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Halfcomb honey cassettes — A new method for comb honey production comes of age 230

Plus

COVER STORY

Comb Honey in The Halfcomb

The Modular Halfcomb Cassette and Super

by JOHN A. HOGG[1]

The Halfcomb cassette is a radically new MODULAR comb honey section. By virtue of its modular design, the Halfcomb cassette offers the comb-honey producer unprecedented labor saving and marketing advantages. The much reduced wax content of "Honey in the Halfcomb" is an entirely new dimension in comb honey quality. The overall advantages described herein, combined with the prospects for premium pricing, considerably enhance the potential for profitability in "comb honey" production. The Halfcomb cassette is now available commercially.[2]

I. GENESIS OF THE MODULAR HALFCOMB CASSETTE

INTERIM REPORTS[3] describing Halfcomb prototypes were published in 1980 and 1984. This report brings the development up to date in an overall summary.

The purpose of this project from the beginning has been to devise a *one-piece* comb honey section that is *Modular*. In addition to the elimination of parts by one-piece construction, such a *modular* section was envisioned a) to interlock in the super in repeating units, b) to self-serve both support and comb regulation functions, yet allowing access by the bees, and c) to constitute (with cover) a pre-package section for marketing, as well as a convenient server of comb honey.

That a *Modular* section would be possible became a reality when the idea of box-like structures arranged piggyback, bottoms-to-tops, came to mind. The outside bottom of each box would then serve to regulate the extent of comb in the next box.

Subsequent to the filing of patent applicants[4] on the Halfcomb cassette, it was learned that the idea of a simple box (individual serving size) with foundation at the bottom had been disclosed in a now expired U.S. Patent in 1935.[5] A more recent patent[6] discloses a means of interlocking *pairs* of such boxes bottom-to-bottom in frames in a super, as well as top-to-top as a package when filled with honey. That both were designed for paired bottom-to-bottom arrangement was presumably in the belief one must simulate natural comb. Also, both require the usual surrounding support frames and intervening separators.

Three *Modular* Halfcomb cassette prototypes of one-piece molded plastic were designed and tested sequentially before the present commercial design (figures 1 & 2) was finalized.

Polystyrene has been the plastic of choice because it fulfills the requirements for FDA approval, bee acceptance, cost, rigidity and the desirability of clearness.

II. REFINEMENT OF THE CASSETTE AND EXTENSION OF THE MODULAR CONCEPT

Some of the changes and additions worthy of note are:

(1) **Deletion of the rotating cover concept:** Originally the cassette was usable with cover in place while on the hive, then rotated to close the filled cassettes. Although novel, this later was seen as a liability since rotation was actually just another step, the covers became soiled, and a proper fit of cassettes in the standard super was pre-empted by the requirement for squareness. Cassettes are now 4½" x 4⅝" x 1⅜".

(2) **Improved structural strength:** Stress points were reinforced, redesigned for strength, or eliminated

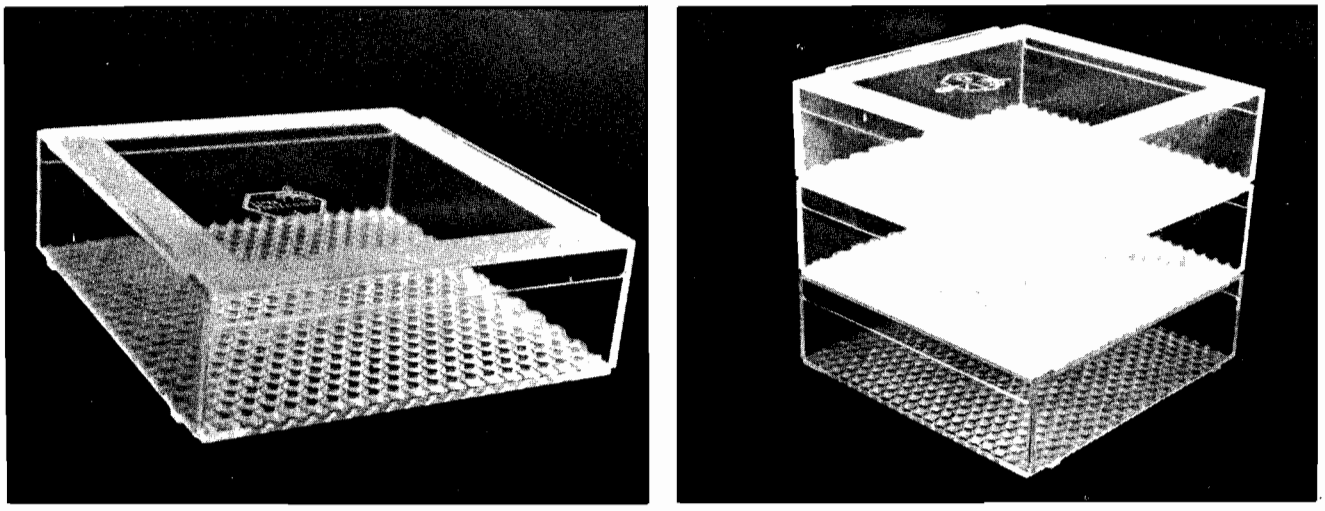

Figure 1: a) The commercial Halfcomb cassette. b) A set of three covered cassettes showing interlock.

wherever possible to minimize impact breakage — a characteristic of rigid FDA approved polystyrene.

(3) **Top corner posts:** Especially notable in the foregoing category is the sturdy new top-corner post. These posts interlock with corresponding receptacles in the cassette bottom corners for support when installed in the super. The cover corners also lock into them, later, when the cassette is filled with honey (figure 2).

(4) **The larger and sturdy new top cover posts** provide a location for a small "snap-on cover" button.

