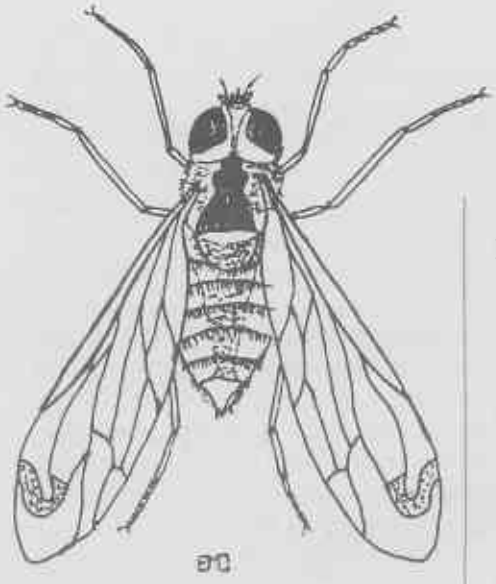
FLORA



Comptosia *fly*

POLLINATION

By Eric McCrum

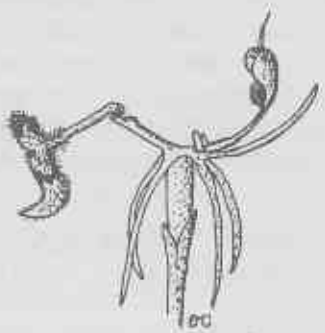
WHAT an amazing series of adaptations have occurred when plants sought various ways to have the pollen transferred from the stamen to the style! You would imagine that with the stamens and the style both in the one flower, this would be simple. However, flowers do not like, nor endorse, self pollination.

To avoid this, flowers become protandrous, or in a few cases protogynous. A protandrous flower develops and releases the pollen from the anther well before the sticky style develops and becomes ready to accept pollen. Most flowers are protandrous but one commonly eaten fruit – the banana, is protogynous [pollen released after the style develops – Ed]

Pollen can be transported from the stamen to the style by a variety of vectors. These are usually wind, water, insects, birds and mammals. The first vector used by plants was the wind, and the first pollen-bearing plants on the earth used wind. Grasses, sedges, bulrushes, pines, sheoaks and zamias all use the wind. Styles of these plants have become feathery or very sticky, to capture the wind-blown pollen which is released in abundance, weeks before the style becomes ready.

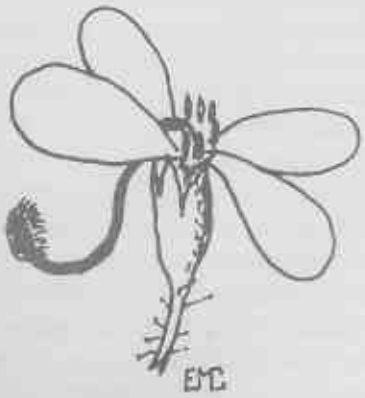
Often the pollen grains of these plants were ornate, bearing bumps, ornamentations or even wing-like projections. All these enabled the pollen grain to remain in the air longer, and thus have a greater chance of finding a style. Most of the wind-pollinated plants, even to this day, flower in winter to take advantage of the associated strong winds. Note that the sedges and some species of sheoak usually flower immediately after the first heavy rains fall. The moisture in the air helps keep the pollen grains close to the ground where most of these flowers are located.

By far the most common pollination vectors are the insects. Most of our plants have co-evolved with insects using a whole range of flowering modifications to suit the insect pollinator. Plants, in their urge to survive and succeed, modified their flower size, structure, colour, nectar and scent to exploit the vast range of insects. Because most insects fly, the plants could cut down on their pollen production and design their anthers to release pollen only when the insect visited the flower.



Hammer Orchid
Drakaea

Winter flowering plants exploited the moths and beetles, flowering at night (their pollinator's active time) and producing perfume to guide the insects to the flowers. To avoid the nectar being washed away by the rain, these flowers either hung down (like silver princess, *Eucalyptus caesia* and *Correa* spp) or had tubular flowers like many of our heaths. White flowers utilised the moonlight, to make the flowers more easily seen.



Triggerplant
Stylidium

Because insect life cycles vary considerably, adult insects emerge at different times of the year. Plants exploit this, by flowering at a certain time to match the pollinator's emergence. Hammer orchids (*Drakaea* spp), flower at the same time that the female Thynnid wasps emerge. These flowers have modified their third petal to resemble a female Thynnid wasp, and the tips of their sepals and petals emit a similar scent to that emitted by the wingless female.

