds of accidents, as it can sometimes protect him from great damage and sometimes enable him to make a considerable profit with this supply.

13) Some yellow wax, which is often needed in beehives and in the household in general.

14) A glass of eau de lavande, or lavender spirit, to protect oneself or others from swelling after a bee sting. See the fifth chapter, § 23.

15) Hammer, pliers, nails, screws for glass lids, etc.

Chapter Eight - List of excellent plants that are beneficial to bees and from which they collect honey, wax, and pollen.

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(*) From the flowers, from which bees only collect honey, they also obtain wax, because they separate it from the honey in their bodies and extract it. However, since it is highly probable that flower pollen also contributes to wax production, wax is used here to indicate what this or that flower provides most, and this expression of the ancients is mostly retained.

§1 Why this list has been included

I am making this small excerpt so that a bee lover can judge for himself how his region is suited to beekeeping, and also so that anyone who has the opportunity to do so may take the best of beekeeping into consideration when setting up the rest of his farm, and plant and cultivate something that provides other benefits to beekeeping, and encourage other beekeepers in their neighborhood to sow and plant similar things, which would also be useful even if they did not have bees, but which can also help beekeeping, and plants that are suitable for their region. There is also no need to clutter up one's gardens with bee herbs, thereby negating their main use. For the little that is grown for the bees in the vicinity of the apiary and in the garden in a small area does not mean much, because even if it is often the best, they do not easily stay nearby, but prefer to go into the field, unless it is rainy weather, when the flowers they have near the apiary are most welcome to them. A

Bee lovers should remember to promote the cultivation of plants that are useful to bees and that are lacking in their area at certain times of the year. This is because in some areas, and this is again the case in areas where the bees' main food source is in late summer, if there is either a mostly wet or completely dry and hot summer, there will again not be much to harvest, unless the honeydew was very abundant and productive in the spring. If the summer is mostly wet or very dry and hot, there will again be little to harvest unless the honeydew has been very abundant and productive in the spring. Nevertheless, beekeeping could be made a considerable and useful part of agriculture almost everywhere if more attention were paid to it in higher places and if the leaders of the communities were given more detailed instructions on the planting of various trees in woodlands or on barren and empty spaces, where many beautiful lime trees, poplars and other trees could be planted if there were more bee lovers, or at least if those who are in one place would come together and unite to make their area more conducive to beekeeping. Kind nature helps us in this in all regions. No region is so poor that it has nothing, and none so barren that something cannot be added for the bees, if only every bee owner in a place does something in this regard, which would already provide great advantages for the establishment of beekeeping as a whole.

§2 Plants that are of general and considerable benefit to beekeeping in a region

The plants that provide general and considerable benefits for beekeeping in a region are primarily:

Heather, or buckwheat. This provides the best honey harvest, and its long-blooming flowers yield a large amount of honey. It is widely planted in sandy areas and is excellent for fattening cattle.

Wild heather is also a very important and long-lasting food source for bees, but it produces a brownish honey.

Good **meadows**, which produce sweet fodder and are therefore rich in flowers, are very important for beekeeping. Even in late summer, when the hay has already been made, bees find plenty of honey on white clover.

Winter crops, which bloom early in the spring, and **summer crops**, which are very good for bees in late summer and are called **vine** and **turnip** in some areas, produce a lot of honey and wax.

Spanish broom is also an excellent source of honey for bees. A field planted with Spanish broom provides enough wax and honey for ten good beehives. This is because Spanish broom not only produces a large quantity of flowers, but also remains in bloom for a long time.

Broad beans, which are grown in many places on several acres of land for pig fattening, produce rich honey and are an excellent food for bees.

Bees also thrive where many **legumes** are grown. Around St. John's Day and into August, they find plenty of honey, especially on vetch, where they collect the honey not from the calyx of the flower, but from the outer edge of the flower, where the calyx is located. Since vetches are mainly grown for green fodder, they are also sown late in some cases and thus provide bees with a source of honey even in autumn. Legumes also include **peas, lentils, garden beans**, etc.

Poppy seeds, especially the simple variety, provide bees with good nutrition for bee bread and wax. Their pants look ash gray from eating them (*).

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(*) The color of the pollen is not always, and in fact rarely, the same as the color of the flower itself. Many red flowers have pollen that looks completely white; blue flowers often have red pollen, others have blackish pollen, and most have yellow pollen, etc. – If you want to know from which flowers the bees get their red, white, yellow, brown, and green trousers, you only have to go out and watch them carefully, and you will soon notice, especially since bees usually stay with one type of flower. – The flowers that provide both honey and pollen are the best, such as
grapes, heather, etc.

They visit them only in the morning or after rain, and quickly gather a load. They also visit **hemp** very frequently, where they find plenty of wax and honey.

The fruit trees, which are so useful, especially apple trees, plum trees, and cherry trees, produce a lot of honey when they are in bloom. How many beautiful places could be filled with them that now stand empty and desolate!
Among the wild trees, the **linden trees** are well known and cannot be praised enough. Their blossoms not only provide the richest material for wax and the best honey, but also frequently spray honeydew from the aphids that live on them, which the bees eagerly collect. The honey from these trees has a pleasant, balsamic taste and is excellent for medicinal purposes, which is why it is much more expensive in pharmacies than even the best honey. What better place could there be to plant this honey tree, which also spreads such a refreshing scent beneath its shade?
The palm willow or goat willow, which grows quickly in marshy or damp places, especially the male variety, which differs from the female palm willow in its pollen, is extremely useful to bees. Its flower cones are not only the first of the year and allow bees to collect large quantities of pollen, but they also strengthen them immensely due to their excellent, volatile, balsamic nature, whose scent is in no way inferior to that of lime trees or Spanish elder. This also includes various other types of willow, all of which can be planted frequently and easily along streams and meadows in villages with good policing. Hedges and fences with many **gooseberry bushes, alder buckthorn, blackberry, sea buckthorn,** and **raspberry bushes**, mixed with **sour cherry** or **barberry**, provide many excellent benefits to a bee-keeping area. Gooseberries are available to bees very early in the season, are very healthy for them, and provide honey and wax. Raspberries produce a great deal of honey, and bees are attracted to them from early morning until evening. They bloom well into the fallow month.

