Nests of Australian Stingless Bees

Third Edition — PDF eBook

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Aussie Bee & Australian Native Bee Research Centre

Nests of Australian Stingless Bees

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by Dr Anne Dollin
Australian Native Bee Research Centre

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All photographs and drawings are by the author, except where otherwise acknowledged in the text.

FRONT COVER
The brood comb in a nest of Australian *Tetragonula* stingless bees.
Photograph by Anne Dollin.

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Contents

Come With Us on an Exciting Tour…

The intricate nests built by the Australian stingless bees (genera *Tetragonula* and *Austroplebeia*) are radically different from the regular white honey-combs built by the better known European commercial honeybees (*Apis mellifera*).

In nests of the Australian stingless bees, clusters of delicate honey and pollen pots nestle in an elaborate tangle of resinous pillars and sheets. The nursery or brood, a constantly changing and intricate structure, occupies pride of place in the centre of the nest. All this is built in total darkness by hundreds of bees less than 5 mm long.

My husband, Les, and I have spent many exciting years studying the nests of all the species of Australian stingless bees on remote safaris through the Australian outback. Come with us on a guided tour through an Australian stingless bee nest…

The author, Anne Dollin, examining an Austroplebeia nest in the Northern Territory

Nest Sites

Because they are stingless, these bees need a secure, enclosed nest site which they can defend against predators. Most Australian species of stingless bees nest inside hollow trees. However, overseas a much wider variety of nest sites is used by other species of stingless bees.

Nest Sites of Overseas Stingless Bees

Some species of stingless bees overseas build nests up to 5 m underground. They use pre-existing cavities, such as those formerly occupied by ants. One stingless bee nest in Brazil was 3.3 m below the surface and had an almost perpendicular entrance tunnel spiralling down into the cavity.

Other species nest in extremely flat cavities, such as under the bark of a tree or between the boards of a building. These cavities are so flat that there is not enough space for the bees to group their brood cells into combs.

In Central America, some stingless bees choose an eccentric array of artificial nest sites. Nests have been recorded in a letterbox, an oil can (using the spout for an entrance), an old fashioned phonograph box and a sewing machine.

Abandoned birds' nests may also be used by overseas stingless bees. One bee colony built in a bird's nest made of twigs and earthen material. One of the bird's eggs was still in the nest, covered over with propolis.

The long entrance tube of a nest of Tetragonilla stingless bees in a Malaysian jungle

Overseas stingless bees may also use partially or fully exposed nest sites. They may enclose a space for their nest by building a resinous wall over the bases of palm fronds, over a niche in a cliff or under overhanging parts of a building. Other species may build an entire nest cavity for themselves by constructing a set of resinous walls supported by the branches of a tree.

Some overseas stingless bee species nest in extremely high densities. A study by Roubik and Harrison found up to 15 nests per hectare in a moist forest in Thailand, and Camargo recorded up to 37 nests in a single tree. Michener found 141 nests from 12 stingless bee species clustered together in the crumbling ruins, several centuries old, of Old Panama.

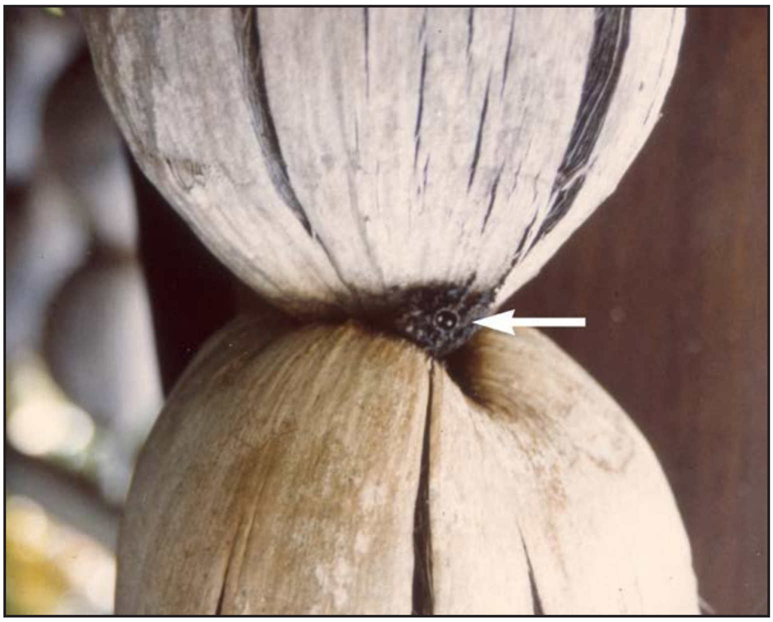
Nest Sites of Australian Stingless Bees

In Australia, most stingless bees nest inside hollow trees. Some species choose large spacious cavities whilst others choose narrow twisty cavities. These hollows are superbly insulated by the thick timber of the tree's trunk and convenient access holes into the hollow are formed when branches decay and fall off.

