

# Chapter 1

## Introduction: The beekeeper and beekeeping

### 1.1 What is needed in a beekeeper?

The qualities which are needed in someone who is to be a successful beekeeper can be arranged in several headings.

- **Physique**

Beekeeping involves the lifting, carrying and gentle handling of awkward heavy boxes weighing up to 30 kg (60 lb) in round figures. Every beekeeper must have the strength for this.

- **Access to a suitable site**

Traditional requirements for an apiary site are: open sunny location but with some shade; ready access to clean fresh water for the bees (within 200 metres or 200 yards); the presence of ample amounts (many hectares/acres) of suitable foraging plants within 2 km (1 mile) — see later in this chapter. Of equal importance these days are protection from vandalism and screening (by hedges or distance) from neighbours who may be frightened of bees and complain if they are stung when bees are out of temper.

- **Available time**

The keeping of even a few (3 or 4) stocks of bees demands roughly one afternoon a week during the active season from April to August. Bees given less attention than this will yield less well and may become a liability. In addition a fair amount of time will be required in August-September to process the honey crop. If heather honey is sought, more late season (August-October) work is involved. Bees satisfactorily bedded down for winter need very little attention from September to March — mainly an occasional glance to ensure that hives have not been disturbed by the weather or by vandals.

Obviously keeping bees on a larger scale requires proportionately more effort.

- **Inclination and enthusiasm**

There is no point in beginning to keep bees unless you are interested. Many beekeepers (including myself) enjoy working with bees in a small way and getting enough honey for family and friends. Others like the harder challenge of trying to make a small supplementary income by keeping up to 20 or more stocks, and selling honey either direct retail or selling to shops (who must be allowed a generous mark-up and so will not pay so well).

Those who keep 40 or more stocks are aiming to make a significant part of their income from their bees. It is a hard and demanding occupation on this scale and the return is very uncertain, being dependent on weather and fluctuating honey prices which naturally fall during glut years. Competition from imported honey from countries with easier climates than ours — Mexico, Australia, etc. — limit the income that can be made. The *average* annual yield per stock is around 15 kg (30 lb), and the wholesale price of Scottish honey in 2007 is about £2.50 per lb, so the basis of calculation is fairly clear. The provision of a pollination service to fruit growers and other farmers can help the commercial beekeeper to make a more reliable income. However if you are thinking of beekeeping on this scale, don't forget the overheads and inevitable costs!

In Scotland there are a very few people who can genuinely be classed as bee farmers. These are people who choose to make their principal livelihood, or at least a large part of it, from beekeeping. This involves keeping many hundreds of stocks of bees, and being knowledgeable and careful about making efficient use of the limited time that can be devoted to each individual colony. On this scale also it is worth the large outlay of investing in industrial-scale equipment for the extraction and bottling of honey, and for moving hives. Great care needs to be given to the siting of apiaries and stocking them to an appropriate level, so that no area is over-populated with your honey-bees. After all they cannot get more honey from a district than is available from the flowers that grow there. It is no use having your own bees competing to the death with one another and starving in consequence. That kind of beekeeping in my view should only be undertaken by someone who has been trained for it by working on a bee farm, so that the methods and hazards are explored before the big investment decisions are made.

## 1.2 Development of methods of beekeeping

Honey-bees in more or less their present form have existed on earth for far longer than human beings. From the very earliest human records there is evidence that men have sought their honey. There are several primitive stone-age cave paintings apparently showing men robbing bees' nests. Some people say they can even see in some of the pictures that the man is carrying a smoking torch — evidence that even at this early date smoke was being used to pacify the bees.

In prehistoric times the discovery must also have been made that if the hollow log containing a bees' nest was moved to a convenient place near home, the bees would continue to live in it, and also that if a swarm of bees was introduced to a hollow log, earthenware pot or straw skep in the evening, there was a good chance that they would set up home there.

All early civilisations in Europe and Asia show familiarity with beeswax and honey. There are many references in the Old Testament. Ancient Egyptian tombs that have been investigated by archaeologists have contained offerings to the dead of both beeswax and honey, remarkably well-preserved, especially the wax.

The ancient Greeks and Romans wrote many treatises on the art of beekeeping, some of which have come down to us. The system they describe is similar to one still practised in parts of Africa and the less well-developed parts of Europe even today, and was almost universal until about 100 years ago.

The bee-keeper using this primitive system starts by capturing a swarm, whose cluster he shakes from its branch into a box or basket, using smoke if necessary to subdue them. In the evening he throws the bees on to an upward sloping board leading up to the entrance to his bee-hive which is merely a hollow vessel of ten to twenty litres capacity, reasonably waterproof, made of wood, straw, pottery or whatever is available. The bees take up residence and the bee-keeper watches over them but does not otherwise interfere.

In their second season it is likely that further swarms will issue from the first stock, which the beekeeper tries to capture, so increasing his number of stocks.

At the end of every summer, the beekeeper assesses his stocks. Those hives which are very heavy with honey and those which are very light and not prospering he decides to sacrifice. Those of

middle weight he leaves to over-winter, hoping they will survive till next season.

By the use of much smoke and drumming on the sides of the hive the bees are driven from the hives to be sacrificed and all the combs inside are then removed for harvest. The honey is pressed out, and the residue is melted down for beeswax.

This is a very wasteful system. The best-yielding colonies and their brood-nests are destroyed. The worker bees driven off may gain entry to some of the other hives and supplement their numbers, but often the smoke used in this operation was that of burning sulphur which killed the workers.

In the eighteenth and nineteenth centuries many improvements in agricultural practice were being introduced in Western Europe and America, and those beekeepers who had enquiring minds began to consider how beekeeping might also be improved. Such improvement depends upon accurate knowledge of the needs and behaviour of the species being cultivated. This knowledge about bees was growing fast at that time.