(5) **The cover is now so designed** that a strip of tape on one cover flap becomes a *hinge* for convenient opening and closing of the cassette when used as a server. Note that a strip label could be used all the way around the cassette to fully seal the cover; then part of it removed by the consumer, leaving a *hinge* on one side (figure 3).

(6) **Coverless cassettes are stacked in columns of ten** (figure 4) in the manufacturing process, following spray waxing, and then they are taped securely with a strong tape which is not offensive to the bees. The handling of individual cassettes is eliminated. Only 4 units (figure 5), each a stack of 10 cassettes, are to be handled by the beekeeper to load a super. This, in a sense, is an extension of the modular concept. These columns, peripherally pressured by springs (or wedges) in the super, withstand considerable weight and are thus self-supporting.

III. CONVERSION OF THE STANDARD LANGSTROTH COMB HONEY SUPER FOR HALFCOMB USE

Super construction is equal in importance to the cassette. Together they are the invention (figure 6). Precise control of space in the super, sturdiness, and ease and speed of cassette in-

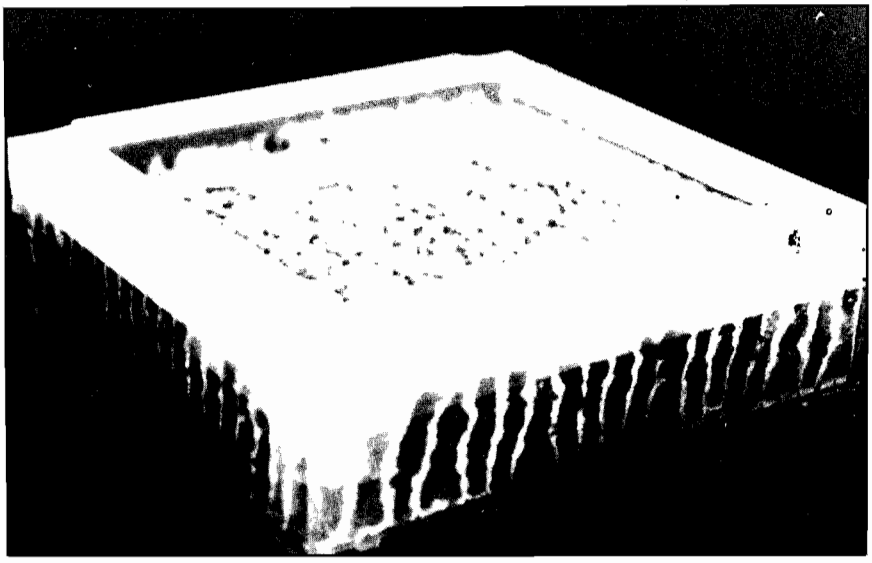

Figure 2: Honey in the Halfcomb

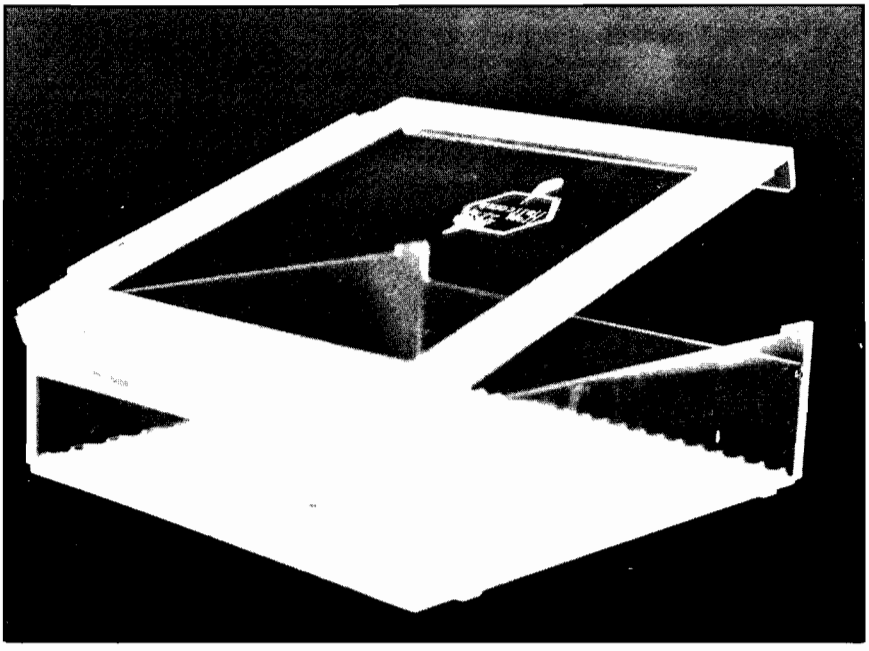

Figure 3: Cassette with tape-hinged cover

stallation are essential complements to realizing the full potential of the modular Halfcomb cassette. Special attention has been given to simplicity in the design of a *Super Conversion Unit* for use in the U.S. standard 4¾" Langstroth comb honey super. Factory installed at the outset, conversion units were designed also for convenient installation by the beekeeper. Specifications and directions are provided in this section.

A. Specifications for Super "Bee Space": Langstroth's important concept of bee space is much too loosely defined and all too often ignored. C. C. Miller[7] points out that a space of ⅜" between comb supers and frames invariably results in "Burr combs in abundance" and states that in such circumstances ¼" (or a bit less) is optimal. With the Halfcomb, strict adherence to this fact is especially important since such space control is the principle means of protection of the two sides of each cassette that are exposed. Accurate spacing thus becomes a matter of cosmetics. There are two entirely different types of bee space in a comb honey super.

1. **Top and bottom bee space.** The bee space between cassettes and the brood frames of a hive, or between cassettes of adjacent supers, should be ¼". Since frames in the brood chamber are 3/16" top spaced, the super should be bottom spaced 1/16" so that there is ¼" between super and brood frames. With super shells precisely 4¾" deep, the space between adjacent supers also becomes ¼", because the cassettes are 4½" deep.

