The Three-for-Two Split System for Comb Honey Production

by JOHN ALEXANDER HOGG
2225 South 36th Street, Galesburg, Michigan 49053

INTRODUCTION

IN THE EARLY stages of the development of the new modular Halfcomb cassette for comb honey I needed a plan for on-hive testing of the Halfcomb concept.[1]

Numerous systems for comb honey production are described in the journals and in books. Most are procedural descriptions, but some explain the principles thought to be involved as well.

In complexity they range from a pretty much let-alone style of management, which requires considerable experience and the ability to size up the status quo of a hive on quick inspection and act appropriately, to a plethora of procedures, variably detailed, many of which have proven track records.

Rather than select one of these schemes, I chose to look for the best principles and practices among them as well as for relevant art in the literature, with the aim of incorporating these into a single system that would best serve my purposes.

The result of that exercise is embodied in the **three-for-two split system** for comb honey production described here. Basically, the three-for-two split is the rearrangement of a pair of single queen, double-brood chamber hives into three honey-producing hive units (Fig. 1), one double queen consolidated brood nest (CBN),[2] and two single queen, for the nectar season or part of it, after which the original pairs are reconstituted. This is shown schematically in Chart 1.

The three-for-two split concept made it possible to integrate a large number of desirable objectives into one condensed plan for comb honey production and to do so in smooth continuity with the preflow and postflow management practices of most beekeepers.

Most of the commonly used combinations of multiple brood chambers fit nicely into the scheme. Double Langstroth deep, one and one-half Langstroth, or a trio of Illinois depth supers are compatible. However, in this discussion only the double Langstroth depth hive will be used for illustration. (See Chart 1).

I. THE THREE-FOR-TWO SPLIT

The prerequisites for the 3/2 split at any time are 1) a nectar flow in progress or expected, 2) At least 10-12 frames of brood distributed between two chambers, and 3) there should be no swarm cells.

The latter implies that swarm prevention measures appropriate for the season at the time of the split have been taken. However, bear in mind that the 3/2 split is a highly reliable swarm prevention measure in itself, as will be further discussed.

A. THE PROCEDURE

The "flow-targeted" three-for-two split is illustrated in detail in Chart II.

The purpose in Stage 1 of the overall procedure in Chart II is to chase the queen of each of the paired hives into the top chamber and confine them by an excluder. The queen is smoked up into the top deep of each pair (recognizing that the queens may already be there) and confined there by slipping an excluder between the brood chambers. Actually, Snelgrove had recommended this in his book *Queen Rearing*, page 318, as the way to assist in finding the queen of a two-story colony. According to Snelgrove, "With the hive tool raise one edge of the lower brood box from the floor and inject several strong puffs of smoke across the lower edges of the combs — wait three minutes. It is almost certain that the queen will have ascended to the upper brood box. To be reasonably sure (repeat) and wait another two minutes.

