

# *Aloe tomentosa* – a species with unusual hairy flowers from the Yemen

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*Aloe tomentosa* is unusual within the huge diversity of this large genus, since it is one of a small group with hairy flowers that have a limited distribution in the Horn of Africa and southern Arabia. Photography by the author.

**A**loe is a large genus of over 500 species (Carter et al, 2011) and even today that number continues to increase. Of these, a very small number of species, perhaps no more than 20, are unusual in having hairy flowers. These are concentrated in southern Arabia and the Horn of Africa. In respect of Saudi Arabia, for example, Collenette (1999) records 22 species of *Aloe* and two hybrids. Three of the Saudi aloes have hairy flowers, which represents only 12.5% of the total number of aloes recorded for this large country. In Oman, Miller et al (1988) record no aloes with hairy flowers. Further south in mainland Africa, Sebsebe Demissew & Nordal (2010) accept six species out of 46 with hairy flowers for Ethiopia and Eritrea, making 13% of that total. For the small adjacent country of Djibouti, Ruch et al (2013) recognise that nearly half the species, ie four out of a total of nine (44%), are hairy-flowered species. Further east in Somalia, Lavranos (1995) similarly identifies four species with hairy flowers, but this represents only 12.9% of the total of 31 recognised species in this larger country. The most recently described hairy-flowered Somali species is *Aloe anodonta* T.A.McCoy & Lavranos (McCoy & Lavranos, 2015). The furthest south that hairy-flowered aloes have been

recorded on the African continent is northern Kenya: *Aloe citrina* S. Carter & Brandham (Carter et al, 2011). Madagascar, with its great diversity of aloes, currently totalling perhaps 150 taxa, has no hairy-flowered species at all (Castillon & Castillon, 2010).

The names of a few of these species indicate the hairiness of the flowers, ranging from shortly downy to conspicuously very hairy. *Aloe pubescens* Reynolds was named for its pubescent or finely hairy flowers,



Fig. 1 Seedlings of *Aloe tomentosa* at about two years old



Fig. 2 *Aloe tomentosa*, mature plants in 25cm pots

*Aloe trichosantha* A.Berger for the hairy perianth, *Aloe lanata* T.A.McCoy & Lavranos for the woolly flowers, and the principal subject of this current article, *Aloe tomentosa* Deflers, which is tomentose with flowers covered in densely matted hairs. One term that has yet to appear as a specific name in *Aloe* for a hairy-flowered species is hirsute, ie as *Aloe 'hirsuta'*.

Of these hairy-flowered species, *A. tomentosa* was the first to be discovered and described from the Yemen, thus it would seem appropriate to begin with a summary of its history. Botanical exploration of Arabia began with Pehr Forsskål (1732–1763), who was a member of the Royal Danish expedition to Arabia Felix, modern day Yemen. The expedition was abroad from 1761 to 1763 and travelled via Egypt on route to the Yemen. It was ill-fated since all but one of

the participants died on route, with Forsskål himself succumbing to plague in July 1763 (Hepper & Friis, 1994). Fortunately Forsskål's work was not in vain, since his work resulted in the first flora of Arabia (Forsskål, 1775), which was published posthumously by an editor, Carsten Niebuhr, who was an astronomer and mathematician, but not a botanist. Forsskål's flora includes seven aloes, of which four are currently recognised (Walker, 2005), but none of which have hairy flowers.

The French botanist, Albert Deflers (1841–1921), followed in Forsskål's footsteps in the Arabian Peninsula over 120 years later, and it was he who discovered and named the first hairy-flowered *Aloe*. In 1887, having obtained permission from the Ministry of Public Education, Deflers carried out a botanical study

in Arabia. Whereas Forsskål was obliged to confine his observations to the Tihama – the lower slopes of the mountains – between Lohaja, Hodeida and Taiz, Deflers explored the highlands of Yemen to an altitude of around 2,800m above sea level. He travelled to Hodeida on the Red Sea, then went to Sana'a and explored the mountainous region, travelling southwards via Yerrim and Sedda, as far as Aden (Walker, 1999). The story of this journey was published as a book in 1889 with the title *Voyage au Yemen* (Journey to the Yemen) (Deflers, 1889).

