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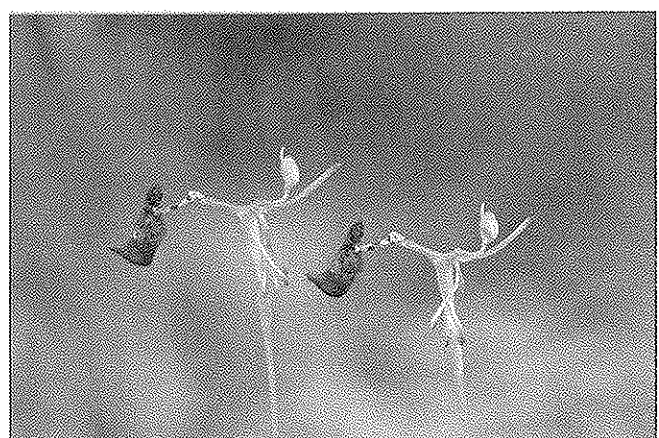
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WESTERN AUSTRALIA

## WESTERN AUSTRALIAN ORCHIDS - THE MASTERS OF DECEIT (PART 2)

Andrew Brown

The attraction of male insects to flowers under sexually false pretences, often termed pseudocopulation, is used by several south-western orchid groups in which the flowers share certain characteristics with the female insect. Their colours, for instance, are usually dull shades of green, yellow and maroon and they are usually, but not always, odourless to humans. However, all produce powerful chemical lures that are irresistible to male pollinating insects. These 'sex pheromones' appear to be especially active on still, warm days, particularly from mid morning to early-afternoon. The dragon orchid (*Caladenia barbarossa*) is a superb example with its insectiform lip closely matching the size, shape and texture of a female flower wasp.



The hammer orchid *Drakea livida* is pollinated by flower wasps

Like *Caladenia barbarossa*, hammer orchid (*Drakea*) species are masters of sexual deception. Their inconspicuous odourless flowers are living examples of extreme specialisation. These flowers are invariably solitary on top of a thin wiry stem and are reduced to mere remnants of their colourful counterparts seen in genera

such as the spider orchids (*Caladenia*). The biggest and most conspicuous part of a hammer orchid flower is its lip, which resembles to a remarkable degree a female flower wasp. Pollination is achieved by sexual deception of the male wasp, which is flung over and upside down against the column when it attempts to fly off with the female decoy. Each species of *Drakea* is thought to be pollinated by a different species of wasp and illustrates one of the most specialised relationships between pollinator and plant known to occur in Australia, and indeed the world.

Yet another group of orchids that use sexual deception are species of duck orchid (*Paracaleana*). These have a sensitive lip that is similar to that of trigger plants (*Stylidium*) in being capable of movement on mechanical contact. The female decoy is formed by the lip and is attached to the inverted winged column by an elongated springy claw. On contact with the female decoy, both the male wasp and lip are swung down into the pouch formed by the column wings. It takes considerable exertion by the wasp to back-peddle out of the trap and in doing so it removes or deposits pollinia. The flower resets itself to the firing position over a period of several minutes.