Male Thynnid wasps pick up the 'scent' of a female and track it down. Seeing the modified petal, which looks (and smells) like a female, the male grasps it and tries to fly off. However, the petal swings the male into a pollen trap which glues a pair of pollinias onto his back. Realising he doesn't have a real female, he

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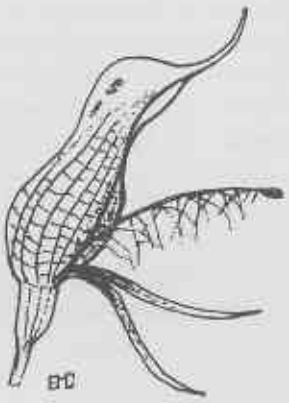
flies off to the next 'female', where the pollinias are taken from his back by that flower's glue.

Many flowers are structured to accommodate one group of insects. Watch the triggerplants (*Stylidium* spp) and see the flies involved in their pollination. They are often *Comptosia* flies, note the boomerang-shaped cell in their wingtips which readily identified this group of long-winged flies. If you look at the triggerplants' flower structure, some triggers come over the top, others from the side and a few from below. These triggers initially deposit pollen on the backs of the visiting insect. Once the pollen is exhausted, the same trigger is used to collect pollen from another visitor.

Few people realise that mosquitos are used as pollinators of certain orchids, for example bird orchids (*Pterostylis barbata*) and snail orchids (*P. nana*). These flowers emerge in late winter and early spring to correspond with the emergence of the adult mosquitos. Hairy 'labellums' or 'trapdoors' in the flowers, trap the mosquito and cause it to pick up the pollinias.



Bird Orchid
Pterostylis barbata

Quite a few blue or purple flowers have their pollen in tubular anthers which open in small pores at the tip. Many lilies (*Arthropodium* and *Dichopogon*) and the *Solanum* flowers have these tubular anthers. Native bees (*Amegilla* and *Nomia* spp) visit these flowers, curl themselves below the anthers and "buzz" their wings, causing the pollen to puff through the pores and onto the bee's belly.

Chocolate Lily
Arthropodium

On the ground, ants are often involved with pollination. Prostrate banksias and the underground dryandra (*D. bipinnatifida*) use ants and also bushrats. Ants are also involved in the pollination of the woollybush group (*Adenanthos* spp). To lure the ants to the dull-coloured flowers, the tips of the leaves surrounding the flowers bear pseudo-nectaries offering nectar to the ants.

Honeyeaters, honey possums, pygmy possums and silvereyes are animals involved with a wide variety of plant pollination. The open flowers of many species of eucalypts lure many birds and insects to the nectar supply. Some pendulous eucalypts (*E. caesia, E. stoatei, E. forrestiana*) have their stamens curling inwards to deposit pollen on the snout of the mammal or face of the bird as it gets nectar from the flower.

Kangaroo paws, grevilleas and woollybushes have their tubular flowers specifically designed for honeyeater pollination. Large inflorescences, like banksias, open the flowers from the base, allowing the birds to land on the unopened flowers above. One species (*B. tricuspis*), opens its flowers from the top of the flower head, allowing honey possums and pygmy possums to climb on the unopened lower flowers to get at the nectar.

To utilise one vector (honeyeaters), the banksias on the coastal plain around Perth open at different times. *B. attenuata* flowers from October through to February, *B. menziesii* from February to August, and *B. ilicifolia* from June to November. Thus the honeyeaters have a constant supply of nectar from the three common species of banksia in the area.

It is an interesting activity to keep a diary of the flowers that open and record the visitors as possible pollinators. If possible, make a note of whether the flower is scented or not, so it may be nocturnally pollinated. Many flowers have not had their pollinator recorded. Your observation may be the very one that registers the pollinator! For example, the beautiful babe-in-the-cradle orchid (*Epiblema grandiflorum*) has no known pollinator but, being a swamp lover, it may be a mosquito.

Eric McCrum will be known to generations of school children as the person who ran the Gould League's Herdsmans Lake Wildlife Centre. Now retired, he can be contacted on 9295 3344.

Illustrations: Eric McCrum

Note: In botanical latin, the shortened form of species, singular, is sp. Many species, plural, is spp.