A New Comb Honey Concept

The Half-Comb Section[1]

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THIS report describes a modular comb honey section, multiples of which can be packed into a super without the usual preparation and accessories. Thus, several of the components normally employed in comb honey production and utilization, such as: 1) the section perimeter, 2) foundation, 3) the separator, 4) the package, 5) spacing and 6) the serving platter were consolidated into a single comb honey section unit. The overall pragmatic objectives were labor and cost reduction.

The key to controlling and directing the pattern of construction of honey comb for surplus or brood by bees evolved from the invention of wax foundation by Johannes Mehring in 1857, a contribution second in importance to beekeeping only to Langstroth's invention of the modern hive in 1853. The various forms of comb honey sections presently have in common a perimeter of wood or plastic into which is positioned a midrib of wax foundation which is bilaterally embossed with the cell bases and the start of cell walls. The bees fill the cells with honey as they draw them outward on both sides to a distance controlled by separators.

To obtain the objective of this modular comb honey concept a deviation from the normal pattern of wax foundation use was required. Figure 1 shows a prototype of the modular comb honey section, constructed of materials described later. It may be of one piece molded plastic. This embodies 1) a **unilaterally** embossed foundation placed at one edge of the section perimeter with the embossed surface facing inward and the other (non-wax) surface facing outward, 2) small supports at the outside base corners for self spacing and 3) bevelled base edges. The latter is of considerable significance as described later.

Such a structure has a receptacle-like character. It was anticipated that the bees would be obliged to fill it with a unique form of comb honey characterized by deep cells accessed from one side only — a "half-comb."

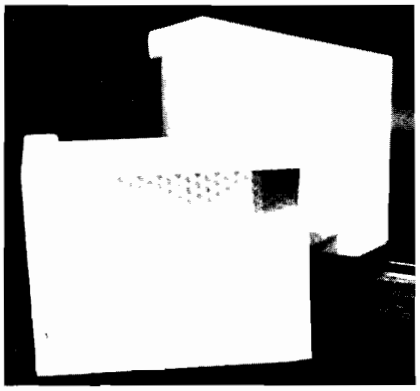

Figure 1: Prototype of the half-comb section simulating one piece molded plastic construction. (Photographed before a mirror.)[6a]

When packed into a suitable super in the piggyback relationship to one another, like the pair shown in Figure 2, the self spacing projections at the outside bottom corners of one section serve to control the bee space (⅜") entering all four sides of the other section, while the bottom is positioned to serve as a separator to regulate the

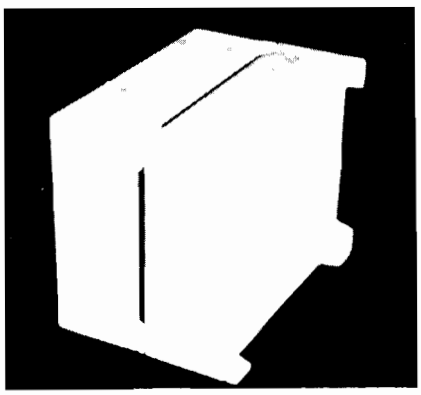

Figure 2: A pair of the modular sections of Figure 1 showing piggyback relationship when packed in a super.[6b]

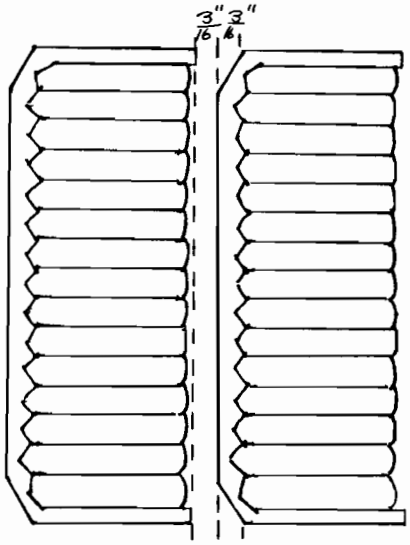

Figure 3: Cross section of modular sections paired to show spacing dimensions.

depth of comb construction in that neighboring section. The pair of modular sections of Figure 2 are sketched in cross section (Figure 3). Note that the bevelled outside bottom perimeter is an essential feature in order to provide concurrently proper spacing for both the entry of bees into each section and the regulation of comb surface. In order to accommodate modular half comb sections in this way, the standard Langstroth super would need to be modified only by providing cross support at the base. Follower boards with super springs firmly position the packed sections.

