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Amateur Beekeepers Australia

THE AMATEUR BEEKEEPER

NEWSLETTER FOR MEMBERS
AUGUST•SEPTEMBER 2022

VARROA EMERGENCY

21 QUESTIONS BEEKEEPERS ARE ASKING

Into the Mind of a Bee

Renew your membership now

HOW TO
BREED YOUR OWN QUEENS
PART TWO

Get the best results
ALCOHOL WASH TIPS

Amateur Beekeepers Australia

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COVER PHOTO of varroa by Théotime Colin. Theo is a Macquarie University researcher currently in France. He is looking at a technique to control varroa which involves isolating the queen so she stops laying eggs for a few weeks, interrupting the mite's reproduction cycle (which depends on the brood).

The Amateur Beekeeper is the journal of Amateur Beekeepers Australia (registered in NSW as The Amateur Beekeepers' Association of NSW Inc). It is distributed to members six times a year. Contents are presented for general information only: members should always seek advice tailored to their individual circumstances. The editor will consider adverts from businesses relevant to beekeepers to run free of charge where they contain a special offer to ABA members.

ABA NEWS

President's letter

Testing times

IT IS NOW two months since Varroa destructor was detected in a sentinel hive at the Port of Newcastle.

For the first few weeks we all watched in horror as new infections seemed to pop up at odd locations almost every day, and the red zone gradually bled across the map of the Lower Hunter region.

After about a month of intensive surveillance operations, the spread stopped, and we were able to take stock of the freshly-defined outer limits of the red zone.

This delimiting of the borders has provided the information that the epidemiologists need in order to make decisions on how the eradication programme will work, and this week has led to the removal of the yellow zone.

This week also brought the announcement of the rates for the Owner Reimbursement payments for commercial beekeepers.

Whilst I and the other Industry Liaison officers have argued against any differentiation in the treatment of recreational and commercial beekeepers - the two-stream reimbursement programme will actually work in our favour, as the recreational scheme is much easier and quicker to use.

The commercial scheme is based on an audit of the hives euthanised, and is available to beekeepers who can prove that they run a legitimate beekeeping business by way of ABN number and tax records.

The recreational scheme on the other hand, simply pays a flat rate of $550 for each hive euthanised and removed by the DPI teams.

The Biosecurity Order allows beekeepers to remove their honey super before the hive is euthanised. This benefits both the beekeeper and the DPI, as the beekeeper will still be reimbursed at $550 f or the remaining hive, which is much easier to transport for disposal.

It's worth noting that beekeepers opting to retain their hiveware must commit to properly disposing of the contents of the hive themselves. This includes all frames, wax, honey and dead bees. These beekeepers will only receive $200 for their hive, which seems like something of a false economy.

Sheila Stokes president@beekeepers.asn.au

Varroa information

THE RULES around what beekeepers can and can't do in different zones during the varroa emergency response can change at short notice. So we have avoided any references to restrictions in this issue.

For the current regulations, please refer to the relevant state government websites.

NSW: dpi.nsw.gov.au/varroa
QLD: daf.engagementhub.com.au/varroa-mite
Vic: agriculture.vic.gov.au
ACT: act.gov.au
SA: pir.sa.gov.au
NT: nt.gov.au
WA: agric.wa.gov.au
Tas: nre.tas.gov.au

SPECIFIC QUERIES relating to any varroa restrictions or to report any exotic pests should be directed to the exotic pest hotline

1800 084 880

FREE ONLINE SEMINAR

BREED YOUR OWN QUEEN BEES

SEPTEMBER 25 @10 am with Kevin Tracy

Join a live online event for ABA members.

Kevin Tracy will run through what you've learned so far in our special Queen Bee Breeding course. (See Part Two in this issue.)

It'll help you to revise what you've learned so far, and prepare you for Parts Three and Four of this course (released in October) where you'll get started on practical tasks. Questions welcome!

For details and to reserve your place, email us now on feedback@beekeepers.asn.au

A PICK OF THE BEST Varroa

Here is a selection of some of the excellent free resources online

MITE FIGHT

Honey bee breeders are stepping up efforts to create colonies that can resist the deadly *Varroa* parasite

By Erik Stokstad

The death of his favorite queens in 2013 was the final straw for Bartjan Fernhout, an amateur beekeeper in Rommer, the Netherlands. Fernhout's queens, which he had purchased from a specialty breeder, produced workers with prized traits: They were calm and made plenty of honey. Then, Fernhout's hives became infested with a parasitic mite named *Varroa destructor*, which has become a major contributor to the demise of bee colonies worldwide. Chemicals and other methods can control the parasites. But the mites are developing resistance, and the treatments sometimes don't work—or even backfire. The chemical Fernhout used to fight his mites, for example, stopped his queens from laying eggs. That caused the workers to kill the barren queens and begin to raise new royalty, a ruthless reaction the bees evolved long ago to ensure the future of their hives. Frustrated, Fernhout decided there had to be a better way to combat the mites.

310 24 JULY 2020 • VOL 368 ISSUE 6491 sciencemag.org SCIENCE

Published by AAAS

Learn how honey bee breeders have joined the fight to counter varroa by trying to develop bees with traits that can help break the lifecycle of the parasite. This feature by Erik Stokstad, from *Science* magazine, is a great introduction to the world of bee breeding.

HTTPS://WWW.SCIENCE.ORG/DOI/EPDF/10.1126/SCIENCE.365.6451.310

Understanding the Enemy is a review of the genetics, behaviour and chemical ecology of Varroa destructor. Taylor Reams and Juliana Rangel sum up the state of scientific knowledge in this readable and precise account published in the *Journal of Insect Science*.

HTTPS://ACADEMIC.OUP.COM/JINSECTSCIENCE/ARTICLE/22/1/18/6523143

This free online course provides Varroa mite training in line with the eligibility requirements of a movement permit for beekeepers in NSW. On successful completion of this course you will receive a certificate to attach to your application for a permit.

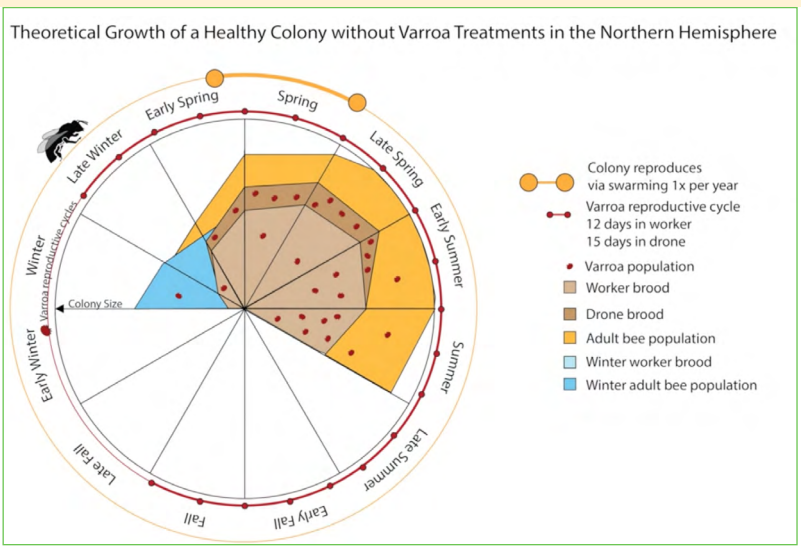
Recommended for *all* beekeepers – you don't need to be moving bees to sign up. It's interactive and very clear on the basic facts. https://courses.tocal.nsw.edu.au/courses/varroa-mite-online-training

Beeaware.org.au is your 'Go To' place for Australian info on pests and diseases.

>>> For the latest on the response and NSW rules: **dpi.nsw.gov.au/varroa** **<<<**

KIRSTEN TRAYNOR leads a review of recent developments in the biology, pathology, and management of varroa, and integrates older knowledge that is less well known. "Varroa is the greatest threat to honey bee health. Worrying observations include increasing acaricide resistance in the varroa population and sinking economic treatment thresholds, suggesting that the mites or their vectored viruses are becoming more virulent." From the journal *Cell*

WATCH Traynor explain how varroa breeds in a colony. dx.doi.org/10.1016/j.pt.2020.04.004#mmc2 (Scroll to end)



ABA MEMBERSHIP

2022/23 year

Renew now! It's never been easier

AFTER A FEW hiccups, renewal notices have now been emailed to all members. Your email contains a link to pay your club/s and ABA fees and to opt for beekeeper liability insurance if you require it. We are now busy compiling and sending out ABA membership packs to all renewing and new members. These include:

- 2022/23 Beekeeper's Log Book
- Drone uncapping fork and instructions on how to perform this important biosecurity test when you see drone brood in hives. (Drone uncapping is a good way to check for varroa.)
- Membership card and welcome letter

All memberships and insurance run through to June 30, 2023.

Members should renew as soon as possible or risk missing out on benefits. (Remember: renewing later does not extend your term.)

When you renew, double check your details are correct. The info on your records is the info we use to print your membership card and post your pack. Our software extracts the details and prints cards and labels according to what you have typed. So *please* check your details and provide a valid postal address. (If your pack is returned to us because of an invalid address, we will ask you to pay the costs of remailing it to the correct address.)

This year's fees? The ABA fee is $25. Your local club fee is set by the club and takes into account local operating costs and other sources of income such as markets, courses, fundraising etc. Both fees are payable now.