2. **Bee space inside the super rim.** This space, surrounding the entire block of comb honey sections may be 5/16" up to ½" (figure 7). This enables bee travel and occupancy favorable *to maintaining warmth* around the outer sections. The sections should thus be better filled. Cool temperatures discourage comb building, especially likely at night. This type of bee space has greater dimensional tolerance than elsewhere in the super. Very little if any burr comb is likely between such opposing wood surfaces at the super periphery.

B. The Super Conversion Unit: The conversion unit is made up of 4 followers (2 fixed and 2 movable) with spacers; 2 metal corner supports; and several super springs to be inside the standard 4¾" comb honey super. A top-down view of a converted super is shown schematically in figure 7. Designed to achieve accurate space control, the conversion unit also supports the block of 40 cassettes which it surrounds.

The details of the 2 long followers, the "guts" of the unit because they support the cassettes, are shown in figure 8. They are cut from ½" high density fiber board. Plywood or chipboard are generally inadequate because of splitting (by nails), chipping, warping and other defects. There are two triangular metal supports to be nailed onto the bottom corners of the super support for the long movable follower. The fixed long follower, with a metal strip support, is nailed in place. As will be seen shortly in the directions

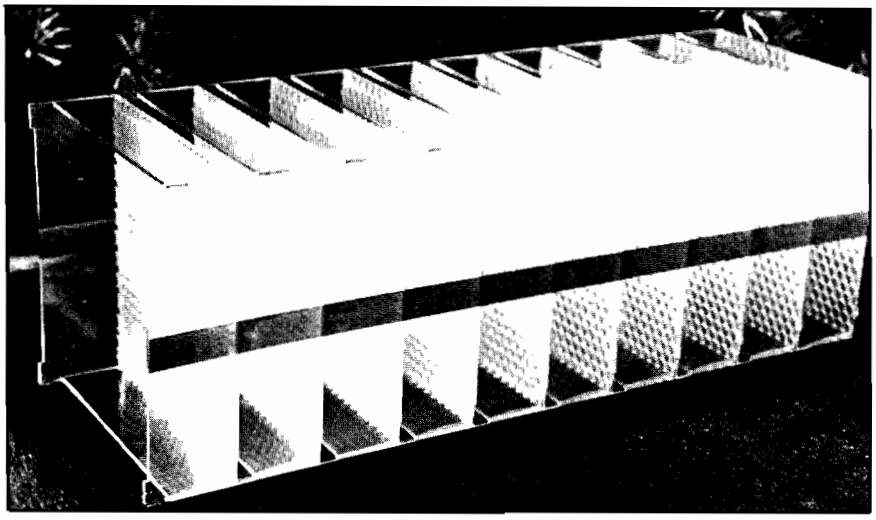

Figure 4: Taped stack of 10 cassettes without covers

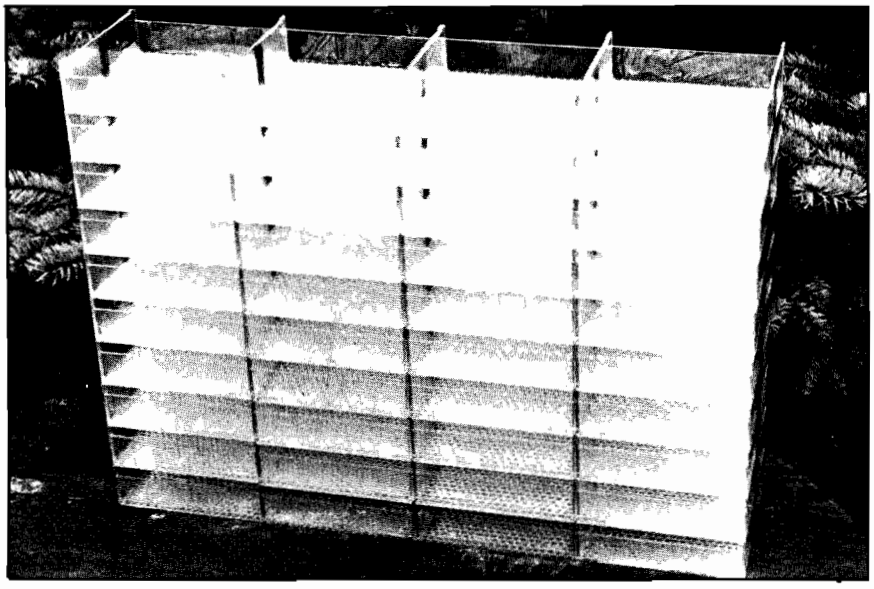

Figure 5: A complete set of four stacks to fill one super of 40 cassettes

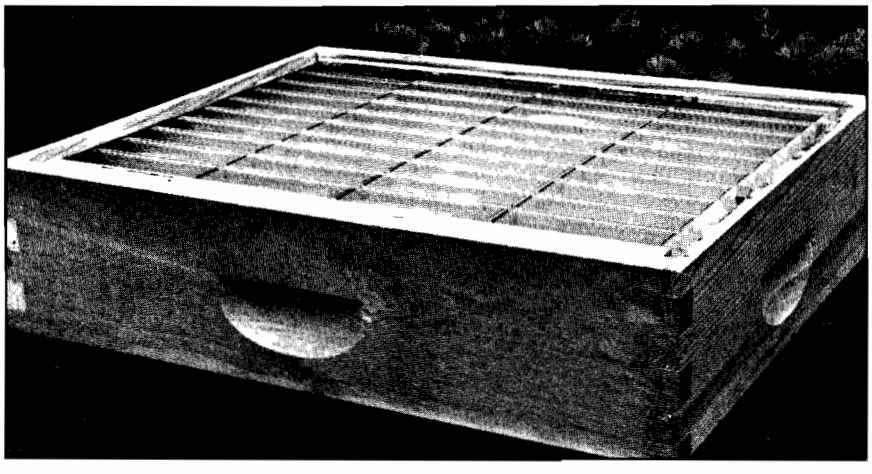

Figure 6: A completely assembled Halfcomb super

for installations, no special measuring or assembly skill is needed for accurate spacing in the super because of the 1/16" feet on the two long followers.

