The Beeginners Box

By Cameron Crane, Liberty County Beekeepers

BEE SPACE

Rev. Langstroth is generally credited as having as having discovered bee space. A few other people around the same time had noted the bees preference to having control of the open space in their home. Anything less than1/4 inch will eventually get filled with propolis and anything more than 3/8 inch will get filled in with comb. Langstroth designed his hives around this space and behavior. Notice in Langstroth drawing that there is bee space on top, bottom and both sides. This crawl space is important to the bees. Less space in the brood comb means less space to heat or cool and less space to patrol for pests.

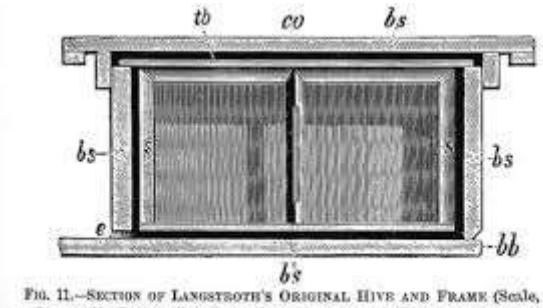


FIG. 11.—SECTION OF LANGSTROTH'S ORIGINAL HIVE AND FRAME (Scale, $\frac{1}{12}$). *co*, Cover; *bb*, Bottom Board; and *e*, Entrance of Hive; *bs*, *bs*, Bee-space; *tb*, Top Bar; and *s*, *s*, Sides of Frames.

So, why is this spacing so important? In the old days of beekeeping the main reason was that bee space made our standard hives with removable frames workable. With this space on the sides, top and bottom the bees don't typically attach the frame to the sides of the box allowing you to easily remove the frame. Frames are also designed to space the comb between them leaving enough (bee space) so the bees don't attach one frame to another. The frames also leave bee space between the top bars for the bees to pass through and move into the next box. This is an important point to why your frames should be pushed tightly together in the box- to maintain the proper spacing between comb layers. Let's look at what happens if you leave a little bit of extra space between the frames. Look at the bottom of the picture on the left- The bees have put propolis between the side boards of the frame. Now they will be a little more difficult to remove either of those frames. Also with that propolis there, even after your next hive inspection when you loosen those frames from each other, you won't be able to slide them back together tightly so the bees don't "re-glue" them back together. With that little bit of extra space, it will be harder for the bees to keep the brood warm in the winter months. I've learned some of this the hard way. I've learned when I finish putting the last frame back in a box, I always put my hive tool at one end near a corner between frame and box and give it a twist to be sure all the frames are tightly together and repeat at each corner. See on the right what happens when you leave a lot of space. Those two frames are going to be hard to remove and will make a mess of things for the bees to fix. Would you not rather your bees are gathering nectar and pollen, taking care of the queen, or raising more bees instead of spending time building bur comb or propolis up extra small spaces? We make the bees redo this work when we break that bur comb apart during inspections. As you find these situations in your hive- clean them up and get those frames pushed back together closely.

Those darn Small Hive Beetles: Here in Texas we are all dealing with small hive beetles. Our bees do what they can to run them off. Any extra space in the hive makes it harder on the bees. Maintaining good bee space helps. If you build any of your own equipment, keep those sizes in very close tolerance to maintain proper bee space. Don't create small gaps with saw cuts that give the beetles a place to hive or lay eggs. I run a small bead of glue along the inside of my boxes corners to close off any small gaps where the wood comes together.