Figure 1: An Early Season Three-for-two Split

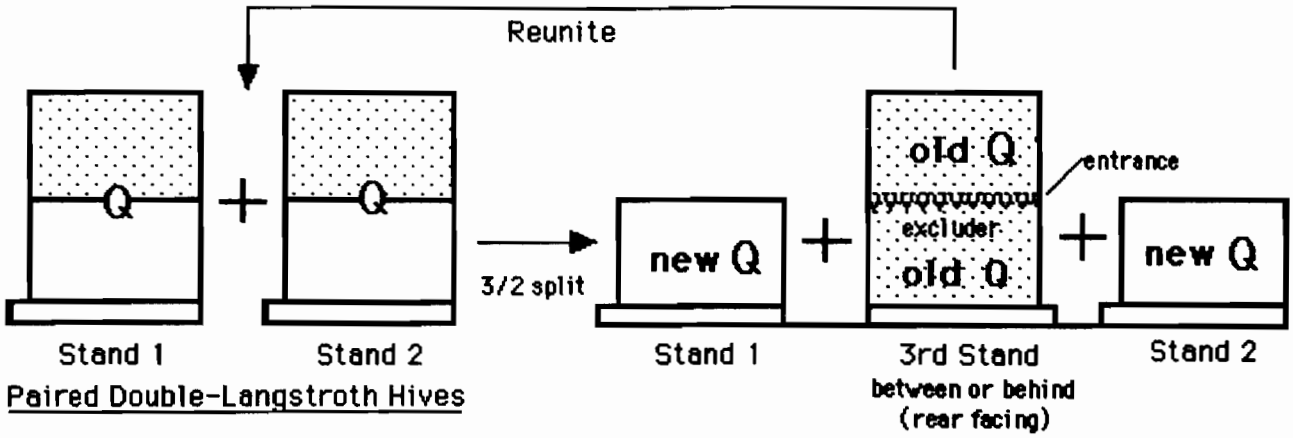

CHART I: The Basic Three-for-Two Split: Schematic

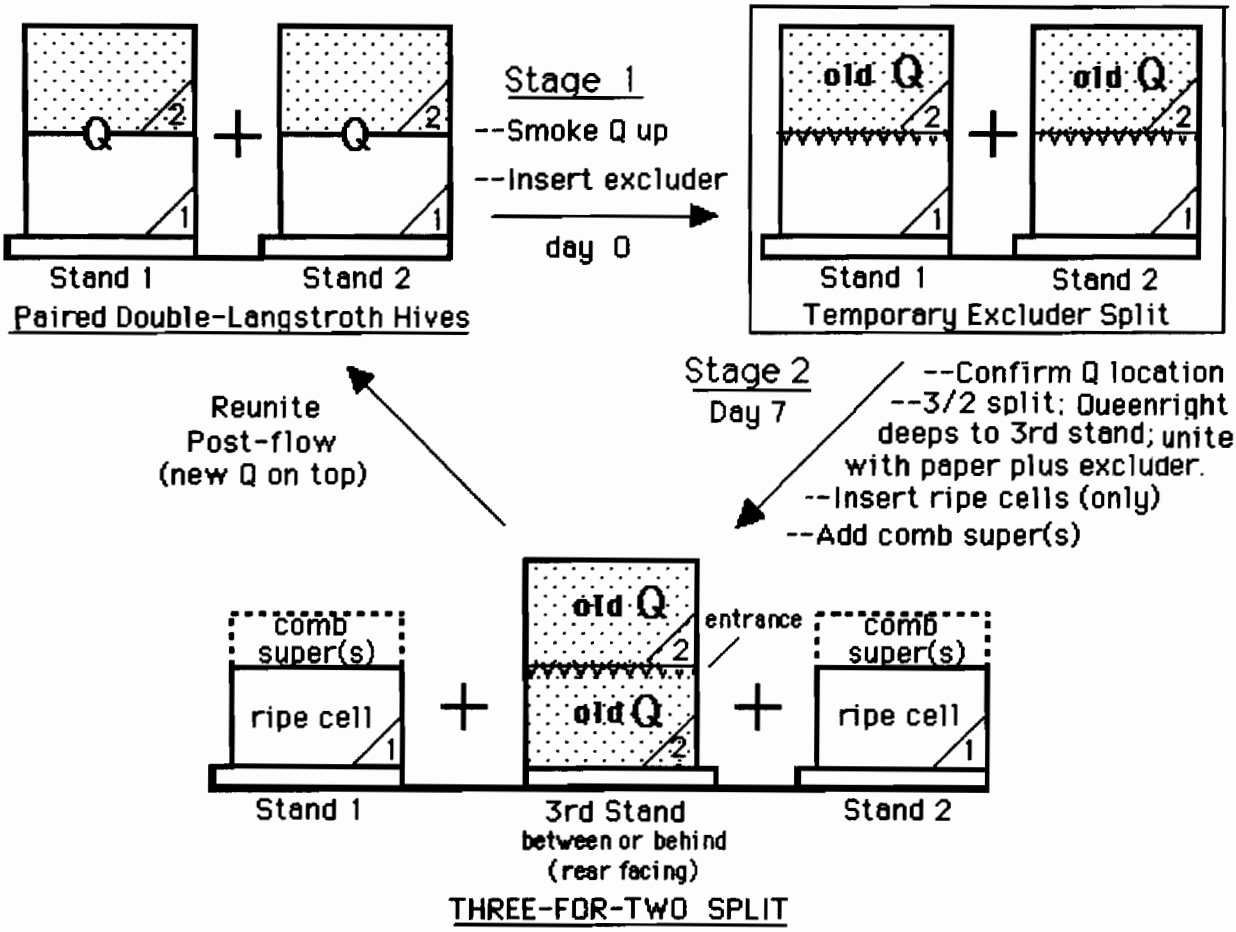

CHART II: "Flow-targeted" Three-for-Two Split; Flexibly timed for the threshold of the swarming season or major mid season nectar flows.