Two shorter end followers are identical pieces of 1/8" masonite, or the like. Each is 4½" x 12⅞". The five wooden spacers are 4½" long, cut from ¾" x ⅜" strips.

C. Directions for Installing the Super Conversion Unit: First: the comb honey super must meet standard specifications (4¾" exactly). Reject, or correct if possible, any super that is not; the cassettes are exactly 4½" deep, which leaves the required ¼" for space distribution between top space and bottom space.

The fixed long follower is nailed in place first while the super is positioned on the bench as shown in figure 9. Note in figure 8 that a 1 1/16" x 17" metal strip to provide a 3/16" support ledge has already been nailed to this follower. The spacers are previously positioned and secured by a first nail, partially driven. The 1/16" feet at the bottom ends of both long followers are the key to achieving **automatically** 1/16" bottom spacing. To nail the fixed follower, these feet are pressed against a 3" board, held tightly against the super bottom rim. The first nails are driven to fix the position. A total of three nails through each spacer is desirable.

If a number of supers are to be converted, instead of a loosely held 3" board, it is of great help to construct a fixed backstop, as actually shown in figure 9. A straight 2" x 2" piece is screwed onto the edge of an 8" wide piece of ¾" plywood. This gadget can be marked with a line 4¾" from the 2" x 2" for quickly checking the suitability of a super for depth. Not only is one assured at the time of assembly that both top (3/16") and bottom space (1/16") are correct, but assembled conversions can be quickly checked for space compliance at any time. In this way an **actual space of** 1/16" (as it would be on another super) is achieved. Error due to irregularities of the super rim is cancelled.

Secondly, the two triangular metal supports, cut from 1¼" strips of metal are nailed in place opposite the fixed follower. That's all! The 1/16" feet of the movable long follower rest on these corner supports, automatically providing 1/16" bottom space on that side of the super. The pair of rabbets on the movable follower serve to engage the posts of the cassettes and thus support that end of cassette columns.

Thirdly, the fixed short follower is nailed in place (to the left of super as shown in figure 9) over a pair of spacers. Simply align it with the fixed long follower.