Langstroth style hives have bee space between the top and bottom of the frames. Box designs from different manufactures will place this bee space either under the frames or on top with a deeper dado cut for the frames to rest on. It is best to stay with the same manufacture so that as you stack boxes on the hive the space between top and bottom is correct. It seems more manufactures place this bee space below the frames. In the cut-away picture on the left, the top of the lower frame is almost in line with the seam between the boxes. Thus the bee space is below the frames. I have found this a problem with hive beetles on the top box. There is then too little space over the frames in the top box. The bees cannot get in there to chase off the beetles unless you are using an inner cover that creates a little more space. The first year I was dealing with hive beetles I was using a solid inner cover or no inner cover. I found that beetle traps in the top box to be totally ineffective- I thought they didn't work. I discovered this was because there was not enough space for the bees to chase the beetles into the trap. I added a few spacers (like a popsicle stick) to hold the cover up a little more- Wow, a week later I had beetle traps full of hive beetles! Make sure your set-up allows for bee space (1/8"-1/4") above your frames in the top box.

That should cover the basics of bee space…. But then there is an area of beekeeping that gets more in depth. Using supers with 9 or even 8 frames for greater honey production. I've not seen any studies or data, but when commercial beekeepers tell me that they get more honey out of a super with less frames, I figure they know what they are talking about. Over and over again I read: when adding a super with just foundation (no drawn out comb) put in all 10 frames. The bees will draw out the comb more evenly on both sides. In following year, with less than 10 frames in the super, they are spaced out and the bees will draw the comb out further making it deeper. The greatest advantage to having fewer frames then 10 in the supers is that the comb extending out past the frames is easier to un-cap and provides more wax. Even the bees believe in wider comb when storing honey. I've done many removals where the outer combs are packed with honey often 2" thick- sometime more than that. Brood comb in natural hives is also much thinner and closer together.

I heard a beekeeper say that he uses 9 frames in his brood when he is using 9 frames in his super. I was a little shocked at the idea. The reasoning was that it keeps the frames lined up between lower boxes and upper boxes thus making it easier for the bees to move from one box to another.

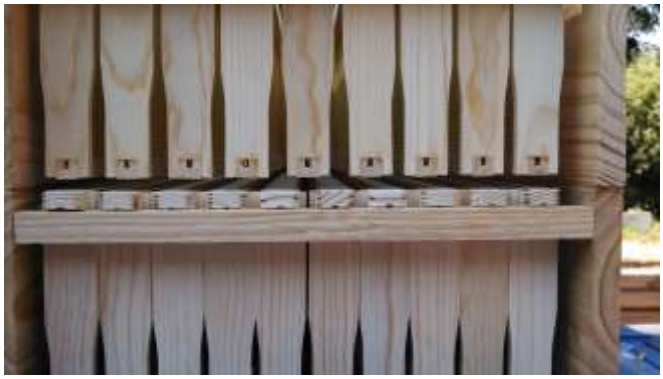
I went to researching the whole 9 or 10 frame brood configurations. Wow, what a can of worms.... it's a little more complicated than just the pros and cons of 9 or 10 frames. It seems that a number of people run 9 frame brood boxes with frames all put together in the center, or to one side. Then you have those that shave down their frames a little bit so that they are "more naturally" spaced and putting 11 frames in the brood boxes. Holy cow! Yet, another choice. Bottom line what is the best choice…

After my research of this subject, I am still dead set that 10 (or 11) frames in the brood is the proper way to go because you are maintaining bee space. I'd decided this was a good subject for an article. First let's be clear, when talking about supers- there are a number of opinions about the number of frames to put in a super- BUT, the "general" consensus is to start a new super with 10 frames: that is one with just foundation, let the bees draw out foundation (build comb) while there are 10 frames. This helps keep the bees making comb that is more even and straight across the frames. The next year when you are adding supers with frames of drawn out comb, you pull one and have only 9 frames and space then out.

As best as I can tell, the most common set-up if a beekeeper does not stay with the traditional 10/10 in all boxes is to have 9 frames in the supers and 10 in the brood. Most beekeepers seem to prefer using ten frames in the brood boxes—and for good reasons. Using 9 frames in a brood box also has it's own split: 9 frames spaced or 9 frames together. Those running 9 frames together do so simply for the reason that it is easier to remove frames from the brood box and keep the frames pushed close together for the reason those who run 10 frames in brood boxes- it's better not to have brood frames spaced out. I don't see the issue or problem doing inspections with 10 frames in a brood box. I don't want to lose a frame of brood and I know the bees will eventually fill that extra space with bur comb if you only have 9 frames in the brood box.