Place an excluder temporarily between the two boxes to prevent the queen from returning. The writer (Snelgrove) almost invariably finds the queen in the upper brood box."

The use of an excluder in this way without the use of smoke is a well known procedure for locating (and isolating) a queen in a two-story hive. Four days after the insertion of an excluder, the top story is examined for eggs; if there, so is the queen; if not, she is below. Thus, if the queen does not "ascend" in some instances after smoking, this will become obvious.

Actually, it is possible to influence the odds that the queen will be on top in advance of the split date by the use of a classical method for swarm prevention — the "deep swap," which is widely used during the spring build up to prevent swarming. About 10 days after such exchanges the queen is usually back up in the top chamber.

Stage 2 is undertaken about seven days later. The first thing is to examine a brood frame or two in the top

chamber for the presence of eggs. If no eggs are found, never mind. She is below, and the split can be carried out anyway. The penalty is a bit more lifting.

The **queenright deeps** are set down onto a spare bottom board between or behind the parent stands and facing rear, being sure to install the excluder and to use the paper method of uniting. A small upper entrance by notching the excluder rim allows drones to escape. This is the double queen consolidated brood nest hive reported earlier.[2] Ripe queen cells from elsewhere are at once installed in the queenless deeps remaining on stands 1 and 2, and the comb supers are added at this time. **Never attempt to use caged queens instead of** cells because the queenless deeps may contain supersedure induced queen cells. The temporary excluder split is actually also a version of the DeMaree plan for swarm control (isolation of the queen brood) in which supersedure cells are often constructed in the queenless portion. For this reason, variations of the DeMaree concept provide the basis for many commercial queen-rearing systems. (See Part III)

The stage is now set in the parent stand hives for the targeted flow immediately following. The field force returns to the single deep parent stands. Brood is up to the top bars to stimulate comb building in the supers. All brood is or soon will be sealed. A flow is in progress so the bees will start work promptly in the comb supers. Until the new queens begin to lay and eggs are hatching, stores are not consumed for brood rearing. This results in better than usual yields of honey during the **targeted flow** immediately following the split — for up to six weeks. The double queen unit on the third stand will be rebuilding its foraging forces, so this is a good place to store extracting supers (if any) until ready for comb supers or until flows are over. This is not all. **The split, itself, is a highly effective swarm control measure.** The double-deep, double-queen unit on the new stand 3 (Chart II) **won't swarm,** because the field force has returned to their parent location. The singles on the parent stand **can't swarm** because they have as yet no queen to go out with a swarm. The new virgins there were timed to hatch **a few days earlier** than the supersedure-induced spontaneous cells there, so all will be destroyed by the virgin for you; and the bees won't swarm when she goes out to mate.

B. TIMING OF THE THREE-FOR-TWO SPLIT

The three-for-two-split can be initiated at any time starting in late spring at the threshold of the swarming season through to the onset of the latest major flow; this excepts the fall flow because of the risk of leaving colonies poorly prepared for winter, even though the three-for-two split for fall flows could be productive.

However, there are two important interdependent considerations which call for a difference in management of splits made at different times. One is the fact that about six weeks following the split there will be a **"new forager hiatus"** in the stand 1 and stand 2 units, due to the **egg laying hiatus** that occurred following the split and lasting until the new queens began to lay. The other is to know the **historical regional nectar profile.** Management of the 3/2 splits can be conducted to avoid the coincidence of a foraging hiatus during the peak flow, as will now be discussed under the headings of Early Season, Main Flow and Delayed Early Season Splits.

C. THE EARLY SEASON (Swarm Threshold) Three-for-two Split

The early season split at the threshold of the swarm season and its associated flows is ideal for full season comb honey production, provided the prerequisites mentioned earlier prevail. In this region (S.W. Michigan) this is in the first half of May during the dandelion/fruit flows. The stand 1 and 2 hives should do well right after the split if late May and early June flows (e.g. berries) are good. In this case the new forager hiatus falls in late June when nectar flows ebb. All three units normally can be expected to have good forager populations in time for the July to early August main flows.

D. THE MAIN FLOW TARGETED THREE-FOR-TWO SPLIT

The main flow targeted three-for-two split is ideal for an abrupt shift from extracted honey production to comb honey production. Optimum conditions are set up for comb honey production in the two parent stands.