Where do the fees go? The club fee is passed directly to the club for local operations. The ABA retains the ABA fee to cover the costs incurred running the association, including the resources provided directly to members, the support given to clubs (the membership system, admin services, club insurance, software and email accounts, education resources), and the work the ABA does representing recreational beekeepers. Where members choose to join multiple clubs, the extra cost to the ABA is negligible so these members pay the relevant club fees and one ABA fee.

Why is the personal accident insurance included with membership but the public liability insurance charged as an extra? We've found this is the fairest and most economical way to provide these benefits. All members are covered by a group policy providing cover for personal accidents incurred while involved in beekeeping activities. This now includes weekly benefits.

Members who opt to purchase public liability insurance are named on a group policy and get a personalised certificate of currency.

Can I pay my club direct? Members must pay all fees online through the centralised membership register.

By all means talk to your club membership officer for help. But please remember: if they offer to log in on your behalf, you are still responsible for ensuring your details are correctly recorded. Errors may mean you are not entitled to club or ABA benefits.

THANK YOU to everyone who has already renewed. While the new membership system took longer than we anticipated to get up and running – and for that we apologise to everyone – initial feedback has been great.

Membership records now live on the same system as other ABA records, such as the swarm system, club administration details, member journals and insurance certificates.

Members who wish to join more than one club can now apply via the Portal.

Queries? Contact membership@beekeepers.asn.au

LIMITED EDITION

Commemorative honey bee coin

Support your ABA. Buy one now!

The Royal Australian Mint has released a special honey coloured $2 coin to commemorate 200 years of honey bees in Australia. These coins are sought after collectors' items.

The ABA has a limited number of uncirculated coins in presentation packs available to members. We are selling them at the RRP of $15. Order yours at beekeepers.asn.au/shop

The first successful introduction of honey bees to Australia was in 1822, when hives were carried to Sydney aboard the convict ship Isabella.

The Sydney Gazette of 15 March 1822:

"SALES BY AUCTION BY MR. LORD At his Auction Mart, Macquarie-place, on Tuesday next, the 19th Instant, at 11 o'Clock in the Forenoon,

THE FOLLOWING ARTICLES, without Reserve;

seven hives of bees, just imported from England"

Your honey's secrets

This research project needs your help

Mantavya Bishnoi, a postgraduate research student at Western Sydney University seeks raw and unprocessed honey of different floral varieties from different locations in Australia for a research project.

Mantavya's research involves examining the physicochemical, biological (anti-microbial and anti-bacterial) and heavy metal properties of honeys.

Please contact Mantavya direct if you have monofloral honey to sell. "I assure that the identity of honey suppliers or beekeepers will not be disclosed without their consent." Beekeepers will be provided with the results of the scientific analysis.

Mantavya Bishnoi

Contact: 0403550383

Email: mantavyabishnoi@gmail.com

Answers to tricky varroa questions

21 questions that beekeepers are asking and want answered now

1 "Why is varroa so dangerous? I've heard a colony can live with it for years."

A colony of bees with varroa is expected to survive maybe two years if left to its own devices. The bees become weakened by the parasites feeding off their body tissue, and the colony becomes susceptible to viruses transmitted by the mites and to other diseases or other pests.

Overseas, arguments have been put forward for a Darwinian approach to fighting these parasites – allowing 'survival of the fittest' rules to weed out colonies, allowing natural resistance to build up. The problem is that colony losses if varroa is left unchecked would be catastrophic, wiping out perhaps over 95% of colonies throughout the country.

This would devastate the honey bee industry and dependent crops, make commercial beekeeping untenable, and recovery would take years.

If we can't eradicate varroa and need to learn to manage it with chemicals and husbandry, judging by overseas experience, 50 to 60% of commercial and recreational beekeepers would quit beekeeping — shaken by colony losses, and the extra costs and complexities of keeping bees.

2 "Surely if we just treat our hives with miticides now, we'll all be okay?"

Here are a few reasons why it's not a solution:

- Miticide treatments reduce mite populations – they don't kill100% of mites.
- Some, when used at a level to be effective, also kill a proportion of the bees in a colony.
- Some have very significant health and safety problems for the beekeeper if used incorrectly.
- Miticides leave residues in hives and apiary products, and the more so if they are used without proper guidance and training. Australian honey, wax and other bee products are highly valued because they are free of the chemicals other beekeepers must use to keep varroa in check. Once we start routinely using miticides, the value and attractiveness of our apiary products will take a hit.
- Varroa develop resistance to miticides that are used consistently.

Currently, miticide strips are being used by emergency response teams as a technique to pick up low levels of varroa in strategic operations and under trained supervision. Authorities have permits to allow the use of miticides under direction.

3 "Shouldn't we all be learning about management techniques now?"

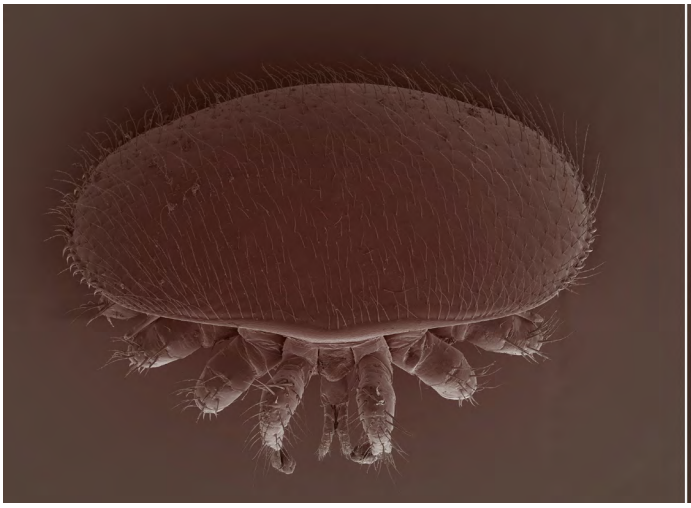
Understanding how much more complicated beekeeping will become if varroa can't be wiped out — well, that's an added incentive to do everything we can to get behind the eradication effort now.

It's useful to learn about what other countries do, but beekeepers mustn't start using treatments 'just in case'.

Certainly knowledge will be critical if eradication efforts fail and we need to move to a 'management' phase. But the team leading the emergency response currently believes eradication is achievable. That determination is reviewed regularly.

4 "What's to stop me importing and using miticides as a precaution?"

The law. The Australian Pesticides and Veterinary Medicines Authority determines which chemicals can be used on animals and exactly how they can be applied. That's to ensure each product is safe and effective in Australian settings, and so it won't impact



humans, animals and the environment in unintended or dangerous ways.

The massive effort underway to try to eradicate varroa — and the losses that beekeepers are suffering in eradication zones – are all so that Australian beekeepers can continue to produce premium products. Unauthorised actions could mess that up.

5 "How did it arrive?"

This is the mega-million-dollar question. Although social media is awash with theories, this is what we KNOW: it almost certainly arrived on a live bee that bypassed the normal strict biosecurity protocols.

The chance it arrived, say, on beekeeping gear is very remote. Varroa cannot survive without a bee host for more than a few days, and then can't simply fly or walk into a hive.

We may never know exactly when or how it arrived — but investigative teams are working to fill in the details.

6 "Where did it arrive and how long has it been here?"

The latest analysis of mite counts in infected hives and patterns of distribution, show that it must have been in Australia since at least December 2021. The mite loads (numbers) in commercial hives at Williamtown, north of Newcastle, were considerably higher than those in hives in central Newcastle. (Only one or two mites were found in sentinel hives near the port.) Infected hives at Nana Glenn, near Coffs Harbour, had been moved from Denman in the Hunter Valley in April. As a buffer, tracers are now looking at records of bee movements from the Newcastle region stretching back three years so they can isolate and test hives.

7 "How come it spread so far before anyone noticed?"

Obviously with varroa discovered at around 100 sites, the rule requiring every beekeeper in NSW to carry out a couple of mite checks per year at least four months apart didn't catch the problem as early as we could have hoped. Either not all beekeepers have checked their hives recently, the checks didn't pick up varroa, or the pest wasn't correctly identified and reported.

If we successfully eradicate varroa this time, it will be critical that surveillance and detection measures involving all beekeepers are improved.

8 "How do we know all the cases are connected?"

In the early days of the emergency response, whenever mites were discovered at new premises, investigators immediately began looking at how the mites could have reached those bees. All cases (to date) are linked either by their closeness to infected hives or are hives that had been adjacent to known infected hives and then moved.

Tracing forward - to where any bees from an infested location have travelled to, and tracing back, to where colonies with varroa could have been exposed to infestations, reveal chains of infection. This allows investigators to target areas where risks are higher, and it led to the discovery, for instance, of the infested colonies near Nana Glen and problems near Calga.

9 "If it's in so many managed hives, what's to say it's not already well established in feral colonies outside the red zones?"

Without human intervention, varroa infestations spread fairly slowly. As it cannot fly on its own, like for instance small hive beetle, varroa is constrained by the flight range of a host bee and the ability of that bee (or a bee the varroa transfers to) to enter a different hive.

If it takes 15 days for one varroa mite to produce two or three fertile daughters, that's a month to become say 9 mites, another month to become 92, then 980, 10,450. . . Without human intervention the rate of spread through an area is relatively slow.

This is why an immediate 10 km eradication zone is imposed around each discovery of an infested colony, with surveillance work is focused on finding the outer limits of any spread. If varroa are in an area, it's expected it would eventually appear in both managed

and feral colonies. There is no evidence it has moved into feral colonies beyond the Newcastle area.

While it seemed alarming to see more and more red zones springing up virtually every day, it wasn't because the mite was on the move: it's because we're learning more about where the mites had spread before the first Emergency Order was declared in late June.