However, Australian stingless bees also build in other types of natural cavities:
— under tree roots
— in rock crevices
— inside termite mounds

Extensive tree clearing, since the arrival of European settlers in Australia, has certainly destroyed countless nests. However, in other ways the encroachment of civilisation has considerably enlarged their choice of nest sites. This process is particularly seen in the northern regions of Australia where nests are commonly found in:
— stone walls
— timber walls
— verandah posts
— fence posts
— iron pipes
— hollow doors

We have also seen nests in a coconut husk in a decorative wall, under a flower pot, inside an historic monument and under a footpath in a busy street where the bees flew in and out between the feet of passing pedestrians.



A nest of Tetragonula clypearis inside a hollow coconut in a decorative wall in northern Queensland.
Arrow: two bees peeping out of the tiny entrance tunnel.

Some artificial cavities, such as hollow doors and iron pipes, provide very little insulation for a nest. Species using such cavities must able to tolerate remarkable levels of temperature variation.

Left: a Tetragonula carbonaria nest inside an old tyre inner tube. The top of the spiral brood comb (arrow) can be seen amongst the folds of rubber. Photograph by Rob Raabe.
Right: a Tetragonula clypearis nest inside the plastic cover of a tennis racquet. The fine cells of the brood can be seen on the strings, along with some larger honey pots. Photograph by Athol Craig.

Materials Used for Building the Nest

Nest structures made from cerumen in a stingless bee nest

The nests of Australian stingless bees are much darker in colour than the waxy combs of the commercial honeybee. This is because stingless bees build their nests from *cerumen*, a mixture of wax and resin.

Wax is produced by the worker bees as thin shiny scales from special glands on the top surface of their abdomen (tail segment). They curl their hind legs up over their backs to remove the wax scales and then chew the scales to make them soft.

Their wax is similar to the wax made by commercial honeybees but is softer because it is more unsaturated. This would make it easier for the bees to use on cold days. Wax production requires a tremendous amount of energy. The bees need to eat twelve grams of sugar to make one gram of wax. So they mix the precious wax with large amounts of other materials which they can easily collect from outside the nest.

One of the main materials mixed with the wax is resin from damaged trees. It has antifungal, antibacterial and antiviral properties. Resin is collected by the bees and carried back to the nest in little balls on their hind legs, in the same way as they carry pollen. The pale yellow, aromatic resin of the turpentine tree (*Syncarpia glomulifera*) is a strong favourite with *Tetragonula* bees in New South Wales.

In Queensland, the resin of the cadagi tree (*Corymbia torelliana*) is avidly collected by the *Tetragonula* stingless bees and they will fly up to a kilometre to gather it. The cadagi tree produces this resin in its seed pods and the bees unwittingly gather the tree's seeds along with the resin, dispersing the seeds quite long distances. Cadagi resin may cause problems with boxed hives of stingless bees because it has a low melting point. The bees may store large quantities of the resin in their hive; then in hot weather this resin may melt. Beekeepers may have to clear excess resin deposits out of their hives or move the hives into cadagi-free areas during the fruiting season.

T. hockingsi bees in Queensland have discovered that fresh paint makes an admirable substitute for tree resin, especially when it is so abundantly supplied by some unfortunate house painter near their nest. Other materials that the bees may mix into their wax for nest construction include termite dirt and pollen.

Even insects, such as beetles which invade the nest, may find themselves slowly buried alive by guard bees placing blob after blob of cerumen on their backs. Finally the unlucky intruder is entombed and becomes part of the structure of the nest.