The three-for-two split is initiated on the eve of the expected "historical" main flow. In this region that is late June to early July which anticipates of the star thistle flow lasting to near mid-August.

The anticipated "new forager hiatus" in the stand 1 and 2 hives, where comb honey production should excel, falls **beyond** the main flow; the unfinished extracting supers can be placed on the 3rd stand (CBN) double queen hive (or elsewhere) where in a good season they may still be finished when the loss of field force recovers.

E. DELAYED EARLY SEASON THREE-FOR-TWO SPLITS

Early season splits delayed too long, i.e. to within 6 weeks (late May in Michigan) of the main flow so that the new forager hiatus occurs during the main flow (Early July), may still be made if the beekeeper is prepared to make a change after the benefits of the immediate post split flows have been gained.

That change, just before the main flow, is to recombine the three units to form a pair of mixed-match double queen CBN alternative (Chart III-B). This combines and equally divides the foraging age force of all three units into comb honey producing units for the main flow.

F. REUNITING THREE-FOR-TWO SPLITS OR A PAIR OF DOUBLE QUEEN CBN HIVES

At the end of the summer flows the 3/2 splits (or CBN pairs) are reunited to reconstitute the original single queen double deep pairs on the same stands 1 and 2. No paper is needed, but the chambers with the new young queens should always be **on top** to assure survival of the young queen. The requeening process is thus completed.

The bee population will equally distribute between the reconstituted pair. This is the main reason that 3/2 splits using randomly located hives in an apiary is not recommended, even though it can be done. The extra labor and poor logistics of maintaining equalized bee population on reversal contraindicates this.

II. THE SOLELY CBN ALTERNATIVE: THE DOUBLE QUEEN CONSOLIDATED BROOD NEST (CBN) HIVE[2]

Some may wish to use the 3/2 split only as a route to a pair of double queen CBN hives for comb honey production. Two to three weeks after the 3/2 split of Chart II is accomplished, and the young queens are mated and laying in both single deeps on stands 1 and 2, these are paper-united with an excluder between. The other CBN is already established, but it **must now be turned to face front.** The bees will distribute evenly (Chart III-A)

Alternatively, the same 3/2 split can be arranged into two double-queen CBN hives in which the queens are the other way around, i.e. mix-matched (Chart III-B), with the young queen on top just as it should be later after the flow when the CBN's are reversed by pulling out the excluder.

In part I-E the problem of a potenital overlap of a "new forager hiatus" with the main flow in the case of a delayed early season split was mentioned; the above is the procedure mentioned there to offset this coincidence of a main flow with a forager hiatus.

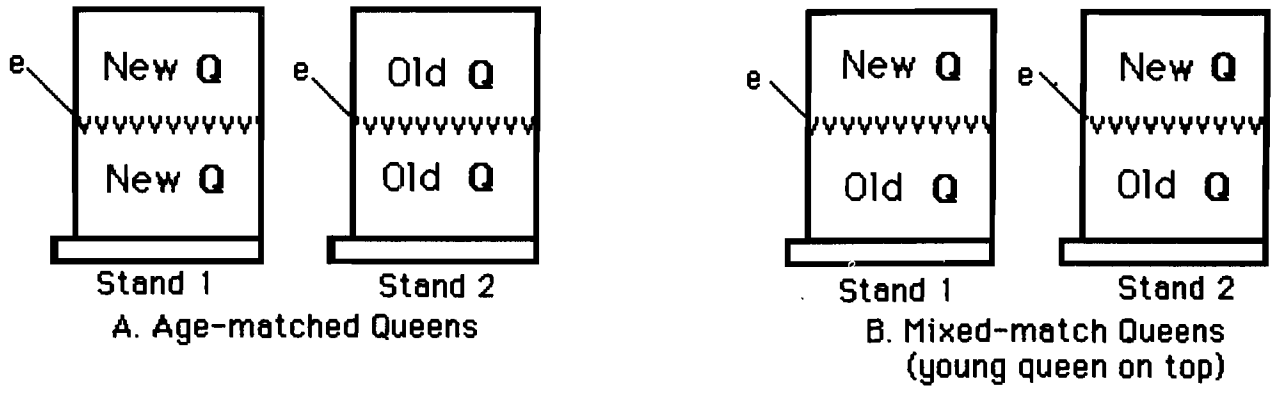

CHART III: Double Queen Consolidated Brood Nest (CBN) Arrangement Showing Queen Combinations

III. IN-APIARY QUEEN REARING

Ripe queen cells can be raised in-hive by an excellent method that is compatible with the 3/2 split system and requires no grafting of larvae.