10 "Who decides on the details of the emergency response?"

A number of organisations and levels of government are involved in deciding what should happen. The operation is run by NSW Department of Primary Industries, as varroa was discovered in NSW.

11 "Why not just let it rip — other countries have learned to live with it?"

See Q1. Australia has a chance NOT to have to learn to live with it. The longer we can keep varroa out, the greater the odds that scientists will be able to develop effective and safe treatments – and save us from catastrophic colony losses and complex/costly new beekeeping rules.

We saw how stalling worked with COVID: Australian lockdowns kept a lid on cases until effective vaccines and treatments were developed and introduced – saving tens of thousands of lives.

12 "Someone on social media said . . ."

Hold it right there. Social media is rife with opinions. Opinions or rumours are often presented as facts.

If you know the poster and can be certain of their level of *direct* knowledge and expertise, that's one thing. If someone you don't know is making a lot of noise – that's another thing.

Ask yourself: Is what they are saying useful? Is there another side to this? Why should I trust this person?

What's their motivation? To help? To insert themselves into the conversation? To stir people up?

Social media can be fantastic; it's also thrives at amplifying emotions.

13 "Why are the emergency response teams using surveillance methods such as alcohol washes which sample hives but don't guarantee a hive is totally FREE of varroa?"

There are no tests to determine categorically if a hive is clear. Surveillance tests such as sugar shaking, alcohol washing and drone uncapping are all sampling tests that rely on examining a small selection of bees or larvae. Miticide strips and sticky mats have a higher chance of picking up varroa, but still these are not 100%, and they have significant downsides — they can taint honey and take much longer to carry out. The type of test used varies according to the location, timing and known risks.

14 "Why have colonies identified with varroa been left for so long without killing them?"

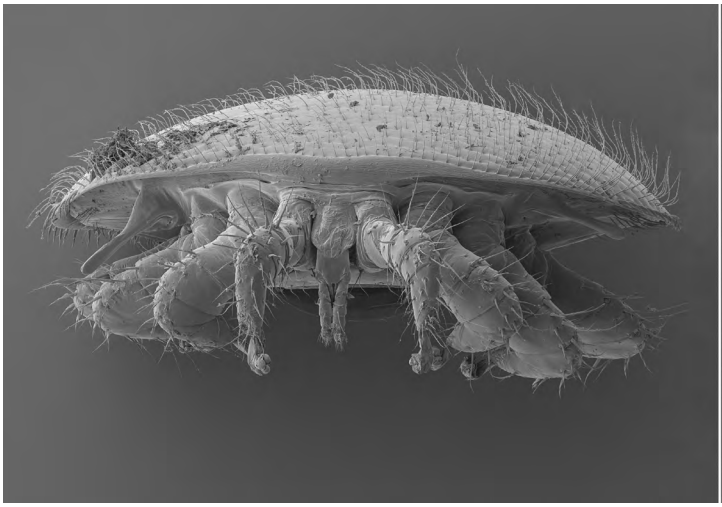
Keeping an infected colony intact — so long as it doesn't endanger others — preserves important clues for investigators — how many varroa are present in relation to adjacent hives, the DNA of the mite, or any evidence of viruses, for instance.

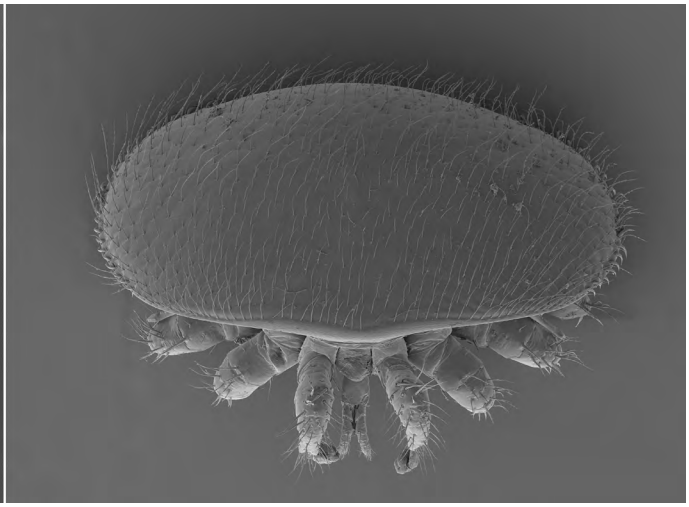
By declaring a 10 km 'red' zone around the site, emergency response teams have been able to concentrate on surveillance to find the outer edges of the spread and then to work back in.

It's a natural reaction to want to leap straight in and euthanise a colony with varroa. But that destroys vital evidence, as well as diverts crews from other activities deemed more useful to the overall response.

15 "Surely it's madness to allow any movements of hives while Australia has ANY varroa?"

The permits to allow commercial beekeepers to move their hives have been one of the most controversial aspects to the response. There's an argument to say no one should be allowed to move *any* bees while there's *any* risk. There's also the agreed pro-





tocols of the Emergency Plant Pest Response Deed, (EPPRD) where government and industries have determined ahead of any threat how a biosecurity response is handled.

Biological threats to honey bees are regarded for biosecurity purposes as plant pests — due to the keystone role that bees play in pollinating agricultural crops. (The value of bees as pollinators is over $12 billion to the Australian economy vs the value of bee products of some $200 million.)

Herein lies the dilemma — the money that is needed to fight this incursion comes 50% from government and 50% from industry — with the honey bee industry just one of 49 signatories to the EPPRD, and one of16 affected industries. The response is tasked with ensuring the continuity and longterm viability of affected industries.

16 "How come the response changed from zero tolerance (eradication) to 'low risk' movements? Surely that's a recipe for disaster."

If the eradication effort fails due to varroa spread, say through pollination services, expect this criticism to be amplified. AHBIC believes the risks can be mitigated by a range of checks and processes put in place, and that migratory hives must be able to get to crops. Not all agree with this stance.

17 "What has to happen before we can declare we've eradicated varroa?"

Once all colonies are euthanised within 10 km of identified varroa infestations, ongoing surveillance will be required for three years to ensure no new cases emerge. If new cases are identified, depending on circumstances, new eradication zones will be declared and the clock may need to be restarted.

18 "If it's not contained, at what point do we decide we've lost the battle to eradicate varroa?"

The National Management Group meets regularly to assess if eradication is techically and economically feasible.

At some stage, if the NMG deems eradication is beyond Australia's grasp, the country will move to varroa 'management.'

19 "If we eradicate it now, what's to stop it coming back?"

If Australia wins this battle, it certainly won't be the last time varroa turns up on our shores. We are learning much from this operation and we ought to be better prepared.

20 "Is there any hope that we can conquer varroa -- as in, make it less harmful to bees?"

Since *Varroa destructor* started wreaking havoc around the honey bee world in the early 1960s, scientists have been working to find solutions.

Some strains of bees seem to be more resistant to the parasite. Either they are better at grooming to shed the parasite from their bodies, or they exhibit other hygienic traits such as uncapping infested brood cells before the next generation of varroa can mature. The holy grail of bee breeding is to develop productive bees that exhibit varroa sensitive hygiene (VSH) traits from one generation to another.

Research is also underway to develop selective pesticides that target the mites but don't harm bees. And genetic work to make varroa less deadly.

Such work is painstaking and advances are incremental. And it is the way of research that many promising leads fail to eventuate.

That 'breakthrough' you read about? Invariably such reports also say that someone 'hopes' an idea will work or that it is 'promising.' Before getting too excited, we need to know it's 'proven to work'.

21 What about 'natural' treatments used overseas? Natural is good, right?

You may have heard about essential oils, formic acid (found in ants and derived from acetic acid) and thymol (from thyme).

Over 150 compounds containing essential oils have been tested as varroacides. At concentrations needed to kill mites, however, there's a significant risk of harming or killing bees.

Evaporative oils are easily absorbed into beeswax and can leave a noticeable smell and taste in honey at as little as 1.1 parts per million.

Thymol does not kill varroa in brood cells but can reduce varroa numbers (by disrupting proteins and cell membranes) if used correctly at the right time of the year. It can damage human eyes and burn skin at concentrations needed to kill mites.

Various commercial treatments contain thymol and other naturally occurring substances in slow release, carefully controlled formulations to help address some of the safety concerns, but these are usually not suitable for heavy infestations. Disposal is an issue.

BONUS Have you heard about this great treatment for varroa that someone sent me a link about?

Lots of 'treatments' work to some degree. But the problems are usually that they harm the bees, leave residues, have harmful effects on the beekeeper, don't work very effectively or aren't appropriate for local conditions.

In countries with varroa, beekeepers must rely on a bevy of techniques to keep varroa levels low while not letting the mites build up resistance. Nothing is routinely 100% effective, but a combination of carefully applied chemical and management techniques can keep varroa levels in check.

If there was a 'magic bullet', beekeepers all around the world would be saving time, money and stress, and using it.

QUESTIONS AND ANSWERS COMPILED BY SUE CARNEY

Treatments fall into three categories:

1. Essential oils - such as thymol
2. Organic acids - oxalic acid and formic acid
3. Synthetic pesticides - Amitraz, flumethrin, taufluvalinate, coumaphos

In addition, **management techniques** that can reduce varroa numbers:

1. drone brood removal
2. queen caging
3. colony splitting

YOU can help fight varroa

Get into the habit of checking your bees for mites

Is the Sugar Shake still recommended?