Where there is abundant **clover growth**, bees also find plenty of food. White clover, alfalfa, sainfoin, large mountain clover, blue oxeye, etc., especially sweet clover, produce a lot of honey. Bees love this last type of clover very much, even more than cornflowers, and visit it frequently when the linden trees are in bloom. They find plenty of honey and wax on it. Sweet clover has small yellow

flowers that bloom one after the other for a long time. Red clover has a lot of honey juice, and bumblebees make excellent use of it; but the calyxes are too deep for the bees' tongues, as is also the case with the so-called Jörgerosen, which otherwise have an excellent-smelling honey and also spread a wonderful scent in summer huts, so that they cannot reach the honey without visiting the small, unopened buds at the bottom, which they only visit in the early hours of the morning. But when this clover has honeydew, which it often does, the bees gather on it in large numbers.
The frequent yellow flowers that the Astarische tobacco bears for a long time also give the bees a lot of honey and wax.

§3 Of individual trees, flowers, and plants that are beneficial to bees

In addition to these and other trees and plants that are excellent for beekeeping and are frequently planted in large fields in various locations, there are many individual trees, flowers, and plants that are beneficial to bees and belong to the large table that the Creator has set for them. Among others, the following are well known:
Wild chestnuts, which provide bees with plenty of propolis, wax, and honey. The pollen from these flowers appears dark red on their legs.
Al**mond** and **peach trees** provide honey and wax. Quince, **mistletoe**, **hazel**, and **hawthorn provide** wax.
Alder trees provide wax and resin, and **oak trees** can provide bees with a great deal of honey during the period of high smoke and honeydew, their leaves often dripping with honey. Bees find a lot of honey on **fir** and **spruce trees** very early in the year, as well as in hot weather, and bees thrive in fir forests.
Aspen (Populus tremula) and other **poplar trees**, especially balsam poplar, shipyard or palm willows, especially Salix aurita, arenaria &c. provide a lot of pollen and putty.
The **cone tree**, whose small white flowers are extremely popular with bees, provides them with plenty of honey.

Larch tree (Larix) Wax and putty.
Herlitzen or **Welschkirchen**, also known as Cornelian cherry trees, provide bees with their first source of wax.
Elms, field maple, wax, and honey.
Wild and tame **currants**, **bone wood**, **ash**, **sloes**, **bird cherries**, **celandine**, **blueberries**, and **cranberry bushes** provide a lot of honey. So does the **buckthorn**.
Ground ivy (Hedera terrestris) **Wild mustard** or **Meirich** produce a lot of honey. This little herb is special because it provides bees with their first honey and blooms early in March. Winter **aconite** (Aconitum hyemale), **snowdrops** (Viola odorata)**, yellow violets** or **pansies** (Viola tricolor) provide a lot of honey. **Wild rosemary** or **bog myrtle (**Ledum palustre:) honey, **columbine** (Aquilegia:) **cornflowers** (Centaurea cyanus:) **broom** (Spartium Scoparium:) **wild thyme** or **field cumin** (Thymus Serpyllum:) lots of honey.
Caltha, lots of wax and honey. The same applies to greater **coltsfoot** (Petasites) and **wood sorrel** (Acetosella), both types of **lungwort** (Pulmonaria) and honey. **Liverwort** (Anemone hepatica) wax. **Pasque flowers** (Pulsatilla) lots of wax. **Verben**a produces a lot of honey. It has elongated dark green leaves, a stem with many branches and many blue star-shaped flowers in succession. The seeds are eagerly sought after and eaten by poultry, and bees love the flowers so much that they can often be found on them even when the aforementioned heather cornflowers are in bloom. The flowers appear at the end of July and last until autumn.
All types of **deadnettle**, **March violets**, and **spoonwort** produce a lot of honey. **Dandelions** (Tarazacum) provide a lot of wax and honey. **Speedwell** and **hyssop** provide honey. **Wild storch's tongue,** wax, and honey. **Wild sage,** the blue snapdragon-like flowers in the meadows, a lot of honey. If you squeeze one of these flowers with your fingers, a drop of the best honey appears, about the size of a pinhead.
Woodruff (Matrisylva Lonicera Caprifolium L.) and lots of large-flowered **vetch**, honey. **Ginstern** (Genistella), wax and honey. **Wallwort**, **freesamkraut**,

(Viola tricolor) honey. **Field mustard**, honey and wax. The **poppy** species, **spring saffron**, yellow **daffodils**, honey.
Gout roses, produce a lot of wax, **syringes**, white **crocus** and **Jerusalem flower**, a lot of honey. Wild **jasmine**, wax and honey. This is excellent for a hedge around a bee garden. The honey collected from it can be easily distinguished from all others by its balsamic smell and taste when cut from roses.
R**hubarb** produces honey and wax.
Bear's garlic, **leeks**, **garlic**, and **onions** are useful for strengthening bees.
Spoonwort produces a lot of wax and honey. If sown at the right time in autumn, it is one of the first plants that bees flock to in spring. All types of **cabbage** and **beets** produce wax and honey, and are just what bees need. **Garden cress**, all **types of mustard** and **radish** are useful to farmers. The flowering of **winter cress (**Barbarea) lasts a very long time and is visited by bees extremely often.
All types of **hawkweed** (Hieracium) and **goat's beard** (Tragopogon) yield wax and honey. **Rose species** yield wax. **Turk's cap lily** (Lilium floribus reflexis) yields a lot of wax. **Raspberries** yield honey and wax. **Blackberries**, **vine flowers** (Lysimachia) yield wax and honey. The species of orchis, **troll flower**, **forest melissa**, good honey. Large **meadow rue,** large **measure love,** wax. **Watercress, small yellow meadow rue,** wax and honey.
The species of **thyme**, especially wild thyme, **wild thyme** or field cumin, which also grows in the most barren areas, is considered one of the finest bee herbs. They produce a lot of honey of exceptional quality.

All types of **poplar herbs** (Malva) produce honey and wax. The flowers of **the cheese poplar** (Malva Sylvestris), which are available for over three months from May, are particularly rich in honey. The bees that collect from them return home as if dusted with ash.

