

Notes on *Glossostigma elatinoides* (Scrophulariaceae)

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EARLY in January 1969 I found a little mat of *Glossostigma elatinoides* beside the eastern shore of Lake Horowhenua, half out of the water and half almost submerged. It was easily recognizable by its small spatulate leaves, fairly thick in texture and minutely pitted. The plant was liberally starred with white flowers in early maturity, each about 3 mm in diameter. Under a lens their lobes had a sparkling appearance like frosted glass.

Two small lobes make up the upper lip of the flower, and three larger lobes the lower lip, surely a fine mounting platform for small pollinators. Horizontally across each flower lies the broad folded-over stigma, like a clenched fist with the fingers flat on the palm, which covers the four stamens and prevents self-pollination. When gently touched on its outer edge (where the finger-nails would be on the "fist") the sensitive stigma unfolds and lies back flat against the two upper lobes of the flower.

How long would it remain thus, I wondered, and how soon would it be folded down in its resting position? Any books I had did not give very precise details, so the best thing seemed to find out from the flowers themselves. For five days a number of flowers were activated and timed, with the following results:

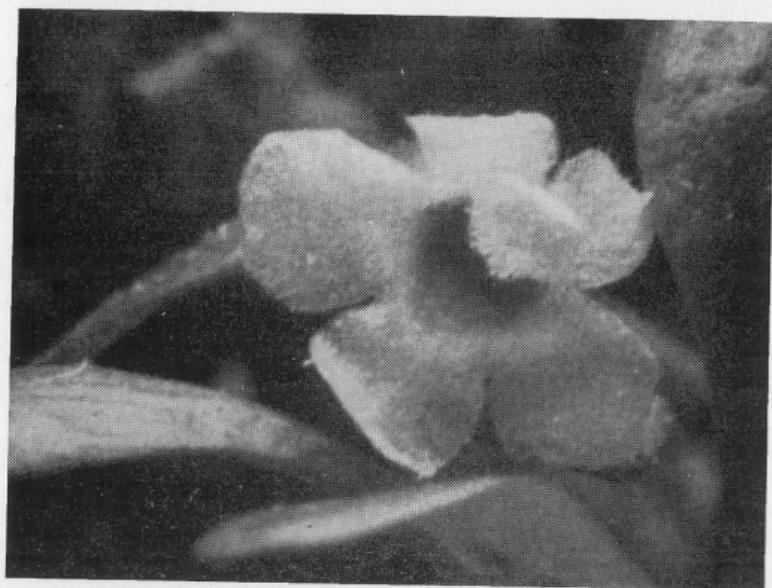
	Day 1 (64 deg. F)	Day 2 (62 deg. F)	Day 3 (66 deg. F)	Day 4 (70 deg. F)	Day 5 (70 deg. F)
Flower A					
I	7 mins	9 mins	8 mins	7 mins	9 mins
II	15 mins	20 mins	15 mins	14 mins	25 mins
Flower B					
I	6 mins	9 mins	6 mins	9 mins	10 mins
II	16 mins	23 mins	18 mins	25 mins	22 mins

I—Stigma starting to return by lifting away from the back lobes.

II—Stigma completely folded down in its resting position.

Time of activation about noon throughout.

The above figures show considerable variation in timing. Young flowers took between six and nine minutes before starting to return, the longer times reflecting cooler conditions, while older flowers took seven to ten minutes even though conditions were warmer. The entire movement was completed in approximately 15–17 minutes, though a slight temperature drop extended the time to 20–23 minutes.



Photos: E. F. A. Garner.

