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## THE WORLD'S BEEKEEPING — PAST AND PRESENT

by EVA CRANE\*

THE PRESENT BOOK is the direct successor to one written by Lorenzo Lorraine Langstroth, published in 1853 under the title *Langstroth on the Hive and the Honey-bee*, which made known Langstroth's practical application of the concept of the bee space in 1851, and laid the foundation of the whole of our modern beekeeping. In this introductory chapter the story of beekeeping is told briefly, as it leads to and from the climax in 1851, and a short account is given of the position of beekeeping in the world today, which stems largely from Langstroth's work and the book he wrote.

### BEEKEEPING UP TO 1500

Honey bees now live in all parts of the world except the extreme polar regions, but this was not always so. Until the 16th century they were confined to the Old World, where they had evolved and were widely distributed long before man appeared on the earth. Primitive man learned to get honey by robbing the bees' nests in hollow trees or rock crevices; a painting made in a rock shelter in the mountains of eastern Spain in Mesolithic times, probably about 7000 B.C., survives to show us how this was done (Fig. 1). Bee hunting is still carried out in various parts of the world, and honey can still be a lifesaving food for primitive peoples in times of famine.

Beekeeping proper started when man learned to safeguard the future of the colonies of bees he found in hollow tree trunks or elsewhere, by a certain amount of care and supervision. Gradually, separate hives came to be used as substitutes for the natural dwellings of bees; for convenience and safety they were collected together in an apiary. Hive construction depended on what local materials were at hand, and on the local skills of the various communities. It is almost certain that the beehive had no single origin: it was an inevitable development in any region populated by honey bees, as soon as man advanced from hunting and collecting food to producing it, and thus started a settled existence.

In the great forests of Europe, the earliest hive probably was a log from a fallen tree in which wild honey bees had nested. The log would be separated by chipping away the rest of the tree with axe and adz, a technique used throughout the Stone Age. Cork and other types of bark were also made into hives and, later, planks cut from tree trunks (Fig. 2).

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FIGURE 1. Rock painting depicting honey gathering. Discovered in the Cuevas de la Arana near Bicorp in Valencia, Spain. (Courtesy of E. Hernández-Pacheco, Museo nacional de ciencias naturales, Madrid)

The earliest centers of culture were in the Middle East, in hot, dry open country which was not forested. The first hives there were probably pots in which swarms happened to settle. Pottery vessels were made during most of the Neolithic period, from perhaps 5000 B.C. onwards, and water pots are still used as hives in some Mediterranean lands (Fig. 3). In ancient Egypt and adjoining regions, pipe hives were used — long tubes lying horizontally and piled together, made of clay and other materials.

In agricultural communities, techniques were developed for making containers of basket work as well as pottery, and these baskets were also used to house bees. Baskets have changed little through the ages, and baskets of coiled straw are made today in the same way as before 5000 B.C. The bone awl (Fig. 4), effectively the same as that of a Mesolithic basket maker, was in fact used for making skeps for bees as late as the 1950s in a Yorkshire dale in England. Woven baskets came later, and were made of various materials such as pliable hazel twigs; examples made between 3000 and 2000 B.C. have been found in Egypt. Wicker-work hives still linger on in a few parts of Europe (Fig. 5).

