LOVE AMONG THE FLOWERS

The small annual, *Monopsis debilis*, and its pollinator, the bee, *Haplomelitta ogivioides*

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*Monopsis debilis* (L.f.) Poir. is one of about eighteen known species belonging to the genus *Monopsis* Salisbr. (Campanulaceae: Lobelioidae) which has a tropical and southern African distribution. There has been some confusion as to the constitution of some of the species, but the taxonomy of *M. debilis* was recently revised and clarified by Phillipson (1986).

*Monopsis debilis* is a low-growing tufted annual which forms dense patches in moist areas from Namaqualand to the Cape Peninsula with very little east-west extension. Its purple flowers are produced in profusion in September and October. The petals are united into a tube, which is split to the base. The filaments of the stamens are free but the anthers are joined laterally to form a tube. The style bears a crown of hairs at the bottom of the anther tube. Once the flower opens, the style lengthens, pushing the pollen out of the tube where it is detained by the crown of stiff hairs, now on the top of the anthers (see accompanying diagram). The stamens and style, initially enclosed within the petals, curve outward to project from the corolla tube. After the removal of the pollen the stigmatic lobes open to expose the receptive surfaces.

We sampled flowers for insects in the western Cape during September and October from 1985 to 1992, repeatedly observing *Monopsis debilis* for insect visitors throughout the day. The principal sampling sites were in the Goegap Nature Reserve near Springbok in Namaqualand, 11 km to the west of Clanwilliam on the way to Graafwater and on the outskirts of Citrusdal.

The flowers of *Monopsis debilis*, like many dark purple flowers, though striking to the

Above: *Monopsis debilis* flowering in profusion at Citrusdal, Olifants River Valley, south-western Cape. Photo: F. Gess

Flowers of *Monopsis debilis*: (a) corolla cut away to show stamens and style enclosed within the corolla tube before the elongation of the style; (b) anthers cut away to show style (before elongation) with the pollen-supporting hairs at the base of the anther tube; (c) the extended style with pollen-supporting hairs well above the anther tube and stigmatic lobes open. The stamens and style are now projecting from the corolla tube.
human eye, appear to attract few insects. A bee, Haplometrina ogiviae (Cockerell) (Melittidae), however, was found to be a frequent and dependable visitor. We observed both males and females of this bee visiting the flowers to obtain nectar, and females, in addition, collecting pollen.

Although a short-tongued bee, H. ogiviae, when visiting the flowers, is able to reach the nectar as the split down the side of the corolla tube allows it to force its head into the flower. When the flowers are in the pollen-presenting stage the head of a nectar-drinking bee becomes coated with pollen (see accompanying photograph). The bee, when passing from such a flower to one in which the stigmatic lobes have parted, will transfer pollen to the receptive surfaces. Bees of both sexes are thus potential pollinators. When the female bee is collecting pollen for provisioning a nest-cell she purposefully collects pollen which she packs onto her hind legs. This pollen is clearly not available for pollination.

It was Rozen (1974) who, when investigating the nesting biology of H. ogiviae, first found that M. debilis was the source of the most provisions at Veldrif (the south-west of Citrusdal). The nests were obliquely sloping, unlined, single-celled burrows excavated by the bees in the ground. The provision for a cell consisted of a spherical moist pollen ball, 3.25 mm in diameter.

H. ogiviae is not entirely restricted to M. debilis, the authors having recorded it as an occasional visitor to two species of Wahlenbergia (Campanulaceae: Campanuloideae) - W. pilosa in the Goegab Nature Reserve and W. annularis at Citrusdal, and to two species of Asteraceae - Athanasia trifurcata between Clanwilliam and Klawer and Senecio sp. at Citrusdal. They, however, found W. pilosa to be principally visited by masarid wasps and W. annularis by two species of Capricola (Mellitidae).

The impression that visits of H. ogiviae to Asteraceae were casual in nature is supported by observations of Rozen (1974) who noted that the bees collected their provision from M. debilis which was rather rare in the nesting area, not from the abundant low-growing herbs of which a yellow-flowered composite was particularly common.

Whether or not H. ogiviae extends throughout the range of M. debilis remains to be determined, but it is certainly known from the greater part of its distribution.

The evidence so far assembled suggests a mutualistic dependence between M. debilis and H. ogiviae. H. ogiviae being apparently the sole pollinator of M. debilis in the areas investigated and M. debilis being apparently the principal source of provision of H. ogiviae.

References