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# FRAMELESS MOVABLE-COMB HIVES IN BEEKEEPING DEVELOPMENT PROGRAMMES

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## Introduction

In modern beekeeping with a movable-frame hive, exact measurements must be respected; equipment is expensive, and quite a lot must be understood about what is being done. Combs can be (although perhaps should not be) used year after year, and in this type of beekeeping centrifugally extracted honey is the marketable product, beeswax being conserved as expensive to produce.

In regions where wax is produced for sale easily over much of the year, a movable-frame hive does not necessarily have many advantages over a frameless movable-comb hive, which can likewise be made to satisfy requirements of apiary hygiene. Movable-comb hives of the types discussed below consist of one unit only; so, unlike movable-frame hives, they can be hung or supported in trees where this is necessary for protection against predators. It seems likely that they will form the basis of future beekeeping in large parts of Africa, and possibly elsewhere. They can be made locally, at minimal cost, using local skills and local materials, and have only one critical dimension—the correct spacing between adjacent combs.

## Movable frames and movable combs

The bee-space in Langstroth's hive was achieved by the use of frames subsequently filled with comb by the bees[8]. Some years later, comb "foundation" was invented and fitted in the frames before they were given to the bees.

The bar-hives which preceded Langstroth's consisted in general of wooden "boxes" with vertical sides, and although the regularity of comb separation was achieved by the siting of the top-bars, the combs could not be removed and replaced because the bees fastened them to the side walls. The one known hive in which combs built from top-bars *were* individually removable was the Greek basket hive[2,4], whose sides sloped inwards towards the bottom (Fig. 5). The slope of the side walls would seem to be the factor, or at any rate a major one, in determining whether the combs hang free or whether they are attached to the walls. Other factors that may well be relevant include the width of the hive (or the effective length of the top-bars if these are provided); the height of the hive; the ratio between the last two measurements; the "wax productivity" of the colony; temperature; and characteristics of the race and strain of bee.

A rectangular frame is a convenience in honey extraction, but is not necessary for free manipulation unless the hive walls are vertical (Fig. 2, 3), or slope inwards towards the top (Fig. 1) as in the usual skep or in what the French refer to as an ogival hive. In such hives, the bees would attach the combs to the hive walls unless inhibited from doing so by the "bee space" ensured by the presence of frames.

Modern beekeeping with movable-frame hives is expensive and, to the uninitiated, complicated. In a number of African countries whose potential honey production is largely unexploited[3], attempts have been made recently to introduce movable-comb hives which are cheap, simple to operate, and

involve a beekeeping system fairly similar to what is already practised locally. This article summarizes what is known at B.R.A. headquarters about these experiments. We should be most grateful for any further information.

## Round movable-comb hives

The traditional Greek movable-comb hive (Fig. 5) is made of wickerwork covered with cow dung, and is like a large, fairly tall upright waste-paper basket[4]; the example in the B.R.A. Collection is 19 inches high, $15\frac{1}{2}$ inches in diameter at the top and $10\frac{1}{2}$ inches at the bottom, all internal measurements [$48\frac{1}{2}$, $39\frac{1}{2}$, 27 cm]. The slope is thus about $7\frac{1}{2}°$. Bees build their combs from the top-bars, which are bevelled on the underside, and which completely cover the top of the hive. The combs hang free and can be manipulated, although not interchanged freely because the centre combs are larger than the outer ones. Miss P. Papadopoulo, Apiculturist in Rhodesia, successfully introduced a similar hive[11] to beekeepers there who were used to working horizontal log or bark hives. Miss Papadopoulo recommends a height of 18 inches and top and bottom diameters of 16 and 12 inches [46, $40\frac{1}{2}$, $30\frac{1}{2}$ cm]. The sides slope at an angle of $6\frac{1}{2}°$. She found it necessary to provide a strip of beeswax along the underside of each bar to prevent combs being built across the bars. This hive is woven from local materials, as is also the conical thatched roof (hackle) which protects the hive.

In Kenya, J. Nightingale is experimenting with a modified form of the Greek hive[12]. In Senegal, J. Linder has introduced a "David" hive of straw and wood, also based on the Greek hive. (His "Rivka" is a local modified version of a Langstroth, suited to Senegal conditions and bees.)[9]

