

# Hive Talk

## May 2011

May is the month of queens; and this month, of all months has to be just that. It cannot go unremarked that we have just witnessed the first royal visit to the Republic of Ireland since independence by the head of state of the United Kingdom. However successful or interesting the visit of HM Queen Elizabeth II might be, our interest, from an apicultural perspective, must be on the development or rearing of queen Honey bees.

The natural production of a new queen often results in a swarm. Mention was made last month that the first swarms were spotted in Belfast at the end of the first week of April. This is not unprecedented but it is out of the ordinary and not to be expected so early in the year. The 'swarmiest' month is generally May and there are good reasons for this. The bees will have had time to build up and in the process to bring stores of both nectar and pollen into the hive. They will also have had time to make an assessment of their overall condition and that of their mother (the queen) and to decide on a particular course of action. This sounds as if there is some sort of decision-making process used by the bees to determine what should be done. There is a process but there is no inner council or ruling group. A bee researcher by the name of Jürgen Tautz in his book "The Buzz about Bees – Biology of a Superorganism" (2008 Springer-Verlag) describes the process in these terms: "The bee colony is a complex adaptive animal community, consisting of many thousands of individuals that are continuously active and respond to the conditions of their surroundings and to the presence of their nest mates. There is no ruling body, instead the overall behaviour of the colony results from the co-operation and competition between bees". So in response to a number of biological 'feedback loops', the colony may consider the best course of action is to reproduce itself. This results in a number of special queen cells being created and in turn when eggs are laid or placed in them and hatch into larvae, these royal progeny are fed on a protein, lipid and carbohydrate rich diet of Royal Jelly that causes them to develop into queens. Once the first queen cell is ready for sealing about four and a half days after the three day old egg has hatched, the first or Prime swarm containing the original queen, the mother of the colony, flies off taking at least half the flying bees with her to begin a new colony elsewhere. This is the natural form of reproduction. A single virgin queen may be left behind after she has seen to the dispatch of her sister virgin queens or a number may be left and will swarm separately. The first to go, the first 'cast' will have a substantial number of bees and could be about the size of a football. Subsequent casts will be smaller and sometimes no bigger than an adult fist. It is received wisdom that the best queens are those that are naturally reared by the bees themselves under the swarming impulse. This said, some strains or 'lines' of bees are much more inclined to swarm than others and it is generally not in the interests of the beekeeper to have colonies of bees headed by queens that genetically carry a propensity toward swarming.

Honey bees are not domesticated animals and the degree to which the beekeeper can exercise control is limited, but there are opportunities to influence behaviour toward achieving a number of outcomes. One of these is the selection of breeding lines to rear queens with certain desired characteristics. Another is timing; it may be that the bees have no inclination to swarm at all this year, or it may be that their chosen time is much later in the year. The bee keeper can select the 'mother' queen on the basis of certain desired characteristics and – unless instrumental insemination is used – he or she can select a mating site where the expectation is that the drones from that area also possess desirable traits. In open mating of this type, it cannot be guaranteed the twelve to fifteen drones that inseminate the virgin queen will be of the 'right' stock. Only by the use of artificial methods can there be any certainty in relation to origins. The odds can be improved if beekeepers cooperate and only keep bees of a certain type in a particular area. The idea is to flood that area with drones that have the right sort of genetic material that will result in the development of a breeding line predetermined by particular characteristics. The beekeeper can time the procedure to suit him/herself once conditions are right in terms of the preparedness of queen cell producing colonies and finishing colonies - and the presence of suitable drones.

There are a number of methods and techniques by which bees are encouraged or led to produce queen cells and rear queens. Fundamental to all methods, except where the bees spontaneously start their own queen rearing programme (the swarming impulse), is queenlessness or simulated queenlessness. If Honey bees 'believe' they have no queen, their first impulse is to start queen cells and to use larvae up to three days old for the purpose. The beekeeper exploits this behavioural response to produce queens to meet his or her own ends. Queen rearing and queen breeding is not the same thing, though they must be applied together to get the best results. The simplest method of rearing a queen (or queens) is to 'split' a box of bees by removing a number of combs containing all stages of brood from eggs to sealed brood and leaving other similar combs, together with the original queen in a separate box. The 'queenless' half of the colony will build what are known as 'emergency' queen cells and providing they are left to their own devices, and conditions are reasonable, they are likely to succeed in producing a new queen to head up the newly formed colony.

There are a number of drawbacks to this method. The bees themselves tend to favour older larvae when they select for raising a queen. We know through observation and research that better quality queens are those fed and intended to be queens from the moment the egg hatches. Older larvae are more likely to have been fed a reduced diet of royal jelly with honey and pollen being introduced as intended for worker bees. So physically the queen could be inferior and in addition, the colony itself may not have been brought to optimal condition for the rearing of new queens. Feeding queen larvae is labour intensive and to do it well a colony must be well supplied with the appropriate age of nurse bees whose hypopharyngeal glands (the glands in the head of the worker bee used to produce royal jelly) are at the peak of their development. In addition, basic raw material in the form of pollen, honey and nectar should be available in abundance for the bees to convert into the royal

jelly being fed to queen larvae. The best queens are those produced under optimal conditions like those just described, but also where a planned approach to breeding has been adopted that takes into account the selection of the mother or breeder queen and the mother queen(s) of those colonies selected to provide the drones for mating.

As well as May being the month for queens, it is also the month during which candidates for the Preliminary and Intermediate Federation of Irish Beekeeper Associations (FIBKA) sit their examinations. The Preliminary examinations were held on Saturday 21<sup>st</sup> May at various locations across Northern Ireland. After a half hour twenty question paper, candidates are examined in relation to their practical abilities in opening up and working with a hive of bees. They must demonstrate certain practical skills and demonstrate their knowledge of the types of bee occupying the hive, knowledge of the make up of the colony and knowledge of various common diseases. Several individual associations affiliated to the Ulster Beekeepers Association (UBKA) prepared candidates for this exam and some also undertook to provide each participating student with a nucleus or starter hive at some time in the summer.

This 'complete' approach to the development and teaching of aspiring beekeepers is to be applauded and those associations that have such a scheme up and running should be congratulated.

This type of scheme depends upon the successful production of sufficient queens together with enough bees in support to make up a viable colony. There have been problems this year. Despite a dry April and a fairly warm one, the last three weeks or so of wet, windy and cold weather have interfered with the queen breeding and rearing plans of many beekeepers. A significant number of queens have already been produced, but the poor weather has prevented them from being successfully mated. There is only a limited 'window' in which a queen can be properly mated. After about three weeks have elapsed, the virgin queen is said to go 'stale' and her internal reproductive organs are no longer capable of receiving and successfully storing the sperm from drones she may eventually mate with. If this happens to be the case, and she continues to head the colony, she will be a 'drone layer', laying only unfertilised eggs that will develop into drones. Where the provision of a nucleus scheme exists, the Preliminary exam' candidates deserve a starter colony but, as with the rest of beekeeping, we are all hugely dependent upon the weather!