

FLORA

WESTERN AUSTRALIAN ORCHIDS - THE MASTERS OF DECEIT

Andrew Brown

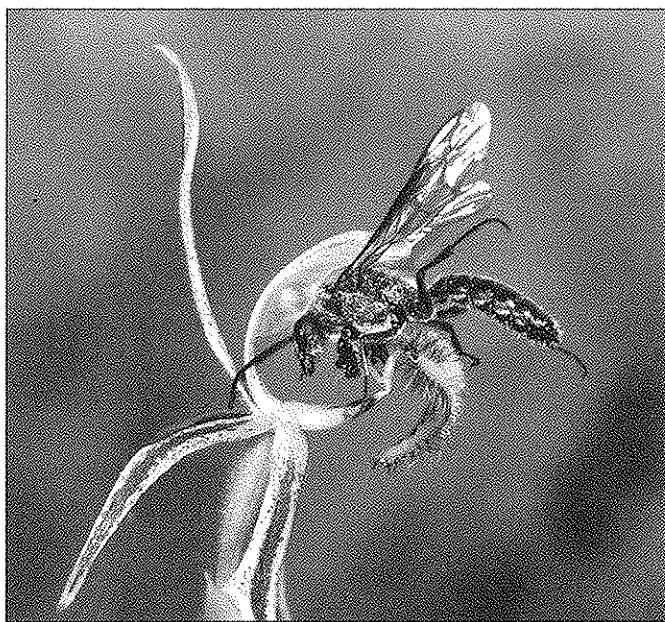
While some south-west Western Australian orchid species are able to multiply vegetatively (asexually) by producing two or more tubers each year, most rarely multiply this way. They must instead rely upon seed dispersal as a means to increase their numbers and this dependence requires the flowers to be actively pollinated by insects or, in rare cases, by self-pollination or apomixis.

Western Australian orchids use a variety of contrivances in order to attract pollinating insects. Some are no different to most other flowering plants in offering food to potential

sophisticated development in south-west WA.

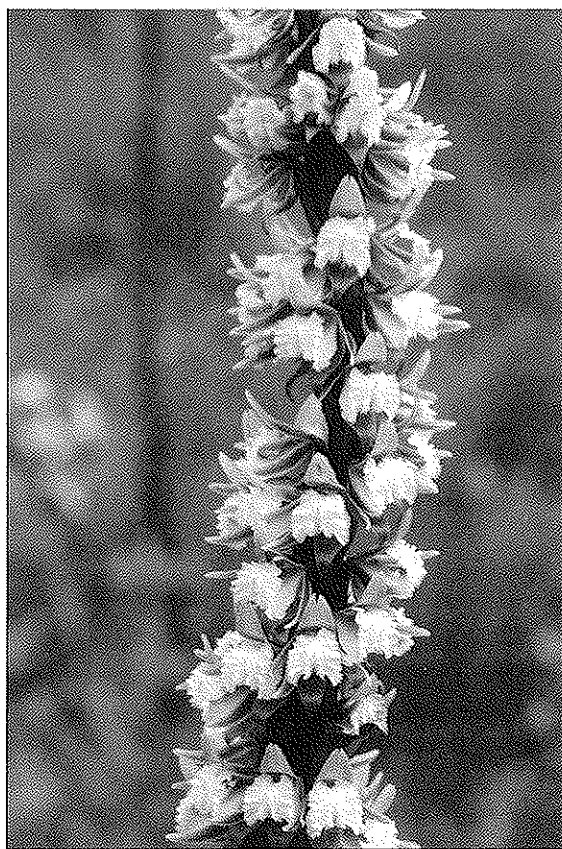
Some of the first observations of pollination events were made in the 1870s by Robert Fitzgerald who is well-known for his perceptive studies on the pollination of species of sun orchids (*Thelymitra*). Using jars to cover flowers, Fitzgerald demonstrated that, unlike most other Australian orchids, some sun orchid species were capable of pollination without insects. In the 1900s Oswald Sargent unwittingly observed the pollination of the dragon orchid (*Caladenia barbarossa*) by a black wasp. This was followed by Edith Coleman's observation in the 1930s of the pollination of slipper orchids (*Cryptostylis*), thus putting Australia firmly on the map as a place where unusual and unique pollination systems occur.