Breton and **scabious** produce a lot of honey and some wax. **Brunelle**, honey. **Woolly mullein** [mullein], (Verbascum) wax and honey. **St. John's wort**, honey. The species of **houseleek** (Sedum) and **thistle** also produce wax and honey. **Well-tempered** (Origanum) produces good honey, **mint**, **goat's beard**, wax, and honey. **Marshmallow**, the species of **deer root**, wax, and honey. **Horehound** (Marrubium) **devil's bit** (Succisa) **heather (**Erica) and **cow wheat** (Melampyrum Coma purpurascens) yield much honey. **Cow wheat (**Melampyrum luteum latifolium) and blue **cornflower yield** wax and honey. The middle flowers of the latter are balsamic, and bees love them so much that they often go for them when the linden trees are in full bloom, even falling on their buds before they bloom. **White hedge mustard** and **flaxseed** produce a great deal of honey. **Carrots**, **black cumin**, **hemp nettle**, **eyebright**, honey. **Nightshade**, **sow thistle**, **hemp**, **hops**, **roses**, honey, and wax.

Hyssop, **lemon balm**, **lavender**, **rosemary**, lots of honey. The latter three herbs are among the most excellent for bees. From the flowers of rosemary, which grows wild in the fields around Narbonne, bees collect the most delicate honey, which surpasses all others and is sent in large quantities to pharmacies in Germany. **Melissa** is also excellent and is therefore also called the honey flower. **Lavender, melissa, marjoram**, and **thyme** should be used instead of the sucking, foul-smelling boxwood, which has already been banned from most gardens, to border flower beds and paths.

Gamander, **catnip** (Nepeta), honey. **Lavatere**, lots of wax and honey. **Endive**, **chicory** or **oak lettuce**, **storzonera**, **hare's ear**, **lovage**, **fennel**, **aniseed**, **ragwort**, wax and honey. **Winter marjoram**, honey. **Large rudbeckia**, lots of honey and wax.

Borage, or borage, lots of honey. This herb spreads very quickly, like weeds in a garden. It has prickly leaves and, when young, can be eaten in salads and tastes like cucumbers. That is why it is also called cucumber herb. The flower is a beautiful light blue, shaped like a star. It blooms from St. John's Day until winter and into November, as long as the frost does not spoil it. It is one of the most excellent

honey flowers for bees, and should be allowed to grow in all the useless corners of gardens.

Yellow beets, **cucumbers**, and **pumpkins** also produce a lot of honey. Bees are particularly fond of cucumber flowers.

The **sunflower**, lots of wax, honey, and putty. This flower is also very good for bees and serves them well until winter. The seeds yield a lot of very good oil. It could be used to border potato and other fields, as it does not hinder anything and is very useful, both for oil and as food for bees.

Basil, **balsam**, **aster**, some wax. **Fenugreek**, **marigold**, wax, and putty. Large **marigold** (Tagetes), **nasturtium**, **satureja**, honey.

There are also flowers and plants that bees partly detest and partly find harmful. Among those they flee are **chamomile**, **hellebore**, **hellebore**, **dog's mercury**, **wolf's milk**, and **wormwood**. Wormwood does not harm them, but it is against their nature. **Tulips** kill bees because they close slightly in the afternoon and the bees trapped inside cannot escape due to the smoothness and curvature of their leaves, and therefore die; however, there is no reason to remove them from a garden where bees are present.

Bees collect a lot of honey from the **imperial crown**, but it is said to have harmful properties. They also suck honey from the poisonous **aconite** [monkshood], which many people use to decorate their gardens, and this honey is also considered harmful. They do the same with **delphiniums**, which are believed to have pungent and unhealthy properties.

Chapter Nine – Something about bee law

§1 Why Roman law in general and ancient German law in particular can no longer be applied to beekeeping today

What legal scholars in ancient and, to some extent, more recent times have codified about bees and beekeeping is of little use to us today due to changes in beekeeping practices. Roman law ruled fairly in many respects, and some old German laws are based on it; but others, especially Saxon law, deviate even more from it and can in no way be applied to our current beekeeping system. The erroneous provisions of bee law by ancient and various more recent legal scholars stem in part from the old erroneous principle that bees are (according to the expression in the Saxon Weichbild, Art. 119) wild worms, and therefore res nullius, quea occupanti cedit; which could well have been said in the past, when bees were kept only in forests without any treatment and were regarded as wild animals. However, those who had the right to hunt also had the right to appropriate the bees, the honey, and the swarms they found. The erroneous legal rulings arose partly from a lack of understanding of beekeeping and the difference between domestic and wild bees.

The best and most reliable information we have on this subject can be found in the excellent and highly regarded work published in Berlin between 1775 and 1778 by Joachim Pauli in four volumes under the title: Oeconomia forensis, oder kurzer Inbegriff derjenigen landwirtschaftlichen Wahrheiten, welche allen sowohl hohen als niedrigen Gerichtspersonen zu wissen nötig (Agricultural Economy, or a Brief Summary of Agricultural Truths that All Judicial Officers, Both High and Low, Need to Know).

§2 Who has the right to appropriate a young swarm of bees when it settles in a third area

In practical beekeeping, the main question that arises is who has the right to seize a young swarm of bees that has been drawn away and to appropriate it if it settles in a third area?

Since in our times the ownership of all things is much more clearly defined than it used to be, the questions and doubts raised by the ancients in such matters mostly disappear of their own accord, especially since they often concern such trifles that, under the current legal system, it is unlikely that a lawsuit between reasonable people would arise. Accordingly, as the famous author of Oeconom. forens. says, it is an almost awkward question in law whether the owner can pursue a swarm that has been drawn away from his apiary and, if he finds it, capture it. It will always remain a natural consequence, since the ownership of bees is universally established in our day, that their brood, which, in the language of bee experts, is called swarms, also belongs to the owner of the bees, as Roman law already decides this matter in such a way that he may do so as long as he keeps the swarm in sight. Nothing could be more contrary to natural justice almost contrary to reason itself, than when some legal scholars, based on a misinterpretation of Saxon law, are of the opinion that a swarm of bees that has moved away and settled on the land of a third party cannot be pursued and reclaimed because the third party is entitled to refuse the owner of the bees access to his land. (*)

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(*) Saxon law states: "If a swarm of bees flies from a man's house or farm to his neighbor's, he must keep the swarm closer than the one who follows him, for the bee is a wild worm. Weichbild Art 119.

