

# Paper Wasps of Canberra

by Philip Spradbery

Dr Philip Spradbery was a Senior Principal Research Scientist at CSIRO and is now Managing Director of XCS Consulting Pty Ltd

Photographs by Philip Spradbery and Stefanie Oberprieler

This article first appeared in the *Canberra Times* – 16 January 2012



[Left] Mature nest of the Paper wasp, *Polistes humilis*, with males and females.

THERE is an old German proverb that says that “God made the bee, but the Devil made the wasp”. A truly unfair assessment of a group of fascinating insects, many of which build spectacular nests from wood and are undoubtedly the original paper-makers.

The Ancient Egyptians almost certainly copied the wasps’ habit of producing paper nests from wood pulp when they developed their papyrus paper-making skills.

Using their strong mandibles, wasps scrape wood from dead but generally sound weathered timber such as posts and fence palings, chew it into a paste and make thin sheets of moist paper which dries to form a papier mâché.

There are three Paper wasp species in Canberra, the common and widespread Australian native Paper wasp, *Polistes humilis*, a much smaller species called *Ropalidia plebeiana* and the recently introduced Asian Paper Wasp, *Polistes chinensis*.

Their nests consist of an exposed comb of hexagonal, honeycomb cells attached to the substrate by a single pillar in the case of the *Polistes* species and with several attachments in *Ropalidia* nests.

In very early October, the *Polistes* females that have successfully overwintered begin building their nests, first constructing a stout pillar from which the rearing cells are produced and as each cell base is made, the wasp lays an egg and glues it to the cell wall.

Occasionally an old nest may survive the winter and be used again but more often, the nests do not last more than a year in Canberra. From an engineering standpoint, the hexagonal cell is the most efficient use of materials for making rearing compartments. Up to 100 or more cells can be added to a nest during a single season.

Natural enemies of wasps include predatory spiders, birds and also marauding ants. To counter the latter, the Paper wasps paint an ant repellent on to the stalk of the nest which prevents ants attacking the vulnerable eggs and larvae in the comb – especially during the early stages of nest development when the comb is left unattended while the founding wasps forage for food and building materials.

The gland that produces the ant repellent is linked to a fringe of hairs at the tip of the abdomen – making an ideal paint brush!

Many nests are founded by a single female but they can also be started by groups of two or more wasps that are probably sisters. In these cases, the founding adults behave aggressively towards each other until one becomes the dominant alpha wasp or queen that lays all the eggs and stays on the nest.

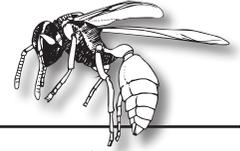
The more submissive females behave as non-egg laying workers, sacrificing their reproductive potential for the sake of the wasp colony as a whole.



[Above] Nest initiation in *Polistes humilis* after 1-2 days. Note egg in newly-made cell base of the 4-cell nest.



[Above] A 20-cell nest of *Polistes humilis* with founding female. Note the glossy attachment to the substrate which is treated with an ant repellent by the female wasp.



[Above] Nest of *Polistes humilis* established by 3 females that form a social hierarchy with a single dominant, egg-laying female.

The eggs hatch within a week or so and the small wasp grubs are then fed a high-protein diet of mainly chewed-up caterpillars which the adult wasps capture as they forage among the plants in our gardens.

*Polistes* wasps are so efficient at this foraging activity that their nests are often manipulated by farmers in Japan who provide nesting boxes to encourage the wasps and thereby protect their cabbage fields from caterpillars.

When fully-fed, the wasp grubs spin a silken cocoon over the cell opening and undergo the miracle of metamorphosis into the adult stage. The nest gets bigger as the number of wasps increases until late summer when the males and new queen-like females are produced.



[Above] Early stage in nest growth in *Ropalidia plebeiana*, Canberra, November



[Above] *Ropalidia plebeiana* nest, Canberra, December 10

*Polistes* nests are cooled during hot summer days by the wasps collecting water and spreading it onto the comb structure from which it evaporates and lowers the temperature – an effective form of evaporative cooling that evolved many millions of years ago!

The *Ropalidia* wasp species in Canberra was officially recorded for the first time in the early 1990s when nests were observed attached to the Bruce Hall of Residence and nearby trees at the ANU – directly opposite the CSIRO Division of Entomology, by a visiting Japanese entomologist. But clearly, *Ropalidia* had been in Canberra for far longer and generations of entomologists may have passed the ANU nesting sites unaware of their significance.

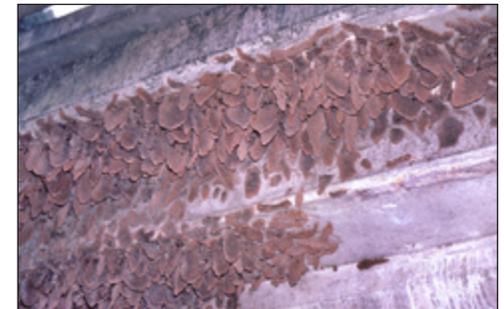
This species is widespread if uncommon in Canberra with a particularly vibrant colony under the eaves of the vicarage at St John's near Anzac Parade.

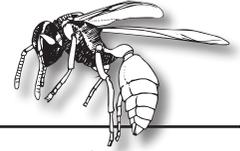
With the nests attached by multiple pillars, they tend to remain for many years and in spring, females return from overwintering quarters to their nests, effecting repairs and adding new cells, or building new combs as the annual cycle begins. In most respects, this species is very similar to *Polistes* in its annual cycle in Canberra. However, most if not all nests are established by multiple foundresses, with up to 8 females per nest.

[Right] Detail of aggregation of *Ropalidia plebeiana* nests under Nelligen Creek bridge



[Above] Nelligen Creek bridge with huge aggregations of *Ropalidia plebeiana* nests (below)





Our *Ropalidia* species has attracted much attention by groups of visiting Japanese entomologists because of its extraordinary behaviour at sites outside Canberra.

Under all the old bridges crossing creeks and rivers between Canberra and Bateman's Bay and at the coast under cliffs and overhangs, there are massive aggregations of *Ropalidia* nests, many thousands packed together under the protective arches.

The interactions between and within each nest has received special attention. Each comb is a discrete colony with one or a few egg-laying females and the remainder behaving as workers which react aggressively towards neighbours even though they are likely to be genetically closely related.

One major discovery was an unusual method of colony reproduction in these wasps which has never been reported before or since.

When a nest with a single large comb has ten or so foundress wasps present, they form sub-groups and then begin to chew away at the comb until it is divided into two or more pieces, the resulting parts becoming independent nests. Such 'comb-cutting' behaviour is unique in the wasp world.

Paper wasps do not often impact on humans as their food needs do not coincide with our menu, unlike the invasive European Wasp which is attracted by most things that we eat and drink.

If their nests are left alone, the Paper wasps generally present no problems. If they build a nest over a doorway, on garden furniture or are otherwise too close for comfort, the use of a fast-knockdown insecticidal spray after dusk, when all the adult wasps are on the nest, will generally be an effective control.

But, there is no need to destroy nests everywhere in the garden, especially under the house eaves – they are a gardener's friend!

So, the next time you see a Paper wasp nest, remember that these inhabitants of Canberra's suburbs are wonderful builders, they keep caterpillar pest populations at bay and they do not normally impact adversely on our lives.

Live and let live and admire their architectural skills. ■



[Right] Recently established Asian Paper wasp, *Polistes chinensis*.