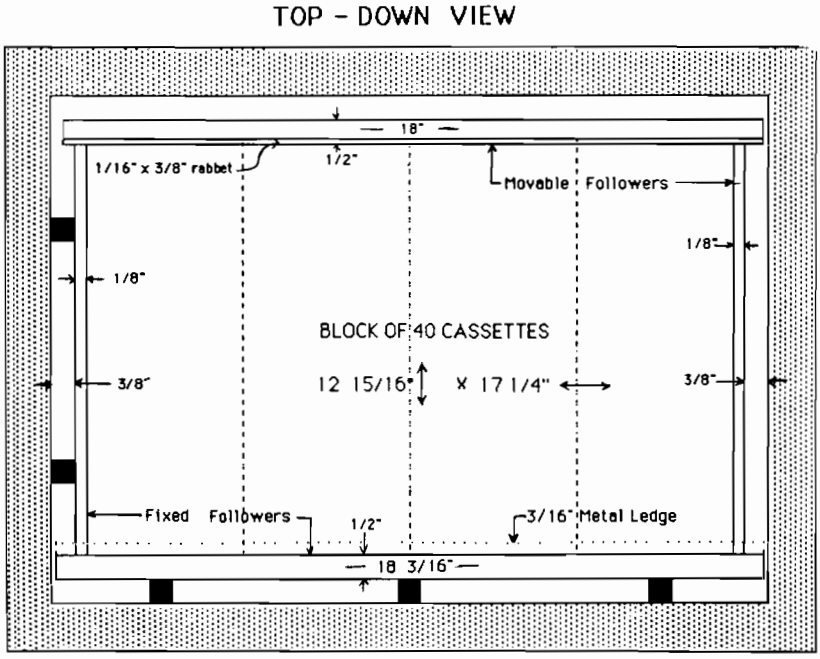

Figure 7: Sketch of super showing super conversion construction

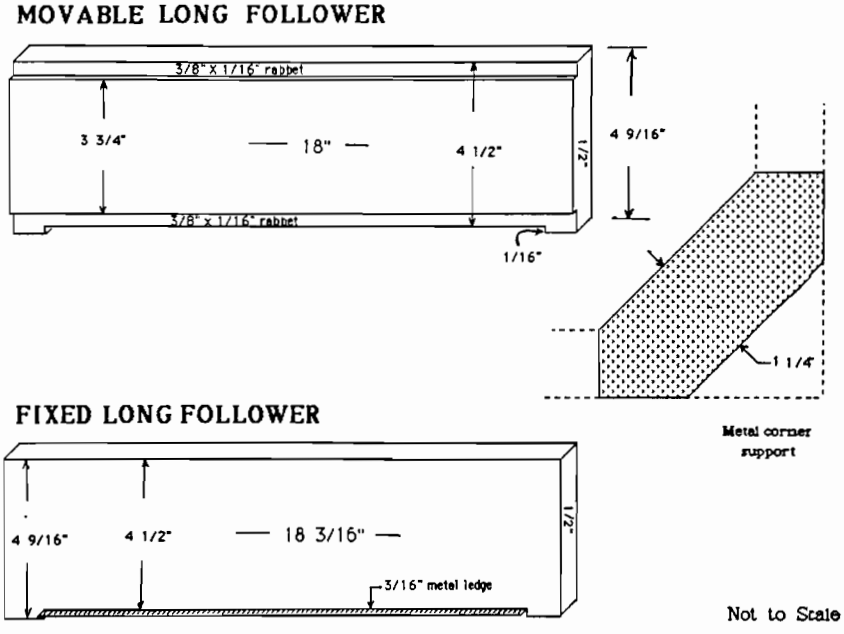

Figure 8: Long support followers of figure 7

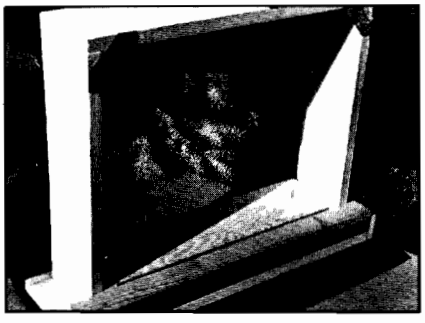

Figure 9: Installation of the fixed long follower

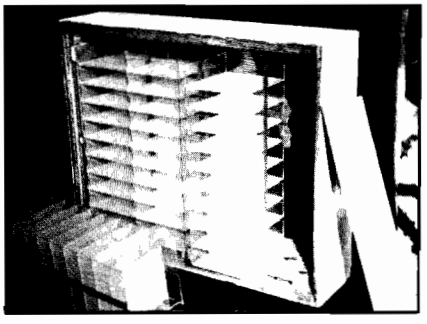

Figure 10: Position for loading a super

D. Directions for Installing Half-comb Cassettes in the Super: 40 Half-comb cassettes, pre-waxed and pre-stacked in 4 taped columns of 10 each, may be installed in a converted 4¾" comb honey super in less than two

minutes.

First, place the empty super vertically on the long edge which directs the top opening of the super toward the operator. The fixed followers are now to the left and below (figure 10)

The 4 taped stacks of cassettes are then set onto the long fixed follower with the bee entry slots exposed. Shove the stacks firmly to the left against the short fixed follower and back against the 3/16" metal ledge.

Then insert the long movable follower along the top 4 cassettes with the rabbets down and the corner posts of the top cassettes fitted into them.

Next, secure this rabbeted follower firmly by inserting 4 super strings between it and the upper super rim – one at each column with the curled ends againt the follower.

After checking to be certain that all of the cassette corner posts are fitted into the rabbets, turn the super bottom down on the table as it would be on the hive (figure 6). Install the short movable follower securely with 2 super springs. In this same position, make certain that the 4 columns of cassettes are pressed together so there are no cracks between them, and pressed downward against the metal supports so that they are flush. Top space should now be 3/16".

To remove honey-filled cassettes from the super, follow this procedure in reverse.

IV. ON-HIVE TESTING OF THE HALFCOMB CASSETTE AND SUPER

Throughout this project, on-hive testing was conducted by the author and many others. The objectives were to identify structural and design deficiencies, and to evaluate cassette acceptance by the bees and comb building performance in the Halfcomb super.

The most difficult task was to determine whether to fault the cassette or the beekeeper when a poor result was observed. Hence complaints not accompanied by information on hive status quo, nectar flow conditions, manner of use, or compliance with super specifications were considered for their anecdotal value only.

A. Acceptance by the Bees: From a large number of documented case histories and carefully controlled experiments, it was not uncommon to find that the bees had occupied the Halfcomb super and started comb building within hours. Such results speak for themselves as to the vargaries of the honey flow and the readiness of the hive for comb building. Failed acceptance was usually attributable to:

1) **Violations of super or cassette specifications:**

a) The *beeswax foundation coating* was too skimpy.
b) The super had been *freshly painted* especially bad when painted on the hive – A SPECIAL WARNING.
c) *Adhesion tapes* with strong adhesive odor had been used.
d) The super had been exposed to a smoke-filled or otherwise *tainted environment.*
e) *Cool air inflow via* an open inner cover, super rim to hive contract cracks (inherent with brand new supers never sealed by bees), or other nearby holes or hive defects.
f) Even human scent from excessive handling of cassettes as demonstrators has been suspect.

2) **Hive mismanagement**

a) The brood chamber was honey bound[8]
b) Foraging and comb building momentum had been pre-empted by swarm preparation.
c) Bee population was inadequate[8]

3) **Comb honey super misuses:**

a) Putting a super on the hive with no knowledge of the hive's condition or consideration of timing with flows.
b) Placing both a comb super and an extracting super on a hive together. The extracting super is at once usable space. The extracting super will always pre-empt the comb super in a contest.
c) The mistaken assumption that a comb honey super added belatedly will immediately increase space, as would an extracting super. A comb honey super with foundation becomes *usable* space for the bees *only later after comb is constructed.*

B. Comb Building Characteristics in the Halfcomb Cassette: There are two outstanding characteristics of "comb honey in the Halfcomb" which are inherent to the Halfcomb concept. One is the *total visibility* of the comb in every detail because of the crystal clear plastic. Even cut comb in plastic boxes is much less observable, especially when wrapped. The other is the deep-celled comb which has no midrib. Hence, the *wax content* is *significantly reduced* over that of all conventional comb forms.

It was found that bees fill cassettes all the way to the walls and corners, full depth from side to side. This important discovery was unexpected, since traditional square wooden sections are notorious for the tendency of the bees to resist completion of those cells next to the walls and corners. It is reasonable to view this as evidence of the possibility that bees actually perceive the developing comb in the neighbor cassettes through the clear plastic and/or the reflection of the comb they rest on, and attempt to

build continuous comb.

The tendency of bees to avoid completion of those sections to the outside and corners of a super, noted in III A2, is seen in all types of comb honey supers, including the Halfcomb. This avoidance is clearly explainable by reduced temperature there, since it is much more pronounced in cool weather with cold nights, and almost unnoticeable in hot weather with warm nights. The solution is to construct and manage supers in ways that favor continuous warmth in so far as is possible. One standard way to improve this situation is to provide the aforementioned continuous bee space around the block of sections for insulation and warmth by bee occupancy (figure 7). Another is the systematic rotation of supers close to the always warm brood nest (see VI on supering).