However, civil law deviates from this, because according to civil law, my neighbor must suffer that I enter his property in order to recover my wild animal." Locam. quaest. Justin. 122.

A ruling by the Leipzig Schöppenstuhl (court of lay judges) from 1663, following consultation with Hieronymus von Wingwitz, states: "Although the aforementioned Franz took a swarm from an oak tree behind the rectory in your courts in Briesen and carried it away. However, since it cannot be determined from your question whether you caught such bees and brought them into your possession, no theft could have been committed against such wild and uncaptured bees under the law; and therefore the prisoner is released from his imprisonment on a charge of ordinary disorderly conduct, v. R. w." Berlich p.5. Concl. 50. n. 10.
And in Schneidew. ad §14 Inst. de. rer. div. & adq. ear. dom. it says: "If a young swarm flies away without the owner's knowledge, anyone may catch it, even if the owner saw it and could prove that it came from one of his beehives."

If a calf that has fallen from my cow strays onto someone else's land, no one would be so foolish as to refuse to let me retrieve it. But why should the same not apply to a swarm of bees that has flown away, the ownership of which is as certain to me as that of the calf? No reasonably plausible explanation can be given for this.
The old German laws, which simply assign a swarm to the person in whose territory it settles and to whom the tree or the object to which the swarm attaches itself belongs, no longer apply here even if it is only on a branch that hangs over his garden and from which he otherwise enjoys the fruit that falls, an opinion based on §14 Inst. Tit. de rerum divisione et acquirendo aerum domino, which is no longer applicable in our day, in which it is claimed that quod apium fera natura fit. Both forest bees and garden or house bees now have their specific owners. The former are now attracted to hollow trees or hives carved out for this purpose and belong to the owner of the forest, and no one has the right to climb them except the owner himself or those to whom he leases the use of the bees; as was the case in the past, when the Zeidlergesellschaft (beekeepers' association) was formed, which paid a certain rent in honey and wax to the forester or other landowner of the forest. Domestic and garden bees, however,

belong to our domestic animals and are treated by farmers in the same way as tame animals, kept in special containers and bee hives made for this purpose, and cared for and maintained for the production of honey. And how could the right of ownership of these bees be disputed, since they become ours either through purchase, exchange, gift, inheritance, or the like, and are also divided in inheritance like other livestock and movable property? If I have the right to pursue any of my domestic animals that have run away onto my neighbor's land and to seize them or demand their return, why should I not be able to capture my young swarm wherever it may be found? The same applies if it has only become attached in a foreign area. No reasonable person would declare bees wild because they fly around everywhere in search of food. According to the old Roman legal expression, they have animum reuertendi, like the pigeons that fly around in the fields during the day and return to their dovecote in the evening, and as such are to be regarded as the true property of those who keep them, care for them, and feed them in winter. Just as geese and chickens do not cease to be the property of their owner when they fly into the field, so the farmer does not reasonably lose his right of ownership of his bees when they roam in fields and forests or when their brood and swarms fly away.

However, the situation is different for a swarm of bees found somewhere. If the owner or possessor of the beehive from which it was taken does not pursue it, and it is therefore not proven that it came from one of his beehives, it belongs to the person who discovered and found it, provided that he takes it in such a way that it does not cause damage to the other party's property, tree, house, etc., to which the swarm has attached itself, or that any damage caused is compensated.

§3 What is equitable and lawful with regard to robber bees

It is well known that there are often robber bees among bees, which, especially in spring and towards the end of summer, rob the beehives of third parties and not only carry away the honey, but also often destroy the entire bee colony

. Due to a lack of understanding of this matter and the nature of robber bees, various old legal rulings on this matter have also been completely erroneous. Those legal scholars who believed that robber bees were a special species of bee that constantly carried out their harmful activities advocated burning and completely exterminating them. However, since the situation with robber bees is quite different, and since they sometimes arise from the best bees that have not previously robbed, without it often being possible to discover the cause, and since they forget their robber habits even after their location has been changed or they have been removed to a distant area, such complete extermination is unnecessary and unjust.

Furthermore, fortunately for beekeeping, there are few bee owners who know how to make robber bees or who are so unscrupulous as to do so (who should rightly be punished severely if it were easy to prove that they had done so) but rather that the owners of robber bees cause such damage through disorderly management of their beekeeping, through untimely or excessive cutting of the honey and deprivation of the bees, thereby forcing them to seek their food elsewhere; it is therefore fair and just that they should not only be required to make good the damage caused, but also, in order to prevent further inconvenience, that such robber bee hives should be removed to a place some distance away for a period of one year. After this period, however, they may safely be returned to their former location, as they will no longer rob, both because they will have lost the habit of flying to their former prey during this time and because the old bees that robbed them will have mostly died, since it is well known that the life span of a worker bee does not exceed one year.

With regard to compensation for damage caused by replacing a robbed bee hive, consideration shall be given to whether and to what extent the owner of the bees that have been robbed is himself to blame for the robbery, whether this is due to inexperience and poor treatment of the bees or to carelessness with the honey and incorrect feeding of the bees.

§4 In which cases one is liable to compensate for damage caused by bees to others

Experience teaches that bees sometimes cause considerable damage when they are knocked over or otherwise provoked, and it is not uncommon for horses and other animals to lose their lives as a result. Every careful beekeeper will therefore ensure that his bees are kept in such a way that livestock cannot easily reach them and that neither they themselves nor livestock or humans can be harmed. It is also prohibited by law and state regulations to place beehives very close to public roads or in places where livestock can easily reach them and cause damage. Anyone who is guilty of such damage through carelessness or negligence: anyone who has placed their bees too close to the road, or has not properly fenced or secured their garden where the bees are kept, is obliged to compensate for any damage that may have occurred. However, if the place or garden where the bees are located is adequately secured and an animal nevertheless breaks through unexpectedly and is injured by them, or if similar damage is caused by a swarm of bees (the latter case being extremely rare), no compensation shall be awarded.

