

so on (in acmena, when the fruit is c. 5 mm diam; in waterhousea, c. 3 mm diam.) shows that a very peculiar thing has happened (Fig. 1d, e, f): the embryo has burst out of the testa. It has grown considerably and has become lobed on its inner side against the placental region, which in turn has grown out towards the embryo. So we see two free but interlocked structures (like a hand plunged into a bowl of dough). A curious difference between the two species is that the embryo is green in acmena but red in waterhousea.

The growing embryo then is seen to have the septum and enlarging placental region on its adaxial side, and beyond that the "infertile locule" which is becoming compressed in a latero-apical position. The testa typically persists as a kind of ragged-edged hood at the base of the placental region. Crucially for this interpretation, the other ovules of the "fertile locule" are latero-apical between the testa hood and the top of the endocarp (See Figs. e, d, f) .

In waterhousea, because of the more or less basal position of the ovules on the septum, the seed as it grows can be serviced by a very short strand of vascular tissue coming up from below, that is, the placental region remains basal. In contrast, the septum in the acmena fruit is elongated and flattened to one side of the maturing seed, which consequently is supplied by a strap-like bundle several millimeters long. Anyone wanting to confirm this can take an acmena fruit and dissect out the strand — it will be found that where it curves over into the placental region there will be, hardly enlarged, the fruit's "infertile locule", its ten or so defunct ovules lying one on top of the other like a stack of scales. The defunct ovules of the fertile locule will be nearby, separated by the septum of the ovary, this appearing as a very

thin oval patch of tissue but having the curve of the seed's vascular strand within it.

Early on in fruit development the tissue intruding from the placental region is yellowish and fleshy — perhaps surprisingly, it lacks lignified vascular tissue. Whether all this intrusion derives from multiplication of the testa at the attachment point of the ovule, or whether its inner part comes from multiplication of the placenta in the strict sense, that is, the attachment region on the septum, I cannot say.

It can be supposed that when the fruit nears maturity the presumed food-transferring function of the intrusion would no longer be needed. Consequently the intrusion loses its fleshy nature and, compressed to a degree by the final swelling of the embryo, transforms into a dark-yellowish (tannin-filled?) gummy branching.

Notes

1. Seeds with a very thin coat are not unknown -- in drupaceous fruits mechanical protection is often the function just of the endocarp, e.g. as in a peach. In a few other taxa it seems that an initially thin seed-coat is absorbed by the endosperm during development. But I am not aware that the situation described above has been reported elsewhere than in *Syzygium* and relatives.

2. In contrast, seeds with intrusions into the space normally occupied just by the cotyledons or endosperm are known in quite a number of families. Most commonly, e.g. in numerous palms, in pawpaw, and in many rubiaceae taxa, the intrusion is made by the seed-coat. The ecological advantage such "ruminant" seeds might have is unknown, but I think it reasonable to suppose that by this morphology attack of the seed by insects might be slowed down.

Reference

Gardner, R.O. 1987: *Syzygium* and related genera (Myrtaceae) in Auckland. *Auckland Botanical Society Journal* 42: 12-14.

Note on the flowers of *Hebe speciosa* (Scrophulariaceae)

Rhys Gardner

Introduction

For several years I have been growing authentic material (cuttings ex Maunganui Bluff) of this fine plant, a true "easy care" shrub. I had thought to experiment with its pollination, to learn whether there might be some self-incompatibility here (de Lange & Cameron 1992) and so help answer one of urban ecology's medium-sized questions: "why, in the world's weediest city, have hebes (*Hebe* spp.) naturalized in almost none of the many and varied habitats available to them?"

In the meantime though I just want to offer an observation concerning floral morphology, of minor import but apparently novel. (I am not breaking a promise made long ago to my parents that I would never get involved with a hebe - since they are all veronicas now ...).

Flower development

My several bushes of *H. speciosa* have two main flowerings per year, once in summer (January) and again in winter (May to mid-July). The flowering on the larger ones takes place over a month or so. The opening of the flowers on a single inflorescence has a

strong tendency to begin at the base and continue to the apex, although the flowers of the central two-thirds of the inflorescence often open more or less together. (This contrasts with the flowering of *H. stricta* and *H. bishopiana*, where the flowers of an inflorescence open more or less together. Perhaps the large size of the *H. speciosa* flower and its relatively copious nectar means it must space out its flowering).

