POLLINATION OF RHABDOTHAMNUS SOLANDRI: MORE OBSERVATIONS NEEDED

R.E. Beever

On 14 January 1983 I visited Hukutaia Domain, Opotiki, to look at the offshore island plants that are in cultivation there. Having been given a quick guided tour by Marc Heginbotham I began measuring and photographing a small plant of the Chatham Island nikau. In keeping with photographic tradition I spent some time positioning my camera and while doing so I became aware of the rather noisy sound of a nearby tui making a series of frequent short flights. On looking over a fallen log I realised that the tui was working flowers on a large shrub of Rhabdothamnus solandri. (Interestingly, R. solandri is not native to the Domain but is scattered throughout, having spread following introduction from Little Barrier.) Over a period of a minute or so it visited about half a dozen separate flowers, hanging for grim death onto the thin swaying branches while dextrously twisting its head and poking its beak into the floral tube.

Well what was the tui up to? Presumably it was seeking nectar but did it also effect pollination? D. Petrie (TNZI, 35 321-3, 1903) made a particular study of the floral structure of R. solandri and concluded that the flower is constructed and develops in such a manner that unassisted self pollination is unlikely; he suggested that it was probably bird pollinated, but found it difficult to accept that the fine twigs could support "even the smallest native birds". He did not see any bird visitors but some years later (TNZI 45 264, 1913) he reported "with much satisfaction" that he now had evidence to support his suggestion, and related that a correspondent, Mr M. Fraser of New Plymouth, vividly recollected seeing tuis visiting R. solandri during his boyhood in the Waipu district. I have not located any further reports of actual observations of visitors to R. solandri. G.M. Thomson in a review of the pollination of N.Z. flowers (TNZI 57 106-125, 1927) refers to Petrie's papers and suggests that, in addition to tuis, bellbirds probably visit the flowers but this seems to be merely speculation, albeit reasonable, on his part. R. solandri is not considered a significant nectar source for birds by ornithologists (R.A. Falla et al. 'A New Guide to the Birds of New Zealand' 1979), although of course R. solandri is not a very conspicuous plant. However, even on Little Barrier where R. solandri is common, D.J. Gravatt (Notornis 17 96-101, 1970) did not find that it was visited by tuis, bellbirds or stitchbirds although he recorded some twenty other native plants that were.

While it certainly seems reasonable to conclude that birds visiting R. solandri in search of nectar may effect pollination this does not mean that a pollinator is necessary. Perhaps, despite the apparently elegant mechanism to keep the pollen and stigma separate, air currents do eventually transfer some pollen to the stigma if a pollinator does not help. To test this I carried out a simple experiment on an isolated plant of R. solandri that we have in cultivation in Royal Oak, Auckland. In February I artificially pollinated 7 flowers by brushing pollen from each flower onto its own stigma; in all 7 instances the flowers went on to produce fruit which ripened 8-10 weeks later. In contrast 6 other flowers were tagged but otherwise left alone; in this case no fruit were produced. This experiment indicates, then, that a pollinator is normally needed. But could pollinators other than birds be involved as well? Are bird visits sufficiently frequent to account for all fruit set in the wild? For that matter how often does fruit set occur? Petrie did not observe any insect visitors but then he did not see any bird visitors either.

Some of the flowers on the bush that I'd seen the tui visit at Hukutaia had small holes near the base of the corolla tube. Petrie attributed similar corolla damage to bird visitors and indeed this was one of his reasons for suggesting bird pollination. However I'm not convinced that the examples I saw were caused by birds. Perhaps the holes were made by a nectar raider that removes nectar by "smash and grab" rather than using the front door; and in so doing avoids pollinating the flower. House sparrow and chaffinch are known to raid puriri flowers in this manner, and bumble bees take a similar short cut to the nectar of clover and broad bean flowers.

So the next time you see R. solandri look to see if the flowers are damaged, check for fruit set and stage of ripeness of any fruit, and then having earnt a rest, spend a relaxed time quietly watching from a discreet distance!

IS PITTOSPORUM FAIRCHILDII A TETRACOT?

Lynne Scott

Angiosperms (flowering plants with seeds contained in an ovary) can be further subdivided into monocotyledons and dicotyledons. Seeds of monocots (grasses, lilies &c) have one seed leaf or cotyledon. In contrast seeds of dicots (legumes, buttercups &c) have two cotyledons.

The function of the cotyledons is to supply food for seedling development. They can act as food storage organs and completely fill the seed. Examples of these cotyledonous seeds, among the native flora, are: Corynocarpus laevigatus, Sophora spp., Metrosideros spp., Leptospermum spp., Knightia excelsa. Conversely, they may be surrounded by the food of the endosperm which they absorb. Examples of these endospermic seeds are: Elaeocarpus dentatus, Elingamita johnsonii, Pennantia baylisiana and P. corymbosa, Entelea arborescens, Aristotelia serrata, Pittosporum spp. As the seedling develops the cotyledons may remain below the soil inside the seed coat, or leave it and become the first visible 'leaves' increasing in size and becoming green. The latter is the case with Pittosporum spp.

Some so-called dicots have one cotyledon and some three, or four or even five. This variation in number occurs occasionally among different species of the same genus. For example, several N.Z. pittosporums, P. crassifolium, P. tenuifolium, P. rigidum, P. anomalum, P. divaricatum, P. crassicaule and P. lineare have three to five cotyledons, while P. tobira from Asia and P. undulatum from Australia have the normal two (Stebbins 1974). I have made observations recently that could add another to the list.

P. fairchildii is a Three Kings Islands endemic growing on all four islands in the group. On West Island it grows in forest scrub on a steep cliff face, with two other endemics, Elingamita johnsonii and Brachyglottis repanda var. arborescens (Baylis 1956).

Seeds from a plant under cultivation in Birkenhead were sown in a petri dish on damp blotting paper in October 1981. Two germinated about six months later and were transferred to soil in pots. One seedling, A, was placed in a controlled environment greenhouse, receiving water and fertilizer regularly and the other, B, placed on a window sill. It was a few weeks before the cotyledons appeared. They were somewhat curled up and my first impression was that the seedlings were abnormal.