§5 On the punishment of bee theft and damage to bees

According to the law, bee theft was often punished severely, sometimes with expulsion from the country, sometimes with imprisonment, and, depending on the nature of the offense and the magnitude of the theft, with hanging. According to Saxon law, p. 4. c. 36, bee thieves were sentenced to expulsion from the country. The Leipzig legal scholars issued the following ruling: *"The aforementioned woman confessed that she climbed over the wall at night while her husband was asleep, cut out the two beehives, and took the honey from them. thereby damaging the beehives, estimated at 5 thalers, to such an extent that they will be difficult to recover, as was also the case with the honey alone found in the possession of the accused, which was worth 18 grams, etc., she is hereby punished for the theft committed*

and known theft. B. R. W." Depending on the nature of the theft, bee thieves were punished like other poachers. Costit. Eleckt. Sax. 36. p. 4. However, if the value of the stolen goods did not exceed five gold guilders, such thieves were punished either with imprisonment or expulsion from the country or even with stoning. Berlich.
p. 5. concl. 50 n. 7. However, Elector August made the following restriction in this case: *"Theft of bees and honey shall not be punished in our lands more severely than other thefts, and the severity of Saxon law shall not be applied in this case*." Par. IV. Constit. XXXVI.
Anyone who harmed another's bees had to replace them and was punished with a fine or other arbitrary punishment. Brunnem ad D. l. 49 de L. Aqu. This is the wording of a Leipzig responsum from 1620. "*When H. H. placed a bowl of honey, presumably mixed with other things, in his garden on a warm, sunny day in the month of March, and his neighbor's bees smelled it, flew to it frequently, and attached themselves to it, he crushed and killed many of them with a piece of wood, but in the meantime, to prevent his own bees from flying there, he kept them in his barn, covered with cloths, and when his neighbors complained about this, he only said that he had thought they were robber bees that wanted to steal his bees' honey, etc. Thus, the aforementioned H. H. is obliged to compensate his neighbors for the loss of the bees and the resulting smoke, as each will attest, and may be punished arbitrarily with either 3 or 4 days in prison or a reasonable fine according to his means, provided that the fine does not exceed one silver shilling. V. R. W*." Damaging or stealing bees that are kept within walls or secure places increases the penalty. The more secure and safe the places are, the more serious the crime. Arg. §. 10. Inst. de rer. diu.

§6 Whether and when bees can be considered as an allowance (item of inventory)

Whether and when bees can be considered as a bequest (item of inventory)? (*)

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(*) See Oeconom. forens. second volume, fourth main section § 201.

Bees should not be forgotten among the livestock, especially if their use has been included in the purchase price. However, if no apiary is included in the purchase price, it goes without saying that the seller may then take the existing beehives with him.

In purchases that are not based on a previous notice, but where the bees have been included in the purchase, the existing bees always belong to the buyer, because it can be assumed that the contrary can never be proven to him due to the lack of a purchase notice.

§7 On the difference between house bees and forest bees, and that the former, when the fief is separated from the inheritance, belong to the allodial heirs, but the latter must remain with the fief

On the difference between house bees and forest bees, and that the former belong to the allodial heirs when the fief is separated from the inheritance, but the latter must remain with the fief (*).

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(*) Oecon. forens. Fourth volume, 7th main section § 125.

That beehives belong to the estate (Allodio) and that the feudal successors cannot claim any rights to them in any way has been unanimously established by legal scholars. This opinion is also entirely consistent with the general principles adopted in this separation of fief and estate. For bees and beehives are just as much as sheep and cows

undisputed appurtenances, and in their nature far less necessary than the latter for the maintenance of the fief.

However, it is not unknown to those who have some knowledge of this branch of agriculture that in many places where there are large forests, the main bee population consists of so-called wild bees.

Experience shows that in such forests, especially spruce forests, bees tend to nest in large numbers in hollow trees, where they build their hives and store their honey. It is likely that these now wild bees originated from domesticated swarms that were driven away due to a lack of sufficient supervision. In the meantime, where they are not disturbed, these bees have multiplied in many places to such an extent that they bring the owners a great deal of income.

It is obvious that these forest bees are quite different from ordinary house bees, and that the opinions expressed by legal scholars regarding the latter do not apply to the former. If the landowners were allowed and willing to take away these forest bees as part of the allodial inheritance, it would be a natural consequence that they would also be allowed to cut down the trees in which these bees had made their homes. However, this can never be considered permissible according to common sense.

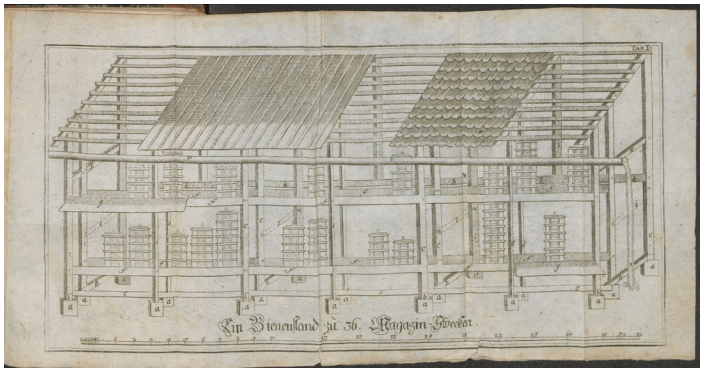
From the economic description of these bees given so far, it is quite clear that they are nothing less than appurtenances. They are, rather, indisputable accessories to the trees they inhabit, because if they were to be taken away by allodial heirs, the trees could no longer remain trees. Since the trees of the forest are to be regarded as indisputable appurtenances of the fief, but the appurtenances of the parts are at the same time appurtenances of the whole, it is clear to everyone that such forest bees cannot be separated from the fief and therefore cannot become part of the inheritance.

It is all the more necessary to make a clear distinction between house bees and forest bees, as otherwise the general opinion of legal scholars that bees are the property of allodial heirs could easily give rise to all kinds of useless disputes, even impossibilities, in places where forest bees are also present. It is very

It is likely that the legal scholars were not aware of the aforementioned difference between domestic bees and wild bees when they formed their opinion, as otherwise, being reasonable men, they could not possibly have overlooked it.

May the Lord of Nature, whose goodness fills the earth and whose wisdom and power are proclaimed even by the smallest insect, favor the useful and pleasant practice of beekeeping with his blessing.