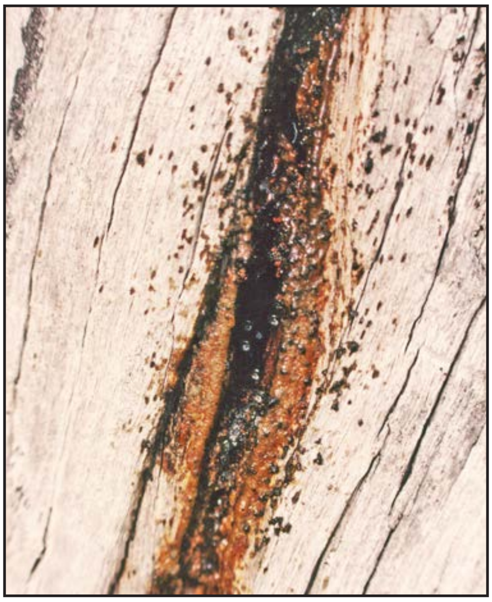
A nest of Tetragonula hockingsi with white paint dotted through the resin structures (on right) and around the entrance hole (arrowed)

Nest Entrance

The nests of many Australian stingless bees are hard to find in the bush because their nest entrances can be quite inconspicuous. In *T. carbonaria, T. hockingsi* and *T. davenporti* nests, the entrance usually consists of a simple crack or hole, about 10–30 mm wide, in a tree trunk.[1] Against the rough texture of the tree bark, such entrances can be very difficult to spot!

The bees may add a smooth coating of black, brown or orange resin around the entrance hole. Some *T. hockingsi* nests protect their entrances with a sticky ring of resin blobs, mixed with other material such as dirt or even dead ants.

Three different T. carbonaria nest entrances: right, a simple hole in the bare timber; below left, surrounded by blobs of resin; and below right, with a thick coating of resin around the entrance hole.



In contrast, all of our other Australian stingless bee species may construct a small resinous tunnel at their nest entrance. Three of our *Tetragonula* species (*T. mellipes, T. sapiens and T. clypearis)* and all our *Austroplebeia* species often build tunnels, 5 – 12 mm wide, as their nest entrances.[1, 2] The tunnel length varies with the species. Most *Austroplebeia* tunnels are less than 20 mm long but one exceptional *A. cincta* nest had a tunnel that was 430 mm long! Some *T. clypearis* bees build tunnels up to 180 mm long, that run down or around the surface of their nest log.

Right: this A. australis nest has built a 12 mm long entrance tunnel out of resin

Clockwise from top right: The tunnel of a T. clypearis nest tucked in beside a twist of fencing wire in a hole in a fence post in northern Queensland; four parallel entrance tunnels in a T. mellipes nest in Arnhem Land, Northern Territory; the elaborate entrance tunnel of an A. essingtoni nest in Arnhem Land; the rough textured entrance tunnel of an A. australis nest in Queensland.

Occasionally multiple entrance tunnels are built by the one nest. One unusual *T. mellipes* nest that we saw in the Northern Territory had four tunnels projecting from its nest entrance (see photograph above).

The nest entrance plays an important role in the defence of the nest. It is where the guard bees wait to repel any predators. Some *T. carbonaria* and *T. hockingsi* nests have long slit shaped entrances, built in a crack in the timber. These are ideal for defence because the narrow width of the slit keeps out large predators, whilst the long length of the slit allows many bees to guard the entrance at the same time. In species that build entrance tunnels, longer or more elaborate tunnels may be built when a nest is regularly bothered by predators such as ants.

The *Austroplebeia* stingless bees close up their entrance tunnels against predators at night with a fine lacy resin curtain. This curtain has many fine holes in it so that the bees can still ventilate their nest at night.

Right: This colony of A. cassiae has built a lacy resin curtain over its entrance tunnel at night

The bees may alter their nest entrance design to assist with climate control within the nest. In hot areas the nest entrance forms a platform where the bees gather to fan the nest. During cold spells, a *T. carbonaria* nest may partially close up their nest entrance with a solid panel of resin to shield the entrance against cold draughts.

However, none of our Australian species builds a nest entrance as elaborate as some species of stingless bees do overseas. Two large stingless bee species in Southeast Asia build enormous projecting entrance tunnels that are up to 50 cm long and weigh a few kilograms. One *Scaptotrigona pectoralis* nest in Costa Rica had a long slanting entrance tube estimated to be one metre long.

A solid resin wall constructed by T. carbonaria bees to modify their hive entrance

Cavity and Batumen Plates

Passing through the entrance of an Australian stingless bee nest, we find the nest itself enclosed snugly in a well-sealed cavity. The bees generally coat the inside of the cavity with a layer of resin.

If the cavity chosen by the bees is larger than they need, they build solid walls sealing off parts of the cavity. These durable barriers are called *batumen plates*. The bees use a particularly hard mixture of cerumen, with large amounts of resin and other solid material mixed into it, to build the batumen plates.