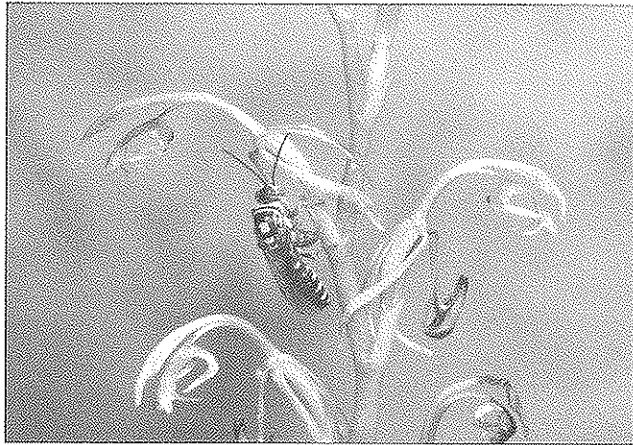


The flying duck orchid *Paracaleana gracilicordata*

# FLORA

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## WA orchids



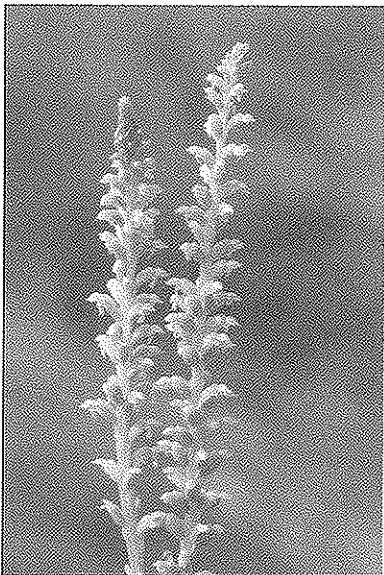
A male flower wasp is attracted to the insect-like lip of an elbow orchid, *Spiculaea ciliata*, then, as it tries to fly away, it is swung up against the pollen

The tiny elbow orchid (*Spiculaea ciliata*) is bizarre even by orchid standards. Although emerging in autumn it does not begin to flower until the moss swards, where it grows, dry out prior to the long hot summer. Under these rather harsh conditions the orchid dies at its base but is able to support the flowers and developing seed pods with water and nutrients stored in its thickened fleshy stem. Each plant has up to seven flowers with a hinged insect-like lip and curiously shaped column wings. When small male flower wasps, attracted to the female decoy, attempt to fly away with it they are momentarily trapped by the column wings, thus depositing or removing pollen.

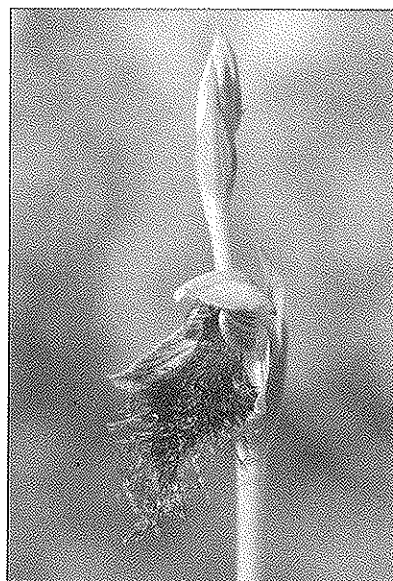
Pollination by ants is an extremely rare occurrence anywhere in the world. A few species of mignonette orchid (*Microtis*) are known to be pollinated by ants, but

pollination by sexual deceit of male flying ants is unique to the hare orchid (*Leporella fimbriata*) The orchid is unusual in that it flowers in autumn. However, this makes sense when you consider that it is this time of year when most flying ants swarm. These primitive ants (*Myrmecia urens*) are in search of a queen with which to mate and start a new colony. On nearing the flower of a hare orchid they act in a similar way to male flower wasps on other species of orchid by being initially attracted by a chemical lure (sex pheromone). However, unlike the male flower wasps, they first land on the plant's stem rather than the flower, then climb upwards, align themselves sideways across the lip for a few minutes, and squirm their way out, picking up pollinia as they do.

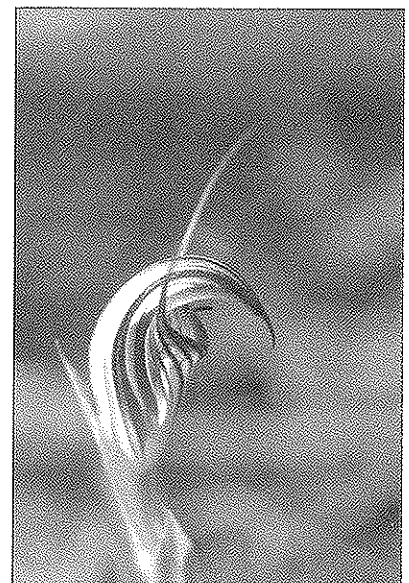
The large, colourful scoliid wasps (*Campsomeris*) appear to be attracted to the wonderfully ornamented lip of