Copper plates



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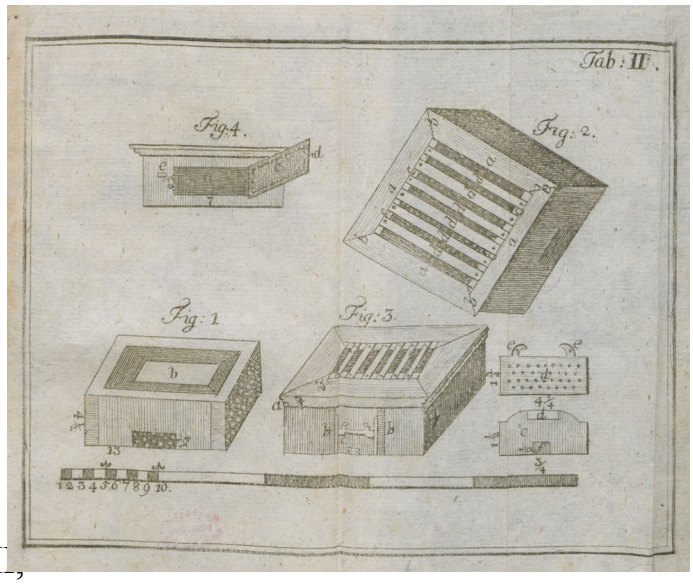

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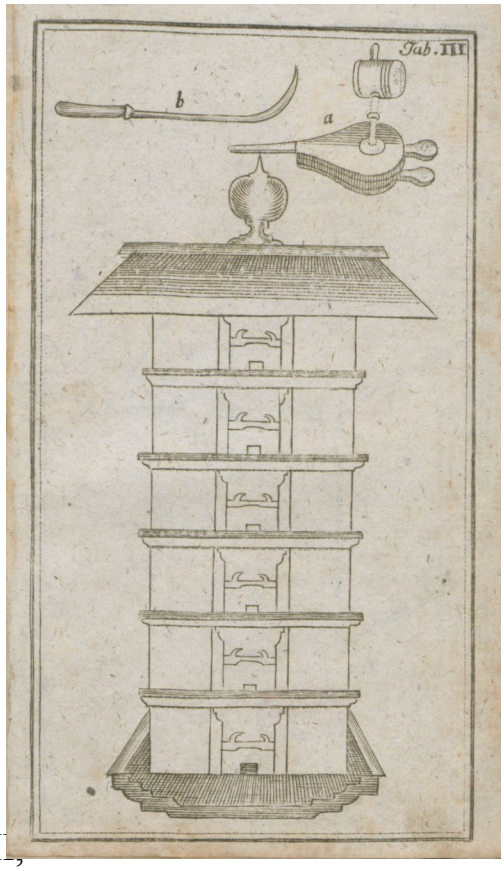

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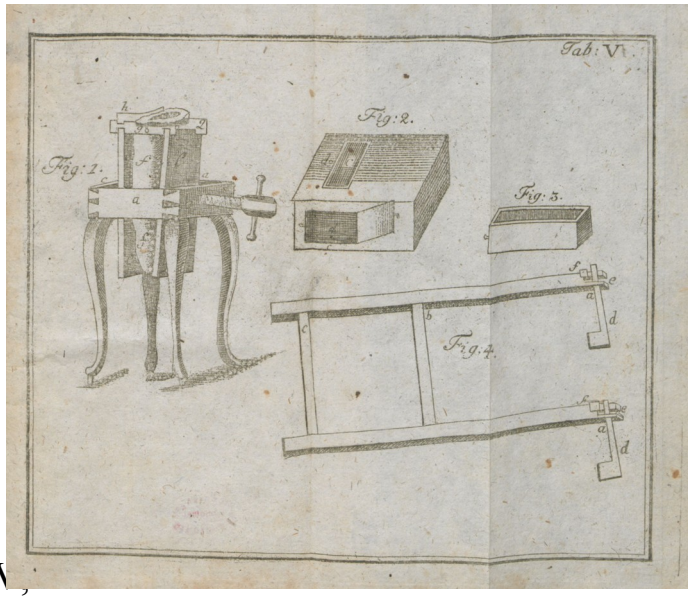
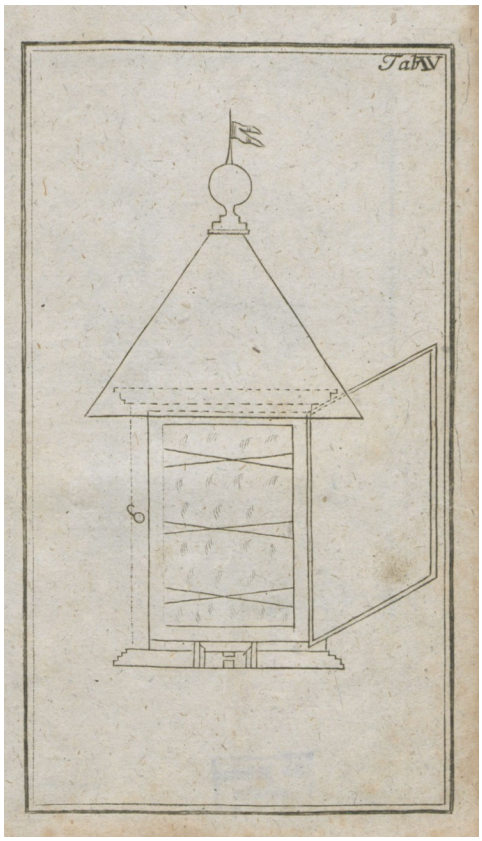
Copper plate IV





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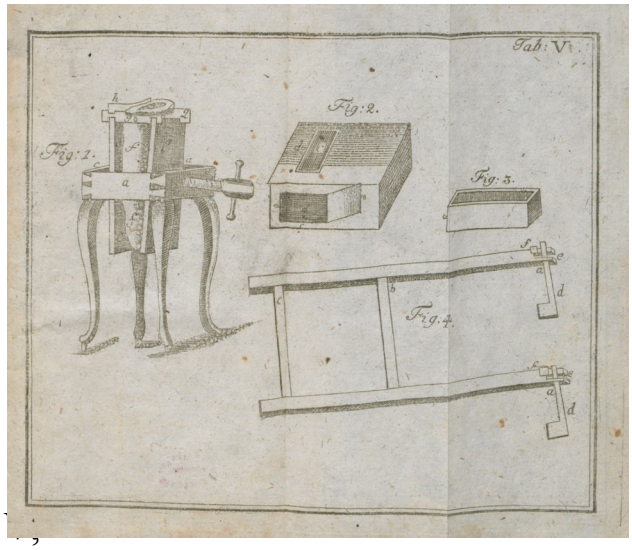

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Transcriber's notes

Johann Ludwig Christ – far ahead of his time

Actually, I just wanted to read a little bit of this book, as I am interested in natural beekeeping, and in particular the "Warré method." I was vaguely familiar with the name Johann Ludwig Christ and his magazine hives, and I wanted to know how the construction of the Warré hive differs from the Christ hive. But my quick read turned into something more. The "instructions" captivated me so much that I started taking notes as I read. An obvious idea was then to make the work available to the public in digital form. (*)

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(*) There is obviously already a transcript, created and published by Eric Zeissloff in 2006, but this is only available in printed form, if at all. Unfortunately, I have not yet been able to obtain a copy.