From a group of 4 to 6 hives which have been paired for the 3/2 split choose one as the breeder to provide cells for all.

The temporary excluder split (Stage 1, Chart II) is performed on the breeder hive two days before the others. After the queen has been chased up by smoke and locked in by the excluder, locate the frame with the queen on it and set it aside momentarily. Smoke a good share of bees back down into the lower deep to concentrate nurse bees there. At once exchange the excluder for a double screen notched for an upper rear entrance. Numerous queen cells will be started below in this queen-over-screen split (Fig. 2).

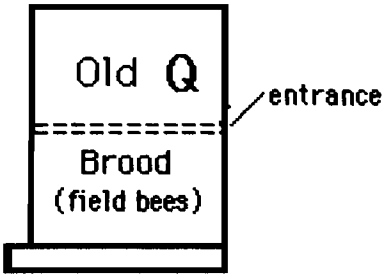

Fig. 2: Queen over screen split for in-hive cell raising

In two days the other hives will also be excluder-split with the queens on top to be left that way for one week — at which time the cells in the breeder hive are 9 days old; the three-for-two splits are completed on that day. The breeder hive (Fig. 2) substitutes for one of the temporary screen splits and also provides the ripe cells for all by whole frame exchange. (See Fig. 3)

Robin Van Berkhout of New Zealand taught me a very clever way of grafting larvae into queen cells using a very small artist's brush that even I could manipulate with remarkable success.

I made use of this in a breeder hive such as the above by pressing a half dozen commercial queen cell cups into one or two of the brood frames just under the top bar at the time the breeder was set up. This was done in the field using larvae from the very frame in which the cells were embedded.

To graft with the brush it is first sterilized and wetted with fresh nectar. The brush is then guided into the cell wall. At the bottom the brush simply follows the contour of the cell and slides under the larvae, which adheres to the brush as it is withdrawn. Pressed against the bottom of the cell cup to be grafted, the brush is finger-twirled to dislodge the tiny larvae. I used a four power magnifying glass with a head band. These cells can easily be cut out for distribution.

A choice for brush-grafting into imbedded cell cups that may be even more compatible with the 3/2 split procedures would be to smoke the queen down under the excluder (a true DeMaree) and do the grafting on cells in the top deep where progress can be readily watched and ripe cells removed more easily. I believe that this would be better for mid-season 3/2 splits when the colonies are truly strong enough to build good cells in a

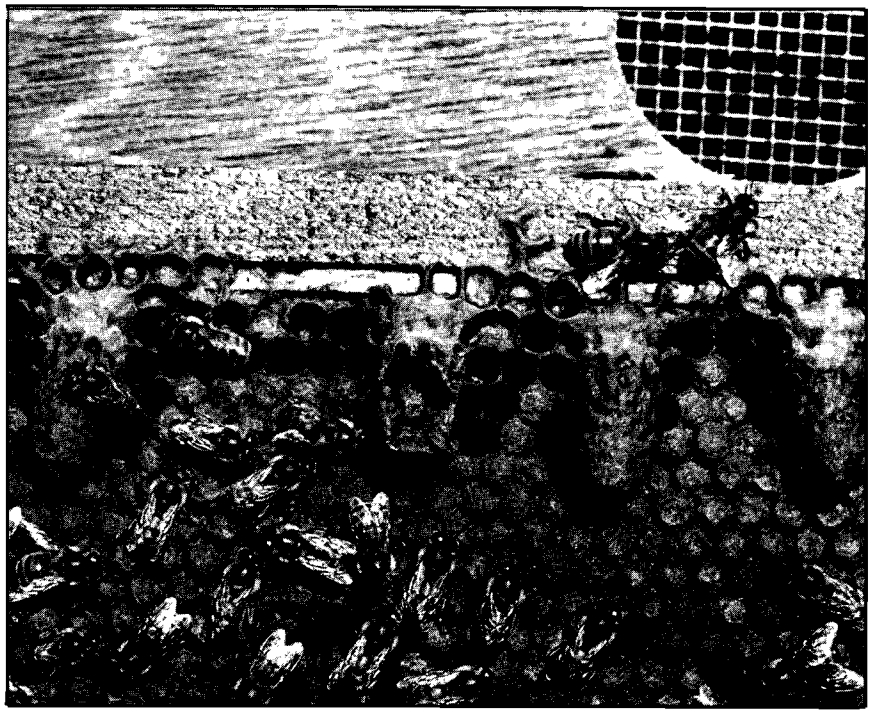

Fig. 3: Brush Grafted Cells

DeMareed colony. This "DeMareed" breeder hive can also be paired in one of the 3/2 splits.