The Sugar Shake test – rolling in icing sugar and shaking off any dislodged matter– has been regularly promoted by the NSW DPI and other state governments for beekeepers to meet the requirements of the Biosecurity Code of Practice. (Drone Uncapping and Alcohol Washing are the other two tests endorsed by the BCoP.)

The wisdom has been that recreational beekeepers are more comfortable with (and more likely to carry out) a screening test that avoids killing 100% of the sampled bees. But now that varroa has hit Australia, the stakes are higher.

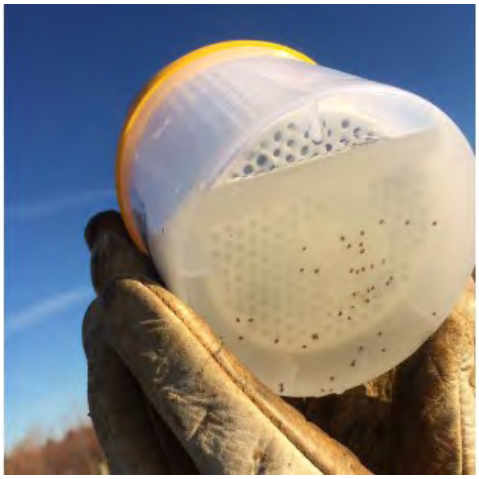
Alcohol Washing is used by Emergency Response teams in zones around known infected sites.

Beekeepers are encouraged to learn alcohol washing, (see next page) although sugar shaking bees is still effective if done properly. (It is critical to roll the bees for several minutes, let them sit, and then roll again.) Sugar shake kits -- with new and improved jars -- are available for $15 plus postage at the ABA online store

Drone Uncapping is quick and needs little equipment

Look out for your bright new ABA Uncapping Fork in your 2022/23 membership pack, read the instruction sheet, and know what to do next time you open a hive.

Alcohol washing This test is easy and very effective. And it's a new skill that you should be learning now. The good news: it's easy and you can improvise on the equipment. See next pages for details.



Alcohol washing: how to get the BEST results

Follow these tips to make your varroa check as effective as possible

What's changed? These tips boost the effectiveness of an alcohol washing test. They are a step up from previous guidelines, in response to the current emergency.

What to use: Any form of ethanol. The easiest and cheapest drench is methylated spirits.It *can* be diluted to **25% with 75% water** (one part meths to three parts water) but undiluted meths will produce a better result. You can also use rubbing alcohol (isopropyl) or spirits. Do not use petrol.

Safety first: Alcohol is very flammable. Keep it and any associated gear away from your smoker

Equipment: Purpose-made containers retail for between $16 and $45. But you can improvise (see next page). Use a regular lidded jar (such as a jam jar) to wash the bees in the alcohol and then pour the contents through a mesh or sieve with 3 mm holes.

Prepare: Before you open your hive, measure 3/4 cup (185ml) of your ethanol into your container. Always keep the ethanol well away from your smoker.

Bees: Collect 3/4 cup of nurse bees. That's around 500. As varroa live mainly in brood cells, the bees that spend most of their time tending brood are most likely to be infested.

Remove a brood frame. Check if it contains the queen: you want to keep her safe, so carefully put her back in the hive or temporarily in a queen cage. Shake the adult bees onto a sheet of paper. Repeat with several brood frames. If you didn't spot the queen on the frames, double check the paper.

Don't worry if some bees fly off: the ones left are more likely to be the nurse bees. Use the paper to funnel bees into an empty container marked at the 3/4-cup level. Tip these bees into your washer and promptly close the lid.

The queen: It's worth repeating again: you definitely don't want the queen in your sample since these bees will be killed by the alcohol.

Extras: Any surplus (unjarred) bees should be tipped back into the hive. Close up the hive.

NB: Unless you need it to test more hives, you can do the rest of this test away from your site.

How long: Alcohol kills bees quickly. But then you need to vigorously swish the sample around for **four minutes** to have the best chance of dislodging any mites. (This advice has recently been revised up from one minute to make the test more accurate.)

Four minutes is probably longer than you think – count slowly to 240! (Some experts even suggest then letting the dead bees sit in the alcohol for a day to be sure any mites have detached from the bees.)

Tip the contents through a sieve – if your container doesn't have one built in – into a container with a white cloth or filter paper to catch any matter that gets through the sieve. (Coffee filters are ideal.)

Repeat: Swirl and tip twice more using water to further increase the effectiveness of the test.

Look: Use a magnifer or the magnifying function on your phone to examine any specks.

ALERT: Now is not the time to hesitate.

- **If you see something suspicious, call the hotline number: 1800 084 881**
- **Take a close-up photo of the suspicious matter**
- **Secure all materials in ziplock bags until you get further advice**

Once filtered, your alcohol mix can be stored in a well-labelled container and reused.

Do not tip ethanol down the drain or onto the ground. Dispose of it at regular council chemical collection centres.

Dead bees can be burned, buried or wrapped for waste disposal.

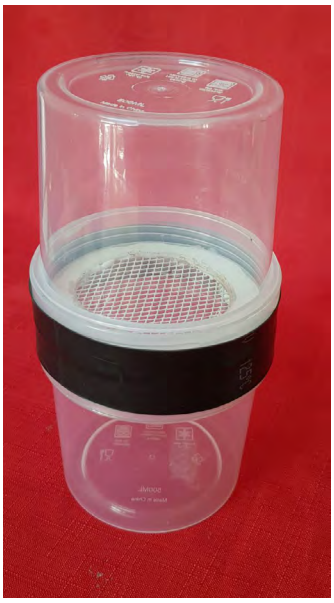
INVENTIVE BEEKS

DIY alcohol washers

Improvise and save money. It's too easy

MAKE YOUR own alcohol washer. Here are some examples created from easily sourced household items.

Warwick Coghlan from Nepean Beekeepers created this shaker using **two plastic storage containers** ($2 for three 500 ml at KMart), a $6 **paper bin** from The Reject Shop, **wire cutter**, **silicon** and some **heat-shrink tape**.



Cut a hole in both lids (use a hole saw) leaving about 1cm to the edge.

Cut a disc of mesh out of the paper basket to cover the hole in the lids. "The mesh is 3.4mm square and very easy to cut to shape," explains Warwick. "I estimate we could get 20 or so screens from a bin."

Warwick then sandwiched together the two lids and mesh using silicon, and used heat shrink to hold it firmly together and stop any leaks.

To use: put alcohol in one container. Add bees and screw on combined lids with the second container attached. Swirl vigorously for four minutes. Upend so the alcohol and any mites will fall into lower jar. Unscrew lid and tip alcohol and any matter through a filter paper.

Total cost: $3 to $10 depending on how many you are making.

Or, for the more DIY challenged:

We sourced a Lock & Lock 700ml **pickle jar with built-in strainer** from Amazon ($11, below). This works like a purpose made varroa check shaker.

An alternative is the Sistema Pickle Jar, which is cheaper but hard to find locally at the moment.

Another suitable bit of kit: a **mesh pencil holder** from bargain stores (similar mesh to the paper basket) and a **lidded plastic tub** that will allow the pencil holder to fit snuggly inside. You'll need to experiment.

Probably **the most basic kit of all**: a regular honey jar in which to swirl the bees in ethanol, and a 3mm mesh sieve such as this **kitchen tidy** ($4 IKEA, pictured below). (A regular kitchen sieve does not have large enough holes.)

To use: hold the mesh sieve over a container with a white cloth stretched across the top, and tip the dead bees and liquid through the sieve. The sieve catches the bees, the cloth catches anything that has washed off the bees, and the ethanol is filtered into the base container, ready to reuse.

The Biosecurity Code of Practice for Beekeepers requires you to perform mite inspections at least twice a year and at least four months apart. Are you complying?

SCIENCE

Journey into the mind of a bee

Professor Lars Chittka explores the rich inner world of bees

The French philosopher René Descartes, whose views on animals were highly influential, argued that animals acted purely by reflex — they had no intellectual capabilities.

But there has been a Copernican revolution since then. We now know that sophisticated minds are all around us in the animal queendom — not just in close relatives of humans such as chimps and apes, but also in "aliens from inner space" such as the octopus.

And now we are learning just how smart insects can be. As I show in my new book, "The Mind of a Bee," the latest research indicates that even tiny-brained bees are profoundly intelligent creatures that can memorize not only flowers but also human faces, solve problems by thinking rather than by trial and error, and learn to use tools by observing skilled bees. They even appear to experience basic emotions, or at least something like optimism and pessimism.

The possibility of sentience in these animals raises important ethical questions for their ecological conservation, as well as their treatment in the crop pollination industry and in research laboratories.

Social insects are traditionally thought to be wholly governed by instinct: They can build complex nests and efficiently divide up their labour through innate behaviours, but are considered stupid as individuals, with complexity emerging only at the group level.

But there is significant evidence that bees have an inner world of thought — that they are not responding to stimuli only with hard-wired responses.

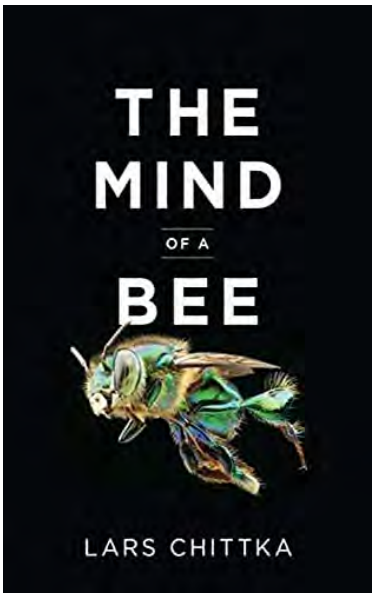
To explore bees' learning abilities, scientists reward them with little drops of sugar water when they have solved a task — the same reward that bees obtain in nature when they discover a nectar-rich flower. For example, to probe bees' face recognition skills, foragers were first rewarded with sugar water on a platform in front of a black-and-white photo of a human face. Once they learned to fly to this platform, they were confronted with a test in which they had to locate the correct photo out of a number of images of other people. No rewards were now present, and the correct photo was located in a different position during the test. Nonetheless, they found the correct face over 80 per cent of the time — lending credence to the common beekeepers' assertion that bees can recognize the person who looks after them.