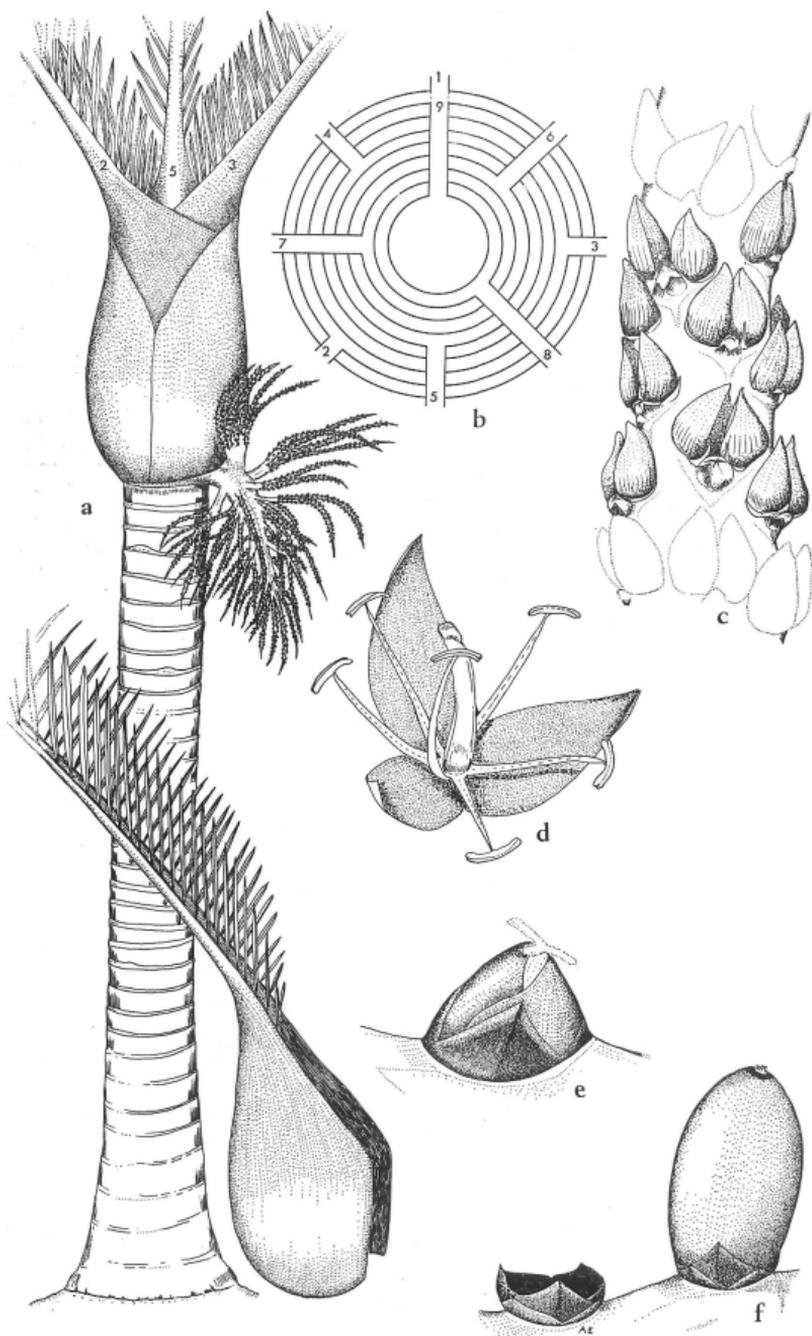
Glossostigma — (above) Position I: Stigma lifting away from the upper corolla lobes; (below) Position II: Stigma folded over the stamens, showing fimbriated tip.

Both flowers A and B were barely mature on the first day; A started to deteriorate on the fifth day and B on the fourth. In this condition the second part of the return movement was slowed down, and the stigma did not lie down as flat as it had in its prime. Flowers which were more shrivelled responded promptly to stimulation, the stigma standing well back against the upper lobes, but failed to make any return action. Other prime flowers touched gave results comparable with those of A and B but for various reasons they had to be disqualified for the five-day test. Some flowers were placed in a sunny window, where the temperature was 104°F. The return of the stigmas commenced in five minutes and was fully completed in twelve, but the flowers shrivelled soon afterwards.

Cheeseman (*Trans. N.Z. Inst.* 10, 1878, 353-56) described the pollination process in detail. To test the timing he touched the stigmas of several flowers, "causing them to uncover the stamens and occupy their position at the back of the flower". He found that one style commenced to move inwards twelve minutes afterwards. "At 9.15, all had advanced a considerable distance; at 9.20, five out of the seven had resumed their original position." No temperatures were recorded, but as the operation was carried out in the morning conditions were probably cooler than in my experiment, which would account for the slower times.

I am grateful to Mr E. F. A. Garner for providing the photographs illustrating the two positions of the stigma.

I wondered how this isolated little plant came to be by the lakeside where much disturbance of the foreshore had been caused by the dumping of gravel to make a parking area. One would expect a mass of weeds to be introduced, but strangely enough it is mostly the original herbaceous flora which is returning. The origin of the *Glossostigma* was explained a few weeks later when I noticed a few wisps of green material floating by the shore amongst torn and rotting vegetable matter. These fragments of *Glossostigma*, as they proved to be, had probably been scratched from their moorings by waterfowl elsewhere on the lake shore, and washed against the muddy eastern verge after floating across on the ripples caused by the easterly winds. Here they started new colonies. By early April there were many patches about an inch across, some even starting to flower. Early in May the waterfront was a sheet of their tiny leaves in extensive patches. The capsules were still green but numerous tiny seeds, 20 or more per capsule, appeared to be ripe. By the end of May the water level had risen and the patches of *Glossostigma* had been practically blotted out by other plants, but even a small patch would by this time have produced many hundreds of seeds to perpetuate the colony.



Leaf arrangement and reproductive structures of nikau: *a* palm showing leaf arrangement, leaf scars and inflorescence with developing fruits; *b* diagrammatic representation of leaf arrangement; *c* portion of inflorescence showing pairs of male flowers with associated female flower; *d* male flower at anthesis; *e* female flower with receptive stigmas; *f* fruit.