Sometimes when a nest is built in a hollow tree, the bees leave small holes in the batumen plates above and below their nest. This allows cool air from the long tree hollow to be fanned into the nest.

A thick batumen plate closes off part of a tree cavity in an Austroplebeia nest

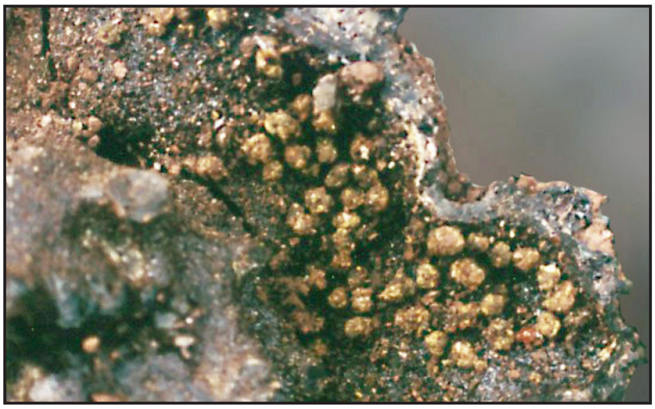
Internal Tunnel

The bees often build a passageway or internal tunnel leading from the entrance to the inner parts of the nest. A resin dump may be found in this area to supply the guard bees with sticky weapons to fight off intruders. This is also where *Austroplebeia* bees store the materials for the resin mesh that they construct across their nest entrance each night.

A cross-section view of the beginning of the internal tunnel in an Austroplebeia nest. The tunnel passes through a crack in the log into the log cavity.

Also in this area may be found little rubbish dumps where debris from the nest and bee droppings are stored prior to being carted outside and discarded.

Moving further inside the nest we find a network of cerumen sheets and pillars. In amongst this scaffolding are found the food stores.



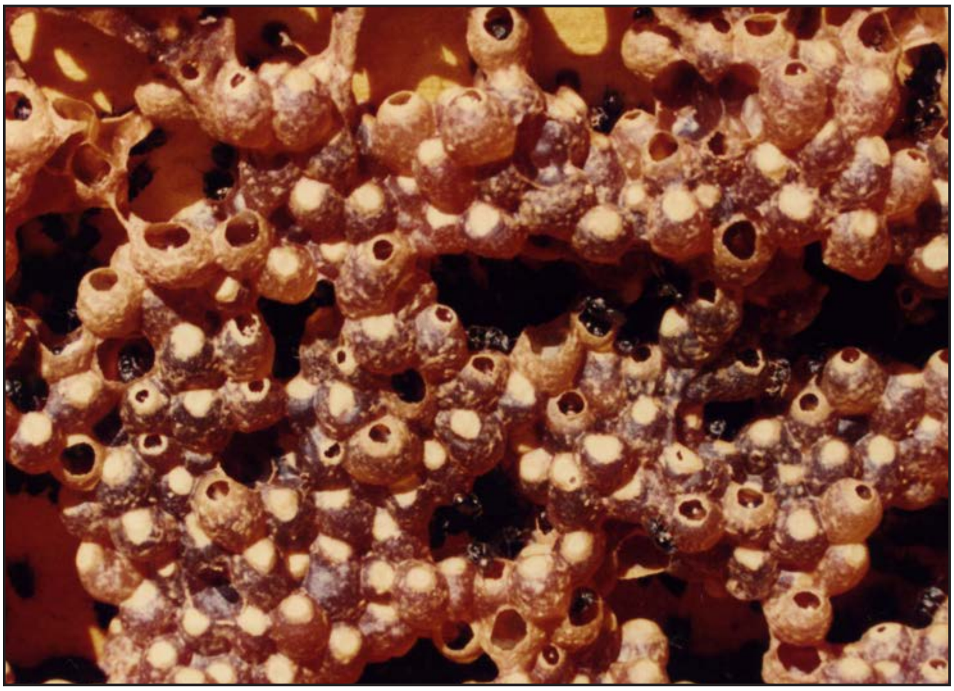
A rubbish dump constructed by Tetragonula bees near their nest entrance

Honey and Pollen Pots

Stingless bees do not store their honey and pollen in a hexagonal comb as the commercial honeybees do. Instead they construct oval pots for their stores (about 10 – 22 mm high and 9 – 16 mm wide in *T. carbonaria* nests).[1] When full, the pots are sealed and other pots are built on and around them. Finally the whole clump looks rather like a densely packed bunch of grapes.