IV. MISCELLANEOUS

There are a few subjects of relevance to the 3/2 split which should be mentioned briefly now by way of further discussion.

A. INCREASE

Although not the source of the 3/2 split concept, it is of considerable interest that L. L. Langstroth, in his 1853 book *The Hive and the Honeybee* (page 187), recommended the formation of a third hive by combining artificial swarms from each of a pair of hives for the purpose of increase. He said, "I much prefer to form only one new stock from two old ones . . . this will give even more (honey) from the three than could have been obtained from the two . . ." This, of course, suggests increase as another dimension of the 3/2 split system.

B. SWARM INTERVENTION

Snelgrove[3] discovered that when the field bees are separated from a colony with swarm cells, the swarm cells will be torn down within a week. This separation of field bees is exactly what happens in the top chamber of the screen split (Fig. 2) for cell raising. I have tried this several times on hives preparing to swarm and it works. However, there were cells also below; presumably, if all but one cell was destroyed in the lower deep and an empty extracting super placed under the super until the new queen is established below, this screen split could then be reunited to form a double queen consolidated brood nest hive.

C. SHORTCUT

Commercial or otherwise experienced beekeepers anxious to conserve on time and labor may find it possible to shortcut the procedure of Chart II by combining Stage 1 and 2 into a single operation on one occasion.

Such a possibility would be realized if one could consistently chase queens by smoke into one of the deeps, insert the excluder, and be confident that the queen is where you want her without looking.

But certainly the queen could be put **down** using a fume board and then locked in with the excluder just as the fume board is removed — after which the bees would be allowed time to fully redistribute while working with the next hive.

Within a few minutes the entire 3/2 split could be performed; the queenright deeps would be united as described on the 3rd new stand and **either** ripe cells (from elsewhere) or caged queens introduced into the singles on stands 1 and 2.

Alternatively, the queenright deeps could be CBN-united as usual, but also the as yet queenless deeps could be so united introducing caged queens only (not cells) simultaneously resulting in two CBN units side by side. Both should face front.

D. ACKNOWLEDGEMENT

The inspiration for this synthesis came from so many sources that it is impossible to acknowledge them all. However, those familiar with the writings of C. C. Miller,[4] George Demuth,[5] Gene and Carl Killion,[5] G. W. DeMaree,[7] E. R. Root in "ABC & XYZ of Bee Culture," and others, will recognize that the strategies they taught have been carefully incorporated into the three-for-two system — even though the tactics here may obscure that fact.

BIBLIOGRAPHY

1. **Hogg, J. A. 1980.** "A New Comb Honey Concept" American Bee Journal, Vol. 120 (5), pg. 357-362.
   Hogg, J. A. 1984. "The Halfcomb Honey Cassette" American Bee Journal, Vol. 124 (4), pg. 265-272, 311, 312.
   Hogg, J. A. (1989). "Comb Honey in the Halfcomb" American Bee Journal, Vol. 129 (4), pg. 230-240.
2. **Hogg, J. A. 1981.** "The Consolidated Double-Queen Brood Nest and Queen Behavior" American Bee Journal, Vol. 121(1), pg. 36.
   Hogg, J. A. 1983 "Methods for Double Queening the Consolidated Brood Nest Hive" Part I, Vol. 123(5), pg. 385-388; Part II, Vol. 123(6), pg. 450-454.
3. **Snelgrove, L. E.** "Swarming, its Control and Prevention," (13th Edition, 1981), pg. 40.
4. **Miller, C. C.** "Fifty Years Among the Bees" (1915).
5. **Demuth, George S., United States Farmers Bulletin 1039,** "Commercial Comb Honey Production" and United States Farmers Bulletin 503, "Comb Honey" (1917).
6. **Killion, Carl,** "Honey in the Comb" (1981), Dadant & Sons, Inc.
7. **See: "ABC & XYZ of Bee Culture," The A. I. Root Co. (1935 Ed. pg. 216).**