Third edition as a basis

I chose the third edition as the basis for the transcription. This edition (and also the fourth, which does not differ significantly from the third) was published by Christ himself during his lifetime and is therefore authentic.
In later editions, the content was partially rewritten by the editor, and certainly not always to Christ's advantage or in his spirit. One example of this is that Christ, along with other naturalists, already suspected that drones were male bees, contrary to popular belief. The editor of the fifth edition in 1829, a certain Heinrich Friedrich Oehme, completely negated this statement without any reference to it.

Christ in the original from 1798:

"The other species of bees, which are found in a hive, but not at all times of the year, are the drones, or bumblebees, or as they are still called by some, brood bees, because it was formerly believed that they had the task of incubating the young bees, but this is not the case."
"The drones are considered to be the males of the queen and make the eggs of this queen bee fertile. I have never had the good fortune to see them mating with her, but other naturalists, especially Mr. von Reaumur and Mr. Riem, claim to have witnessed it."

Oehme's version from 1829:
"The other species of bees, which are found in a hive, but not at all times of the year, are the drones ... or bumblebees, or as they should rightly be called, brood bees, because the hatching of the young bees seems to be their main and perhaps their only task.
In general, drones were formerly considered to be the males of the queen, to whom their fertilization was attributed. However, recent research and experience have shown this opinion to be erroneous, and it is now well established that drones are not male and therefore cannot fertilize the queen bee."

This small example shows how progressive Christ was in his thinking and actions, how far ahead of his time he was, supported by careful observation, precise study, and impartiality.

Sources for the transcript and illustrations

- Text: https://archive.org/details/bub_gb_XJ9bAAAAMAAJ
- Copper plates urn:nbn:de:bvb:355-ubr14634-7

Adaptations to the content

- Since the present book is more or less a factual text, I have taken the liberty of adapting various passages that would otherwise be difficult to understand to the current German language.

. However, I have only done so where I believe it actually improves the flow of the text.

- The spelling and word usage have been brought closer to modern usage where this seems sensible for the reader's understanding. Expressions that are no longer in use today but whose meaning is still clear when read have deliberately not been changed.

Units of measurement and coins

I am not exactly sure which of the possible equivalents correspond to the measurements given in the book, especially the length measurements. In one place, but only one, Christ writes of Parisian inches ("*An ordinary queen bee of medium size, which is 10 to 11 Parisian inches long when alive, is therefore only 1 inch longer than a dead worker bee, which is 5½ to 6 inches long when dead, and at most 7 inches when alive and young*"). Assuming that all inch, shoe, and line measurements refer to this, it is not necessarily the case that the conversion

- 1 Paris foot ~ 32.48 cm =
- 12 Paris inches (~ 2.71 cm)
- 144 Parisian lines (~ 32.48 cm)

  (Source: http://www.daniel-stieger.ch/masseinheiten.htm)

at the time of the publication of Christ's book, as the uniform metric system was not introduced until 1799.

However, based on the conversion of 1 foot = 32.48 cm, the magazine building presented here is indeed enormous. "The front posts are 9½ feet [3.09 m] high, not including the tenons with which they are mortised into the sills and rafters.
The rear posts are 11 [3.57 m] high, 3 inches wide, ..."

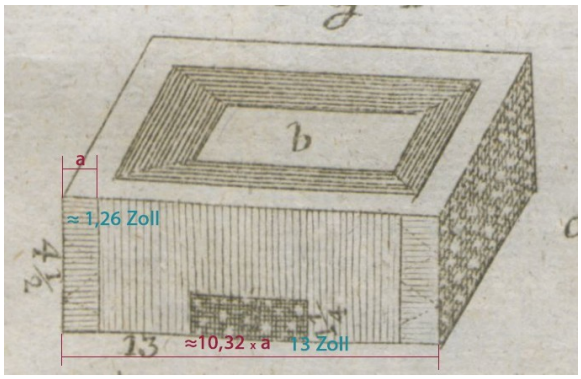
Note on units of length

My guess is that Christ, even though it seems very strange, actually used two different units for the inch. For all dimensions except one, which he explicitly referred to as the "**Paris** inch," the Frankfurt inch used during Christ's lifetime in his region would then come into question.

the Frankfurt inch commonly used in his region during Christ's lifetime. I mean this for the following reason.

The dimensions of the magazine boxes are given as 13 x 4 ½ inches
"*The width of these two half planks determines the* ***height of the attachments, which*** *is* ***4½ inches****. They are then cut into pieces* ***13 inches long*** *and zinc-plated according to Fig. 1."*
Unfortunately, Christ does not provide any information on the wall thickness, possibly because this measurement was implicit for "planks," "double planks," and "half planks" at that time. H. F. Oehme, the aforementioned editor of the 5th and 6th editions, writes:
"*The author has neglected to specify the thickness of the boards from which the magazine boxes are to be made. And yet this is a very important consideration. If boards that are too thin are used, perhaps only 1/2 or 3/4 inch thick, the boxes will easily warp and twist, develop cracks and gaps, and will not provide a warm winter home.....Therefore, if these problems are to be avoided, posts at least 5/4 or 6/4 inches thick must be used to make the boxes, which will of course make them much more expensive than Christ had assumed."*

From this, and also from the proportions of the magazine boxes shown on copper plate II, I conclude that the thickness of the planks used by Christ must have been somewhere between 1 and 1¼ inches. If figure I on copper plate II is to scale, the wall thickness was 1¼ inches, as can be seen in the illustration below.