Pollen tends to be stored near the central brood area and honey in the outer parts of the nest. However, it is not unusual to find both honey pots and pollen pots in the same clump.

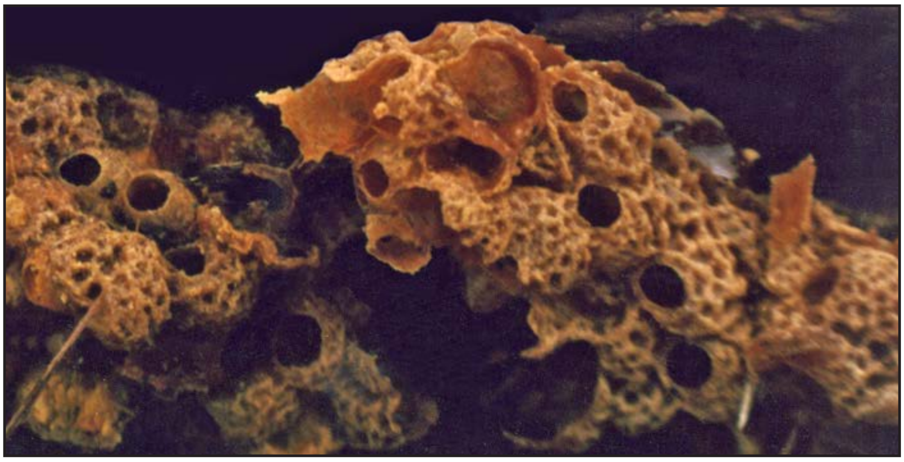
The storage pots of *Tetragonula* nests tend to have thicker walls and to be made of darker cerumen than do the pots of *Austroplebeia* nests.



Above: a bank of heavy walled pots containing honey and pollen in a T. carbonaria nest. Right: much thinner walled honey pots in an A. cassiae nest.

Sometimes *Austroplebeia* bees will add criss-crossing strands of cerumen to their pots to strengthen them, giving their surface a basket weave appearance.

The quantity of honey stored in a nest varies with the species. *T. hockingsi* and *T. carbonaria* are two of the best honey storers. *T. carbonaria* nests we have studied generally stored 0.5 - 1 kg of honey, although one exceptional nest had over 2 kg. These quantities are very small, however, compared with commercial honeybees which can store about 50 kg per hive!



Above: heavily reinforced honeypots with a basket weave appearance in an A. australis nest.
Below: Sugarbag honey from a stingless bee hive.

The honey made by our Australian stingless bees is known as *Sugarbag*. Its colour ranges from a rich dark brown through to a clear pale gold. Its flavours are tangy with hints of lemon or eucalyptus. Stingless bee honey, especially from the *Tetragonula* species, has a stronger flavour than the honey made by commercial honeybees. It is delicious when drizzled over ice cream!

Sugarbag is also more fluid than the honey of commercial honeybees. Eight batches of *T. carbonaria* honey analysed in 2008[3] had an average moisture content of 27%, whilst typical honey from commercial honeybees has a moisture content of about 16 to 18%.

This study also showed that *T. carbonaria* honey had a much lower glucose content than that seen in commercial bee honey. This means that the *Tetragonula* honey would be much slower to crystallise or granulate than commercial bee honey does.

The following table shows the average sugar composition for *T. carbonaria* honey reported in the 2008 study, compared with typical commercial honeybee figures:

Sugar Type	*T. carbonaria* honey g/100g	*Apis mellifera* honey g/100g
Fructose	24.5	about 40
Glucose	17.5	about 30
Maltose	20.3	about 7
Sucrose	1.8	1 to 2

Aboriginal people have traditionally used stingless bee honey as a medical remedy for complaints such as varied as burns, sore eyes and diarrhoea. A 2010 study[4] confirmed that *T. carbonaria* honey has broad spectrum antibacterial properties. Some of these properties may come from the pots that the honey is stored in. The honey pots are made from a mixture of wax and plant resins and these resins contain antimicrobial compounds. *T. carbonaria* honey could be valuable in the future for its medicinal properties as well as its unique aromatic flavours!

Involucrum

Around the brood (or nursery cells) in the centre of the nest, many species of Australian stingless bees build a vital structure called the *involucrum*. This is a protective capsule consisting of a single sheet, or multiple sheets, of cerumen. *T. carbonaria* bees may build an elaborate involucrum with up to six layers of cerumen.

The involucrum has two important functions.

— The involucrum restricts air flow into and out of the brood and thus helps the bees maintain a constant temperature in the brood.