The critical question was whether the habit of bees to draw comb bilaterally from a center base would pre-empt their willingness to draw out one sided comb consistently,[2] especially to the abnormal depth expected without starting separate combs (or burr comb) in the available space.

Modified prototype sections in rectangular and triangular shape (Figures 4 and 5), i.e. without the self spacing

provision and bevelled base of Figure 1, were constructed to determine to what depth the bees would indeed draw out one sided comb consistently, accepting that optimum spacing would be compromised.

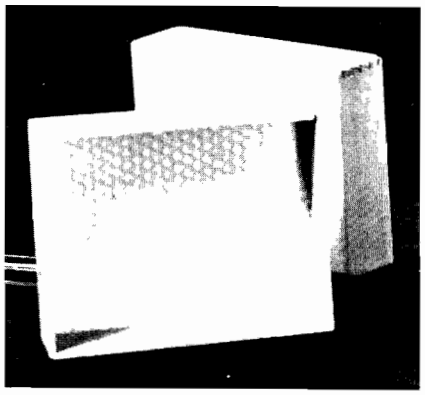

Figure 4: 4" x 5" rectangular half-comb section prototype, without spacing provisions. (Photographed before a mirror.)[6a]

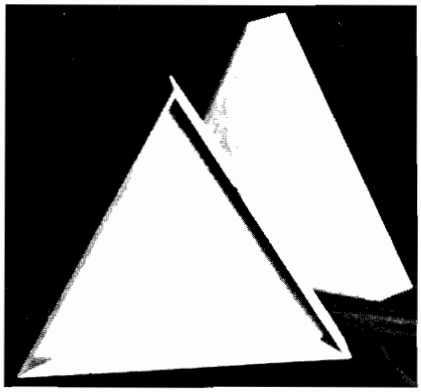

Figure 5: Triangular half-comb section prototype, without spacing provisions. (Photographed before a mirror.)[6a]

Following are directions for constructing the rectangular 4" x 5" half-comb section of Figure 4 for those who may wish to experiment.[3] Each step is shown pictorially in Figure 6: Standard 4" x 5" x ⅛" basswood sections were placed over blocks of wood 1¼" thick and just a shade under the 4" x 5" dimension, Figure 6 (a). Commercial comb honey foundation cut to the inside dimension was placed on the block snugly inside the section rim, Figure 6 (b). Then plaster of paris, mixed to a reasonably fluid composition, was placed on the foundation and levelled off to the rim of the section with a straight steel ruler, Figure 6 (c). After a few minutes the half-section, Figure 6 (d) can be removed carefully from the block and set aside to harden.

The plaster of paris forms a rigid non-wax outside surface, is embossed in the pattern of the wax foundation inside, yet remains coated inside with the same wax used as a template. By varying the thickness of the block, half-comb sections ranging from ⅞" to 1¼" inside depth were made. Alternatively, 4" x 5" sections of different depths can be prepared by reducing the frame width and using a block about ⅛" less than the width of frame. The use of a series of blocks speeds the process. Also a small 1/16" v-groove at the inside base of the wood frame, made with a router, assures that the plaster of paris base will be firmly secured.