The first systematic account of honeybees we have is that of the Greek philosopher Aristotle of about 350 BC contained in his works on the “Natural History of Animals” and “Reproduction of Animals”. He distinguishes the drones, the workers and the queen and speculated that the queen might be female and the drones male. But as the mating of the queen and drones had never been observed, he remained doubtful about how bees reproduce, and in the end went along with the common male chauvinist line of his day that the bees were ruled by a king. This wrong belief about the sex of the queen persisted till the seventeenth century. Aristotle also noted the division of labour among the workers, and described swarming, although he could not explain it. He also noted how the workers carry “bee bread” — pollen — in the pollen baskets on their hind legs, and how honey is ripened by the worker bees. He also knew that a queenless stock becomes full of drones but could not account for it.

The sex of the “king” was questioned in 1586 by Luis Mendes de Torres of Spain who said she was the mother (a most accurate name) and in 1609 Charles Butler in England described in his work “The Feminine Monarchie” how the queen laid eggs. The date is just after the death of Queen Elizabeth I of England. In 1686 Swammerdam in Holland settled the matter by dissecting queens and drones using the newly invented microscope. He also showed that workers and queens are produced from the same eggs by the feeding of the larvae, as he got worker bees to raise queens from worker eggs placed in queen cells by him — a result confirmed in 1855 by Leuckart in Germany.

In 1730 de Réaumur in France and independently in 1792 John Hunter in Scotland discovered the spermatheca of the queen bee. In 1845 Dzierzon discovered parthenogenesis — the origin of drones from unfertilised eggs. Thus by the mid-nineteenth century a fairly complete picture of the biology of honeybees was available.

The practical question of how to manage bees without having to kill off stocks was now addressed. The main difficulty was how to remove some of the honeycomb from the bees without disrupting the hive to such an extent that it could not survive the winter.

François Huber, a blind beekeeper in Switzerland, had constructed in the eighteenth century an elaborate “leaf” hive which could be opened for investigation, and Hunter in Scotland made a hive in sections separated by a division board. These were experimental rather than practical however.

Wildman in England in 1773 designed a hive with combs built on wooden frames, and Kerr in Ayrshire in 1819 invented the “Stewarton” hive on a similar principle but with a separate top box like John Hunter’s hive, that could be removed with its honey while leaving the brood-nest below intact.

The problem with all these initial designs lay in how the bees treated them. All cracks and crevices less than 6 mm ( $\frac{1}{4}$  in) in width in a bees’ nest are quickly filled by the bees with *propolis* — first described and named by Aristotle — a sticky mixture of resin collected by the bees with beeswax. It forms a very effective glue. Larger spaces are filled by the bees with comb in times of prosperity. Thus all the neatly fitting parts which went together so easily have to be separated with hammer and chisel and much loss of temper by bees and beekeeper.

In 1851 the Reverend Lorenzo Lorraine Langstroth in America, noting that the spaces left by the bees between their combs were about 6 mm ( $\frac{1}{4}$  in) wide, proposed that if a “bee space” of this

size was left between all separable parts, the bees would leave them free. He then designed on this principle a hive with movable wooden frames in which the bees would build their combs, basically the modern Langstroth hive, which is still in use with some simplifications. As Wedmore says in his book, this invention was treated like so many others as “*not good, then not new, then not invention, a thing anyone might have done, and [was] then brought into general use*”. It is no exaggeration to say that modern beekeeping practice is totally dependent on Langstroth’s observation which turned out to be more or less completely correct, although sometimes bees seem to forget it, and a fair bit of ungluing is needed!

Four other inventions play a major role in modern beekeeping:– the modern smoker invented by Quinby in the USA in 1866, the queen excluder invented by the Abbé Colin in France in 1849, embossed beeswax foundation by Kretschmer and Mehring in Germany in the 1850s, and the centrifugal honey extractor invented by Hruschka of Austria in Italy in 1865.

How all these inventions are used will be described later.

The most complete and up-to-date account of the development of methods of beekeeping is “The World History of Beekeeping and Honey Hunting” by Eva Crane (*Duckworth, 1999*).

### 1.3 Significant bee forage plants in our Association area

Gardens in small towns in Scotland contain a wide variety of flowers, many of which are valuable bee plants. However it is only when large acreages are available that they make a significant contribution to the honey crop from a colony of bees. For this reason I mention very few of such plants in the table below, and instead concentrate on those plants which are of such wide occurrence that they can be more or less guaranteed year after year to make a useful contribution.

One crop in particular, namely Oil Seed Rape, was in the 1980s and early 1990s very widely cultivated throughout Scotland, and transformed honey yields. To a large extent it compensated for the loss of what used to be a major source, namely large amounts of wild white clover in grazing land, much of which has disappeared due to the widespread use of artificial nitrogenous fertilisers on grassland. Because of reductions in subsidies, the cultivation of oil-seed rape has declined in the last few years, and tree sources such as sycamore and lime are becoming of greater importance, though if you are fortunate enough to be near fields of oil-seed rape a crop is more or less guaranteed.

Season	Primary sources	Secondary sources
Very early (March/April)	Willow	Dandelion
Early (May)	Sycamore, autumn-sown Oil Seed Rape	broom, hawthorn
Mid-season (June)	Raspberry, spring-sown Oil Seed Rape	cotoneaster
High season (July)	Clover, lime tree, rose bay willow herb (fireweed)	bramble etc.
Late season (August)	Heather (if you take bees to moor)	

Note that this table has been compiled from experience in the Dunblane area. If you live elsewhere, then some of what is shown here may be lacking, and you may have other sources which are not shown here. It is up to you to explore the flowers of your own area. Your bees will open your eyes to aspects of the flowering scene which you never saw before.