— A multi-layered involucrum also creates a complex maze of passageways around the brood. This makes it more difficult for predators such as flies or ants to reach the nest's developing young.

Opening a boxed hive of stingless bees can damage the involucrum around its brood and can make the nest more vulnerable to chilling and predator attack. So a stingless bee nest should only be opened up when it is really necessary.

The intricate multiple layers of involucrum surrounding this section of a T. carbonaria brood

Brood

Passing through the involucrum, we finally reach the very centre of the stingless bee nest. Here is the brood where the queen bee lays her eggs. Each egg is laid into its own brood cell made from cerumen.

The number of cells in an Australian stingless bee brood varies considerably. In one study[5] a *T. carbonaria* brood was estimated to consist of 9,500 to 11,000 cells. At the other end of the spectrum, species such as *T. clypearis* may build much smaller broods with only a few hundred cells.

In commercial honeybees...

— commercial honeybees (below) build their brood cells in vertical hexagonal combs. Their cells are built in a double layer, base to base, opening left and right.

In contrast, in stingless bees...

— most Australian *Tetragonula* stingless bee species (a) build their brood cells in horizontal combs. The cells are built in a single layer, opening upwards.

— *Austroplebeia* stingless bee species (b) build their brood cells in a loose irregular cluster. *Austroplebeia* brood cells open in different directions, facing towards the outside of the cluster.

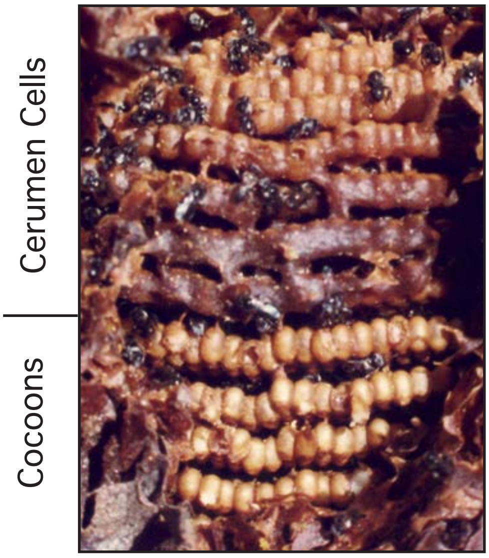

Photo: David Ritchie

Advancing Front

In all of the Australian stingless bees, new cells are constructed from cerumen, which is pale brown to mid brown in colour. Each cell is stocked with a special nectar and pollen food mixture, an egg is laid in the cell, and then the cell is sealed. A larva emerges from the egg and begins to eats the food, growing larger. Finally it develops into a pupa which spins a creamy coloured silken cocoon around itself. Adult workers then strip the cerumen off the outside of the cocoons, revealing the creamy silk.

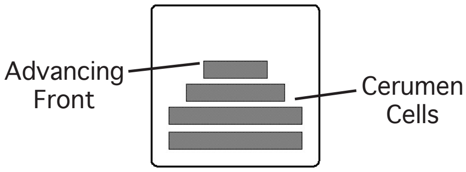
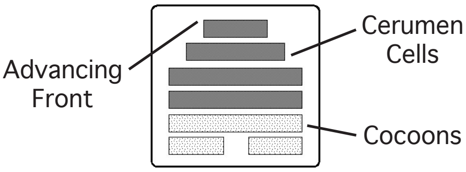
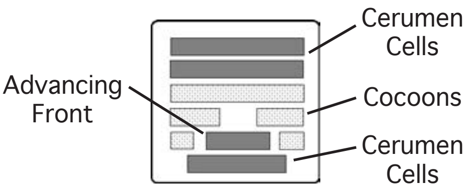
So there are two different colours in stingless bee broods:
— the darker coloured cerumen cells containing the larval brood; and
— the pale-cream coloured cocoons containing the pupal brood.

In the spiral brood comb of *T. carbonaria*, shown in the photograph on the right, these changes in colour can be seen. The newest comb layers are brown, while the cocoon layers are cream.



The surface of the brood where the new cells are being built is called the *advancing front*. In *T. carbonaria* the comb is a spiral that grows upwards as new cells are built. Eventually the advancing front reaches the top of the brood chamber and there is no room for any more new cells.

However, some distance below, there are layers of cocoons containing nearly mature bees. When these new bees emerge, their cocoons are completely torn down, leaving a space. The workers then start to build new cerumen cells in the space left by the cocoons, and so a new advancing front begins at the bottom of the brood chamber (see diagrams below). A brood in a long narrow brood chamber may have several advancing fronts.