To test whether bees can count, we trained them to fly from their hive past four identical landmarks, shaped like two-metre-high pyramids.

During the training, they found a sugar reward after the third landmark. In the tests, we increased the number of landmarks between the hive and the training location of the feeder.

LARS CHITTKA IS A PROFESSOR AT QUEEN MARY UNIVERSITY OF LONDON.

THE MIND OF A BEE, IS PUBLISHED IN AUSTRALIA IN SEPTEMBER. AVAILABLE TO PRE-ORDER AT BOOKSTORES OR ONLINE. AVAILABLE NOW ON KINDLE OR AUDIO BOOK.



When we did, bees landed at a shorter distance from the hive than during the training, apparently thinking they had flown far enough when they encountered the third landmark.

Reducing the number of landmarks had the opposite effect — bees then overshot the training distance and flew farther to seek the third landmark.

Bees are flexible in accessing memories. A master storyteller of the mysteries of memory, Marcel Proust describes in "Remembrance of Things Past" how the narrator, after tasting a tea-soaked madeleine, suddenly recalls long-lost childhood memories in vivid detail.

Similarly, a scent experienced by a bee inside its hive can bring back the memory of a flower patch with the same scent.

To demonstrate this, scientists first trained bees to memorize two different feeding locations about 50 metres from the hive and 30 metres apart,

one smelling of rose and the other of lemon. When researchers blew one scent or another into the hive, it activated the bees' memory of the correct feeding station, to which they flew directly. Thus, their memories can be activated separately from the setting in which they are learned.

On occasion, bees activate such memories in the darkness of the hive at night, and even communicate with other bees about them.

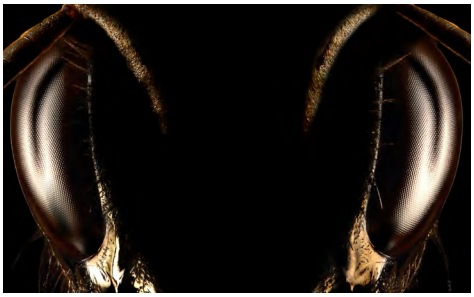
Bees have a "dance language" by which they can inform others in the hive of the precise location of a rewarding flower patch. The symbolic language involves repeating the motor patterns ("dances") of a knowledgeable bee on the vertical honeycomb.

The movements make reference to gravity and the direction of the sun; since it's dark in the hive, bees that want to learn from the dancer need to touch its abdomen with their antennae. Sometimes, such dances are displayed at night, when no foraging takes place: The dancer appears to think about locations visited on the previous day, without an obvious need to do so at the time, indicating that memories can be browsed in an "offline" situation.

My team has shown that bees can, in a sense, picture things in their minds.

Bees that first learn that balls, but not cubes, are linked to a sugar reward by seeing these shapes through plexiglass — in a "look but don't touch" situation — can subsequently identify the same shapes by touch alone. We tested this in darkness, viewing the bees' behaviour with infrared equipment (such conditions are not unusual for bees, since their nests are naturally dark). Bees trained to tell cubes from spheres in darkness could also later identify the correct shapes when seeing but not touching them, indicating a form of mental image that can be accessed with more than one sense.

Bees can also solve problems in a manner that indicates they understand the desired goal. In one experiment, bees learned to roll a ball to a certain area to obtain a sugar reward — a simple form of tool use, in which an object needs to manipulated in a specific way. Untrained bees then improved the technique.



A trick was played on the "demonstrator" bee, so that only the farthest of three balls could be moved to the target area (the two other balls were glued to the horizontal surface). A naive bee was then allowed to observe the skilled bee's performance — always moving the farthest ball — three times. But when the observer was subsequently allowed into the arena alone, now finding none of the balls glued down, it spontaneously (without trial and error) picked the closest ball to move to the goal, solving the task in a manner inspired by the demonstrator but clearly not merely imitating its performance.

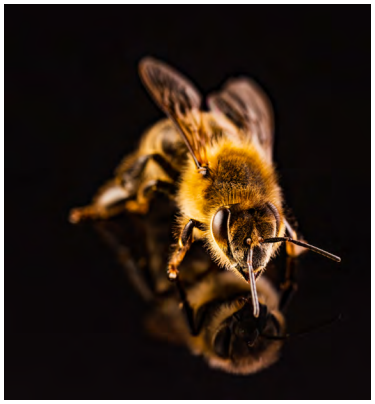
Observer bees could have conjured up this solution only through a kind of mental exploration. This indicates a form of intentionality that was previously recognized only in large-brained animals, such as chimps.

And we now have evidence of emotion-like states, using the same criteria that researchers employ to evaluate whether domestic animals such as goats or horses are being kept in conditions that result in a positive or negative outlook on life.

We trained bees to learn that blue was rewarding and green was not (another group of bees was trained with the opposite conditions) and subsequently presented them with an intermediate colour, turquoise — an ambiguous stimulus. Crucially, the bees' judgment of this ambiguous colour depended on what happened before the experiment. Unexpected rewards before the test appeared to induce an optimistic state of mind in bumblebees, making them more curious about new stimuli and more resilient to aversive stimuli. This optimistic state relied on the neurotransmitter dopamine, as it does in humans.

Read a chapter

press.princeton.edu/books/hardcover/9780691180472/the-mind-of-a-bee#preview



A negative emotional state can be induced by predator attacks.

Some species of spiders sit on flowers and try to catch pollinating insects. We re-created this in the lab, constructing a plastic spider with a mechanism by which a bumblebee was momentarily held between two sponges and then released.

The bees' behaviour changed fundamentally: They seemed more nervous for days after such attacks. Beyond a simple learned aversion to flowers with artificial spiders, they extensively scanned every flower before landing, and even if there were flowers without a robotic spider, they sometimes fled — as if they were "seeing ghosts."

The bees behaved as if they were suffering from post-traumatic stress disorder.

A critical reader might observe that each of these abilities could be programmed into a nonconscious robot. She would be correct, but such a robot would often fail at tasks that a programmer did not build into it.

For example, a robot built 20 years ago to replicate all the skills of a honey bee as understood at the time would not have been able to exhibit the abilities of bees that were more recently discovered: to roll balls to a goal, recognize shapes across senses or display emotion-like states.

Nature has no room to generate beings that just pretend to be sentient. Thus, while there is no accepted formal proof for consciousness in any animal or machine, common sense dictates that growing evidence of consciousness does indeed indicate what it seems to show.

The observation that bees are most likely sentient beings has important ethical implications. It's well known that many species of bees are threatened by pesticides and wide-scale habitat loss, and that this spells trouble because we need these insects to pollinate our crops.

But is the utility of bees the only reason they should be protected? I don't think so. The insight that bees have a rich inner world and unique perception, and, like humans, are able to think, enjoy and suffer, commands respect for the diversity of minds in nature.

With this respect comes an obligation to protect the environments that shaped these minds.

Common migratory beekeeping practices in industrialized agriculture, for example, involve the frequent transport of hives across continents on trailers, which not only spreads disease but is most likely detrimental to bees' psychological well-being, weakening their health further.

Finally, countless insects are sacrificed annually in research laboratories and the insect food industry, the methods of which are entirely unregulated.

It is plausible that our findings about bees' capacity to suffer also extend to other insects, and this should be considered in any legislation regulating their treatment.

Swarm control

By controlling or reducing swarming, we are working against the honey bees' natural instincts

The following procedures can reduce swarming:

▪ Young queens swarm less readily than older queens. But, given the correct stimuli, young queens also swarm. The genetic variation between queens is probably more significant. If a colony swarms it is important to re-queen this hive with a young queen bred from a strain of bee less inclined to swarm.

▪ Rapid build-up conditions may lead to swarming. The more worker bees in the colony, the more field bees available for collecting nectar. If rapid build-up is not followed by an abundant supply of nectar in the field, this will leave a lot of idle bees in the hive. This problem can be overcome by moving the colony to a honey flow.

▪ To achieve a greater population expansion and to relieve congestion in the brood box, a useful practice is to manipulate the brood box. Lift two or three brood combs above the queen excluder and place empty combs into the brood nest. This will allow the queen more laying room.

▪ One of the most effective methods of reducing swarming is to artificially swarm the colony yourself. Remove part of the colony to make a nucleus. When the swarming period is over this nucleus can be joined back to the original colony or treated as a separate entity. You may wish to place a queen or queen cell in the nucleus colony, depending upon your requirements.

▪ Another method of swarm control within an apiary is to remove capped brood and bees from the brood nest and introduce these frames to weaker hives in the apiary. At all times when manipulating brood combs, be vigilant for brood diseases.

▪ Tearing down swarm queen cells is of little value. Often this is too late to effectively stop swarms from leaving the hive. Also, clipping the queen's wings is of no value for eventually a virgin will emerge and leave with the prime swarm. When bees get into a 'swarm fever' they become difficult to control and the measures previously discussed need to be followed.