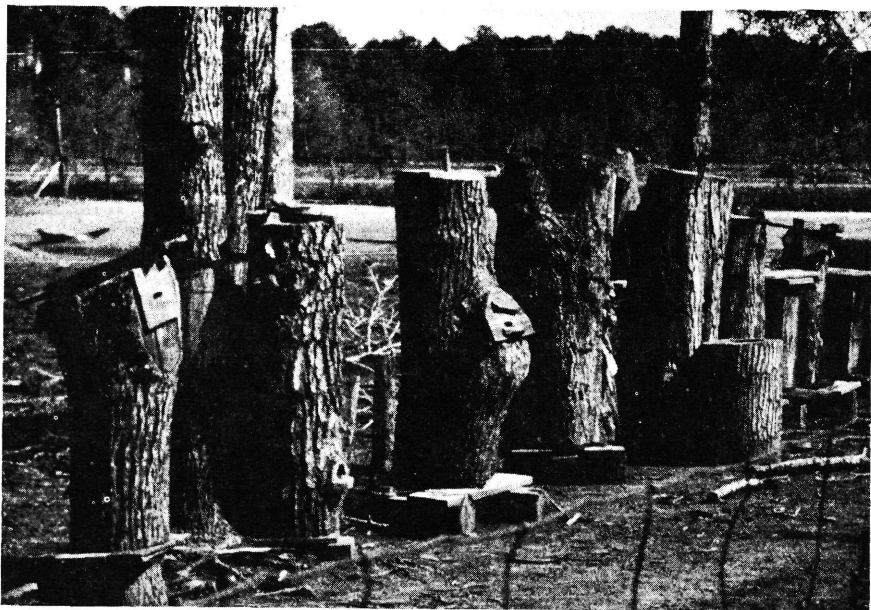


FIGURE 2. Log hives in North Carolina in 1958. The trunks containing bee colonies have been cut from the black gum (*Nyssa sylvatica*). (Photo by W. A. Stephen)

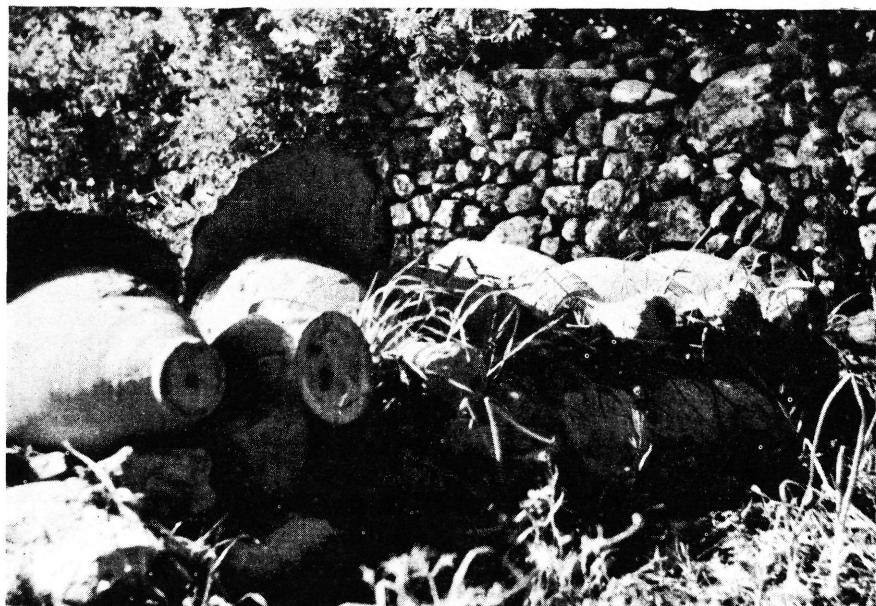


FIGURE 3. Apiary of clay pots, common in Israel and Lebanon. The bottom of the pots can be detached for taking honey. (Photo by Brother Adam)

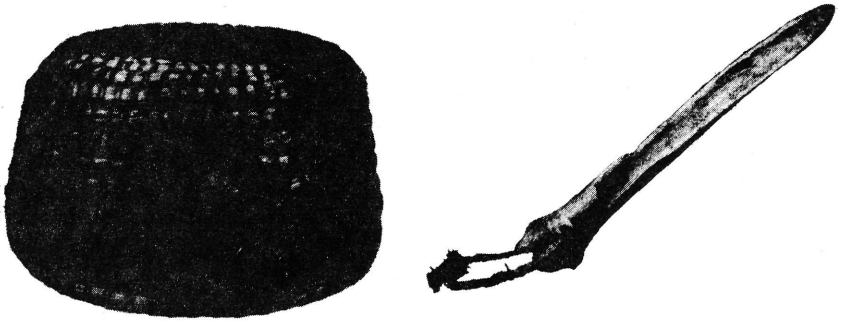


FIGURE 4. Left, coiled straw skep and, right (large scale) bone awl used to make it. Yorkshire, England, 1953. The skep is flat-topped for use with a cap. (Courtesy of Museum of English Rural Life, University of Reading)