Diagram of the Advancing Front in *Tetragonula carbonaria*	
	Stage 1: In the beginning, the advancing front spirals upwards from the bottom of the brood cavity.
	Stage 2: The advancing front reaches the top of the brood cavity. Meanwhile, some larvae in their cerumen cells have matured into pupae in cocoons. The oldest pupae have developed into adults and emerged from their cocoons and these cocoons have been removed, leaving a space at the bottom.
	Stage 3: As there is no room left at the top of the brood chamber, the new cells of the advancing front are being built in the space at the bottom where the new adults have emerged.

Tetragonula species

Our *Tetragonula* species build oval-shaped brood cells. Both the brood cells and the cocoons for the workers and males are about 4 mm high and 3 mm wide.(1)

Tetragonula queen bees, however, develop in larger cells. Their cocoons are up to 7 mm high and 5 mm wide. Because of their large size, they are usually found on the edges of the brood.

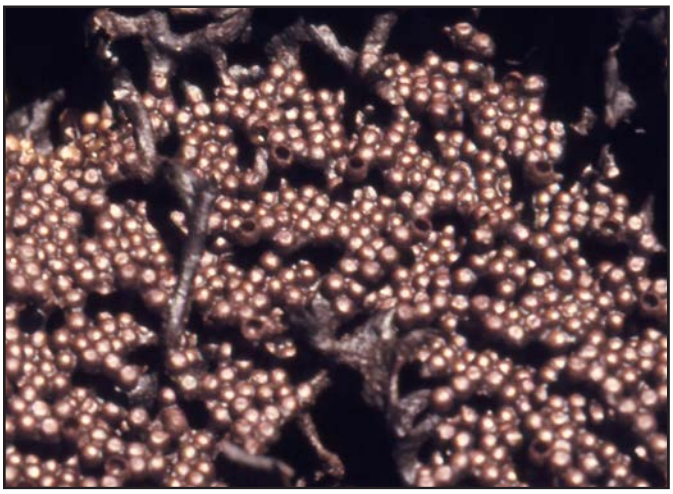
The structure of the brood in a *Tetragonula* nest varies greatly depending on the species:

— In *T. carbonaria* the brood comb rises gracefully in a spiral, similar to a spiral staircase;

— In *T. hockingsi*, *T. davenporti* and *T. mellipes* the brood cells are built in many small interconnecting combs that look rather like cobblestones;

— In *T. sapiens* and *T. clypearis* the brood cells are built in very irregular horizontal or diagonal layers.

More details and photographs of these different brood structures can be found in another eBook in this series: *How to Recognise the Different Types of Australian Stingless Bees* (see page 14).



The small interlocking combs that resemble cobblestones in a T. hockingsi brood

Austroplebeia species

The irregularly arranged cocoons in an Austroplebeia brood

The *Austroplebeia* species build spherical brood cells. The brood cells containing the worker and male larvae are about 3 to 4 mm in diameter. However, the cocoons containing the pupae are oval-shaped, up to 5 mm long and 3 mm wide. *Austroplebeia* queen bees develop in larger cells. Their cocoons are up to 7 mm long and 5 mm wide.[2]

Austroplebeia species, other than *A. cincta*, build their brood cells in a random *cluster* arrangement. The neighbouring cells may touch one another or be interconnected by short pillars. There is no horizontal layering and if space in the cavity allows, the cells form a rough sphere.

Effect of Cavity Shape

The type of cavity that the bees have chosen for their nest can also affect the structure of the brood.

— Some of the *T. carbonaria* brood combs that we have examined were built in a clockwise spiral, whilst the others spiralled anticlockwise. The initial direction of the spiral may be affected by the shape of the brood cavity.

— Occasionally, for reasons not yet known, *T. carbonaria* nests build broods with an amazing double spiral structure.

Right: a rare double spiral brood comb in a T. carbonaria nest. Notice that the upper half of this brood spirals clockwise, whilst the lower half spirals anticlockwise! Photograph by Denis Shepherd.

— In long narrow twisty tree cavities, *T. clypearis* and some *Austroplebeia* species may build a diffuse brood with small scattered groups of cells and little or no involucrum.

— In large spacious cavities, species such as *T. carbonaria* may build bulky broods with a regular layered structure and a multi-layered involucrum sheath.

— Many nests in narrow cavities have multiple brood chambers and the queen moves between them to lay her eggs.

