

# Nectar for the birds

Two species of *Salvia* join *Salvia africana-lutea* as the only three species in the 'Old World' to be exclusively pollinated by birds

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The universal, mainly bee pollinated genus *Salvia* (Lamiaceae family) encompasses approximately 1 000 species, 350 of which occur in the Old World (Africa, Europe and Asia). While there are about 180 bird-pollinated species in the New World (the Americas), predominantly by hummingbirds, up till now, only one species in the Old World was known to be exclusively bird-pollinated: the South African sage *Salvia africana-lutea*.

## *Salvia africana-lutea*

More than 100 years ago the British soldier and botanist George Francis Scott-Elliot observed the Cape white-eye *Zosterops pallidus* pollinating the flowers of *Salvia africana-lutea* in the Cape Town Company Gardens. Though he examined the flowers for a long time, he never observed insects visiting them. Scott-Elliot also described the spectacular pollen transfer mechanism, which is typical for most of the sages. (See text box below).

*S. africana-lutea* (formerly *S. aurea*) is commonly known as brown sage, golden sage, beach sage, dune sage, bruinsalie, geelblomsalie, sandsalie or strand-salie. It is found from Namaqualand

to the Cape Peninsula and eastwards to Port Alfred where it grows in coastal sand dunes and on rocky slopes within arid fynbos up to 800 m altitude. It is a branching shrub that grows up to 2 m. The flowers show characters typical for bird pollination. They are large (about 5 cm long) and conspicuously yellow-brownish in colour. They have reflexed lower lips, offering no landing platform for bees but facilitating nectar drinking for birds. The flowers offer a large quantity of low-concentrated nectar. Sometimes the nectar fills the whole flower tube so that the nectar drips out of the flowers.

This species is also pollinated by the greater double-collared sunbird *Nectarinia afra* and the lesser double-collared sunbird *Nectarinia chalybea*.

## *Salvia lanceolata* and *S. thermarum*

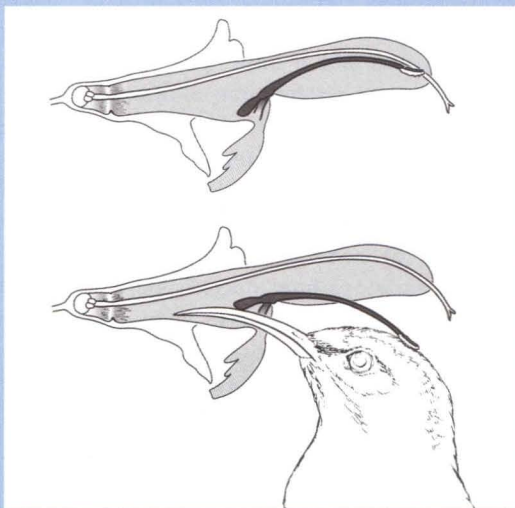
Recent discoveries have shown that two other species of *Salvia*, *lanceolata* and *S. thermarum* are also exclusively bird-pollinated. We were puzzled as to why only one species among the 23 South African sages should be bird-pollinated, so we studied the floral characters of all of them, focusing on

the two most likely candidates for bird-pollination: *S. lanceolata* and *S. thermarum*. Both species have large (about 4 cm in *S. lanceolata* and almost 6 cm in *S. thermarum*) and conspicuously coloured flowers. In *S. lanceolata* they are pink-violet and purplish, and *S. thermarum* has red flowers, which can also be pink or salmon; and in some



## Pollen transfer in *Salvia*

The two stamens are modified levers. A bird seeking nectar inserts its bill into the flower, pushing back the lower end of the 'lever' mechanism that blocks the flower entrance and restricts access to the nectar. The pollen-sac at the upper end of the stamen is thereby 'levered' out of the upper lip and is pressed onto the visitor's head. The next flower of the same species that is visited gets pollen transferred to the stigma of its protruding style.



TOP: A flower of the brown sage, *Salvia africana-lutea*, with reflexed lower lip.

MIDDLE: The conspicuous flower of wild sage or rooisalie, *Salvia lanceolata*.

ABOVE: The long-tubed flower of the Goudini sage, *Salvia thermarum*.

greenhouse-grown plants they may even appear yellowish. The lower lips are reduced compared to bee-pollinated flowers. They are narrow in *S. lanceolata* and short in *S. thermarum*, and reflexed in both species, preventing bees from landing on the flowers. The narrow flower tubes are long, especially in *S. thermarum*, and a bee's mouthparts are too short to reach the nectar, whereas the long bill of a bird can easily reach.

*Salvia lanceolata* (wild sage, rooisalie, Afrikaansesalie, strandsalie) occurs from Namaqualand to the Cape Peninsula and eastwards to Montagu. It is similar to *S. africana-lutea* in size and shape, and colonizes coastal sandveld and arid fynbos up to 300 m altitude. The Goudini sage *Salvia thermarum* was only recently discovered in the Western Cape near Worcester (see *Veld & Flora* 88(2), 66-67 - June 2002). It is perennial, about 1 m in height and occurs in Proteaceae fynbos. The specific epithet 'thermarum' refers to the Goudini warm springs near where it was discovered.

In January 2004 and October 2005 we were lucky enough to observe males and females of the lesser double-collared sunbird and Cape white-eye on *Salvia lanceolata* in Kirstenbosch, as well as lesser double-collared sunbirds visiting the flowers of *S. thermarum*. The birds perched on the branches of the shrub and pulled the flowers towards themselves (which behaviour is supported by the long, flexible pedicels) and inserted their bills into the flowers. The lever mechanism (described in the text box on page 196) immediately caused the stamen to drop, depositing pollen onto their heads; which you can clearly see in the accompany photographs.

**Possible hybridization?**

As the three species share the same pollinator, the lesser double-collared sunbird, and as the distribution area of the sages broadly overlap in the Western Cape, natural hybrids may be expected. We found individual plants with intermediate characters, such as flower colour and flower size, between *Salvia africana-lutea* and *S. lanceolata*. As hybrids are also known from the South African *S. albicaulis* and *S. granitica* and from *S. lanceolata* and *S. africana-caerulea*, it is not unlikely that these individuals were hybrids. 🌿



TOP LEFT: The newly discovered Goudini sage, *Salvia thermarum*, in fynbos at Goudini Spa, near Worcester in the Western Cape.

TOP RIGHT: A female lesser double-collared sunbird inserting her bill into a flower of *Salvia lanceolata* causes the stamen to drop, depositing pollen on her head. Photo: R. Groneberg.

ABOVE: A male lesser double-collared sunbird perching on a branch of *Salvia lanceolata* at Kirstenbosch. Photo: R. Groneberg.

BELOW: A male lesser double-collared sunbird at a flower of *Salvia lanceolata*. The pollen-sacs can clearly be seen touching the head of the bird. Photo: R. Groneberg.

**Acknowledgments**

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For a comprehensive list of further reading, please contact the editor at voget@kinglsey.co.za. For more information on birds and sages please contact **Petra Wester** at wester@uni-mainz.de.