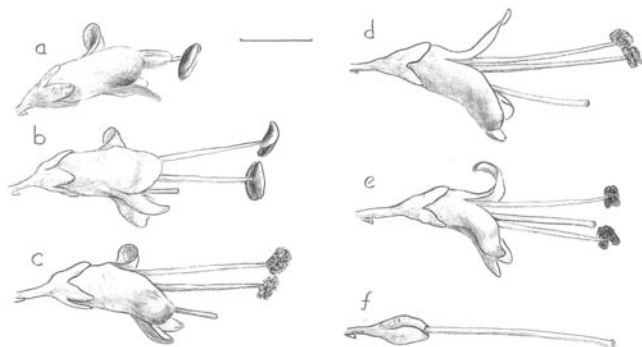


Fig. 1. *Hebe speciosa*. Upper: a-f, floral development from bud-opening to pollen-shedding (c) to corolla-fall. Scale bar (a-f) 1 cm.

Each flower lasts for about a week (corolla-opening to corolla-fall). The development as shown here (Fig. 1 a-f) follows the protandrous mode usual in the genus.

What seems not to have been noted before concerns the stigma. In the first half of the flowering sequence, while the magenta-coloured anthers are shedding their pollen, the style is short and the stigma is barely if at all exerted. At this (presumably non-receptive)

Reference

de Lange, P.J.; Cameron, E.K. 1992: Conservation status of titirangi (*Hebe speciosa*). *New Zealand Botanical Society Newsletter* 29: 11-15.

The story of *Geranium gardneri*

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In 1978, while I was working at DSIR's Mt Albert Research Centre, Alan Esler showed me a fine tap-rooted geranium he and his technician Lynne Scott had found in cliff-edge grass at Glover Park, St Heliers. It resembled a (somewhat less handsome) plant that seemed to be spreading around Auckland, on the volcanic cones and Gulf islands, and also as a garden weed. Guessing that one or both might also occur in south-east Australia, we tried to identify them using Willis's "Handbook to the Plants of Victoria" (one of Alan's secret weapons). But both plants keyed out there to the one name, *Geranium solanderi*. Nor did things become clearer when Carolin's (1964) revision of the genus in Australasia was consulted.

I got early New Zealand specimens from the British Museum (Natural History) and Kew and found that the Glover Park plant matched the collections of Banks and Solander and the Forsters. This is the true *G.*

stage it has a truncate, non-papillose dark blue tip. Subsequently, while the anthers are shrivelling and turning dark blue, the style elongates and the stigma doubles in size (to c. 0.66 mm diam.) to become magenta-coloured, capitate-subspherical and conspicuously papillose.

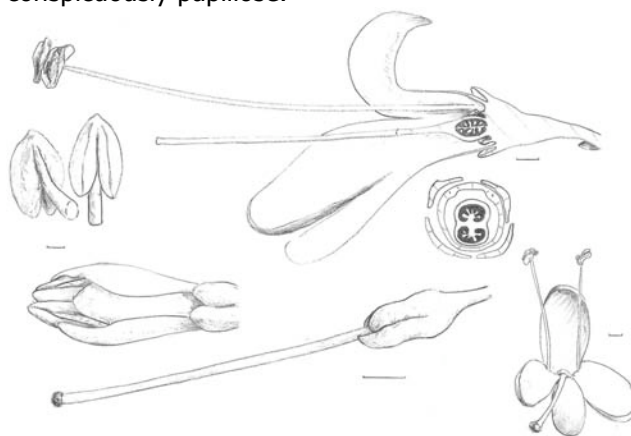


Fig. 2. Various aspects of the flower, including a floral diagram. Scale bars 1 mm.

The same enlargement of the stigma occurs in *H. stricta*. Perhaps this is usual in the genus but I can find no illustration that shows it distinctly. Lastly, I have several times seen in *H. macrocarpa* flowers that open with their stigma already shortly exerted. Rare examples of protogyny in this part of the genus, perhaps? But not knowing what I do now I did not check to see whether those stigmas were in the swollen state.

solanderi (*G. pilosum* of the standard NZ Floras). The other was first represented in the early collections only in the 1860s. This and its weedy tendencies suggested that it might well be adventive to New Zealand.

A couple of good-sized loans from the herbaria at Sydney contained specimens that matched our weedy plant well, but also, others that were problematic. So I just gave it the tag-name *G. solanderi* "coarse hairs", and begun waiting for the time when the Australians would have pay for their sins. A treatment in the new Flora of Victoria (Smith & Walsh 2003) began this process, with "coarse hairs" and some other taxa accepted as distinct species. At last, to emphasize that "coarse hairs" was the only member of the complex present on Norfolk Island (and that it was adventive there too), Peter de Lange (de Lange et al. 2005) gave it the name *G. gardneri*.