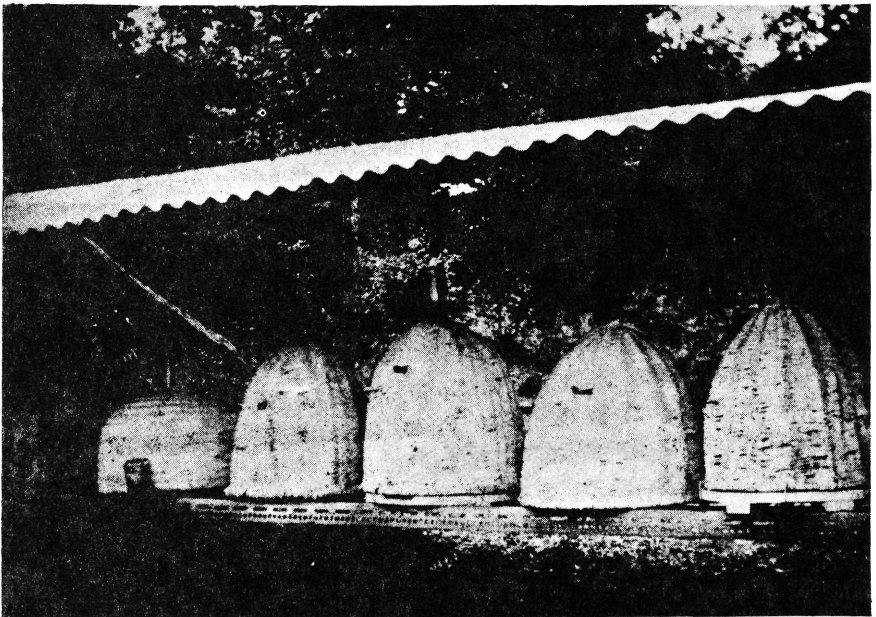


FIGURE 5. Apiary of wicker hives in Belgium, 1960. (Photo by Eva Crane)

All these primitive hives fulfilled certain necessary functions: they protected the bees and their combs from wind, rain, and extremes of heat or cold; their flight entrances were small enough for the bees to guard; and there was some other opening through which the beekeeper could get at the honey and wax which constituted his harvest. Wood, bark, and clay were themselves weatherproof; straw and wicker hives were generally protected with an additional cover, and wicker hives were often plastered with mud and cow dung.

Primitive hives were usually small, because the beekeeper wanted to encourage swarms to populate his empty hives. Primitive beekeeping consisted of little more than providing the hives, and killing the bees (for instance by plunging the hive into boiling water) to get the honey and wax. In ancient Egypt, smoke was used to drive bees from their hive, and by ancient Roman times bees were fed. At some time in the Middle Ages, beekeepers devised a form of protection to wear when handling their hives (Fig. 6).

Until the 16th century — a significant one for the honey bee — the beekeeper's calendar remained virtually unchanged; in early summer he caught and hived the swarms which issued; in late summer he killed the bees in most of his hives, cut out the combs and strained the honey from the wax; in the fall, if necessary, he provided food in the remaining hives, which he overwintered. Burning sulfur was commonly used for killing the bees.

Little was understood as to what went on inside the hive, for the events there could not be seen. It was not realized that the large "king"



FIGURE 6. One of the earliest pictures of bee dress, from Sebastian Münster's *Cosmographia*, 1545. (Courtesy of Bee Research Association)

bee was in fact a female, the mother of the other bees in the hive, nor were the sexes of the workers and drones understood, let alone the facts of mating between queen and drone. It was not known that the bees themselves secreted the wax with which they built comb, nor that their visits to flowers had anything to do with the formation of seeds and fruits.

### BEEKEEPING—1500 TO 1851

Three separate streams of events, each of great significance in the history of bees and beekeeping, were set in motion in the 16th century, and led on to Langstroth's advance in 1851. First, scientific and technical developments enabled beekeepers to understand the fundamental facts of the life cycle and biology of their bees; second, and coupled with the first, there were developments in beekeeping methods which gave beekeepers slightly more control over their bees, as well as greater opportunities for observing the bees inside the hive; and third, the honey bees themselves spread over two new continents, from one of which was to come the greatest single advance in the science and craft of beekeeping.