▪ Providing beeswax foundation for the bees to build worker comb can be a valuable aid in reducing swarming.

FROM AGNOTE DAI/125, NSW DPI . BY DOUG SOMERVILLE

WEB STORE

Shop online and support the ABA

For all your ABA merchandise, essential biosecurity equipment and more, go to beekeepers.asn.au/shop

Beekeeper's Log Book 2021/22 $5

Want one for each hive? Grab some spare copies now We have limited stocks -- when they're gone, they're gone. A5 size. 60 pages plus cover.

2020/21 edition: last copies available. Special price $2

Enamel and metal keyring $10

Featuring the ABA's distinctive bee, framed by the outline of NSW. On the back, there's room for you to add your ID -- perhaps your beekeeping registration number or a trusty contact.. 40mm across

Our popular warning signs suit backyard beekeepers. 200mm by 265mm. Made from lightweight UV-stable material similar to that used for real estate signs. With eyelets for easy fixing to a wall, a tree, a post or gate.

Text reads: *CAUTION. THIS AREA HAS BEEHIVES. THERE ARE MANY BEES ABOUT. BEES CAN CAUSE A PAINFUL STING. IF YOU ARE ALLERGIC TO BEE STINGS YOU MUST NOT APPROACH THE HIVES AS A BEE STING CAN BE FATAL* ***SIGNS $10 EACH***

Sugar Shake Kit $15

Contains all you need to perform a sugar shake test to check your bees for mites. Includes jar, mesh lid, scoop, sugar, instruction sheet and link to demonstration video

Enamel lapel pin $7
Featuring the ABA bee. Pin with butterfly clip

ABA Bucket Hat $15

Enzyme-washed cotton bucket hat. In navy with a contrasting sand coloured trim/underbrim, and embroidered logo in yellow. Or sand with a navy trim/underbrim and embroidered logo in black. Available in two sizes

Canvas tote $15

Quality cotton canvas tote with logo on one side, plain on the reverse. Reinforced shoulder straps. 420mm x 420mm.

AFB brood sampling kit $4

Make sure you have a brood sampling kit at the ready every time you open your hives for inspection.

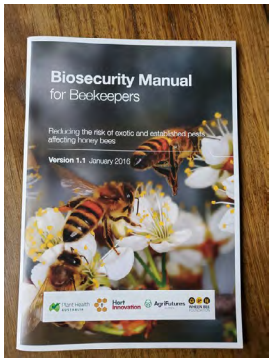
Contains instructions, glass slides, mailers and a laboratory form – all you need to send suspect brood samples off for scientific diagnosis. Versions for NSW/NT and QLD. (The laboratory forms are different for each state.)

Please note: laboratory testing fees are payable. However if you suspect AFB and are a registered beekeeper in NSW, NT or QLD, your state veterinary laboratory will not charge for this service.

Classic Enamel Pin $6

Biosecurity Manual for Beekeepers $3.50

This is your essential guide to local pests and diseases, produced by Plant Health Australia. Available through our shop at cost price. 64-page A4 printed manual.



Amateur Beekeepers Australia

SPECIAL SUPPLEMENT

Breeding QUEEN BEES

PART TWO

SPECIAL SUPPLEMENT

Breeding Your Own Queen Bees

Kevin Tracy presents the second in a four-part series

AS WE HEAD into Part 2 of our series, it is encouraging to know that ***You Can Do This!*** If you missed Part 1, there is plenty of time for you to read and refresh on the information. You can find it here. This series is being presented in such a way as to make it possible for you to start producing honey bee queens in Spring.

Quick revision of Part 1. We covered:

- Know when Spring starts where you are located
- Raise a queen bee to enhance "local vigour"
- O- 24-hour-old larvae produce superior queens
- Your schedule is important and so is keeping records
- Know your pests & diseases management
- Understand the timetable and key terms

If you follow this series from start to finish, you should be able to raise queen bees your-

FREE ONLINE SEMINAR SEPTEMBER 25 @10 am

Join a live online event where Kevin will run through what you need to know as you start to breed your own queens.

It'll help you to revise what you've learned so far and help you get ready to give it a go!

Email feedback@beekeepers.asn.au for details.

WHAT THIS SERIES COVERS

Part 1 May/June Issue

- Benefits and reasons
- What you'll need to get started
- Age-appropriate larvae
- The schedule. Biosecurity
- Glossary

Part 2 In this issue

- **Basic anatomy of worker, drone, queen**
- **Drone Congregation Areas (DCAs)**
- **Races of queens**
- **Selecting your "breeder" queen**
- **Choices. Decisions. Actions**

Parts 3 & 4 released in October

Part 3

- The Cell Builder (CB) Starter/Finisher
- Cloake method
- Equipment and setup
- Records to keep
- Queen rearing methods explained
- Grafting tools and technique

Part 4

- Mating nucs
- Handling queen cells
- Catching, caging, and banking queens
- Marketing tips

BEE ANATOMY

Understanding a little about honey bee anatomy will help you in all of your bee husbandry

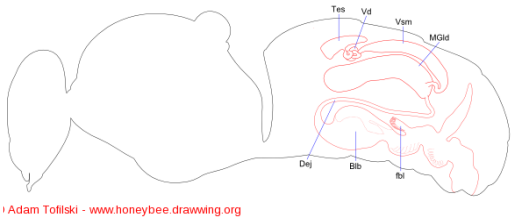
By now you should be well aware of the developmental stages and the differences between hatching times of drones, workers, and queens. Knowing these differences is essential for beekeeping success.

Drones

To the best of our current understanding, the primary role of the drone is to mate with the queen. This takes place either in a DCA (Drone Congregation Area) or with AI (Artificial Insemination).

You may recall the drone is produced from an unfertilised egg. This means the drone carries the genetics of the queen bee only.

The drone's genetic material is contained in the semen in its phallus. The drone is born with all the semen it will ever have, and colony nutrition greatly influences drone numbers, health and sperm viability.



© Adam Tofilski - www.honeybee.drawwing.org

REPRODUCTIVE SYSTEM OF DRONE
BLB - BULB OF PENIS
DEJ - DUCTUS EJACULATORIUS
FBL - FIMBRIATED LOBE OF PENIS
MGLD - MUCUS GLAND
TES - TESTIS
VD - VAS DEFERENS
VSM - VESICULA SEMINALIS

- Drones are important
- Diversity is important
- Multiple drones mate with a queen
- Technically, they are not a caste
- They take longer to develop than the worker and queen
- They are greater or fewer in number seasonally
- A single colony can have as many as 20,000 drones
- Culling drones won't stop drone production
- Drones die after mating

The easiest way to explain the genetics of the drone is this:

> The drone doesn't have a father, only a mother. The drone does, however, have a grandfather.
>
> The drone has only half the chromosomes of his "sisters/half-sisters" because the drone develops from an unfertilized egg.

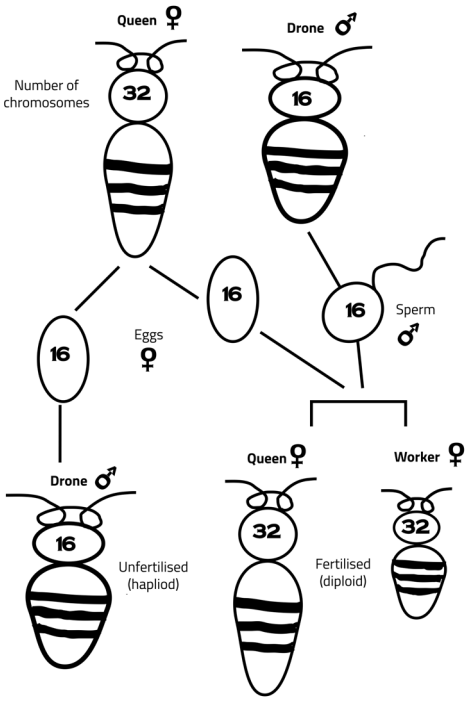
Honey bees are a haplo-diploid species, in which drones have haploid cells (one set of chromosomes), and workers and queens have diploid cells (two sets of chromosomes). The drones that develop, therefore, share a very similar genetic makeup to their mother.

How much drone semen does it take for a "good" insemination? When artificially inseminating a queen, she is given 8-12µl of harvested semen.

As each drone produces an average 1µl semen, at least eight drones are required to make up the

GENETICS OF HONEY BEES

Unfertilised eggs carry the chromosomes from the mother only



COLLECTING SEMEN FROM A DRONE

minimum volume. Usually, many more drones are required.

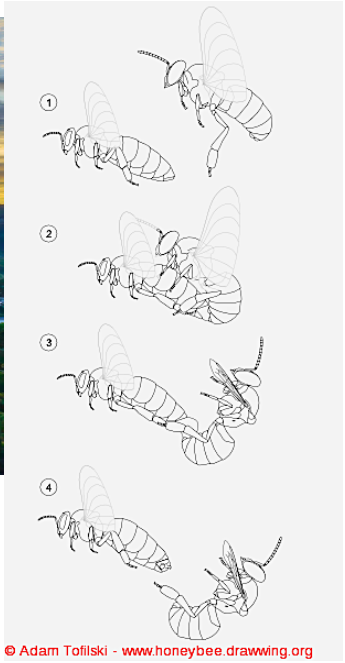
A genetically diverse pool of spermatozoa (up to 6 million) are stored alive in the spermatheca and used to fertilise eggs.

A couple of thoughts to take away:

Drones are important for genetic diversity.

Genetic diversity is important: colonies where queens mated with more drones perform better in survival, health and productivity.

