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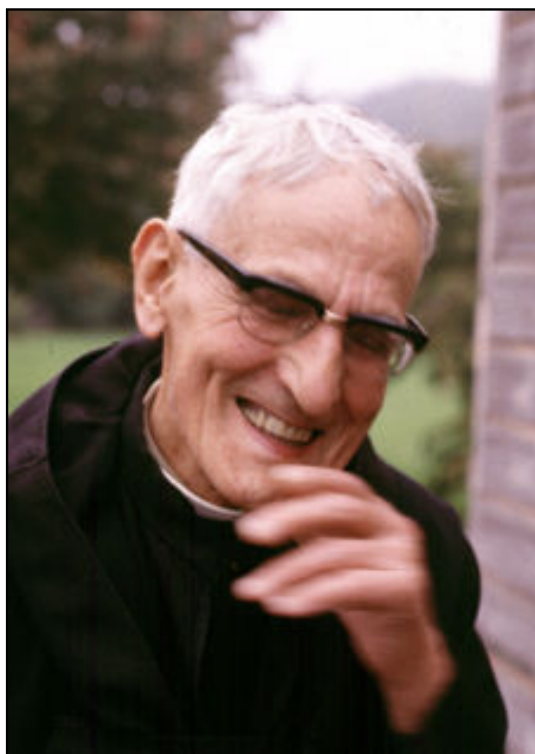
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Buckfast breeding principles

Text, photos and illustrations: Erik Osterlund

(This text was written as a base for a lecture held at Apimondia 1999 in Vancouver.)

Due to his early experiences the Benedictinian monk Brother Adam came to look at different races of bees in a similar way as we usually look at locally strains of one and the same race. With this I mean in the possibilities of using them in the same breeding program. **Every strain and race was looked upon as a possible genetic resource.**



Brother Adam liked to share his experiences and his bees with interested beekeepers.

Photo: Erik Osterlund.

That means that in principle there is nothing mysterious with the Buckfast or its breeding principles. It is like any other bee, or could be like any other bee. But you are free to take from a bigger source of material when breeding the bee.

A key word in Buckfast breeding is **drone control**. Most often you only select the mothercolony of your new queens and let them mate randomly. Or you may put together your best colonies in the same apiary, which you make your mating area for your virgin queens. That's no bad principle at all in general.

But to make a faster progress you must have more control of what kind of drones your queens will mate to.

Let me say here that if you don't aim at fast progress, but just want to preserve or make a slow progress, making a mating apiary with your best colonies regardless of their genetic relationship is a good way, according to my own opinion. But when you cross different strains that are quite different genetically, you will in the next following generations get a quite wide variation, so you need a narrowing of the genetic upset of the droneside to make progress with a reasonable speed.



Brother Adam in his home apiary at Buckfast Abbey in 1983 showing the nice performance of one of his Greek combinations.

Photo: Erik Osterlund

Brother Adam established a special mating station in an isolated area of Dartmoor for this purpose, a desolate area with

little vegetation, few bees and a hard climate. He also used instrumental insemination to a certain degree. But the mating station on Dartmoor has always been the corner stone in his breeding.

The starting point for the drones on his mating station was always one single colony. Due to the heritage of drone you can supply, not only one, but very many, mating stations with the same drone heritage, derived from the same single colony, is possible.