In the case of the Halfcomb cassette super, temperature effects are mainly observable on those cassette walls next to the front and rear ends of the super. Unlike in any other section super, when nights are cool and end filling is slow, it is possible to rearrange columns in the Halfcomb super so that the two outside columns are moved inward where it is warmer. To do this, turn the Halfcomb super on edge right on the hive, blow or smoke most of the bees out, and remove one of the end columns and relocate it at the opposite end, after sliding the three remaining columns to accommodate it. The easy load and unload feature of the Halfcomb super makes this a reasonable option, which could help to increase the percentage of completes.

Occasionally, certain strains of bees were encountered with the innate habit of constructing brace comb inside the cassettes. These were started as small burrs on the bottoms of the next box when the new comb is about 5/8" deep (figure 11), and then become attached to the comb. Such burrs have been reported [9] in Round comb supers. To further show that the construction of these brace burrs is not unique to the Halfcomb and is largely due to innate comb building characteristics in some strains of bees, two experiments were conducted. **First**, when such burrs were removed, the bees would at once rebuild them, but moved to another hive such brace burrs were not rebuilt. **Secondly**, the offending hive was supered with the classical basswood section comb honey super. These same bees proceeded at once to attach burr to the wooden separators also (figure 12).

The solution is to clean out the burrs and move such supers to a better performing hive. The offending hive might be requeened or relegated to non-comb production. This argues further to the need for selection and breeding of strains of bees with favorable comb-building habits.

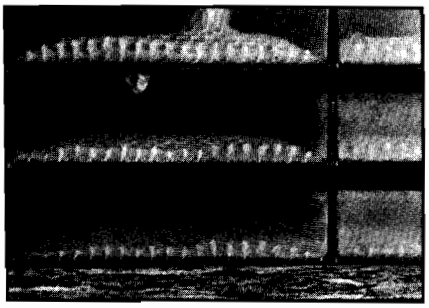

Figure 11: Inside brace burr

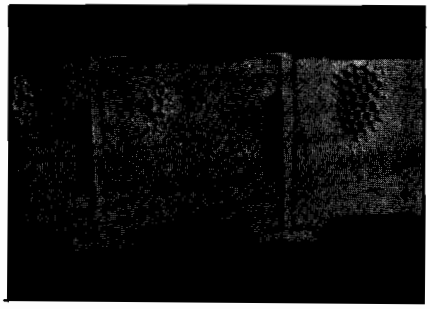

Figure 12: Brace burrs on separators of a wood section super

The more conventional type of burr comb, however – that seen between opposing non-wax surfaces such as between two supers – can be largely controlled by accurate space control.

V. ADVANTAGES ACCRUING TO THE BEEKEEPER

All of the advantages introduced by the Halfcomb cassette accrue directly or indirectly to the beekeeper. They are itemized under four categories as follows:

IN COMB HONEY PRODUCTION:

- No section parts to assemble, including wax foundation
- No section holders to buy or clean
- No section separators to buy or clean
- Durable foundation that lasts indefinitely
- Supers can be assembled in less than two minutes
- No additional packaging, except for cover and label
- Favorable finished-cassette yield potential by rearrangement in the super, and by convenient sorting and return of incompletes
- Very likely less prone to wax moth

IN MARKETING:

- WAX REDUCTION stands out as an IMPORTANT NEW AND EXCLUSIVE SALES PROMOTION PITCH which could extend the use of comb honey
- Visibility: unusual potential for lighted display (figure 14)
- Cassettes rest firmly on 5 of 6 sides with no leaking from open cells
- Covered cassettes interlock for stacking
- Multi PAK possibilities (figure 1 b)

CONSUMER APPEAL:

- A new dimension in comb honey quality (reduced wax content)
- 12 oz. net vs. 8 oz. for Round
- Visibly certified to be NATURAL
- Absolute minimum of human handling (Bee-prepared)
- Convenient server: requires no transfer of honey
- Cover-protected for storage between uses
- Novelty

ECONOMIC:

- Significant reduction in labor (cost)
- Equipment cost savings (holders, separators, foundation)
- An exclusive diversification not subject to import competition (U.S. Patent protected)
- Honey in the Halfcomb merits a premium price. The greater net weight of honey over Round (12 oz. vs 8 oz.) **alone** supports a substantial premium over Round. (The package cost per ounce of honey is about the same.)

VI. CONSIDERATIONS FOR NEW RECRUITS TO COMB HONEY PRODUCTION

A full discussion of comb honey methodology is far beyond the possible scope of this article. Yet there are a few important considerations to be highlighted for first-time comb honey recruits. This includes those experienced extracted honey producers who may not have had cause to contemplate the nature of the radically different task involved in comb honey production. This, of course, has to do with the obvious difference that *new clean comb must be built for every pound of honey produced, and that this comb is part of the product.*

A. A Fundamental Principle: The radically different task is *the requirement to manage for comb building* based on the fundamental principles of comb building by bees. Aside from the need for warmth already discussed, a specific fundamental principle of great importance is that *bees enter the wax phase only as new comb is needed to store incoming nectar.* The lack of available storage cells forces bees to retain nectar in their honey sacs, which in turn stimulates wax secretion automatically for new comb. This "tight linkage between the need for wax and

its production"[10] is a matter of economy in nature. In the absence of comb reserve, or when room for new comb is absent or too distant for the cluster to maintain comb building temperature, the bees compete with the queen for cells at the very top of the brood for storage as young bees emerge; the resulting "honey barrier" above the brood becomes even wider, serving to dampen new work in the thus distanced supers.

By contrast, bees will cross such a barrier to store nectar above in an extracting super — even passing through, but ignoring a comb honey super, to do so. The bees will start and construct new comb best when the comb super is placed directly over and close to brood.