A diverse group of insects pollinate orchid



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pollinators. However, many circumvent the system by providing neither nectar nor pollen. Instead, they engage in pretence and deception. There are flowers that resemble fungi, some that smell like rotten meat, others that have structures like pollen laden anthers of lilies and some flowers simply mimic other flowers to catch the unwary or inexperienced bee. The masters of deception, however, are those orchids that deceive male wasps or flying ants by successfully emulating females of the insect species. This is done by emitting chemical attractants and also, occasionally, by visually resembling the female. This is an evolutionary theme that reaches its most diverse and

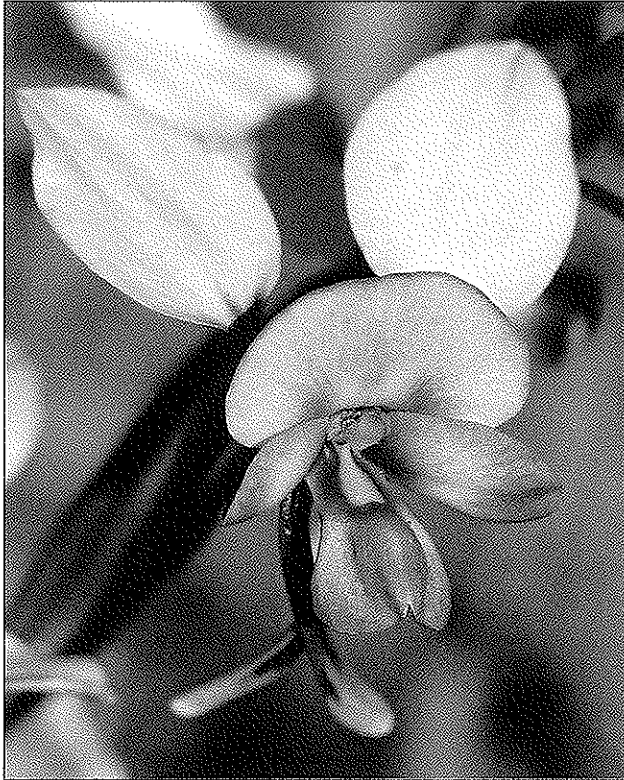


Several orchid groups in the south-west offer nectar and attract a range of insects as pollinators. A beautiful example is the fringed leek orchid (*Prasophyllum fimbria*).

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Orchids

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It will be noticed that there is a close similarity between the central parts of the donkey orchid (*Diuris*) flowers and those of co-blooming pea flowers, including the colours - yellow, brown and mauve.

flowers. These include beetles, fungus gnats, midges, mosquitoes, flies, bees, wasps and flying ants. Although it would appear that bees are the most common pollen vector used by orchids, it is in the latter two groups that some of the closest ties between orchid and pollinator occur.

There are several orchid groups in the south-west that offer nectar and attract a range of insects as pollinators. The two largest are the leek orchids (*Prasophyllum*) and the mignonette orchids (*Microtis*), both of which advertise their nectar by producing sweet floral fragrances and, in some species, colourful flowers.

A typical example of *Prasophyllum* is the beautiful *P. fimbria*. Like others, it advertises the droplets of nectar found near the base of its brightly coloured lip by its sweet floral scent. The flowers of both this and other *Prasophyllum* species attract many nectar-feeding insects, including flies, beetles, bees and wasps, many of which will pollinate the flowers.

Flower bees respond to certain fragrances and colours, and usually seek pollen and nectar from flowers. A diverse array of Western Australian orchids have flowers specially modified to attract bees as their major pollinators. Some fairy spider orchids

(*Caladenia*) exemplify this specialisation. The lip and column combine to form an open-mouthed tube that can be forced apart only by bees of the required size, shape and strength.