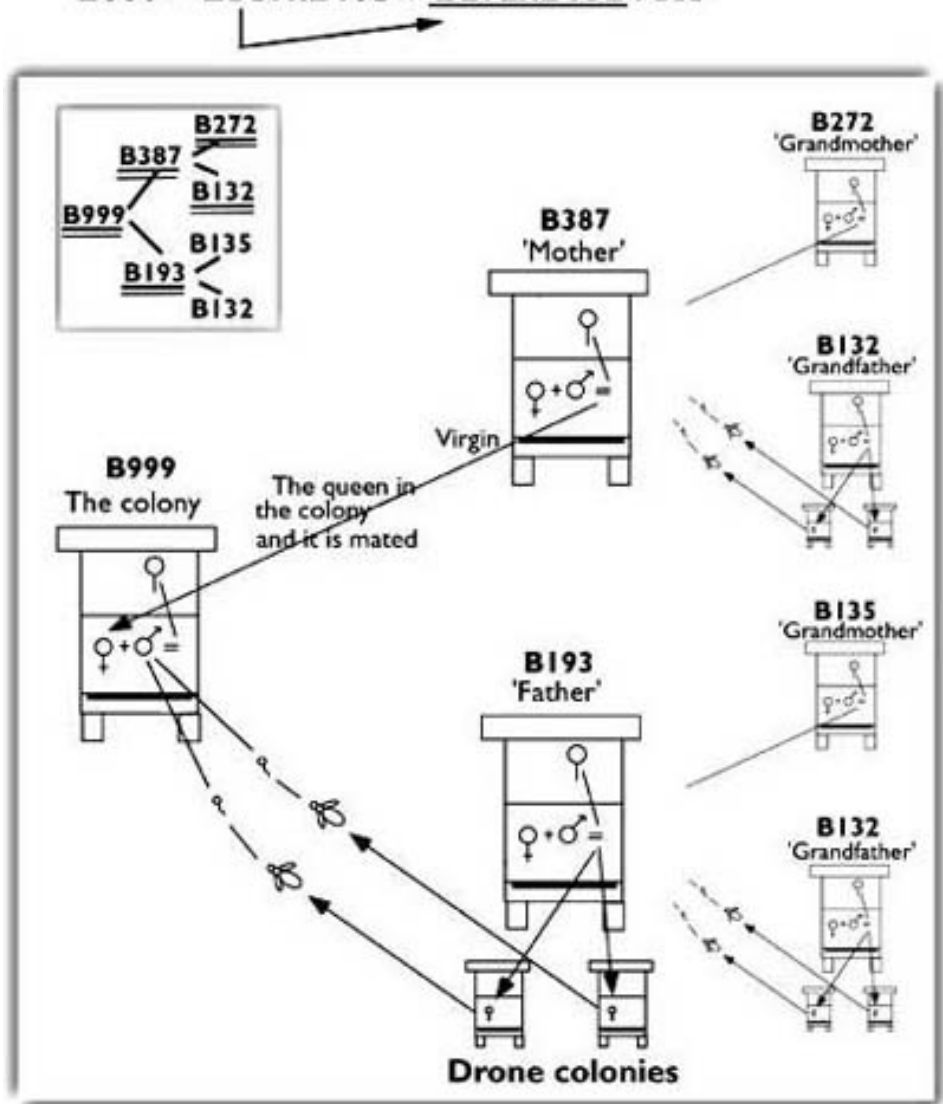
If you find a desired colony, not only one hopefully, but a number of them, and also of some different origin to avoid future close inbreeding, you of course breed virgin queens from it. You can call this colony a 'Mother colony'. But you need drones for those virgins. And another colony you find, may actually would fit very well as a complement to your first colony, to give a lacking quality, or to strengthen another, or both.

How do you combine these two colonies? If you take drones from the second colony, which we can call the 'Father colony', you don't get the full heritage of the colony. You only get the heritage of the queen, as the drones of the colony only gets their genes from her. In a way that's not bad, because the queen is the most important individual in the colony and influences the colony a lot through her pheromones, maybe even more then we normally are aware of. But 50% of the genetic heritage in the workers, come from the semen in the queen, the drones she once was mated to, may be of vital importance too, to the performance of the 'Father colony'.

Workers give the full heritage of the 'Father colony'. But they can't mate to our virgins from the 'Mother colony'. But virgins bred from the 'Father colony' are sisters of the workers and also give a portion of the full heritage of the 'Father colony'. When these virgins are mated, for our purpose here not so important to what, and laying in their own colony, they give drones. And these drones give heritage from only their mother and thus a portion of the full heritage of our desired 'Father colony'.