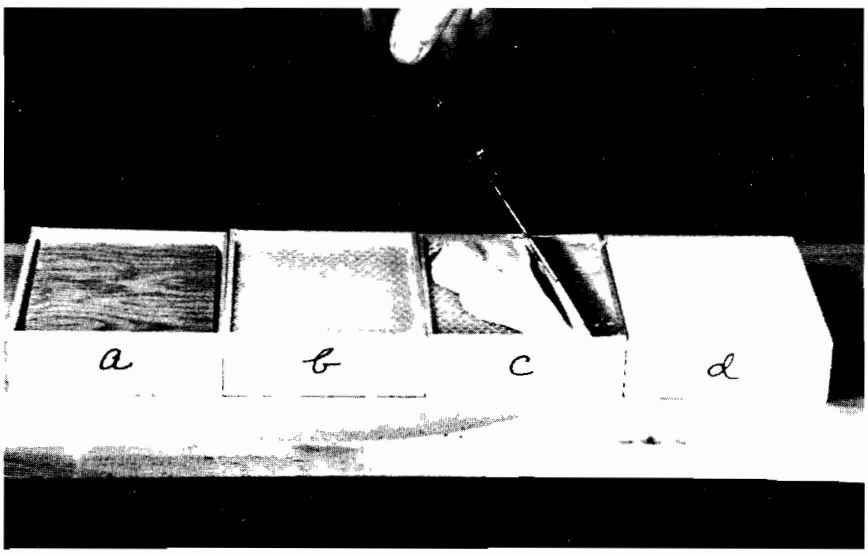

Figure 6: Four stages in preparing modified half-comb sections.[6a]

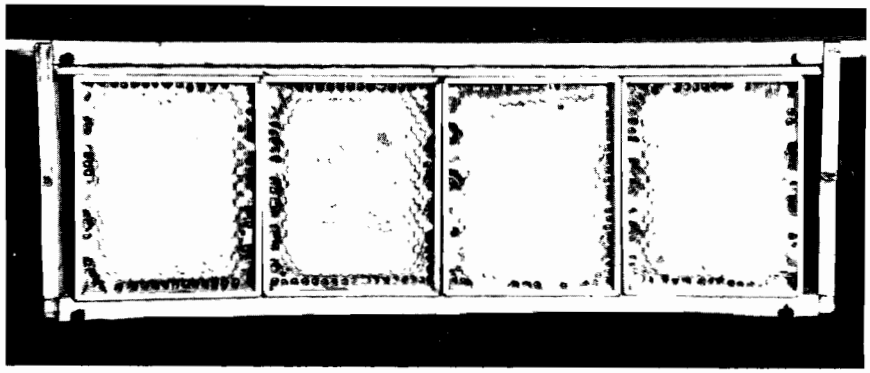

Figure 7: Frame of four finished half-comb sections as used on the hive in this experiment.[6a]

Since these experimental half-comb sections lack the self-spacing provision of the modular half-comb section, shown in Figure 1, holders for this purpose were improvised from 6¼" deep Illinois frames each of which accommodates four half-comb sections (Figure 7). Commercial frames were modified by exchanging the bottom bar with a more sturdy (1⅜" wide by ½" thick) solid wood replacement, after shortening the end bars to 5" as measured from the underside of the top bar. The new bottom bar was attached with screws to allow gentle adjustment of pressure to hold the half-comb sections tightly in place, and to permit easy removal of the finished sections later when one of the screws is loosened.

The 1⅜" deep half-comb sections (outside measurement) were positioned in the frames flush with the edges of the end and bottom bars; screws were tightened and the junction of the sections with top and bottom bars were painted with melted paraffin. Note that the unused space inside the Illinois frame is divided between the ends thus providing extra cluster or crawl space. These spaces could be placed after the first and third sections, increasing lateral travel space closer to the center. By the use of tacks the frames were spaced about ¼", just about the minimum to allow reasonably free passage of bees, but not close enough to optimally control the depth of comb construction. The need for this compromise is, of course, eliminated when the bevelled base previously seen in Figures 1, 2, and 3 is incorporated.

Half-comb sections were labeled individually for inside depth and the tare weight recorded before placing in the Illinois frames. The first Illinois super, containing seven half-comb frames (28

Figure 8: Double brood chamber A-frame hives with Illinois supers.

sections) and two standard Illinois frames with foundation, was placed on top of a strong two-queen A-frame hive[4,5] in early July in the manner illustrated in Figure 8. The super was removed on July 26 just prior to completion in order to observe the stages of comb construction.