I found the argument interesting, that it is harder for the bees to travel from a 10 frame box(brood) to a spaced 9 frame super. So I went on another research binge. This issue has been going on for over 120 years! It seems the frames were made wider when the whole removable frame hives started in the mid 1800's. By the end of the century many beekeepers had experimented and found frames closer together had advantages and made beekeeping easier to manage, quotes from the days of old - as found on Michael Bush's website: "Frame—As before mentioned, each stock hive has ten of these frames.... The width both of the bar and frame is 7/8 of an inch; this is less by 1/4 of an inch than the bar recommended by the older apiarians.
Mr.Woodbury—whose authority on the modern plans for keeping bees is of great weight—***finds the 7/8" bar an improvement, because with them the combs are closer together, and require fewer bees to cover the brood.*** Then too, in the same space that eight old fashioned bars occupied the narrower frames admit of an additional bar***, so that, by using these, increased accommodation is afforded for breeding…***"—Alfred Neighbour, The Apiary, or, Bees, Bee Hives, and Bee Culture…
"… with frames 7/8 of an inch wide, spaced just a bee-space apart, ***the bees will fill all the cells from top to bottom with brood, provided deeper cells or wider spacing is used in the storage chamber.*** This is not guess-work or theory. In experiments covering a term of years I have found the same results, without variation, in every instance. Such being the fact, what follows?
In answer, *I will say that the brood is invariably reared in the brood chamber—the surplus is stored, and at once, where it should be, and no brace-combs are built; and not only this, but the rearing of drones is kept well in hand, excess of swarming is easily prevented, and, in fact, the whole matter of beekeeping work is reduced to a minimum, all that is required being to start with sheets of comb just 7/8 of an inch thick,* ***and so spaced that they cannot be built any deeper****. I trust that I have made myself understood; I know that if the plan indicated is followed,* ***beekeeping will not only be found an easier pursuit, but speedy progress will be made from now on.***"—"Which are Better, the Wide or Narrow Frames?" by J.E. Pond, American Bee Journal: Volume 26, Number 9 March 1, 1890 No. 9. Page 141. Note: 7/8" plus 3/8" (max bee space) makes 1 1/4". 7/8" plus 1/4" (min bee space) makes 1 1/8".
Now days frames are made such that the side bars space the frames for you, so long as they are all pushed together. Thus, I was further convinced, keep all 10 frames in the brood box. The advantages for the brood box

to be full and together seemed to out way concerns about bees traveling between boxes. I still wanted to see what effect 9 frames in a super would have over a 10 frame brood box. I went to the work shop and put together two boxes with 3 sides and added thin rails to hold up the frames on the short side. Below are the pictures of how they line up with 9 frames spaced over 10 frames tightly together.



Frames at the end were very lined up and moving towards the middle the frames were progressively more off-set. Last year I had running a couple video cameras for several months in the bottom of a hive

testing a Beetle Baffle (another story). Watching many hours of video, I knew the bees seem to move up into the hive on the back wall or side walls of the box. The bees also move around in the hive very quickly, around corners and over baffles and other objects with ease.

As a side note: The bees had a lot of interest in the

cameras at the bottom of the box and the one that had IR LEDs got comb built over the LEDs, where the one without night vision was not combed over.

Seems from their behavior, the bees coming in the hive with nectar to store are not traveling up through the center. So I don't see the off set in the middle much of an issue so I don't buy the argument that it is harder for the bees when the frames are not all lined up from brood box to first super.

I'm hoping you understand the importance of bee space and remember when you are in your hive to push all the frames together tightly. Don't leave extra space or leave frames out unless you are putting on a super with frames of drawn comb. The bees will stay busy so let them be working on their regular tasks and not having to waste time and energy filling in spaces they don't like.

Bee happy and bee safe,
Cameron Crane