Let-alone-beekeeping, in its literal sense, is not for comb honey production; but the reward for committing to the extra enlightened attention that is required is considerable.

B. Hive Management: Comb honey production can be managed quite compatibly with extracted production and its equipment, so that diversification makes a perfect combination.

A successful procedure that can be recommended as a starter for new recruits to comb honey is that described by Sechrist[11] for diversification into comb honey by extracted honey producers. Its success rests with the precaution to assure that *the bees are ready to construct new comb and then enabled to do so.*

Basically, with variations, the plan is to shift a *strong colony* from extracted honey to comb honey production temporarily, *during the heart of a main flow*, and then back full circle to extracted honey before the end of the flow.

Starting with a single brood chamber hive with extracting super(s) after the full flow has begun and the *bees are actively storing nectar above the brood nest*, Sechrist simply removes the extracting supers and replaces them with the intended comb supers after removing the excluder. The comb supers are thus next to brood. The extracting supers are placed back on top over an escape board, then moved elsewhere when empty of bees. For the Half-comb, two full supers of cassettes are advised (see VI on super rotation). When the supers are completed, remove them over an escape board. No further supers are added. The extracting supers are returned, while incomplete supers are placed on those hives doing the best work.

With the double brood chamber hive, most commonly used for extracted honey, the same plan can be followed, provided that the two brood chambers are reversed in position at the start. This assures sealed brood next to the comb supers, at once, to stimulate comb start. The double deep hive is generally not satisfactory for dedicated comb honey production because of the tendency to develop a honey barrier at the very top.

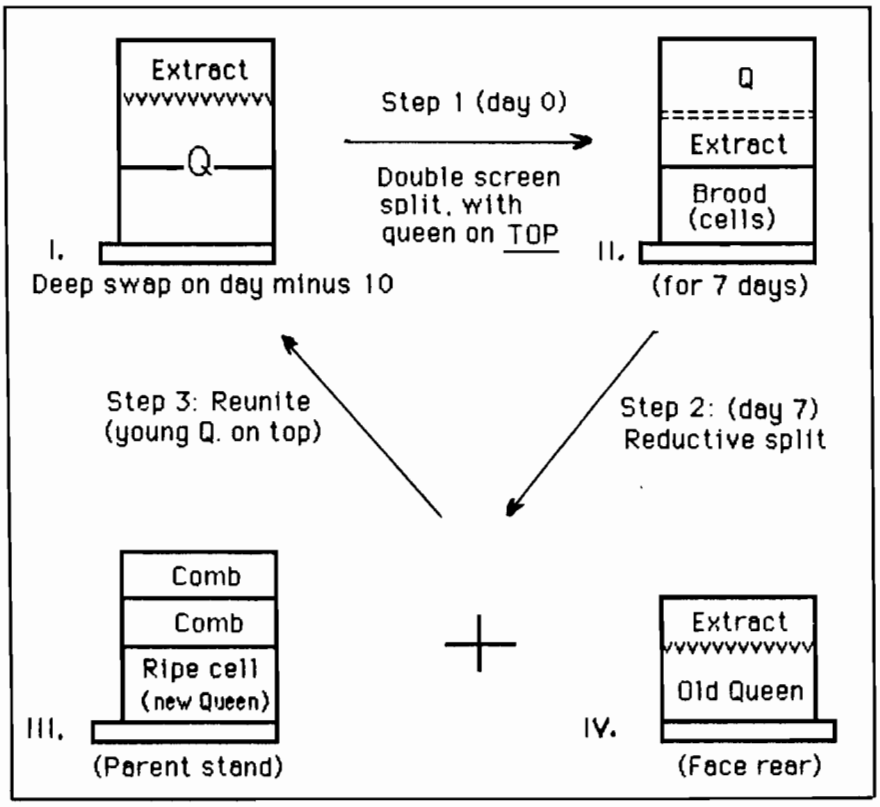

Figure 13: Temporary reduction for comb honey production via the Queen-up/Screen-split

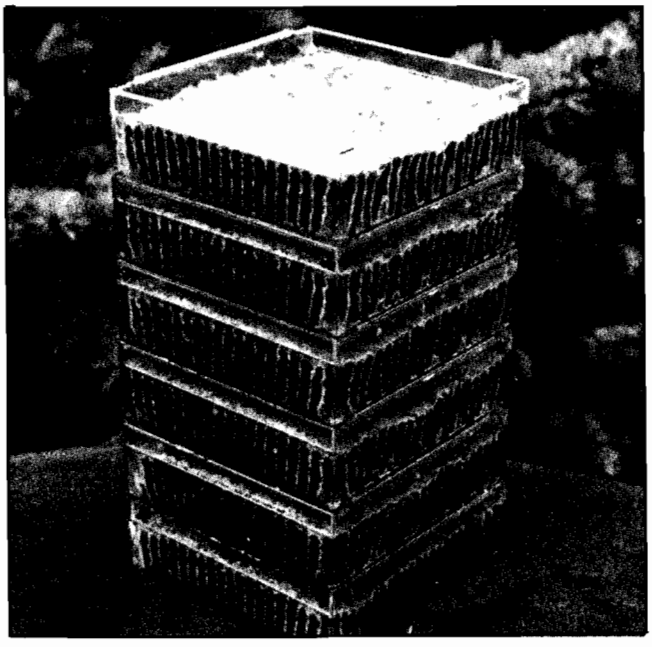

Figure 14: Display of Honey in the Half-comb

The Killion system of reduction to single deeps,[12a] with young queens for the honey flow and absolute control of swarming, exemplifies a widely approved strategy for comb honey production. However some of the tactics for carrying out the strategy are demanding, since the swarm impluse is intentionally forced to generate cells for the new queen, the old queen must be found and destroyed, and the superfluous cells must be found and destroyed.

