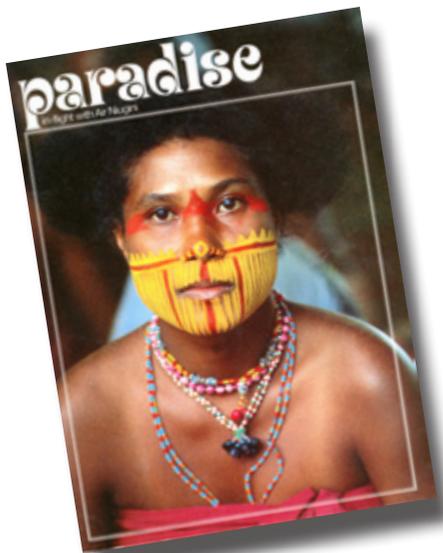


# Paper Wasps

STORY & PICTURES BY  
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AN OLD German proverb says that “God made the bee but the devil made the wasp” – an unfair indictment of an insect group which builds nests in spectacular architectural forms.

Among social insects such as ants, bees, termites and wasps, it is the wasps which have developed the art of constructing nests of enormous diversity from wood pulp.

Man almost certainly copied the wasps’ habits of producing a papery material by scraping wood fibres from posts and trees, chewing them into a moist pulp with the addition of saliva and spreading this into thin sheets of paper – a process little different from today’s technology of paper manufacture from woodchips.

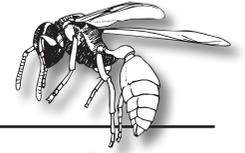
The source of wood pulp for wasp nests is generally sound but dead timber, although some species use soft rotten wood or even bark in an English churchyard, a wasp nest was once made from the discarded confetti from wedding celebrations – with a resulting technicolor construction!

Although paper wasps occur throughout the world, they almost certainly originated in the rain forest environment of the South East Asian tropics millions of years ago.

From humble solitary beginnings many of today’s wasps have evolved a high degree of sociality with colonies ranging in size from a few individuals to tens of thousands. The main advantage of such populous colonies is the communal defence of the nest and its occupants.



*Above: A Ropalidia queen with her embryonic nest. Inset: Collecting wood pulp for nest building by scraping a post’s surface with her strong mandibles.*



*Above: A wasp collecting nectar from a Euphorbia flower.*

*Far right: A Ropalidia loriana nest in a hollow tree in the Central Province rainforest.*

*Below: A Polistes nest in an electric meter box at the wau Ecology Institute.*



Within the large colonies labour is divided among the adults. One or a few females remain on the nest as egg-layers, while the remainder forage for food and building materials. The egglayers are generally called 'queens' and the others' workers'.

The paper wasps are divided into three main groups of which the worldwide *Polistes* and Afro-Asian *Ropalidia* occur in Papua New Guinea.

In the tropics these wasps generally start their nests with groups of females. One group commences construction and, within a few days, is joined by another group which is usually subordinate in status and behaviour to the original founders.

A few *Ropalidia* species start their nests by swarming a group of egg-laying females and workers bud off from the parental colony and set up a new home nearby.

Once a suitable site has been chosen the wasps begin collecting wood pulp and constructing a robust pillar suspended from a branch or rock.

From the end of this pillar, the first hexagonal cells are made and, as soon as the cell base is complete, the female glues an egg in it. As the egg hatches and the wasp grub begins to grow, the wasps extend the length of the cell to accommodate the youngster. The number of cells constructed is determined by the capacity of the wasps to lay eggs – nests founded by a single queen develop very slowly while swarms with several queens and a worker force will build dozens of cells in just a few days.

Although most paper wasps in Papua New Guinea build a simple exposed comb of cells, there are others which construct complex cylinders or spirals of combs, many with a protective envelope of paper surrounding them.

As an added protection from would-be predators, especially ants, some wasps have developed an ant-repellent from their body glands which is smeared onto the pillar where the nest is suspended.

A few wasps actually camouflage their nests, using materials surrounding the nest site such as the lichen-covered nest illustrated here.

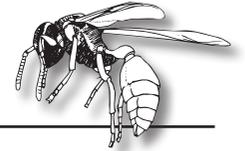
*Polistes* nests rarely exceed 100 cells but some *Ropalidia* species build nests with up to 12 combs and 13,000 cells. These densely populated nests, when disturbed by man or potential predator, can mobilise many thousands of wasps with their hot, needlesharp stings – enough to discourage all but the most intrepid entomologist!

With the hatching of the egg into a larva or grub, the adult wasps begin foraging for food to feed the young. Although adults survive almost exclusively on sugar, such as flower nectar, the grubs are carnivorous.

Considerable quantities of protein in the form of caterpillars, flies and other insects must be hunted and brought back to the nest.

Here, the insect prey is dismembered, chewed into a paste and fed to the grubs. In exchange, the grub produces quantities of sugar-rich saliva which is licked up by the tending adults – a unique form of excretion which promotes





Top: A disguised parasitic wasp descends unchallenged onto a *Polistes* nest and injects its eggs into the wasp larvae which succumb after spinning their cocoons.

Above: *Ropalidia cristata* with their lichen camouflaged nest along the Kokoda Trail.

Below: An advanced embryo nest with 18 cells, each containing an egg or developing larvae.



between different members of the wasp society. Once the grub is fully grown, it spins a silken cocoon cap over the open end of the cell and then changes into the adult form. The young adult later chews its way out of the cocoon to join its nest mates.

Three or more generations of female wasps are produced in the colony before the appearance of male wasps towards the end of the colony's life. The males mate with potential young queens who store the semen in a special organ within their bodies.

This serves to fertilise eggs for the remainder of their lives. These inseminated females then leave the parental colony to seek suitable places for establishing new nests.

Insects living in the tropics lead a precarious existence and few are free of predators even the wasps with their numerical advantage and ferocious stings.

Apart from birds and ants which feed on adults and immature stages respectively, other wasps such as the tropical hornet frequently wipe out entire colonies.

The more subtle insect parasites such as flies and ichneumons are often disguised as wasps and after carefully approaching a nest, will alight and

begin their destructive activities. The parasites lay eggs in or on the wasp grub which is finally consumed after spinning the cocoon.

Although there are still many mysteries in wasp biology to be unravelled, we are today much better informed about the natural history of the social wasps. Gone are the days when the scholar Virgil wrote in 300BC that "wasps are created from the decomposing carcasses of horses"! ■

Right: A *Ropalidia marginata* mature colony showing several cells with silken cocoons spun by mature larvae before becoming adult wasps.

Below: Large paper wasps, *Polistes tepidus*, ready to protect their nest.