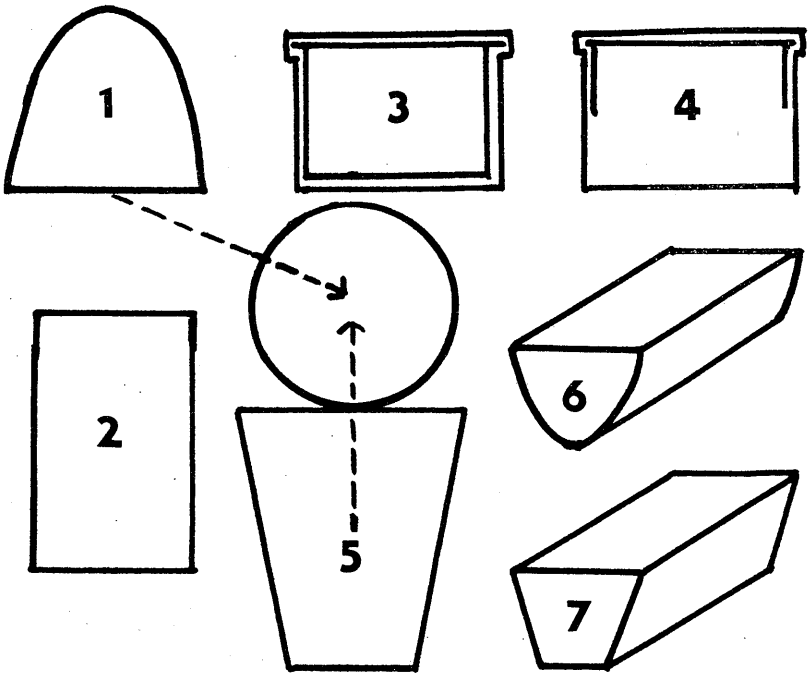
News of the traditional Greek movable-comb hive was first brought to western Europe by Sir George Wheler in 1682, and variants of it were described from that time on. Golding[5] was one who saw its potential very clearly; he described a small version, for use with supers; it was only 9 inches high and with top and bottom diameters $11\frac{5}{8}$ and $10\frac{1}{2}$ inches [23, $29\frac{1}{2}$, $26\frac{1}{2}$ cm]; this gives a very small angle, between $3\frac{1}{2}°$ and 4°.

## Interchangeable combs

If the hive has a rectangular cross-section instead of a round one, with two parallel ends and the other sides sloping in towards the bottom, bars of equal length can be laid across the top, from side to side. The combs built from these bars hang parallel to the end walls, and are free at the sides because of the slope. An article on page 18 describes such a hive (Fig. 6) made in Zululand, woven from local material[6]. The weaving stakes are so spaced that they constitute spacers for the top-bars; since adjacent top-bars are not in contact, a standard super can be used on top of this hive. In England, W. B. Bielby has been experimenting with a plastic "Catenary" hive of a similar shape and for use with a standard super, although for different reasons and to satisfy different requirements[1]. If top bars are used in this hive (instead of the normal frames with a curved lower edge), these combs also hang free from the sides.

Various "transitional" hives have been tried in Tanzania, by G. Ntenga[10] and others. One, called Muninga, is made of wood and uses half-frames (Fig. 4). Each of these has a top-bar and half-depth side-bars; apparently the bees are unlikely to build their combs out to the side of the hive below the end of these short side-bars.

In Kenya, P. Paterson has introduced a long hive of wood, with sloping sides[12]. This looks like a trough (Fig. 7), and is somewhat reminiscent of the old French trapezoidal hive. Externally the cross-section of the top is 32 × 19 inches, and of the bottom 32 × 16 inches [81, 48, 40½ cm]. The hive is 12 inches [30½ cm] high, and the sides slope at about 7°. Up to 20 transverse top-bars can be used; these are 19 inches long with a 2-inch lug at each end, so Langstroth or Dadant frames could be used in a super.




*Hive types in relation to removing and interchanging combs (not to scale)*

| | | combs removable | combs interchangeable |
|---|---|---|---|
| **Fig. 1.** | *Skep, or ogival hive* | *no* | *no* |
| **Fig. 2.** | *Box or log hive without frames* | *no* | *no* |
| **Fig. 3.** | *Box hive with frames and foundation* | *yes* | *yes* |
| **Fig. 4.** | *Box hive with half-frames and starters* | *yes* | *yes* |
| **Fig. 5.** | *Greek hive (also in Rhodesia, Kenya, Senegal)* | *yes* | *no* |
| **Fig. 6.** | *Zululand hive* | *yes* | *yes* |
| **Fig. 7.** | *Kenya trough or trapezoidal hive* | *yes* | *yes* |

## New African fixed-comb hives

The following notes complete the picture of experimental hives made recently in various parts of Africa, as far as is known. The remaining hives are made of rectangular boxes, so units can be used together to form a sectional hive (tiered or collateral). These hives have vertical walls, and their combs are not movable, so there is no easy access for disease examination or manipulation.

In Morocco, P. Haccour's "Maroka" hive consists of unit boxes placed together end to end; the top cover is a board with parallel and suitably spaced grooves fitted with beeswax "starters", running across the hive[7]. In Ethiopia, Tadesse Haile has tried various types of hive, including one made of straw in square "bats", fastened at the corners[13].

## Conclusion

In countries with an established tradition of fixed-comb beekeeping in cylindrical hives, a useful sequence of development would seem to be (1) fixed-comb hive, (2) round hive with movable combs but without frames, (3) hive with movable and interchangeable combs without frames, (4) hive with movable framed combs. In many tropical areas, especially where wax is a major beekeeping product, stage 3 should perhaps be regarded as the final one at present.

The types of hive with a rectangular top and parallel flat end walls (Fig. 4, 6, 7) have the great advantage of interchangeability of combs, and represent a stage of development from which some beekeepers could graduate to the orthodox movable-frame hive. On the other hand, beekeepers accustomed to *this* hive, who have nimble fingers and time at their disposal, could usefully experiment with frameless movable-comb hives of their own materials and design. Such adventures might well throw light on some of the fundamental characteristics of bee behaviour on which the movable-comb hive depends.

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