**Discovery of the Fundamental Facts about Bees.** The first description of the queen bee as a female, which laid eggs, was published in Spain in 1586, by Luis Méndez de Torres. Then in England Charles Butler showed, in his *Feminine Monarchie* (1609), that the drones were male bees, and Richard Remnant, in his *Discourse or Historie of Bees* (1637), that the worker bees were females; Remnant had observed that they possessed "a neat place for the receipt of generation." Meanwhile in 1625, in Italy, Prince Cesi had published the first drawings of bees made under a microscope.

The fact that bees could raise a queen from eggs or very young larvae was published in Germany in 1568 by Nickel Jacob, but the primary facts about the mating of the queen with the drone were not available until 1771, when Anton Janscha in Slovenia published an account of the event. A correct description of the production of beeswax by bees was published by H. C. Hornbostel in Germany in 1744.

The fact that the pollen which the bees collect is the "male seed" of the flower, which fertilizes the ovum, was discovered in England in 1750 by Arthur Dobbs; he also observed that bees gathered pollen from only one kind of flower on each flight, and he suggested that disastrous cross-fertilization would result if this were not so. The part played by bees in fertilizing flowers was established clearly by C. K. Sprengel in 1793, a year after the publication of the observations of Francois Huber, the blind Swiss beekeeper, which properly laid the foundations of modern bee science.

**Developments in Beekeeping Techniques.** Between 1500 and 1851 there were many attempts to devise ways of taking the honey from hives without killing the bees. For instance, several colonies were united together in a single hive for overwintering, instead of killing all but one colony.



The uniting was done by "driving" the bees; their own hive was inverted, and an empty hive placed on it with the two open ends in contact but held apart at an angle; the sides of the inverted hive were "drummed," causing the bees to leave it by running up into the empty hive. Several other colonies were driven into the same hive, where the queens would fight it out until only one remained. The process of driving had been known in the Middle Ages, but had not then been favored.

Alternatively, where fairly large hives were used, like those made of logs or cork, the lower third of all the combs might be cut out with a specially shaped knife; the remainder constituted a permanent brood nest, and each year the "honey comb" was built afresh by the bees and cut out by the beekeeper. With the small straw skeps this was not possible, and various types of extension were added *at the top*, over a hole left in the top of the skep. The extension might be a smaller skep (a cap) or a glass jar (a bell). The bees stored honey but they did not breed there: it was a true honey super. Alternatively an "eke" was placed *under* the skep; this was a straw cylinder a few inches high which formed an extension of the skep downwards. All these extensions could be removed complete with honey combs without disturbing the brood nest.

Hives made of wooden boards were also used. Initially these were simple boxes, but various elaborations were devised later, and "collateral hives" had boxes *at the side* for honey storage.

Throughout these centuries the minds of beekeepers in the most progressive areas were constantly occupied with the problem of getting more control over the bees and their activities, and of learning what was going on inside the hive. It is difficult for us now, with the problem solved and therefore no longer a problem, to enter into the minds of these experimenting beekeepers, who struggled so long and so unsuccessfully to find a way of getting *combs they could easily remove from the hive*. Observation windows in the hive walls were easy enough to make, but did not show much of what was going on inside. There is a tantalizing entry in Samuel Pepys's Diary (1665): "After dinner to Mr. Evelyn's; he being abroad, we walked in his garden, and a lovely noble ground he hath indeed. And among other rarities, a hive of bees, so as being hived in glass, you may see the bees making their honey and combs mighty pleasantly."

Réaumur tells us that the Italian astronomer Maraldi found single-comb observation hives in the garden of the French Royal Observatory in Paris in 1687. Huber's leaf hive (Fig. 7) came over a century later; it consisted of a number of frames hinged together at one side like the leaves of a book, and the bees built combs in the frames. It was invaluable for his observations, but was an observation hive only and quite unsuited to practical beekeeping.

Between 1650 and 1850 many hives with top bars and frames were invented, but after these two centuries of effort there was still failure