Compared to Forsskål, Deflers visited previously unexplored areas of Arabia and this, no doubt, accounts for his new botanical discoveries. He was not especially interested in succulents in general or in *Aloe* in particular. However, it is worth noting that later (Deflers, 1896) he published a separate study of Arabian asclepiads (formerly members of the Asclepiadaceae, now in the combined family Apocynaceae) of which he included 47 species. Of these, 24 are succulent and eight newly described, notably stapeliads and ceropegias (Walker, 1999).

For *Aloe* in the Yemen, Deflers (1889) recorded and described just three species: *Aloe officinalis* Forsskål (altitude 200m); an *Aloe* species for which he gave no name (altitude 1,000–1,200m), and most significantly, *Aloe tomentosa* Deflers. His new species was recorded from Jabal Hadhur, near the village of Bauân, at 2,700m. Note this high altitude, not reached earlier by Forsskål. Most importantly, this new species is described in reasonable detail, and interestingly with a perianth that was densely lanate, ie woolly. So this is the first description of a hairy-flowered *Aloe*.

Next on the scene was Gilbert Reynolds, doyen of *Aloe* students from 1930 to 1966 (Walker, 2010). Regrettably for his work on tropical aloes (Reynolds, 1966), he was never able to visit Arabia. He did, however, visit Somalia, where he found a species with hairy flowers growing in considerable numbers near Moledera, south of Erigavo. He wrote (Reynolds, 1958) that “allowing for geographical variations, and for racemes varying from shorter and denser to longer and laxer, I now regard the Moledera plants as belonging to *A. tomentosa*. Compared with the type, the Moledera form differs in having slightly longer, less dense racemes, with the apical buds less crowded and less hidden by their bracts . . . [So] I conclude that the Moledera plants are conspecific with *A. tomentosa*.” In his monumental monograph of the aloes of tropical Africa and Madagascar, he took the

same stance: *A. tomentosa* occurred both in the Yemen (its type locality) and in Somalia (Reynolds, 1966).

Somewhat later, Lavranos & Glen (1989) reassessed the plants at Moledera, Somalia and described these as a new species, *Aloe molederana* Lavranos & Glen. They concluded that “*Aloe molederana* appears to be only very remotely related to the true *A. tomentosa*”, differing “in its clumped habit, smaller leaves, few-branched inflorescences, lax to subdense racemes and pink flowers”. Their dendrogram, which illustrates similarities between species based on morphological features, has *A. molederana* far removed from *A. tomentosa*. The Moledera species, which has a very



Fig. 3 *Aloe tomentosa* in flower at about 10 years old from seed



Fig. 4 Closer view of the inflorescence

restricted distribution, is also geographically far removed from where Deflers first collected *A. tomentosa* in Yemen. Consequently, the separation of *A. molederana* from *A. tomentosa* is justified on many counts, and this reinstates the latter species as a Yemeni endemic.

Following Reynolds on the *Aloe* scene in Arabia was John Lavranos, well known for his discoveries in Arabia and further afield. He collected a hairy-flowered species that was named *Aloe lavranosii* Reynolds in his honour (Reynolds, 1964), of which more later. Its type locality was at that time part of the Western Aden Protectorate, not then part of the Yemen. Lavranos (1965) in his studies of the aloes of Arabia had at that time, like Reynolds before him, not been able to revisit Deflers's type locality for *A. tomentosa*.

Returning to the Yemen proper, where the true *A. tomentosa* had been studied by Wood (1983, 1997) over a 10-year period, and nearly 100 years after the discovery by Deflers, Wood recognised 17 species,

which he divided into seven groups. His largest group consists of six species with mostly solitary stemless plants with hairy flowers: *Aloe doei* Lavranos, *A. menachensis* (Schweinfurth) Blatter, *A. niebuhriana* Lavranos, *A. tomentosa* and two unnamed species.

Wood considered *A. tomentosa* to be "a very distinct species with massive leaf rosettes and a densely hirsute inflorescence of greenish-white flowers" and it "is set apart from other members of this group by the high altitudes it grows at and by its summer flowering season (April to September)". Incidentally, Wood (1983) was also the first to question the inclusion of the Somali plants from Moledera in *A. tomentosa*, the position later resolved by Lavranos & Glen (1989), as outlined earlier.

In terms of the distribution of *A. tomentosa* in Yemen, Wood (1997) records this species as being "frequent on rocky hillsides between 2,400 and 3,100m on the mountains surrounding the high plateau. It is absent from the outer escarpment apart from isolated records."

