

**Fig. 5. a-c. *Danhatchia australis* with its flowers partly open, taraire forest, Rangiwhakaea Bay, NE Great Barrier Island, 4 Jan 1983 (Ewen Cameron)**

#### **Acknowledgements**

I'm indebted to the people who patiently corresponded with me on this subject by email, mail or phone – Ross Beever, Rod Bielecki, Maru Bing, Leonie Clunie, Judy Simpson, John Smith-Dodsworth and most of all, Dan Hatch; to Audrey Eagle for searching through her old records for her painting of *Yoania australis*, and for permission to reproduce it here; to the staff of the Landcare Research Herbarium (CHR) and Auckland Museum Herbarium (AK) for sending me the records of their holdings of *Danhatchia australis*; to Ross Beever, Ewen Cameron & Dan Hatch for commenting on drafts of this article and Ewen for photographs of *Danhatchia australis*.

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## **Sex in the city: flowers and fruit of titoki (*Alectryon excelsus*, Sapindaceae)**

**Rhys Gardner**

Titoki has been planted along many of the streets in the vicinity of Auckland's Eden Park. Sturdy and tough-wooded, these trees resist drought and rugby crowds alike, and it hardly seems mere sentiment to regard them as constituting the domesticated fringe of the natural titoki forest not far away on the lava flows at Gribblehurst Park.

Most relevant though for this article is that these trees are exceptionally accessible for study. They flower well (including near the ends of their lower branches) and each tree has a more or less unique address, convenient should follow-up work be needed.

Most books say that titoki has two genders: one with male flowers (shrunken ovary and stigma, long stamens), the other with seemingly bisexual flowers (plumose stigma, stamens short but anthers well-formed and with pollen). These are shown in Fig. 1 (a, b). Duguid (1961) however, wrote of a tree she observed for some years that bore both kinds of flower (and was, apparently, self-fertile).

Shortly after New Year's Day 2008, when flowering of the Mt Eden trees had advanced to where the developing fruits were large enough to be detected even high in the crown, I surveyed the gender of 111 of these trees. This was partly with Duguid's

observation in mind, and partly because having data from such a large sample might allow an inference about a fundamental aspect of the species's biology, its natural sex-ratio.

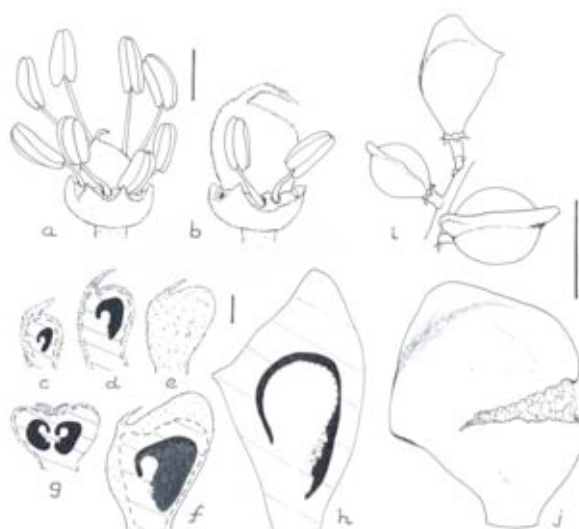
The trees fell predominantly into the text-book classes: male, and bisexual. But there were five "odd men out": like Duguid's tree, their flowers were mostly male, but there were also a few developing fruit on some inflorescences, or else there was some matured fruit in their crowns. There were a dozen trees whose gender I could not determine. Some of these seemed to be "resting", that is, as far as I could tell they lacked new inflorescences and old fruit. Among this type were some relatively young and healthy trees as well as a few shaded or decrepit ones.

Neglecting the five oddities and the twelve resting trees, the ratio of "abundantly fruiting" to "not-fruiting" (i.e., male) trees was 51:43. At first sight then, some reasonable degree of support is given to the hypothesis of equal abundance of the two principal genders. If the fruit-bearing trees are also acting as males to some degree the situation would be described as being one of androdioecy, with some amount (the five oddities) of male "leakiness".

How well might this sample represent the species in the wild? I think one has to be cautious here. Even if these trees had been raised from seed and not from cuttings there would still be the possibility that they originated from just one or a few bisexual individuals, selected perhaps by the nursery person from one season's exceptional abundance of fruit. So their genotypes might be a restricted sample -- in the worst case, only those from the self-pollination of one bisexual tree in one year.

Studying the sexual biology of trees in the wild is strenuous and time-consuming (John Braggins, pers. comm.) so one naturally seeks relief in historical aspects of the subject. The name *Alectryon* (our species was the first-described in the genus) means

"rooster" in Greek, and while many have supposed this would refer to the crimson aril of the seed Eric Godley (1997) has pointed out that a much more likely origin is to be found in the appearance of the unopened fruit-capsule (Fig. 1).



**Fig. 1. Titoki observed flowers and fruit. a: Male flower; b Female flower, only two of the eight stamens shown; c-f Ovaries enlarging, the ovule located towards the base of the ventral (left-hand) side of the chamber, its basal aril present but small; g 2-chambered ovary; h: part-matured fruit, the seed-coat (hatched) beginning to harden, starting from above the contorted aril; i part of unripe inflorescence ; j ripe fruit, dehiscent. Scale bars : a, b 1 mm; c-h 1 mm; i-j 1 cm**

The beak of the rooster is the remnant of the style, and the rooster's crest is made by the single carpel's dorsal edge, which enlarges after fertilization (Fig. 1c-f) to form a conspicuous latero-apical wing. (Very occasionally in the trees studied I saw flowers with 2-locular ovaries (Fig. 1g)). Presumably it is the stress created by this asymmetric growth that eventually leads to the capsule tearing open in its characteristic "irregularly equatorial" way (Fig. 1 h-j).

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## Orona Island, eastern Manukau Harbour, Auckland

**Ewen K. Cameron**

Orona Island (island name from Anon. 2006) (Figs. 1-3) lies some 300 m off the shoreline of the new Karaka Harbourside Estate subdivision, and 170 m off the eastern margin of farmed Pararekau Island in the Pahurehure Inlet, eastern Manukau Harbour, Auckland (Fig. 4). The island lies within the Manukau Ecological District and is clearly visible from the southern motorway (you've all seen it!) just north of the Papakura interchange (Beach Road). It is oddly absent from most maps – *Google Maps* was used to calculate

its size, position and distances from adjacent land. I visited the island briefly on 22 Sep 2007 (for 30 minutes) and again on 16 Dec 2007 (60 minutes) – both times during a low tide.

The long axis of the elliptic-shaped island runs NW-SE and is 55 m long by 30 m across (c.0.15 ha), 6 m asl (map reference: NZMS 260 806584). The pale-coloured eroding cliffs stand out on the southern and eastern sides (Figs. 1-2), and are composed of rapidly