A second Illinois super of 4" x 5" half-comb sections was placed on this same A-frame hive September 1 just after reduction to single queen status in two brood chambers at about the start of the fall goldenrod flow. Sixteen 4" x 5" half-comb sections were essentially completed and others partially completed in this period when other hives containing a single queen yielded no surplus.

Several frames of triangular half-comb sections were constructed in the manner just described for 4" x 5" sections, and tested in A-frame equipment.

All half-comb sections ranging in inside depth from 7/8" to 1¼" were accepted by the bees, drawn to full depth, and nicely finished (when permitted) with no insertions of unwanted random comb construction. Twenty of

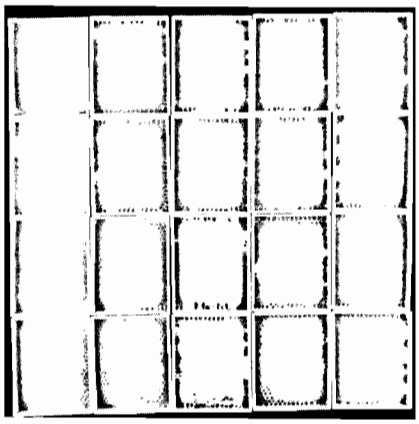

Figure 9: 4" x 5" half-comb sections in several stages of completion (inside depth 7/8" to 1¼).[6a]

these sections are shown in Figure 9. Individual finished half-comb sections are shown in rectangular and triangular shapes in Figures 10 and 11 respectively. Pilot experiments in previous seasons had indicated some tendency for the bees to insert extra comb at depths above 1¼".

The literature documents a tendency of bees to gnaw comb in order to remove foreign material such as wire etc. However, there was no evidence of attempts to gnaw away the wax foundation at the inside base of half-comb sections in order to remove the foreign plaster of paris behind it.

As may be observed in the finished half-comb sections (Figures 10 and 11) the outside row of cells tend to be left uncompleted, although this is not an unattractive result. It is not yet certain whether this result is encouraged by the extraordinary depth of the cells or is compensation for the adjacent constricted ¼" spacing between the sec-

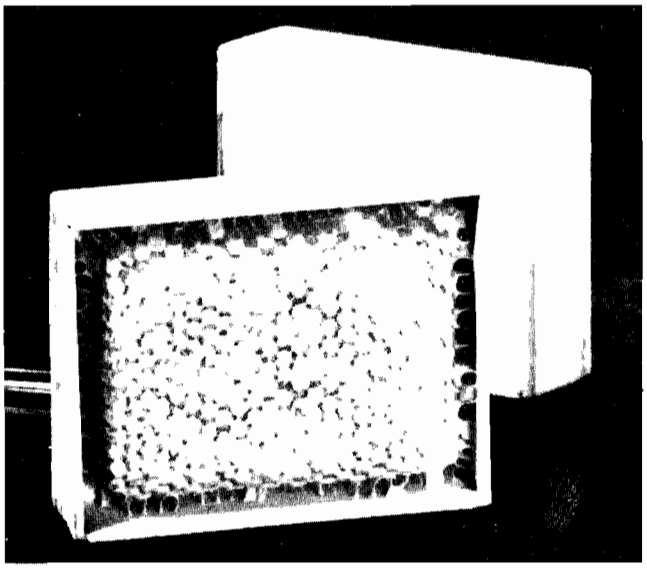

Figure 10: Mirrored view of finished 4" x 5" half-comb section.[6a]