Many insects, such as beetles and bees, are attracted to bright colours, a feature shown in several south-west orchids. The intense yellow of the common cowslip orchid (*Caladenia flava*) and the bright pink of pink fairies (*C. latifolia*) are familiar sights in the spring. These orchids often produce massed displays, particularly following summer fire.

On first inspection, the intricate and delicate flowers of donkey orchid (*Diuris*) species make little sense in terms of pollination. Neither perfume nor nectar are offered. When seen in the wild, however, it will be noticed that there is a close similarity between the central parts of donkey orchid flowers (dorsal sepal and lip) and those of co-blooming pea flowers. Studies have shown that bees regularly visiting pea flowers for their rich source of nectar occasionally explore the donkey orchid flower in the same way. This is often referred to as 'floral mimicry' because the orchid appears to mimic another flower.



The spectacular queen of sheba (*Thelymitra variegata*) mimics flowers of the tinsel lilies (*Calectasia*) and is pollinated by the same native bees. It is fabulously coloured in orange, purple and yellow. (For a photo of a tinsel lily, see WW 11/4 - Ed.)

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Orchids

As William Dampier first observed at Shark Bay in 1699, Western Australia has an unusually high number of blue-flowered herbs and shrubs, most of which attract bees as pollinators. These flowers are mimicked superbly by some species of sun orchid (*Thelymitra*). The nectarless scented sun orchid (*Thelymitra macrophylla*), for instance, has a prominent yellow apex to the column that bees appear to mistake for the bright yellow pollen-bearing anthers of native lilies. Bees are known to collect pollen from these lilies by a special mechanism called "buzz pollination", achieved by audibly vibrating their wings to release pollen from the flower's anthers. Occasionally these bees mistake a sun orchid species for an associated lily and, in an attempt to buzz the false anther, inadvertently pollinate the flower. Other sun orchid species that mimic associated native flowers include the spectacular Queen of Sheba (*Thelymitra variegata*) which resembles species in the genus *Calectasia* (tinsel lilies) and the blue lady orchid (*Thelymitra crinita*) which is a close match for the blue morning iris (*Orthrosanthus laxis*).

The dank floor of south-west Australia's forests or the sodden margins of swamps are the home of the inconspicuous helmet orchid (*Corybas*) species. Fungus gnats appear to be attracted to these orchids, probably due to their fungus-like odour and dull purple and brown colouration. This combination may well deceive the gnat into perceiving the orchid flower as a fungal fruiting body and on visiting the flower they achieve pollination.

Many *Caladenia* species offer neither nectar nor pollen, nor do they contain false anthers, pseudopollen or mimic other flowers. However, they do attract a large range of insect pollinators such as flies, beetles, hoverflies, bees and wasps. This group of orchids are known to emit various scents ranging from sweet and fragrant to obnoxious, the latter often like rotting meat. It would appear that insects are attracted by these odours. Interestingly, a group of flower spiders have specialised in using the *Caladenia* flowers as traps for unwary prey. Beautifully camouflaged to look like the anther at the top of the column, the spiders often capture insects attracted to the flower.



The dank floor of WA's south-west forests or the sodden margins of swamps are the home of the inconspicuous helmet orchid.

(To be continued next issue.)

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Bush Detective

This object, growing in sand near a pine plantation in Perth, is a yellowish egg-shaped ball that has cracked open to reveal a crumbly, sandy-brown mass inside. The leaves around it (banksia and liquidamber) give scale.



What is it? Hint, when dry, the interior mass will disperse like dust if touched or blown in the wind.

It is a puffball, *Scleroderma* sp. These are common fungi, found throughout Australia among leaf litter in forests and woodlands. There are probably several different species and our WA expert, Neale Bougher, calls them all just 'sp'. They are almost certainly mycorrhizal with the trees and shrubs under which they grow. That is, despite their rather scruffy appearance, they are definitely one of the good guys!