Mignonette orchid, *Microtis media subsp. media*



Beard orchid, *Calochilus stamencicola*



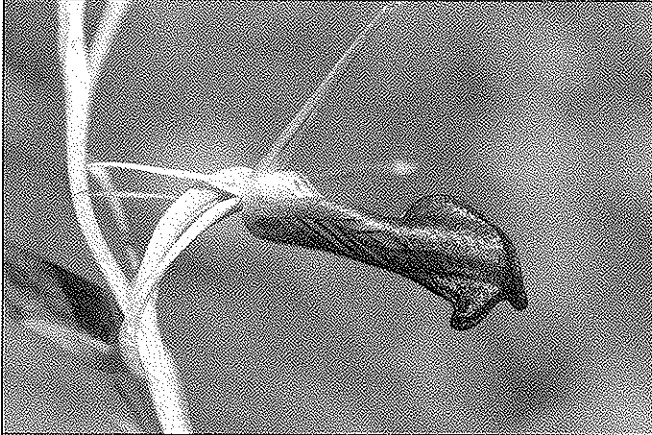
A greenhood, *Pterostylis hamiltonii*

# FLORA

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## WA orchids

beard orchid (*Calochilus*) species. It is believed that they are lured by pheromones emitted by the flower and in their attempt to mate, inadvertently pollinate the orchid. Interestingly, these orchids are also capable of self-pollination should the insects not be active.



The slipper orchid, *Cryptostylis ovata*

But perhaps the most well documented case of an orchid using pseudocopulation as a method of achieving pollination is in species of slipper orchid (*Cryptostylis*). So convincing is their attraction to male ichneumon wasps (*Lissopimpla excelsa*) that copulation is attempted and sperm packets are ejaculated into the orchid. The lip of the orchid is highly modified and held upside down so that male wasps alight upside down and in their attempt to copulate pollinia are picked up or deposited.

Watch out for the new book "Orchids of Western Australia" by Andrew Brown, Pat Dundas, Kingsley Dixon and Steve Hopper to be published soon by UWA Press. It will contain text and illustrations of all the known orchid species in WA. This book should be superb - if you have seen Pat's beautiful paintings in "The Bushland Plants of Kings Park" you know to expect a high standard.

The greenhoods (*Pterostylis*) are a large genus of Australian orchids. All species have their petals and sepals fused into a hood which encloses the column. As with species of duck orchid (*Paracaleana*), the often protruding lip found in most greenhood species is sensitive to the touch, springing upwards to trap inside the flower any insect which alights on it. The most common visitors to the flowers are tiny midges or mosquitoes that, for reasons currently unknown, are attracted to the flower. They can escape only by crawling upwards, first past the stigma on which they deposit any pollen that has already adhered to them, then past the anther from which they remove a new load of pollen. They finally emerge from the flower by passing out through the cavity at the top of the bloom or when the lip resets.

Some Western Australian orchids have foregone the use of insects to transfer pollen and instead achieve self-pollination (autogamy) by a process involving the anther collapsing onto the stigma. Some self-pollinating orchids such as common sun orchid (*Thelymitra vulgaris*) rarely open. However, most species that self-pollinate are also visited by insects and only resort to self-pollination when insects are not active. Self-pollination is especially common in beard orchids (*Calochilus*) and sun orchids (*Thelymitra*), but also occurs in many other orchid genera.

As you can see our Western Australian orchids use a remarkable number of contrivances to attract pollinators, some simple and some intricate. However, I think you would agree all are interesting and make a fascinating subject of study.

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## Did you know ... ?

that plant transpiration cools the air? A well-grown broadleaved tree in a house garden can produce a cooling effect equivalent to that of 10 air conditioners running 20 hours a day.

The conundrum in WA's climate is that growing the plants requires additional summer application of scarce water, while generating electricity to power the air conditioners adds CO<sub>2</sub> to the atmosphere and so increases the Greenhouse warming effect .....