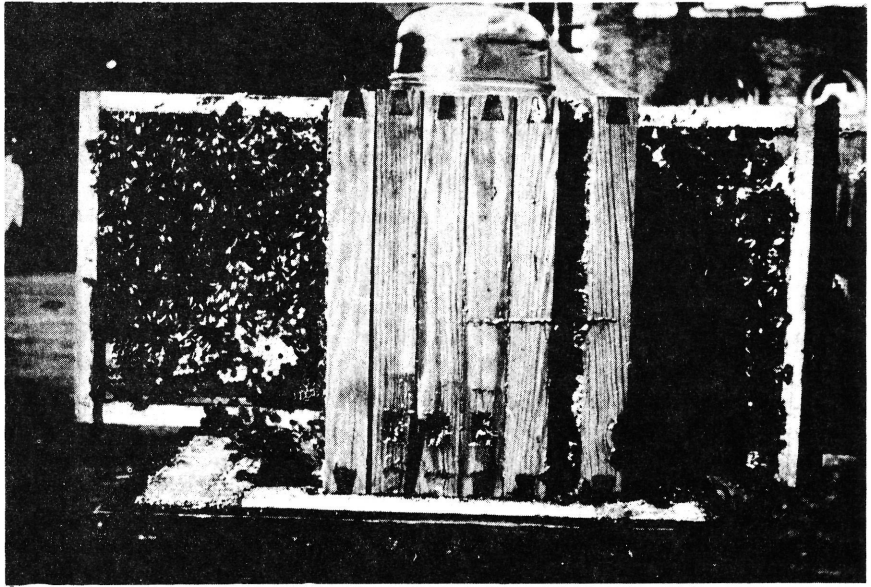


FIGURE 7. Bees in a reproduction of Huber's leaf hive. (Photo by Eva Crane)

on the fundamental point: *whatever bars or frames were used, the bees attached their comb to the walls of the hive as well, and the combs could, therefore, only be removed from the hive by cutting them out.* Only two of the many inventions need be referred to here. About 1806 a Ukrainian beekeeper Peter Prokopovich produced the first movable-comb hive to be used on a commercial scale (and he kept up to 10,000 colonies). This hive had three vertical compartments, the top one having wooden frames with notched bee passages in the end bars; the frames were removed from the back of the hive, but as the bees attached the frames to the hive walls with comb or propolis, this was not at all easy. The second invention was so fundamental, and made so early, that it might well have altered the whole history of beekeeping if it had been more widely known and understood.

Woven basket hives were in early use in Greece, and at some stage — we shall probably never know when — some beekeepers started using them *with the open end uppermost*. The open end was covered with wood which, by the 17th century at any rate, was cut into "bars" about  $1\frac{1}{2}$  inches wide. Each bar was made slightly convex on its under side, and the bees attached their combs along the ridges so formed, i.e. one along the under side of each bar. What distinguished this hive from all the other "bar hives" was the fact that it was wider at the top than at the bottom and, largely because of this slope of the hive walls, *the bees did not attach their combs to them* (Fig. 8). News of these hives reached England in 1682, when Sir George Wheeler described them in his book



FIGURE 8. Apiary of movable-comb wicker hives in Greece. The beekeeper is holding one comb by the lugs of the top bar. (Courtesy of Pan D. Georgantas)

*A Journey into Greece.* He reported that in spring the number of occupied hives was doubled by removing half the combs from each hive and placing them in an empty one. The Greek beekeepers had in fact produced a workable movable-comb hive. Aristotle's account of the life of the bee makes it seem possible that he used one of these hives when writing his *Natural History*.

Wheler's report had a considerable influence on hive development in England and elsewhere, but the crucial step — which would have given the desired movable-comb wooden hive — was never taken. It seems to the author that if one of the many bar hives had been wider at the top than the bottom, the bees would have made their own bee space between the combs and the hive wall, and modern beekeeping might have started 150 years earlier than it did.

**The Spread of Honey Bees over the World.** We must now leave this story of beekeepers' unsuccessful attempts to invent the hive they needed, to follow the adventures of the bees themselves during the same 2½ centuries. The honey bee belonged to the Old World — to Europe, Africa, and Asia. Prior to 1500 there were no honey bees in the New World — in the Americas, Australia, and New Zealand. But, like the dog, the honey bee had accompanied man on most of his major migrations, and the early settlers in each part of the New World took hives of bees with them. Records of the establishment of honey bees in North America do not start until 1638. The first honey bees were landed in Australia at Sydney in

1822, and W. C. Cotton took the first consignment to New Zealand (from England) in 1842. Honey bees were not introduced to the west coast of North America until the 1850s, when they were landed in California; from there they were taken to Oregon, and thence to British Columbia. It is thus little more than a hundred years since honey bees — members of the genus *Apis* — have lived in all five continents.