Christ gives the volume of the magazine boxes as 4 measures.

"*...since each attachment has the same dimensions and experience has shown me that a full attachment, which* ***holds 4 measures when empty****, yields 2 measures of honey and 1½ pounds of wax."*

The conversion factor from measure to liter is generally given as 1.793.
Accordingly, 4 measures correspond to ≈ **7.17 l.**

If we now take the **Paris inch** (conversion factor 2.71) as the basis for converting the dimensions, we get

with a wall thickness of 1 inch:
Width 13 inches * 2.71 = 35.21 cm - 2*2.71 cm= 29.79
cm Height 4.5 inches * 2.71 = 12.2 cm
29.79 cm * 29.79 cm * 12.2 cm = 10827 cc = 10.86 l

and with a wall thickness of 1¼ inch:
Width 13 inches * 2.71 = 35.21 cm - 2*3.39 cm= 28.43
cm Height 4.5 inches * 2.71 = 12.2 cm
28.43 cm * 28.43 cm * 12.2 cm = 9861 cc = 9.86 l

However, if we use **Frankfurt inches** (conversion factor 2.37) and a wall

thickness of 1 inch, we get:
==Width 13 inches * 2.37 = 30.81 cm 30.81 cm -
2*2.37 cm = 26.07 cm Height 4.5 inches * 2.37 = 10.67
cm
26.07 * 26.07 * 10.67 = 7252 cc = 7.25 l

with a wall thickness of 1¼ inch:
Width 13 inches * 2.37 = 30.81 cm - 2*2.96 cm= 24.89
cm Height 4.5 inches * 2.37 = 10.67 cm
24.89 * 24.89 * 10.67 = 6610 cc = 6.61 l

Conclusion

The calculations clearly show that, assuming all lengths in the book refer to Parisian inches, the volume calculated from the dimensions differs significantly from the value given by Christ, namely

+27.3% or +34.0%. The magazine boxes would then have a volume of at least 5½ measures (with a wall thickness of 1¼ inches).

When using the Frankfurt inch, however, these deviations (+1.1% and -8.4%) are within the tolerance range. Although we cannot know whether the volume specification of 4 measures is a rounded value, my conclusion is clear. The lengths given in the book cannot be expressed in Parisian inches, but either in Frankfurt inches or another inch format with a conversion factor between 2.4 and 2.5.

If Figure 1 on copper plate II is to scale **and** "4 measures" is an accurate value for the volume of the magazine boxes according to Christ, this results in a conversion factor of around **2.43**. To achieve a volume of 4 measures in a magazine box with a wall thickness of 1¼ inches, the following dimensions would be required:

Width 13 inches * 2.43 = 31.59 cm - 6.075 cm= 25.52 cm

Height 4.5 inches * 2.43= 10.94 cm

25.52 * 25.52 * 10.94 = 7125 cc = 7.12 l

There are further indications in the book that could confirm my assumption

- The unit of measurement "x lines of Paris inch" is mentioned only once, and only after Christ has used the term "inch" (without further specification) 24 times. It is at least unusual that a unit of measurement, if it is needed, is not defined when it is first used.
- Christ uses only six wooden strips as guides for building the honeycomb. If the magazine boxes are built according to Parisian inches, with an internal width of about 29 cm, this will probably result in wild building. The use of Frankfurt inches results in an internal width of 25 to 25.5 cm, which seems more practical (although the distance between the honeycombs is still relatively large).
- The apiary described in the book seems a little oversized to me when calculated according to Parisian customs/shoe sizes.

Why did he do that?

- The measurements for the apiary, magazine boxes, etc. serve more or less as a blueprint for professional workshops at the time. It is possible that Christ therefore used a commonly used unit rather than the academic one.
- The measurements for the bees refer to **lines** of a Paris inch, which was possibly the unit commonly used by "insect dissectors" and other naturalists in Christ's time.
- Christ may have taken the relevant passage from one of the naturalists of the time, as Mr. Eric Zeissloff suggests: *"Most authors copied from Maraldi, Réaumur, or Lhuillier."* (Source: http://www.dheaf.plus.com/warrebeekeeping/zeissloff_cell_size_de.pdf)

Coin

kr: Kreuzer

fl: Gulden = 100 Kreuzer

Length

Paris inch = 12 lines ≈ 2.71 cm Paris

foot= 12 inches ≈ 32.48 cm

Frankfurt inch = 12 lines ≈ 2.37 cm

Frankfurt shoe= 12 inches= 28.46 cm

Volume

Measure ≈ 1.793 l

Ohm= 80 Measure≈ 143.42 l (Frankfurt am Main)

Weight

Loth ≈ 16.5 g

Pfund ≈ 467.9 g
Zentner= 100 Pfund

Sources for the conversion of units of measurement:
https://de.wikipedia.org/wiki/Alte_Maße_und_Gewichte_(deutschsprachiger_Raum) https://www.chemie-schule.de/KnowHow/Alte_Maße_und_Gewichte_(Hessen)

Stefan Grunert

with a wall thickness of 1¼ inches:
Width 13 inches * 2.37 = 30.81 cm - 2*2.96 cm= 24.89 cm Height 4.5 inches * 2.37 = 10.67 cm
24.89 * 24.89 * 10.67 = 6610 ccm = 6.61 l

with a wall thickness of 1¼ inch:
Width 13 inches * 2.5 = 32.5 cm - 2*2.5*1.25 cm= 26.25 cm Height 4.5 inches * 2.5 = 11.25 cm

with a wall thickness of 1¼ inches:
Width 13 inches * 2.43= 31.59 cm - 6.075 cm= 25.52 cm
Height 4.5 inches * 2.43= 10.94 cm
25.52 * 25.52 * 10.94 = 7125 cc = 7.12 l

This makes it possible to construct a Christmas tree that is largely true to the original. Dimensions of the magazine boxes, rounded for simplicity:

Wall thickness: 3.0 cm
Height: 11.0 cm
Outer edge length: 31.5 cm
Inner edge length: 25.5 cm
Volume: 7153 c c = 7.15 l

6 top bars
Honeycomb spacing:
42.5 mm 7 top bars,
preferred honeycomb
spacing 36.4 mm