

The stinging tree can kill dogs and horses, and has even led to the death of humans, but countless native animals live content among its poison hairs.

Marina Hurley spent many nights among these dangerous plants to discover why.

Selective stingers

Marina Hurley received her PhD at James Cook University in 1997 for research into stinging trees and their herbivores. She now teaches entomology and ecology at the University of Tasmania and, with the CRC for Sustainable Production Forestry, investigates plantation *Eucalyptus nitens* and their beetle herbivores



Australia is home to the world's most painful plant to touch: the 'stinging tree'. Even gently brushing the leaves of this tree can cause intense pain, an itching, burning sensation which in mild cases can linger for months, and in extreme cases can be agonising, even fatal.

Stinging trees belong to the same plant family as European stinging nettle. They are found on Australia's eastern coast, from Iron Range on Queensland's Cape York Peninsula to wet temperate rainforests of the south-east. They grow in rainforest clearings, moist woodland gullies, along small tracks and creek edges, and on properties that border rainforest.

Of the six 'stinging tree' species known in Australia, only two are actually trees:

the southern giant stinging tree (*Dendrocnide excelsa*) and the northern shiny-leaf stinging tree (*D. photinophylla*). The rest are shrubs, including the most painful plant of the genus, the Gympie-Gympie (*D. moroides*). This is found in North Queensland rainforests along with another closely related, but slightly less harmful species, *D. cordifolia*.

I chose to study these two species of stinging tree because they fascinated me and no one had looked closely at them before. The botanist who described the genus in the late 1960s had mostly relied on preserved specimens, resulting in some taxonomic inconsistencies.

The role of the stinging hairs was also puzzling. Although the shrubs appeared to have the ultimate defence system, the

leaves always seemed to be full of holes. Something was eating them. I wanted to find out what it was and whether they were deterred by the stinging hairs.

Not so hapless herbivores

I began my research in a clearing at Wongabel State Forest on Queensland's Atherton Tablelands. There I found that far more animals can eat stinging leaves and fruits than are affected by the sting.

The stinging trees of Wongabel were crawling with creatures: spiders, scarab beetles, green ants, mites, katydids, sapsuckers, leafhoppers, assassin bugs, a few snails and the occasional frog and lizard. It took me weeks to determine which did the most damage.

One evening, when spotlighting for possums, I found the answer. Scattered all over the leaves were shiny green-black beetles (*Prasyptera mastersi*). These nocturnal beetles ate between the stinging hairs, but quite effortlessly walked among them. Another common insect herbivore was a small moth (*Prorodes mimica*) which made protective shelters in the leaves.

From then on I worked in the rainforest during the evening, looking at the beetles, watching them feed, and comparing their density with leaf damage I had measured during the day.

On one occasion, a two-metre stinging tree with large round leaves was stripped overnight. All that was left was chewed remains and scratch marks on the stems. Something much larger than insects was



Left: The rainforest gap at Wongabel State Forest where Marina Hurley conducted her study.

Above: A leaf from the most painful of stinging trees, the Gympie Gympie, showing characteristic damage caused by a voracious nocturnal beetle.

An unfortunate grasp of the nettle

'WORKING in the rainforest at night was easy enough, unless it rained heavily. I always wore a miners torch and took a spare in my pocket.

There was one night, however, when both torches failed and it was lucky that the moon was out. I managed to negotiate dozens of stinging tree leaves by moonlight, to find my way back to the track and then back to my car.

The leaves of *D. moroides* can readily sting your skin through the toughest of clothing. Welding gloves were all I could find to wear to handle the leaves and collect insects without getting stung. I learnt very quickly to develop a sixth sense when moving around the plants, always moving slowly and remaining alert at all times.

But I wasn't prepared for my worst sting that left me in hospital for half a day. I dropped my glove on the ground and as I picked it up I drove my finger right through a dead leaf that was curled up on the forest floor. Another close call was forcing myself not to instinctively jump backwards, and into a patch of stinging trees, when finding a snake basking in the sun at my feet.'

Marina Hurley

The red-legged pademelon's taste for stinging-tree leaves is well-founded. My research has shown that stinging tree leaves are actually nutritious, containing high concentrations of nitrogen and even calcium (nettle tea was a common beverage prepared throughout Europe for similar reasons).

Stinging trees are not protected from being eaten by insects or mammals. In fact they seem better suited to the rapid colonisation of rainforest gaps than to avoiding herbivore damage. Unless small seedlings are wiped out by a pademelon or falling branch, stinging trees are able to put up with heavy leaf damage, by being able to quickly regrow large leaves.