It would now be appropriate to consider *A. tomentosa* in cultivation. I have been growing it for nearly ten years having obtained seed in 2006 which was germinated successfully by Tina Wardhaugh, and three seedlings have grown well since then (Fig. 1). Like many aloes, the seedlings had initially distichously-arranged leaves, either well-spotted (maculate) or hardly spotted at all (immaculate). I suspect that leaf spotting in the juvenile state has something to do with protection, providing camouflage, but there is no evidence as yet to support this hypothesis. My plants have continued to grow well and were repotted into 25cm-diameter pots in 2014 (Fig. 2). The plants at maturity are stemless and solitary. The leaves are virtually spotless at maturity, and dull glaucous grey-green in colour, up to 35cm long and 9cm at their widest, with the margins adorned with sharp, short brown teeth 1mm long and up to 2cm apart.

One of the three plants produced the first inflorescence in August 2015 (Fig. 3) and it is interesting to note that

this is the only one that has flowered so far. The inflorescence is 72cm tall with five branches, up to 23cm long. Each raceme is up to 12cm long, densely arranged with flowers and conical in shape (Fig. 4). The perianth is 25–27mm long and its tepals are white with a central green stripe (Fig. 5). This flower colour is in itself interesting, since the vast majority of aloes have flowers in the spectrum yellow, through orange to deep red or even scarlet. White and green to greenish-white coloured flowers are unusual. The flowers produce copious amounts of yellow nectar that drips onto the plant leaving a sticky deposit that needs to be removed.

The principal unusual feature of these flowers is, of course, that they are hairy (Figs. 5 & 6). DeFlers (1889) described the perianth as lanate, but described his novel new species as *tomentosa* rather than *lanata*. I would describe these flowers more as lanate, meaning woolly, rather than tomentose. The hairs are up to about 1.5–2.0mm in length and are intertwined, but soft like wool and not at all stiff and bristle-like (Fig. 6). Technically these are trichomes, and each perhaps consists of a single or just two cells. The upper part of the inflorescence branches are also hairy, but perhaps better described as being pubescent or puberulent, with a covering of very much shorter trichomes. The lower part of the peduncle is smooth and hairless.

The immediate question is: what is the function of the hairs on the flowers of aloes such as *A. tomentosa*? The obvious hypothesis is that their presence plays some active role in pollination, possibly in attracting bird pollinators, as sunbirds are pollinators in many African countries. Yemen hosts four species of sunbird, according to an internet search carried out by Tom Eichler and posted to the BCSS Forum (Walker et al, 2015). As far as I am aware, there are no published observations of birds pollinating aloes in Arabia, so for now the relationship between greenish-white coloured flowers, their hairy perianths and potential pollinators is merely speculation. Field observations of these plants in flower in the wild are required to resolve these interesting questions.

Finally, what is the relationship of *A. tomentosa* to other hairy-flowered species? *Aloe lavranosii* (which includes *Aloe splendens* Lavranos and *A. doei*; McCoy & Lavranos, 2010) mentioned earlier, is an obvious choice as a near relative, but differs in having a much more laxly (loosely) arranged raceme with a red or yellow perianth, which ranges from glabrous (so not hairy at all) through to sparsely pubescent, but not so densely lanate as in *A. tomentosa*. Another species

with densely lanate flowers is *A. lanata*, another higher altitude Yemeni endemic with a red perianth, described since the last survey of Yemeni aloes by Wood (1997).

In terms of evolutionary relationships, the most extensive cladogram (evolutionary tree) produced to date is that of Grace et al (2015). In this, *A. tomentosa* has been shown to sit in a clade (tree branch) along with other aloes of the Arabian Peninsula, including other hairy-flowered species such as *A. splendens* (= *A. lavranosii*) and *A. niebuhriana*. However, the clade



Fig. 5 *Aloe tomentosa* flowers showing the hairy surface to the perianth



**Fig. 6** Bud of *Aloe tomentosa* with the dense covering of hairs (trichomes)

also includes several glabrous (hairless) flowered species such as *Aloe inermis* Forsskål and *A. pendens* Forsskål. Other non-Arabian species with tomentose flowers, such as *A. trichosantha* from Eritrea, are far removed in the cladogram, so it is possible that hairy flowers evolved more than once as *Aloe* speciation radiated northward from the origin of the genus in southern Africa into the Horn of Africa and Arabia (Grace et al, 2015).

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