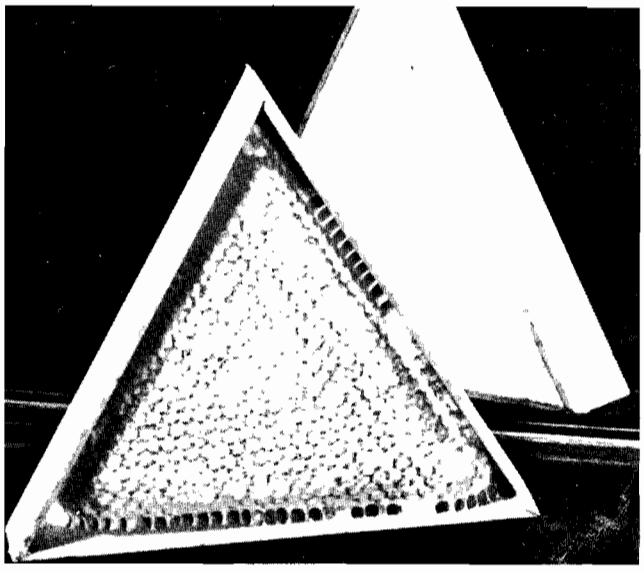

Figure 11: Mirrored view of finished A-frame half-comb section.[6a]

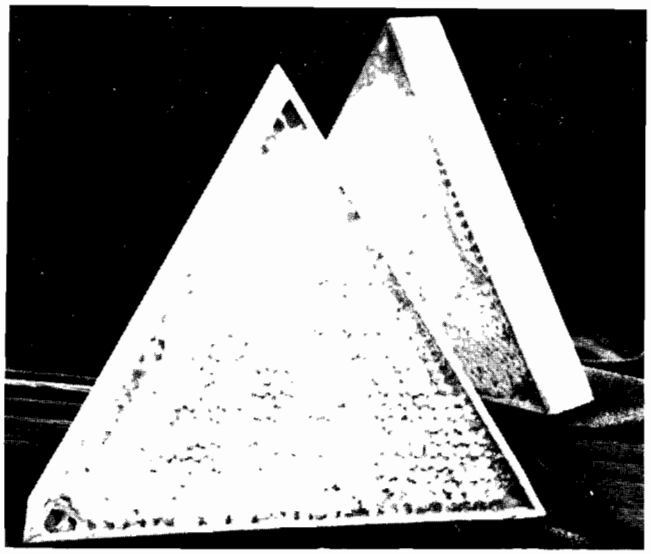

Figure 12: A well-filled 1¾ pound A-frame section in natural comb. (Mirrored picture)[6a]

tions. In contrast, note the well-filled 1¾ pound natural comb section in triangular shape in Figure 12 which was produced as previously described[5] with adequate spacing.

The net weight of honey in the 4" x 5" half-comb sections ranged from 9 ounces in the ⅞" (inside depth) sections to 13 ounces for the 1¼" (inside depth) sections.

The A-frame hive used for this experiment also produced one hundred pounds of 1¾ pound sections of A-frame comb honey of the type shown in Figure 12, and had contained two queens from mid-May until September 1 with no swarming. Most classic systems for comb honey production advocate intensive management to build strong colonies followed by sharp reduction of the brood nest to force the bees to work in sections, thus precipitating the inclination to swarm. There are reasons to believe, both from this and previous experience,[5] as well as in theory, that simplified two-queen systems for comb honey production are possible which will achieve the desired build up and avoid the need for sudden constriction.

In summary, these results establish the practicality of consolidating all of the several functional components in comb honey production and use (section, separator, foundation, spacing, package and server) into a single comb honey section. The concept eliminates the need for investment in accessory parts, assembly time and cleaning of accessory parts. The potential for advantages in economy, labor reduction, convenience, novelty and even re-usability will be readily recognized.

1. Patent pending.
2. **ABC-XYZ of Bee Culture,** 36th Edition, page 161. Also one finds here reference to "freak" one sided acceptance of comb foundation. The author has observed several instances in which bees have drawn out small patches of "half-comb" in spaces inadvertently left open. No foundation was involved.
3. The author will appreciate comments from readers who choose to experiment with the half-comb section as described.
4. John A. Hogg, 1977. "An A-frame Modular Beehive." **American Bee Journal,** Vol. 117 (8): 488-90.
5. John A. Hogg, 1979. "A Management System for the New A-frame Beehive." **American Bee Journal.** Vol. 119 (5). 368-70.
6. Acknowledgment:
The photographs are by (a) Beulah J. Hogg and (b) Dr. Norman A. Nelson.

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