Another tactic to implement the same strategy with less demand, which I have been evaluating for some time, is shown in the chart of figure 13 (as applied to the Sechrist plan). Hopefully, with brief additional comment this preliminary report will be sufficient for the experienced beekeeper to sense its

further applications to dedicated comb honey production.

On day zero, the beginning of a main flow, the **queen-up/screen-split** (step 1) is performed. The double screen (dotted lines) is notched for a small upper rear entrance. At least one partially filled extracting super (or a new one) should be used. Just prior to the rearrangement, smoke the hive entrance. This usually moves the queen into the upper deep,[13] if she is not already there. A deep swap of 1 about 10 days before favors her movement upward. On a small scale one could find and "put up" the queen to be sure, even though the odds are she is already there. Check for queen cells at the frame bottoms of the top deep as one end is raised in the process of setting it aside.

The field bees vacate the top and return to the lower deep. There is no chance of swarming, assuming no swarm cells were present before step 1. The extracting super provides storage reserve. The brood above is warmed by the bees below. The queen's presence above stimulates sustained foraging momentum and insures that the queen cells now started below are of **supersedure** quality.[14]

After 7 days the queenright deep is set aside, **facing rear** (step 2). Here, again, on a small scale it may be best to manually select the finest cell(s) in the lower deep and destroy the rest. A pair of Halfcomb supers are added at this point to the single deep on the parent stand (III). Return to the extracting mode when the supers are finished (see supering). When the single deeps are reunited after harvest, be sure to place the deep with the young queen on top to favor survival of the younger queen.

The queen will be "up" most of the time without assistance. Hence, in general practice with larger numbers no queens are manually "put up." But her location is confirmed by an egg check above after 4 days. Deep swap any that do not have the queen on top. At this same time introduce a ripe 10-day-old queen cell into the queenless lower part of all hives.

For the ripe cells one can utilize the best performing hives and do so without queen rearing expertise. Select the breeder hive(s) and initiate this same procedure six days earlier. By the time of the four-day egg check, cells in the "breeder" hives will be 10 days old. Introduce these usually excellent cells then by whole frame exchange. *When the virgin hatches, she will destroy all of the previous cells for you.* Be sure to leave a frame with a pair of good cells in the "breeder" hive, which is to be split at this time. The others are split another 4 days later (on day 7 or 8) after all cells have been destroyed.

The queen-up/screen-split tactic can be utilized in several ways and on earlier schedules. For instance, one important option for dedicated comb honey production at step 2 is to unite a pair of the queenright deeps from a pair of screen split hives with an excluder (and paper) between. This is the consolidated double queen system[15] for comb honey. Three hives (four queens) are now optimized to be supered for comb honey for the season. A *three-for-two split* has been accomplished.

C. Supering: The rotation strategy for supering described by C. C. Miller[7b] in 1915, and modified by the Killions[12b] in recent years remains sound today. The rationale is convincing, as are the results.

New comb supers are first placed on top of other super(s) (if any). One can conveniently monitor progress of the bees in starting new work in this super at the top, especially in the Halfcomb. **Next**, each super goes down directly over the brood, after a good start has been made above, for the major filling; bees *draw comb best next to brood where it is warm*. **Then** each super, in its turn, is moved upward for capping; comb honey capped away from the brood is whiter and less likely to be travel stained. Finished supers are finally cleared of bees over an escape board which has been placed just above the last new super added.

Note the added possibility when using the Halfcomb super for rotating the end cassette columns inward for better filling if nights are cool (see Part IV,B).

Partially drawn supers, even up to just short of capping, may be carried over to another flow, or another season if well protected.

It is here, in the management of supers during the flow, that one earns the right to a premium for the product.

D. Harvest: Timely harvest is just as important as timely supering. At the time a super to be harvested is placed over an escape board, for clearing of bees, **rough** scrape any burr comb present; the bees will clean up the resulting honey drip for you. A thin bladed tool works well, such as a putty knife finely polished on the cutting edge to avoid scratching. Use short, quick strokes without much pressure.

After removal from the hive, clean-up is most efficiently completed while the cassette sections are still in the super. Cloudiness from travel stain etc. may be removed easily with paper toweling, wetted with rubbing alcohol (or vegetable oil). Dry paper toweling gives a nice polish.

There is usually some wax at the ends of the bee entry slots which can be largely ignored as the covers are installed – at which time unfinished cassettes can be set aside in stacks for return to a hive the same season, or the next.

For perspective, some comparisons of the Halfcomb with the popular Round comb are useful.

The net weight of finished Halfcombs per cassette average 12 oz. (40 per super) vs. 8 oz. per section of Round (32 per super).

Per super, there are 152 units and 32 wrappers as labels to handle for Round vs. four units (figure 5) and 40 covers with labels per super of Halfcomb. Two supers of Round are required to equal one super of Halfcomb in net weight of honey. Thus for an equivalent net weight of Round there are over 300 parts vs. four for Halfcomb. However, there are 64 sections of Round vs. 40 cassettes of Halfcomb in this comparison.

With a window into every detail of Halfcomb honey to verify naturalness and the substantial reduction in wax content, clean white honey in the Halfcomb is truly of gourmet quality. Visibility, stackability and versatile display ability (figure 14) are strong marketing advantages.

With time freed up from super assembly by Halfcomb use, especially during the critical period of the honey flow when there are supers yet to be prepared or reloaded, attention may be shifted to super monitoring. *Here is where the challenge of producing quality comb honey lies, and also the reward.*

A commitment to succeed with Honey in the Halfcomb, or any comb honey production, is probably one of the best ways to learn about beekeeping. Comb honey production is *different*, but it need not be *difficult*. Save the comb super for a better opportunity if historical honey flows fail to materialize.

The savings in labor and the prospects for premium pricing, supportable by the many advantages herein enumerated, considerably enhance the potential for profitability in comb honey production. •

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