Painful analysis

Stinging trees deliver their sting by means of a toxin contained in tiny silicon hairs that cover all parts of the plant, except the roots. These are easily broken off on contact, penetrating the skin and acting like miniature hypodermic needles. Depending upon the species and the degree of contact, the reaction can vary from mild irritation to death, not only in humans, but also in dogs and even horses.

The burning pain is felt almost immediately after contact, then intensifies, reaching a peak after 20–30 minutes. During this time the heart rate increases and the lymph glands in the joints begin to swell and throb, causing almost as much pain as the sting. The hairs are so tiny that the skin will often close over them, making them difficult or impossible to remove.



Marina Hurley

The nocturnal stinging tree beetle is happy among the tree's poison hairs.

Because our bodies cannot break down silicon, the stinging sensation can be felt up to a year. The hair containing the toxin is embedded in the skin and any movement of the affected area caused by touch or exposure to hot or cold temperatures will release the toxin and the stinging sensation will recur.

The nature of the toxin is not fully understood, but acts like a neuro-toxin and is so stable that it retains its pain producing properties for decades. Dried botanical specimens at a CSIRO herbarium in Brisbane, collected in 1910, can still cause pain.

The only human death officially attributed to the tree was recorded in New Guinea by Dutch botanist HJ Winkler in the early 1920s. He also observed that the dried bark of another species *D. cordata*, is fatal when eaten.

I once received a letter from an ex-serviceman Cyril Bromley who was severely stung while crossing Rocky Creek near the Barron River in North Queensland in 1941. During military training, he was swinging on lawyer cane over a creek when it broke and he fell into a stinging tree. He was literally tied to his hospital bed for three weeks because the pain was so bad. He also told me of an officer who had shot himself because he could not stand the pain.

In addition to the pain, I found that the stinging hairs are also shed continuously and cause an allergic reaction to anyone who remains close to these plants for more than one hour. The reaction involves intense, harsh, continuous bouts of sneezing from breathing in the air-borne stinging hairs. This phenomenon was prevented by wearing particle masks, provided they were replaced regularly. Extended contact without protection will eventually result in nose bleeds.



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The hair of the less noxious northern shiny-leaf stinging tree.



A newly-emerged Gypie Gypie leaf, showing its dense, stinging hairs.
Below: Stinging trees are inhabited by a variety on rainforest animals. These green ants are making a nest in the northern shiny-leaf stinging tree.



Why do these plants cause so much pain? It is likely that insects are small enough to avoid the toxic hairs. Were these virulent defences aimed at mammals of a bygone era, the giant Diprotodonts of ancient rainforests, perhaps?

It is interesting that many native mammals and birds are not deterred by the stinging hairs, while the relative newcomers to Australia: humans, dogs and horses are adversely affected. It is likely

Abstract: Australia's 'stinging tree' is the world's most painful plant to touch. The most painful 'tree' of the genus is the shrub, Gympie-Gympie (*D. moroides*). Many native mammals and birds are not deterred by the stinging hairs, while the relative newcomers to Australia: humans, dogs and horses are adversely affected. It is likely that mammals have learned to deal with the pain over time. Stinging tree leaves are actually nutritious, containing high concentrations of nitrogen and even calcium. Common herbivores of the stinging tree include shiny green-black beetles, *Prasyptera mastersi*, the moth, *Prorodes mimica*, which makes protective shelters in the leaves and the red-legged pademelon, *Thylogale stigmatica*. Stinging trees withstand heavy leaf damage by being able to quickly regrow large leaves. They deliver their sting by means of a toxin contained in tiny silicon hairs covering parts of the plant, except the roots. The toxin acts like a neuro-toxin and retains its pain producing properties for decades.

Keywords: stinging trees, herbivores, defence mechanisms, toxins, *Dendrocnide* sp.

that mammals have simply learned to deal with the pain over time.

It is also fascinating to note that the pain, although real, is not a symptom of any actual damage. There is no damage caused to the tissue, (however the hairs of the giant and shiny-leaf stinging trees are large enough to tear the skin), and the toxin is not fatal.

People at greatest risk of dying are those likely to suffer from extreme shock, and those who have died, most probably suffered heart failure. Has this plant originally developed the sting as a simple warning system, causing pain without inflicting bodily injury?