Above: Les Dollin examines a long A. essingtoni nest inside a tree with a very twisty narrow cavity in the Northern Territory. This nest had three separate broods separated by clusters of honey and pollen pots.

— The orientation of a brood can change abruptly if the tree housing the nest falls over. As long as the nest itself is not broken open, the bees will begin to build new brood cells in the new orientation, along side the old cells. For some time the brood looks chaotic with layers of cells running in different directions However, eventually all the old brood cells are removed and the whole brood structure then matches the new orientation of the nest.

Observing a Nest of Stingless Bees

We are sometimes asked whether you can put a nest of stingless bees into an observation box. Unfortunately, the unique defensive behaviour of the stingless bees can make this rather difficult.

As these tiny bees are stingless, they always strive to seal up all openings to their nest cavity, other than their nest entrance. Light coming into their nest, even though the edges of a glass observation panel, is seen as a major breach in their nest seal. So they will diligently endeavour to cover every square centimetre of glass with their opaque resin mixtures.

Here are some tips to increase your chances of success:

— A strong *Tetragonula* nest can cover an observation panel extremely rapidly but *Austroplebeia* nests are more tolerant of being observed.

— Using red light while you are observing a nest will disturb the bees less than using white light.

— Keeping the observation panel completely covered (including the edges of the glass) with black opaque material whenever you are not observing the nest, will reduce the rate at which the bees cover up the glass.

The patient observer, who is willing to periodically invest funds in new glass panels (or elbow grease in glass cleaning!) will be delighted by the marvellous behaviour which occurs every day in a nest of Australian stingless bees.

Glossary

Abdomen — A bee's body has three segments, the head, the thorax and the abdomen. The abdomen is the third or tail segment of a bee.

Advancing Front — The surface of a brood where the newest cells are being built.

Batumen Plates — Thick hard walls of resin and other materials used to seal off sections of a cavity that are not being used by the nest.

Brood Cell — A small cell where an egg is laid and an immature bee is raised. Brood cells may be loosely arranged in a cluster or more regularly joined together into combs.

Cerumen — A mixture of wax and tree resin used by stingless bees for nest construction.

Cluster — A group of brood cells that are in a loose irregular arrangement, not in combs.

Comb — A layer of brood cells or cocoons that are crowded together. They may form a broad regular sheet or they may be in smaller irregular groups.

Cocoon — The silky capsule spun around itself by a fully grown larva inside its brood cell before it develops into a pupa.

Honey Pots — Small pots made from cerumen where the honey is stored.

Involucrum — A protective and insulating sheath that surrounds the brood, consisting of one or more layers of cerumen.

Larva — The grub-like first stage of a stingless bee's development after it emerges from its egg. (See another eBook in this series: *Behaviour of Australian Stingless Bees* — details on page 14.)

Pollen Pots— Small pots made from cerumen where the pollen is stored.

Pupa — The second stage of a stingless bee's development before it becomes an adult bee. (See Booklet 3 in this series for more details.)

Queen — In a social bee nest there are three types of bees: a queen, workers and males. The queen is the fertile female bee that normally lays all the eggs in a nest.

Queen Cell — A larger cell in which an immature queen bee is raised.

Worker — In a social bee nest there are three types of bees: a queen, workers and males. The workers are the sterile female bees that do most of the work in the nest.

Further Reading

Other eBooks in the *Native Bees of Australia Series*:
— *Introduction to Australian Native Bees*
— *Behaviour of Australian Stingless Bees*
— *How to Recognise the Different Types of Australian Stingless Bees*
— *Keeping Australian Stingless Bees in a Log or Box*
— *Boxing and Splitting Hives: A Complete Do-It-Yourself Guide*
The above ebooks are available from the Aussie Bee website: **www.aussiebee.com.au/abshop.html**

The Australian Native Bee Book by Tim Heard (2016). Available from: **nativebeebook.com.au**

The Social Behaviour of the Bees by Charles Michener (1974). The Belknap Press of Harvard University Press, Cambridge, Massachusetts.

Stingless Bee Nesting Biology by David Roubik (2006). *Apidologie* 37: 124-143.

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Notes on Australian species name changes:

— The *Trigona* stingless bees in Australia are now called *Tetragonula*.
See: www.aussiebee.com.au/tetragonula–name–change.html
— The *Austroplebeia symei* stingless bees are now called *Austroplebeia cassiae*.
See Aussie Bee Online Article 25, Meet the *Austroplebeia* species: www.aussiebee.com.au/abol–current.html

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