A 'Father colony' then give their heritage through the drones from its daughter queens. And you can have many daughter queens, so you can really supply with enough drones, even if only one colony is the 'Father'. Of course you can, and should if possible also make selection among the daughter queens, even if the most important selection was done when you choose the 'Father colony'.

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When making a pedigree of the breeders used according to Buckfast principles, the colony from which you breed the young queens can be called the 'Mother' and the colony that has supplied the queens which are heading the drone producing colonies can be called 'Father'. In this way you can get a pedigree that is similar in appearance to pedigrees for mammals. You make in the form of a tree, or like Brother Adam, just on a line. In the latter case you follow the 'motherline' and the mating for one queen in the line in every generation given.

In reality you may not decide beforehand definitely which colony will be the 'Father' a certain year ahead. But you may have a number of them, which you take daughters from, with the purpose of choosing one sister group for the mating station. The performance and wintering ability of the **sister group** may give the last selection argument. And this is actually how Brother Adam worked.

This method is used when your goal is to develop your strain, and develop it quite fast, and make it more stable. When you have reached such level that you don't want to risk what you have got, you may end up in a downward path, if you go on to

long with this method. You will end up with too close inbreeding, even if the pedigree don't reveal it. But if you constantly try out new strains and races and eventually incorporate the result in your main strain you probably don't end up there, if you watch out and avoid the closest inbreeding when selecting 'Father colony' for your 'Mother' colonies. That's the way of Brother Adam. He was always curious on new races and strains, and their eventual possibility to contribute to the progress and development of the Buckfast bee.

If we work with the Buckfast bee as it is, our method may be to look at local works with the Buckfast bee as different sources for tryout. And get breeding material from each other now and then for tryout purpose and eventual incorporation in our own local variety of the Buckfast bee.

When we stop using new races in a Buckfast type of breeding it is even still more important then before to **avoid close inbreeding**. Close inbreeding is our biggest enemy destroying what we have achieved. With inbreeding you loose a lot of the genetic varieties, and further progress becomes less possible and less probable. But in rare instances, especially when you just have crossed two very different strains or races, it can be a tool to help you get more predictable results in the following generations.

It's important though, in all this theorizing, to remember that it is not the theories that give you good bees. You have to actually do the work, make tryouts and watch the bees. Watch the bees carefully. Maybe they are telling you that you are doing the right thing. Maybe they tell you that you are working after the right theories. Maybe they will give you good colonies and you don't understand why these odd colonies are that good. Be humble enough to admit that it is a possibility that you don't know everything and take care of such colonies in your breeding. Work according to your theories, but make also some choices and tryouts by so called intuition. And let the bees tell you afterwards what you have got. Brother Adam always advised you: **Let the bees tell you**.

And when selecting Mother and Father colonies, don't only look at single colonies. Look at the sister groups as a group, how they perform compared to other sister groups. But without your ability to **discern differences between the colonies** you have little help of any breeding system. It is of vital importance that you can see the differences in performance and behaviour. And be able to take in account differences that can influence the result, as strenght of the colonies the queens are introduced to, when they are introduced, if the colonies have different kinds of hives, if they are managed differently, if they are placed in different apiaries with different nectar flows and pollen availability.

Keep watch for positive 'extremes' among your colonies. When you combine different strains, at a certain stage among the

generations, you may get a wide variation concerning certain qualities. Of course you shift the queen in colonies with too bad such variation. But if such an odd colony show up that has a good and maybe rare quality in a very remarkable way, you have to use that colony, at least a little, in you breeding, even if it to some degree may have a less desirable quality. **Take care of the positive extremes.**

Brother Adam said that you need at least **100 colonies** to be able to be sure to be able to make progress in your breeding efforts to develop your bee. Also he said that you have to look in the colonies and get to **know the bees yourself** if you are the one who will make the selection of breeders.

Brother Adam never hesitated to **share** his findings and his bee with other beekeepers who wanted to try them and to use them. He always answered your questions, but you most often had to find out the questions yourself and do ask them to get the knowledge, besides reading his books.

