

The science underpinning the technical assumption that *Apis cerana*, the Asian honey bee, cannot be eradicated in Australia; Senate Standing Committees on Rural Affairs and Transport

I would like to contribute the following points to the discussion that has been raised by the committee concerning:

- (a) the science underpinning the technical assumption that *Apis cerana*, the Asian honey bee, cannot be eradicated in Australia;
- (b) the science underpinning the assumption that the Asian honey bee will not spread throughout Australia;
- (c) the science relating to the impacts of the spread of the Asian honey bee on biodiversity, pollination and the European honey bee; and
- (d) the cost benefit of eradication of the Asian honey bee.

My qualifications relevant to this enquiry include a PhD in Neurobiology of Behaviour and Ecotoxicology, a Masters Degree in Invertebrate Physiology and Honours Degree in Cell Biology and Physiology, Majoring in Neurosciences. I also have over 15 years of active honeybee intensive research experience focusing on the learning, behaviour and neurobiology of *Apis mellifera*, the European honeybee. I have conducted honeybee research for INRA in France, the number one agricultural institute in France; Bayer France and also within the bee group at the Australian National University in Canberra. In considering my opinion I would like the committee to also take particular note that (i) I was trained and employed by a bee research laboratory in France, a country that is plagued by many honeybee diseases and parasites that Australia currently does not have, and which invests a large amount research money into attempting to deal with such parasites and diseases, (ii) that by working alongside French beekeepers I have an understanding of the costs associated with managing commercial hives for pests and diseases such as the Varroa mite (iii) that I also have some training and expertise in the ability of insects to adapt and evolve to new environments (iv) that I am also trained in beekeeper and own and manage 5 active research hives, and (v) I am the recipient of Australian research grants and am actively conducting researching into *Apis mellifera* at the Australian National University.

For point (a) above I would like to contribute the following:

It is my understanding from numerous readings and informal discussions with my scientific colleagues that a sustained attempt at an effective, on the ground eradication program has yet to have been carried out since the Asian bee incursion was detected in May 1997. I am of the opinion that longer period of intensive on the ground surveillance, monitoring and eradication work is needed before a sensible and scientifically based decision can be made as to whether or not the Asian bee can be eradicated from the region around Cairns. This would mean reinstating the on-ground personnel who were previously responsible for detecting and eliminating nests of the Asian honeybee as soon as possible, and tracking their activity over at least a 12 month period of time. I believe that the report issued by Dr Evan Sergeant of the AusVet Animal Health Services was considered to be scientifically sound, and that his recommendations published in October 2010 to continue the intensive on the ground surveillance and eradication program for an additional 6 months was considered to be sensible.

I am unaware as to why Dr Sergeant's recommendations to continue the intensive program were not put into practice. However, I am of the opinion that it was the amalgamating of data before and after the intensive on the ground surveillance period lead to the flawed assumption that the number of hives detected since the 1997 incursion had increased dramatically. However, this claim is seriously erroneous and lacking in rigour as it does not take into account the minimal ground personnel that were deployed in the early stages of the eradication program, nor the significantly higher number of ground personnel that were deployed in the latter stages of the program. It seems obvious even without any scientific qualification that a greater number of active on ground personnel would lead to a greater number of asian bee hives been detected and destroyed, especially as the eradication program to this point has been minimal at best.

An additional point that I don't think has perhaps been properly considered is the swarming period of Apis bees. In temperate areas bees swarm in the spring and summer months after drone (male) bees and new queens have been hatched. Drone are put out of the hive in winter as they do not contribute to foraging and are a liability, so swarming does not occur in winter. In tropical areas however this pattern is usually altered because there is only 2 seasons, and it would need to be evaluated whether the java strain of the Asian bee had a peak period of swarming, and whether swarming behaviour varied throughout the year in the Cairns region. This information would have an impact on the field results, especially if the decision to end the eradication program was based on only 6 months of intensive data, which seems to be the case. To properly evaluate whether or not an eradication program could be at all feasible, it would be necessary to have an extensive on the ground surveillance and eradication program active and sustained through at least 2 years and any peak swarming periods taken into account to make sure that a conclusion was not being based on normal irregularities in the data, which could reflect unequal periods of swarming. If the intensity of the on the ground action was kept constant throughout at least a 2 year period and the number of swarms detected and destroyed properly recorded, then it would be possible to offer a scientific opinion as to whether or not eradication was at all possible. At the moment with such a scant amount of incomplete data, it is my opinion that it is not possible to offer a solid scientific opinion as to whether or not eradication of the Asian bee is possible. More data is needed before an educated scientific decision can be made on this point.