Consider this: would you rather have a "local" queen, one from another environment, or one you raised from your own stock?



Drone Congregation Areas Explained

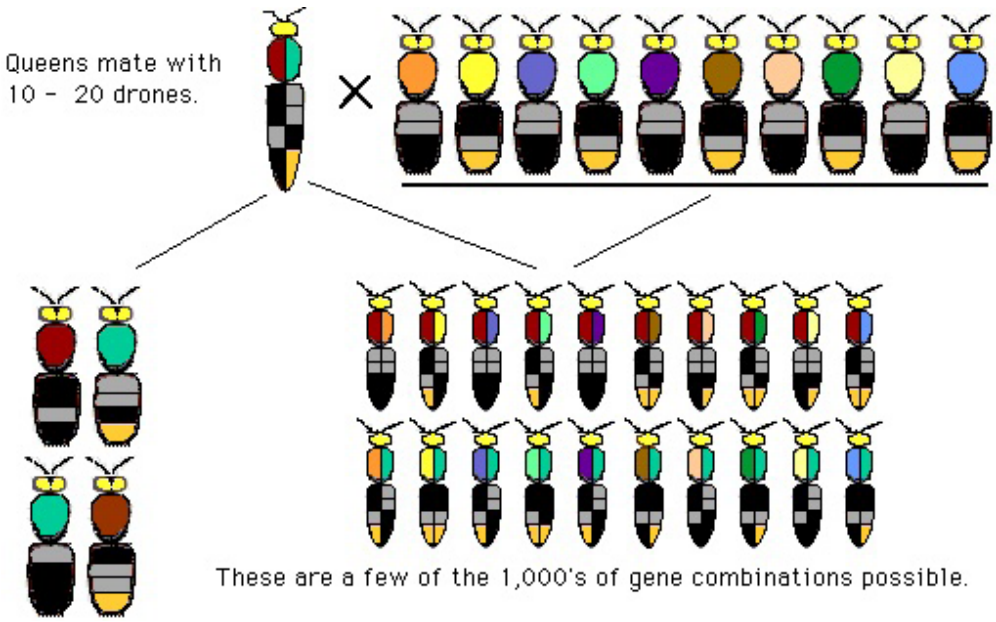
A DCA is an arial space where drones gather to wait for virgin queens.

Scientists have tracked some sites as DCAs for over 50 years, with drones flying as much as five to seven kilometres from home to find the spot to mate. Drones will visit a series of different DCAs in search of a queen, with the length of their flight determined by how much honey (energy) the drone has in its crop.

Each DCA has distinct boundaries, with usually some surrounding obstacles for wind protection and orientation. Think of something like a sports oval surrounded by trees or a golf course fairway.

In optimal conditions, drones patrol a zone 100 to 200m wide and from five to 40 metres above ground level. In poorer weather conditions this area shrinks. Peak activity is mid to late afternoon.

As soon as a queen flies into a DCA, a number of drones pursue her, forming a "drone comet". Perhaps one in 200 drones will successfully mate with a queen. Once they have mated, the drone dies.



Each queen can go on more than one mating flight over a couple of days but not again. In total she may mate with 10 to 20 drones and store a mix of sperm from all of these drones to fertilise eggs she lays for the rest of her life.

Drones don't always go back to their "home" colony.

GENETIC DIVERSITY IS THE KEY TO STRONG COLONIES. IN THE WILD, SWARMS WITH QUEENS THAT MATED WITH A RANGE OF DRONES ARE MORE LIKELY TO SURVIVE.

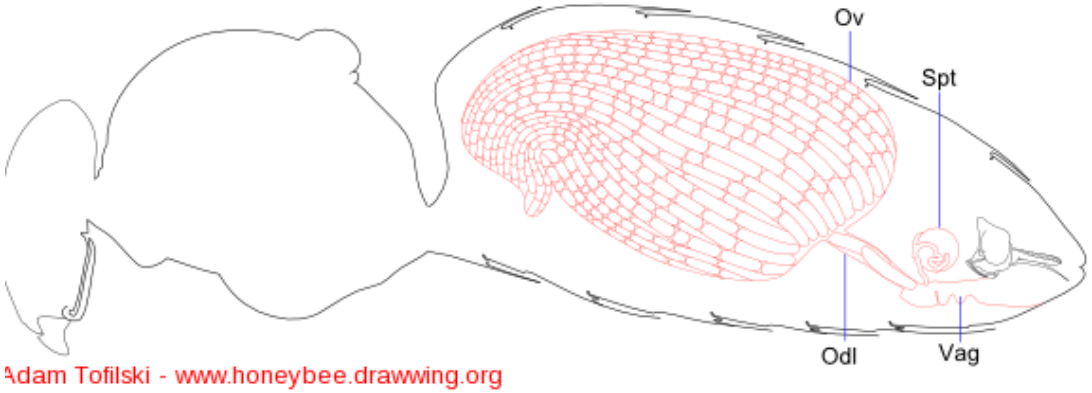
IMAGE: GLENN-APIARIES.COM

Queen

The queen bee is the only female that can mate.

She is born with all the eggs she will ever have. Eggs are stored in two (one pair) of ovaries. She can take more than one mating flight and returns to her colony with a part of the drone's phallus which is called the "mating sign".

The spermatheca is the organ of the queen where semen is not only stored, but where it is also kept alive and viable for the rest of her life.



Adam Tofilski - www.honeybee.drawwing.org

ODL - OVIDUCT
OV - OVARY
SPT - SPERMATHECA
VAG - VAGINA

Sperm is withheld in the case of unfertilised eggs which develop into drones (haploid), or deposited on eggs to fertilise them so they can develop into workers or queens (diploid).

Worker bees and queens are from a fertilised egg (diploid). The difference between worker and queen is the jelly they consume as they are developing.

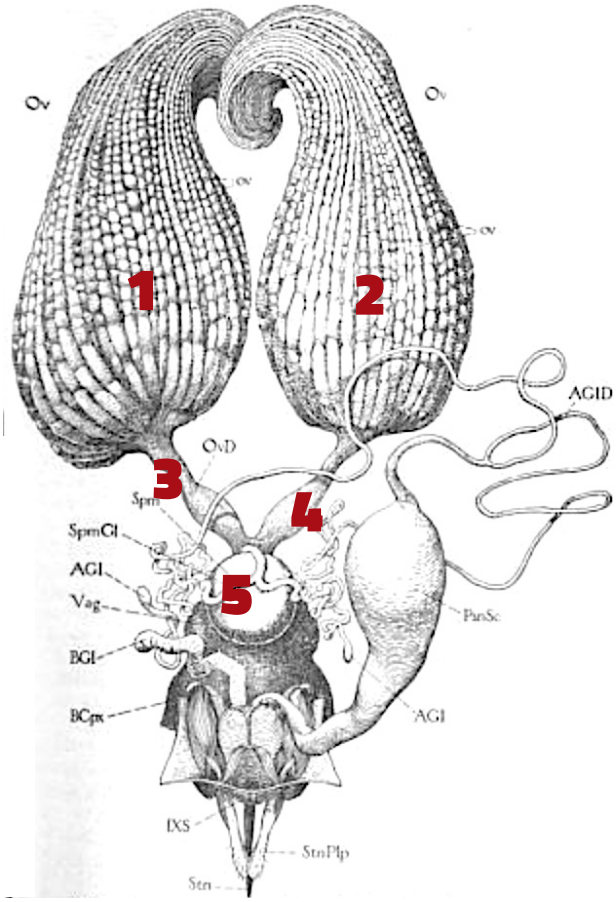
Workers do have ovaries and eggs but are unable to mate. This means that it is possible for there to be a laying worker, but she only lays drones. (Queen pheromones inhibit laying by workers).

Like the queen, workers also have a "modified ovipositor", which is the stinger.

For our purpose it is important to know that worker tasks are, for normal conditions, age related.

Our queen rearing requires us to be able to identify nurse bees that are at an age to feed larvae.

Nurse bees have the most active hypopharyngeal glands, which produce the specific quantity and type of jelly required by the larvae. Hypopharyngeal glands can be stimulated by a honey flow and/or by using a 1:1 (white sugar only) syrup.



A QUEEN HAS TWO FULLY DEVELOPED OVARIES (1,2), EACH MADE UP OF 160 TO 180 OVARIOLES WHERE THE EGGS ARE PRODUCED. AN EGG PASSES DOWN THE OVIDUCT (3,4), BEHIND THE SPERMATHECA (5) – THE GLAND WHERE SPERM ARE STORED. THE OVIDUCT AND SPERMATHECA OPEN INTO THE VAGINA. AN AVERAGE OF TWO SPERM ARE RELEASED TO FERTILISE EACH EGG.

A laying worker is a worker that is laying unfertilised eggs.

A drone layer is a queen bee that cannot fertilise her eggs.

QUEEN BEES ARE ARTIFICIALLY INSEMINATED WITH DRONE SEMEN TO BREED BEES WITH A SELECTION OF DESIRED TRAITS.

ADVANTAGES

Races of queens

THIS IS an often discussed, if not hotly debated, subject

There are choices you need to consider as far as what you have heard, observed, and know from your own research. Your choice might also depend on what you have available or what you want to change.

