Wasp's mating instinct aids orchid pollination

Text and photographs *by A.G. Wells*

The flowers of many plants are large and attractively coloured to attract suitable pollinating animals to the plant; but in the case of Hammer orchids (*Drakaea spp*) the flowers are small and insignificant, a fact that has caused naturalists to ponder on their method of pollination.

In her book "Orchids of the West", first published in Perth Western Australia in 1951, Dr. Rica Erickson wrote:

"Observers are prompted by unusual modifications in orchids to puzzle over their significance. Hammer orchids (*Drakaea* spp) offer such a problem. Consider the insignificant flower. The airy prominent labellum resembles an insect. There is the head with its glistening eyes. There is the body with shaggy thorax and smooth sheeny wings. It is more like an insect than the labellum of the Slipper orchid (*Cryptostylis* sp.) whose glistening glands are suppose to simulate an insect's appearance sufficiently to attract an ichneumon fly. The stem which holds the labellum aloft is pale and fades from sight, leaving the insectiform labellum more detached. Study the elaborate hinge. It is strong and well bufferred on both sections, prepared for a powerful swing. Yet the labellum is not sensitive. In no way can it be induced to fly over, like that of the Flying Duck orchid. It is hinged but does not balance delicately on a claw to be swung over by an insect's shifting weight, like the labellum of some of the Caladenias. It can be flicked, but falls back again into its pendulous position. As the flower grows older, the lower it hangs. The slightest breeze sets it trembling. It resembles an insect. Can it be a bait that attracts a predatory insect? The darting swoop to carry off the prey would fulfil the flower's purpose. The anchored bait would fling the marauder by its own momentum against the column, there to pick up the pollinia. For the flower's stratagem to succeed, the predator must repeat this flying dive at another labellum, to deposit the pollinia on another stigma. Insects may be deceived many times in their sexual appetitie, but will they make more than one mistake over food? If food is not the lure, perhaps the visitor seeks a mate, and copulates on the wing."

In more recent years, Dr. Erickson's prophetic words have

▼ Warty hammer orchid — *Drakaea elastica*

▲ Male Thynnid wasp (undetermined species) alights on the "pseudo-female" labellum of *Drakaea elastica* (Oct. 1980)

▼ Male wasp attempts to carry off the decoy.

▲ The lifting action of the wasp is restrained by the hinge on the stem of the orchid.

▼ The male wasp is thus catapulted into the column, when pollen masses are transferred from the stigma to the body of the insect.

been reinforced by the research studies of Professor Warren Stoutamire, of Akron University, Ohio, U.S.A., during the course of a number of visits to Western Australia. In a bulletin published by the American Orchid Society in 1974, he wrote:

"Thynnids appear to be extensively involved in pseudo-copulation with Australian terrestrial orchids. Thynnids are parasitic wasps, with winged males, and smaller wingless, often ant-like, females. The latter are specialised for digging in the soil in search of insects which the wasp larvae parasitise. The males have the unusual habit of picking up the earth bound females, mating with them in flight, and visiting flowers, where both sexes feed while mating. The briefly mobile female is at once fed and fertilised, before being released for egg-laying".

▲ This photograph illustrates the similarity between the "pseudo-female" labellum of a hammer orchid and a wingless female Thynnid wasp of an apparently different undetermined species

▼ A male and female of the latter species is shown feeding and mating on *Eucalyptus ficifolia* (February 1981)

Professor Stoutamire (in pers. comm.) suggested that some of the orchids in the genera *Caladenia* and *Drakaea* emit a gas-like compound (pheromone) which is likely to be the same in chemical character as that employed as an attractant by the female thynnid wasp. The orchid appeared to succeed with its stratagem, because the male wasps emerged some considerable time before the females. He had also observed that when the female wasp was in a condition for mating, she climbed to the tip of a grass stem, there to await the arrival of a male.

During the spring of 1980, attempts by the writer to photograph this phenomenon near Perth were thwarted by many weeks of persistent poor weather — unusual for the "wildflower season" of Western Australia. However, just when Hammer orchids where in full bloom, and on the first warm sunny windless day, thynnid wasps were seen to be active. Some orchids were visited several times, whilst others seemed to be ignored. It was therefore a matter of luck, in setting up the photographic gear, to anticipate which orchid would provide the action. However good fortune eventually prevailed to enable the accompanying series of photographs to be obtained.

Early in the afternoon, with the arrival of the cool sea breeze, activity of the male wasps ceased entirely.

During the course of the photography, many diligent searches were made in the surrounding grassed areas for female thynnids, but without success.

Several months later, at another locality (Peaceful Bay on the south coast), another undetermined species of thynnid wasp was found with females, both sexes feed whilst copulating, on the profuse flowers of *Eucalyptus ficifolia*.