Today the Buckfast bee from Buckfast Abbey contains heritage from *mainly A.m. ligurica (ligustica)* (North Italian), *A.m. mellifera* (English), *A.m. mellifera* (French), *A.m. anatolica* (Turkish) and *A.m. cecropia* (Greek). The Buckfast bee of today may also contain heritage from *A.m. sahariensis* and *A. m. monticola*.



Important races which are included in the Buckfast strain are Mellifera from England and France, Ligurica (Ligustica) from Northern Italy, Cecropia from Greece and Anatolica from Turkey.

Brother Adam made many journeys, especially around the Mediterranean, to find find different races and strains to try out. One of his last journeys was to Tanzania in Africa to find the black mountain bee in East Africa. And one of his last

statements was that **the African continent is a genetic treasury.**

When you hear of Africa, the first thing you may think of concerning bees is so called Africanized bees in America, which in principal as its base has a number of colonies of *A.m. scutellata* from southern Africa. You then may think of extremely swarmy bees with a very strong defensive behaviour. And this *Scutellata* bee is common in the southern and eastern lowland parts of Africa. You shouldn't forget here that this bee is very important economical base for beekeepers in South Africa and that since the arrival of it to South America the honey production has grown substantially.



The honeybee races in Africa are at least as differing from each other as the European races are between themselves. African honeybees are not only *Scutellata* (the Africanized bee), but also the interesting and promising *Monticola* from the East African mountains.

What could be surprising is that there are other bees of another extreme relatively close to *Scutellata* in Africa. Above the mountain rain forests on the mountain slopes in East Africa you have a bee with a relatively very low swarming tendency. Actually, when combined with the Buckfast bee, you get an **extremely low swarming bee**, that given ample room for egg laying, food storage and for the bees themselves, they don't need any regular swarm control. They may even get along with the old queen till the colony just die with her without even trying to shift her. But that's going too far concerning low swarming tendency. That bee is *A.m. monticola*. On some of the mountains it is black, on other they

are more brownish-red in color. But they are usually bigger in size than *Scutellata* and much more easy to handle. They have less hair and often black hair, especially on the thorax. Who knows what other interesting bees may be found on this huge continent.

After the reports of the resistance of *Scutellata* to the varroa mite in South America and the reports from the expedition of Brother Adam to East Africa I began to get the idea that **African races may have something in common** that makes them more tolerant to the varroa mite. Later on I have realized that it is in first place a tolerance to secondary infections following the mite, possibly in first place virus infections from APV and DWV, and viruses contributing other types of infections like nosema. Now lately I have also realized at least one trait they have in common compared to European strains of today, namely the size. Is that of importance?

When an opportunity opened up to form an **expedition to Kenya**, I jumped on this train and we were four that went there in March 1989. Michael van der Zee from Holland, Erik Björklund, Dr Bert Thrybom and I from Sweden. Many Buckfast groups in Sweden and from other places supported this trip.



An opened loghive on 3500 m on Mt Elgon on the border between Uganda and Kenya. It is fully built with wax, contrary to loghives low down on the mountain side. Those loghives were seldom as full of waxcombs as this one. The colonies swarmed long before. The colony was relatively friendly and easy to handle. It was actually wrong time for drones when we were there. But this colony had a very old queen and had kept a large amount of drones, apparently in preparation for shifting the queen as soon as it was possible.

We came back to Sweden with **pieces of combs with eggs**,

and semen in small tubes. Queens were bred and inseminated. The semen was used after some glucose had been added to give the semen energy to move. More queens were bred from the resulting queens and the first crosses done.

In the beginning the colonies were kept in genetic isolation from the environment, queen excluders on the bottom boards and the like, until more experiences from the bees were secured. Very soon it was evident that this bee was no threat, but a possible resource.

Tests were being made in varroa infested areas to find out eventual varroa tolerance. Concentration were made on the **growth rate of the mite** during one season and the total **number of mites** compared to control colonies. The first findings were positive but not sensational at all. The number of mites were somewhat lower and the development time of the brood was and is somewhat shorter.