For a great summary of the differences between the main purebred races – Italians, Caucasians, Germans, Carniolans, Africans – plus several hybrids, go to bees4life.org/bee-extinction/solutions/sustainable-bee-keeping/guide-honey-bee-races

Here is one simple comparision:

Apis mellifera ligustica

Italian/Yellow Bees

- Constant production
- Suitable for warm climate
- Good honey production
- Easy to work
- 2nd year swarm tendency
- Less propolis

Apis mellifera caucasia

Caucasion/Black Bees

- Regulate their production
- Suitable for colder climates
- Longer tongue
- 1st year swarm tendency
- Good honey producers
- More propolis

DID YOU KNOW?

Perhaps up to 10 per cent of colonies have more than one queen, according to Dr Jamie Ellis of the University of Florida

Moving into our next topic, I suggest we take a moment and consider that, when it comes to queen bee performance -

- **Colour of bee doesn't matter - except for appearance**
- **Race of bee might matter - as to your location and preference**
- **Size of queen can matter - as to ability to fly and size of reproductive organs**

Selecting a breeder queen

There are three essential principles for rearing honey bee queens

1.Breeding stock

From where will you obtain your " breeder" queen?

(The word breeder is primarily used for a queen bee that has been artificially inseminated with selected drone stock semen. For our purpose the word "breeder" means the queen you select to be the mother of the queens you produce.)

You can purchase –

- an artificially inseminated or isolated mated queen from a reputable queen bee breeder. Costs will vary but mostly above $400.00 each
- a production queen from a reputable queen bee supplier and designate this as your "breeder". Cost will vary from $25.00 and up.

OR Select a queen/s from your own or another apiary (with permission) based on characteristics/traits

you want in your bees.

A few examples:

- Good temperament
- Good honey production/pollination ability
- Ability to resist disease
- Local vigour

NB: There are "trade-offs". If you try for too much of one trait, there will be less of another.

Most simply put: To start, choose your best queen for your reasons.

2. Conditions

- There is almost no reason or point in trying to rear queen bees if there are no drones to mate with her.
- Drones are seasonally produced and demand a high nutritional status in the colony
- Food quality and quantity must be available or supplemented
- A light nectar flow and three sources of pollen being collected/observed is needed
- Colony must be pest and disease free

- Healthy, well fed bees and an expanding brood population is essential

3.The Process

You will need to choose which method you'll use to produce your queens –

Grafting (for any number of Queen cells)

Jenter, Nicot system (varying results)

Miller Method (where fewer numbers are needed)

Frame with eggs transfer (where fewer numbers are needed)

These methods will be explained in Part 3 of this series

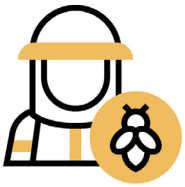
We are now halfway into a 4-part series, which is condensed from a 3-day training course.

It is time to ask yourself some questions so that you can start making some informed decisions

The next two parts will deal with more of the practical aspects – the "hows" of rearing queens: cell builders, mating nucs, handling cells, transporting queens, queen banking, record keeping, and marketing tips.

I do want to remind you of the fact that *You can raise your own honey bee queens.* When you start, it can seem like it is a bit too much. That is how it "seems" but is not the reality.

This series is intended to give you the knowledge and skills to start you on a most rewarding adventure that can change your bees and beekeeping outcomes.



Give it a go!

One last question.

Have you done the BOLT (Biosecurity On Line Training) course yet?

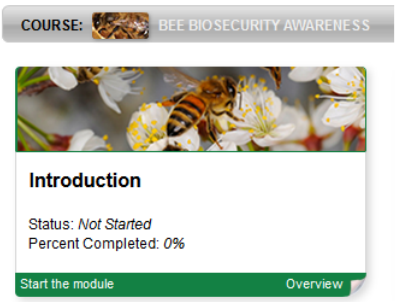
As we go on, it will be assumed that you know how to identify pests and diseases as well as biosecurity protocols. Do not proceed with rearing queens until you can confidently identify and manage pests and diseases. Healthy colonies produce a healthy queen.

Start looking now for the colony or colonies that show the qualities/traits you want in the queen/s you want. Until next time, keep safe, well, and get your plan together for the upcoming Season's Queen Rearing Schedule. (See Part 1 for a little revision.)

CHOICES	DECISIONS	ACTIONS
What queen do I want/need?	**How will I do this?**	**= Choices and decisions**
▪ Temperament	▪ Type of gear ie mating nucs	▪ YES, going for it
▪ Honey production	▪ Apiary sites	▪ Do what you can commit to
▪ Longevity	▪ Cell builder method	▪ Numbers
▪ Local vigour	▪ How many queens to produce	▪ Time
▪ Colour	▪ Breeder queen	▪ Quality before quantity
▪ Hygienic behaviour	▪ When to start/end	▪ Keep records
▪ Over-wintering/rapid build up	▪ Record keeping/schedule	▪ Market
▪ Non-swarming	▪ Where to market	▪ Enjoy 'crazy'
▪ Quiet on the comb	▪ Stay sane or go crazy	

Be Disease Aware

IF YOU'RE thinking of breeding queen bees, you'll want to make doubly sure your colonies are healthy and that you can spot any signs of trouble at the earliest possible moment. Otherwise, your efforts could all go to waste.



The good news: Biosecurity for Beekeepers Online Training (BOLT) is free for all Australian beekeepers.

The Biosecurity for Beekeepers course explains why biosecurity is important, describes the main pest threats to bees, and shows how to check hives for signs of pests and diseases.

It's designed for people with a basic understanding of beekeeping practices, but all beekeepers should find it helpful.

For more information about BOLT, click here. A printout with full instructions about enroling was sent to all ABA members in the 2021/22 membership pack, along with your membership card, log book and AFB diagnosis kit.

Queen Production Glossary

Age-appropriate larva/e Larva/e within 24 hours of hatching from an egg

AI or II queen Artificially/instrumentally inseminated queen bee using selected drone stock

Breeder queen Queen bee selected with traits desired for breeding production queens

Catch When queens are removed from mating nucs and caged (minimum industry requirement is 2 weeks)

Cell cup Where an age-appropriate larva is placed as graft

Cell bar Wood/plastic bar to hold cell cups placed in hanger

Cell builder Queenless colony used to raise cells

Cloake board Divider to separate queen from cells

Day 1 Day of graft

Day 10 Day cells go into mating nucs

Drone Congregation Area (DCA) Where drones gather to mate with queens

Drone Mother Colony Colony manipulated to produce drones from chosen queen stock and used to populate a Drone Congregation Area

Escorts/attendants Nurse bees placed in cage to care for queen

Graft The removal of age-appropriate larva to make a queen

Grafting tool Instrument used for grafting

Hanger Frame on which cell bars with queen cups are placed

Mating nuc Small colony made queenless to receive cell and rear queen

Mating/Nuptial flight Time when queen goes to mate

Mating yard Apiary site for queen mating

Miller method A way to rear queen bees without grafting

Open mating Virgin queens mate in DCA

Production queen The progeny of the breeder queen (queens from graft)

Queen bank Colony prepared and used to hold either virgin or mated queens while waiting use

Queen cage Used for holding queen with attendants

Records A must do for sanity

Royal jelly Substance fed to larva designated to become a queen

Starter/Finisher colony Type of cell builder

Schedule Calendar of queen production dates

Sugar syrup 1-1 white sugar only (sugar:water) used to stimulate bees

Ripe cell Queen cell between10 days and emergence

Virgin queen (VQ) Unmated queen

ABA CONTACTS

MEET THE 2022 EXECUTIVE TEAM

SHEILA STOKES

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ABA president Sheila is a web development professional who builds, maintains and supports all ABA IT infrastructure.
She has been on the ABA executive since 2015. "Lobbying is the way to ensure recreational beekeepers' voices are heard."

KATHY KNOX

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Kathy has been keeping European and Australian bees since 2013. She's a community leader with hobby beekeeping associations on the Gold Coast, and has run a series of successful education programmes for kids and adults in the area.

KEVIN TRACY

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Kevin has a commercial beekeeping background and now trains beekeepers around Australia. He is a queen breeder and an experienced public speaker. "Well managed bees are kept by commercial and recreational beekeepers. Let's all work together for bees."

DREW MAYWOLD

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Drew is the secretary of Gold Coast Regional Beekeepers, and has a background in education and human resources. He's recently been working on an online resources hub for his local club to help members locate useful information.

MIKE ALLERTON

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Mike began his obsession with bees in 2016. Currently engaged in his Cert III Beekeeping at Tocal College and Master Beekeeper Program at University of Florida, Mike gives bee presentations to garden clubs, schools and anyone else interested in bees.

SUE CARNEY

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Sue is a communications specialist with a lifelong fascination for bees. She started the Blue Mountains Beekeepers club and enjoys collecting books about bees and beekeeping. "Bees know it: cooperation and good commmunication are key."

JACQUELINE LEA

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Jacqueline commenced her beekeeping exploits in 2019 and has enjoyed her involvement with the ABA at club level. She is membership officer for Hawkesbury Beekeepers and is now putting her administrative skills to work as treasurer of the ABA.

How your ABA works

The team shown here are volunteers elected at the AGM. They each take on a range of duties to represent members, provide services to affliated clubs and individual members, and keep the organisation running smoothly.

The team meets regularly online or face-to-face to discuss projects, policy and current matters that affect recreational beekeepers and our network of affliated clubs.

The ABA is one of 10 members of the Australian Honey Bee Industry Council – the peak body for the sector in Australia. The ABA is also represented at such forums as the NSW Bee Industry Biosecurity Consultative Committee, and works with government and commercial organisations to promote and support recreational beekeeping.

The team is always keen to hear from members and clubs with ideas to assist recreational beekeepers and support bee populations, biosecurity and bee related education. Please contact us on the emails provided.