Furthermore, it is my opinion that minimal effort has gone into requesting the scientific community to developing more efficient detection, tracking and eradication methods to help with eliminating the Asian bee. The present method involves placing a sugar solution feeder at strategic locations, and then gradually moving the feeders closer and closer in the direction of the hive until the hive is able to be located and destroyed. Some tracking dogs have been used to detect the Asian hives, but even this can be difficult if the swarm is located very high up. However, this method could possibly be improved on quite easily should the Australia's scientific bee community be involved.

For example, it could be advantageous to make use of Harmonic Radars and active tags to speed up the localisation of Apis cerana hives. Such technology is often used in invertebrate behaviour research. In order to locate hives active tag would be fixed to the back of forager bees visiting particular feeders or food sources. The tag would then enable the harmonic radar to locate the bee in flight and to follow it back to its hive, speeding up the localisation process. Harmonic radars cost around \$50 000 each and can be mounted on cars. I was told at a recent beekeepers meeting that they were offered the free use of such a radar by Dr Jerry Bromenshenk to help with the eradication of the Asian bee, but its use was turned down for unknown reasons. I suggest that this is only one example of how detection and eradication method

could be improved should the at a minimal cost.

For point (b) above I would like to contribute the following:

The Asian honeybee *Apis cerana* will spread throughout Australia. It is my understanding that only the Java strain of this species has been detected in Cairns, and there is a widespread misconception that because this is a strain originating from tropical regions, it will not spread to temperate regions in Australia. It is my scientific opinion that this claim is false. Adaptation of *Apis cerana* to our climatic regions is highly probable based upon (i) my knowledge of the current spread of the species in other countries with varying climate regions and (ii) the fact that this species is known to exist and proliferate in temperate and even cold regions. Also, it should be noted that the incursion of even one strain of *Apis cerana* will prevent the further detection of other incoming strains, and also other individuals that may be carriers of the *Varroa destructor* or *Varroa jacobsoni* mites.

Dr Denis Anderson is Australia's leading expert on this matter and to my knowledge the only scientifically qualified person with published, long term, first hand knowledge of this bees' behaviour in the field. His scientific opinion on this matter therefore should absolutely form a crucial part of any decision to halt an eradication plan, and great weight should be given to his opinion on the matter.

For point (c) above I would like to contribute the following:

I believe that as yet not much has been publicly stated on the potential impact of the Asian bee on native birds and animals that use tree hollows. However, *Apis cerana* nests in smaller hollows than *Apis mellifera*, and combined with its aggressive nature could be expected to have a devastating effect on native tree and animal species that reside in such spaces. There is already evidence that it has entered and killed the occupants of aviaries in Cairns and it can be expected to act in a similar way within the Australian native bush. Similarly, for social native Australian bees could be expected to be impacted upon in a similar way.

It is also widely believed in the Australian bee research community (at least outside of government departments) that the spread of the Asian honeybee in Australia will facilitate the introduction of the varroa mite in Australia and thereafter serve as a potential reservoir for mite reinfestation.

The impact on biodiversity and pollination can not be quantified without intensive studies, but it is also my scientific opinion that the impacts to both these areas will be huge should the Asian bee be allowed to spread through Australia. It is true that the behaviour of an organism while colonizing a new environment is highly difficult to predict regardless of our knowledge of the species in another environment. However, based upon previous incursions such as the cane toad and European wasp, I would recommend that it would be pertinent for Australia not to take such a risk. Costs of control invariably hugely outweigh original costs of prevention and/or eradication. Again, I refer the panel to the internationally peer-reviewed scientific opinion of Dr Denis Anderson at CSIRO as the primary expert on this issue.

My final comment is that based upon the current data, it is my feeling that there is still a chance that the Asian bee can be eradicated from Australia. However much more intensive data is needed to verify this as the existing data can not be used with any certainty to make such a decision. Without such adequate data, forming a robust scientific opinion on whether or not eradication is feasible remains absolutely impossible, whatever the conclusion of governmental policy workers or advisory

panels. The scientist with direct expertise in these matters should be consulted if any such decision has any hope of being based upon carefully reviewed scientific facts.