After some years my attention was called upon to the **secondary infections** and I realized that the worst enemy was not the mite itself, but these secondary infections. No colony died just by many mites, but due to other extra ordinary developments of different types of diseases. Most often so called wingless bees were reported. And I have seen no other explanation for these deformed wings then the Deformed Wing Virus (**DWV**).

A question rose in my mind that I had never seen written down anywhere. **What is the normal amount of varroa mites in a tolerant colony?** Everyone seemed to be concentrating on the growth rate of the mite and the total number of mites in a colony, but no one gave a number of mites which was the goal to not reach. I came to realize that the concentration probably should be made on secondary infections instead of on the number of mites, even if both areas are of great interest.

As the bee I have bred from this Monticola-Buckfast crosses are differing a lot genetically from the main Buckfast strain I feel I have to call the new combination something else then Buckfast, so I call it **Elgon**. But it is **bred in the spirit of Brother Adam and according to the principles of Buckfast breeding**.

Today one of the **most succesful Elgon breeder** is Poul Erik Karlsen on the island Bornholm in the Baltic, belonging to Denmark in Scandinavia. 1999 season was the fifth for many of his colonies without any type of treatment against the mite. For the rest of his colonies it was his third season. And they are thriving and giving him good crops. Around him have been and still are in a small scale, other beekeepers with big problems. He lost many colonies just after the arrival of the mite to the island. And so did others, and still do. Today there are not more then 4-500 colonies on the island, of which Poul Erik has about 200. Before the mite arrived there were 2500. Is his bee

varroa tolerant? Well, Poul Erik doesn't care what they are called. He is happy not to have to treat anything and to have thriving bees that give good crops.



An apiary of Poul Erik Karlsen on Bornholm. Many of his colonies had not been treated anything against the varroa mite for five years, when the photo was taken.

There is though an interesting experience from Bornholm to tell, that have to give us something to think about further and more to investigate. **Do chemical treatment increase the susceptibility to secondary infections like viruses?** There are reports that indicate this. And if it is so, we have no great use of tolerant bees if we use chemical treatments, and we will have great difficulties discovering such bees if such treatments are used. Do all kind of chemical treatment have the same kind of bad influence in this respect? Probably not and hopefully not.

In August 1998 Poul Erik Karlsen on Bornholm **treated 90 of his colonies** with formic acid to find out the level of the number of mites in his colonies, as he had not treated at all for a number of years then. 60 of these died of dysentery during late winter. Another 25 of these didn't develop properly during spring and secondary infections and the mites took over in these colonies so he killed them. If Poul Erik had had new mated queens available of his own strain he would have had just shifted queens in the strongest of them to try to restore them. He had finally three left, of which the bees shifted the

queens in two of them. He has of course bred from these three colonies.

Of his **110 untreated colonies**, of which many went into their fifth year without treatment, one died of mice. He used these colonies to make divides and build up his number of hives again. Is the right conclusion that chemical treatment decrease the tolerance to secondary infections?

Also an **initial investigation in Israel** have given interesting results concerning the possibility of Elgon bees being virus and varroa tolerant. **More tests** are on its way there. Also more tests are being done in Sweden and in other places.

The experiences of the possibilities of Elgon bees to tolerate secondary infections and the varroa mite have been **more differentiated**. It is evident that as I myself don't have the mite in my apiaries, I might select the wrong breeder concerning virus and varroa tolerance. I am dependant on beekeepers that have the mite, that they make tests, which contribute to my breeding, as I can get pieces of combs with eggs from selected colonies to graft from. So I warn people to think that if you manage to get queens from Erik Österlund you will get varroa tolerant bees. I would guess, that if you get queens from Poul Erik Karlsen on Bornholm you have a bigger chance of getting such bees.

Let me also say that it seems, if these bees are more tolerant, that this tolerance is connected in a big deal, to the **queen and her pheromones**. It seems as if these pheromones can have a valuable effect on the harmony and how well the colony as a whole functions, both in a **hygienic behavior** against infected brood and in its **immune system**.

Erik Österlund

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