

Isotoma axillaris

Australian Harebell

Isotoma axillaris, the Australian Harebell, is a lovely native plant, widespread in New South Wales, Victoria and south-eastern Queensland. In its native environment, it thrives in well-drained sandy soil in rock crevices, on rocky cliffs and around waterholes, particularly those composed of sandstone and granite. This low growing perennial is also eminently suitable for garden planting and will reward you with an abundance of mauve-blue flowers from late spring through to autumn. Handle the stems and leaves carefully, as the milky sap is quite acrid and can irritate the skin and eyes, although this can also be a bonus, a useful deterrent to grazing herbivores. *Isotoma axillaris* is visited by native bees and other insects although the flower structure indicates it



is probably pollinated by nocturnal moths. Some botanists include the genus *Isotoma* in the family Campanulaceae; others in the Lobeliaceae. Doubtless in the next few years, molecular biologists will put us out of our misery and resolve this perplexing conundrum. The *Isotoma* flowering in the Biology courtyard garden was donated by Nola Hancock, Post-Doctoral Research Fellow in Biological Sciences.

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Distribution map modified from Australia's Virtual Herbarium:

<http://avh.ala.org.au/occurrences/search?taxa=Isotoma%20axillaris#mapView>

Alice Blackwood, Australian National Botanic Gardens, 2008 (Online), *Isotoma axillaris*, *Isotoma anethifolia*, Australian Government, Canberra, Viewed 9th March 2016

<https://www.anbg.gov.au/gnp/interns-2008/isotoma-spp.html>

Contributions to the Flora of Australia: VI

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THE POLLINATION MECHANISM OF *ISOTOMA AXILLARIS* LINDL. AND THE GENERIC STATUS OF *ISOTOMA* LINDL.

While idly admiring the beauty of the flowers of *Isotoma axillaris* Lindl. in the greenhouse, the purposeful appearance of the curved bristle-like hairs attached to the end of the anther-tube caught my attention. Wondering whether they played some part in a pollination mechanism, I took a pencil and touched the hairs. Immediately a small mass of pollen was extruded from the end of the pollen-tube. Each time the hairs were gently depressed, a further quantum of pollen was extruded (Fig. 1A). As the hairs were strategically placed to contact any insect alighting on the open corolla, there appeared to be a very neat method for dispensing an appropriate amount of pollen for each visitor and preventing its wasteful dispersal. From the external appearance of the anther-tube, it was not evident how the mechanism worked. Flowers were therefore collected and examined under a binocular microscope.

The examination revealed a piston mechanism similar to that of other members of the *Lobeliaceae*. The pollen is shed into the anther-tube when, or just before, the flower opens. The flowers are strongly protandrous, the stigma at this stage (Fig. 1C.) being rudimentary. The stigma is surrounded by a brush of stiff hairs which serves to sweep out the pollen, gradually, as the style elongates. There is no control over this process in the majority of *Lobeliaceae*, but in *Isotoma* the tips of the three upper anthers are bent downwards onto those of the lower pair forming a pair of lips (Fig. 1D.), which normally are pressed against one another. The lower lip is bearded with a few small hairs and a pair of long bristle-like hairs which are placed side by side and so close together in *I. axillaris* as to appear like one to a casual observer. Depression of these trigger hairs opens slightly the mouth of the anther tube. The pollen mass inside the anther tube is under pressure from the growing style and its stigmatic brush, so that pollen is extruded through the mouth, when it is opened. The flower remains for several days in this condition and pollen is not lost from the anther tube. The pollen mass is compacted against the arching tips of the three upper anthers, which close the tube. Ultimately, the style breaks through the end of the anther tube and the stigmas mature, enlarging to about five times their original dimensions (Fig. 1B.). If not pollinated, the flower may remain apparently receptive for several days after the stigmas have been exerted, under greenhouse conditions.

Brief mention is made by Mueller, 'Fertilisation of flowers' and Kunth, 'Handbook of flower pollination' of the pollination mechanism of *Isotoma*. Both authors obtained their facts from F. Hildebrand's illustrated account (Bot. Zeit. 27, 476-7, figs. 8-12: 1869), which was based upon his personal observations. Although this information was available, use had not been made of it in considering the circumscription of *Isotoma* and related genera.

* Continued from Kew Bull. 13, 401 (1959)