A place in the forest

Although considered noxious by humans, stinging trees are an important part of the rainforest ecology. They require strong sunlight, and protection from wind. Because of this need for sunlight, they only grow in areas where the rainforest canopy has been broken by the death of an aging tree or a falling branch, or along creek edges and tracks. They are also found in areas ravaged by a storm or partially cleared for forestry or land development.

In natural rainforest gaps, stinging trees compete for light with other plants trying

to gain a foothold and race up into the canopy. But the shrub 'stinging trees' of North Queensland don't live long enough or grow tall enough to reach the roof of the rainforest. By the time the gap closes, after three to five years, they have flowered fruited.

D. moroides produce attractive red fruits, similar to raspberries, and *D. cordifolia* produce green fruits. Both are eaten by many rainforest birds, regardless of the stinging hairs. The seeds are then spread via bird droppings to other parts of the rainforest, where they sit in the soil waiting for the next break in the canopy and the chance to do it all again.

More about stinging trees

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The ripe fruits of the Gympie Gympie (main picture) and a closely related, but slightly less harmful species, *D. cordifolia* (below).

Maïna Hurley

Inventive cures for an unlikely **sting** on the **tail**

GIVEN the same notoriety as crocodiles and snakes, the stinging tree is an interesting source of stories, especially the ones about how intense the pain was and how long it lasted.

By far the most common is the tale which always happened to a friend, or friend of a friend. Strangely I have never met anyone who has . . . 'wiped their bum with a stinging tree leaf and couldn't sit down for a week'.

A leaf torn from a tree would quickly be dropped. A sting on the bum would be much more likely if, in preparation for the act, you sat on a shrub instead.

Dare devils will recommend that if you run your hand quickly down the leaf that it won't hurt, much like the English expression 'grasp the nettle'. I wouldn't try it.

Another myth is that the fruits are okay to eat. They aren't. They are covered in stinging hairs. I know a woman who told me that her tongue swelled so much she could hardly swallow for two days.

There are tales of at least two American servicemen dying after being stung during World War II, and rumours that the US government wanted to develop stinging trees as a biological weapon.

There is even a story about a secret internal Queensland Government investigation in the early 1900s into the premature deaths of forestry workers from lung problems associated with inhaling stinging tree hairs while clearing rainforest regrowth.

Second to the toilet paper myth, but by far the most varied and inventive myth is The Cure.

The most common 'cure' involves rubbing the sap of the Cunjevoi on the affected area. The Cunjevoi is a rainforest plant that often grows near stinging trees. Other than a slight cooling affect, it doesn't work. In fact the sap of the Cunjevoi is highly toxic and will make you very sick if you accidentally get any of it in your mouth.

Another 'cure' involves digging up the roots of the stinging tree, grinding it into a paste and rubbing it on the affected area. I've never tried this, but not only would you risk getting stung again, probably on the head this time, by the time you dig up the



RN Parsons, Through the Looking Glass Photography

Tourists beware: The rainforest regrowth straight ahead is full of stinging trees, but they are difficult to see from a distance.

Right: When full-grown, the Gympie Gympie leaves are large, oval heart-shaped, and appear to be covered in a fine white down. As seedlings they are more difficult to spot.

roots and grind them, the worst of the pain would be over. Perhaps it was designed as a 'distraction' cure.

More helpful suggestions relate to methods that pull the hairs from the skin. Heavy-duty masking tape does remove some hairs, but it is not wholly effective. Another suggestion has been to spread depilatory hot wax on the affected area. I wouldn't recommend this for the faint hearted, as any very hot or very cold substances applied to an affected area can greatly exacerbate the pain.

The best treatment to date, is that discovered by a James Cook University student who applied a hair-removal wax strip Mariana 'genuine wax strips', to treat another student. The strips are made of modified rosin, vegetable oil and paraffin wax, can be used at a gentle room temperature and have been shown to be very effective at removing the stinging hairs. These strips have proved to be so successful that they have been written into a Queensland ambulance journal and are now a widely recommended addition to first aid



kits. Also, a small glass or two of whiskey or rum wouldn't go astray.

Prevention, however, is far better than cure. Most tourist walks through the rainforest national parks are kept clear of stinging trees, so keep to the marked tracks. Even people experienced in the rainforest can miss a stinging tree.

If you do leave the track always wear jeans and boots, don't go rolling around on the forest floor and especially avoid walking through areas of rainforest regrowth. When full-grown the leaves are large, oval heart-shaped, and appear to be covered in a fine white down. As tiny seedlings they are much more difficult to spot. If in doubt, don't touch.