There is something infinitely charming and friendly about the wild flowers commonly known as kalkoentjies that has endeared them to generations of locals and visitors to the Western Cape. Kalkoentjie (the English translation, little turkey, is never used) refers to the charming group of wild Gladiolus species that can sometimes be seen in their hundreds along the roadsides of the Western Cape and even in Namaqualand. When the plants came by their name is lost in the mists of time; kalkoentjies they have been long before Afrikaans was a recognized language. It is quite obvious, however, why the name was used. It was originally applied to the Western Cape species, *G. altatus* and of course alludes to the bright, orange-red flowers that give the short plants a fanciful similarity to turkey chicks, their red-wattled heads leaning forward, mouths agape, in search of scraps.

The earliest use of the name that we have seen is by the Danish botanist and plant collector, C. F. Ecklon, who lived and worked at the Cape in the late 1820s and 1830s. In an 1827 publication, Ecklon mentions the names, ‘caapsh roode kalkuntes’ and ‘caapsh groene kalkuntes’ for plants we now know as *Gladiolus altatus* and *G. vivescens* or *G. archidiflorus*. The use of the name gradually spread to related species with similarly coloured flowers and later merely of similar appearance. Here we suggest restricting the name kalkoentjie to a group of nine species that in fact comprise a natural, or in evolutionary terminology, monophyletic group. They are distinguished in *Gladiolus* by their large upper petals (or tepals) that are abruptly narrowed below, and thus spade-shaped. The lower three tepals are much narrower than the upper ones, are channelled below, always greenish to yellow in the lower half, and coloured the same as the upper tepals at the tips. Additional features are the strongly arched filaments and peculiar, glistening papilllose ridges in the upper part of the perianth tube, along the line of union of the tepals. Like many of the species of their section, the kalkoentjies almost always have wonderfully fragrant flowers.

**Species with dull-coloured flowers**

There are two main groups of kalkoentjies, the orange-red to salmon-coloured species with flattened angular stems and folded floral bracts, and those species with unusual, dull-coloured flowers in shades of brown, purple or green, rarely yellow, with the upper tepals more darkly pigmented along the veins. Outgroup comparison suggests that the latter are ancestral. The best known member of this last group is the green or grey kalkoentjie *Gladiolus archidiflorus*, especially well known for its wonderful scent, a combination of freesia and the best violet. So strong is the fragrance that plants can often be detected by smell before the well-camouflaged flowers are seen. Perhaps closest to the ancestor of all the kalkoentjies, *G. archidiflorus* extends from the northern Cape Peninsula across Namaqualand to the south-western corner of Namibia and inland as far as Kimberley and Kuruman.

Another green or brown-flowered species related to *G. archidi-florus* is *G. watermeyeri* which has perhaps an even stronger fragrance. Restricted to the stony hills and plateaux between Nieuwoudtville and Wuppertal in the northern Cedarberg, *G. watermeyeri* has distincitively ridged leaves. The broad, hooded dorsal tepal is translucent in colour with greenish veins. Its low habit and flowers that face the ground make it even more inconspicuous than the taller *G. archidiflorus*.

The rolling clay slopes of the southern Cape, from Caledon and
Species with orange to salmon flowers

The taxonomy of *Gladiaus orchidiflorus* and its four close relatives was worked out by G.J. Lewis, A.A. Obermeyer and T.T. Barnard in a revision of South African *Gladiaus*, published in 1972 after Lewis’ untimely death in 1967. Not so the taxonomy of the orange-red-to-salmon-flowered species. Those authors recognized two species, *G. equitans*, the great red or Namaqualand kalkoen-tjie, and *G. alatus*, the true kalkoen-tjie, the latter with five varieties. While *G. equitans* is uniform in its large flowers with a hooded dorsal tepal and extraordinarily broad, sickle-shaped leaves with thick translucent margins, *G. alatus* seemed to us to be unusually variable both in leaf and flower shape. Furthermore, there appeared to be no geographical pattern to the distribution of the varieties. Investigation of *G. alatus* thus became one of our primary concerns in the past two field seasons as we neared the completion of a long-term study of *Gladiaus* in southern Africa that will soon be completed and published as a new monograph of the genus for the subcontinent.

True *Gladiaus alatus* we soon found, has a range across the Western Cape from the Bokkeveld Escarpment near Nieuwoudtville to the Peninsula and Bredasdorp, and it can always be recognized by its strongly ridged leaves and long, hairy filaments. Similar to it in leaf structure, the plant called *G. alatus* var. *meliusculus* (a little better), has much shorter filaments, usually pink rather than orange flowers, and the lower tepals are broader than in the other kalkoen-tjies and have large, dark purple blotches near the base. It grows in slightly different habitats to *G. alatus*, nearly always in seasonally wet, poorly drained sites. Its geographical range is much narrower than that of *G. alatus*, extending from

Worcester eastward to the Long Kloof are home to the yellow kalkoen-tjie, *G. virescens*. A relative of *G. orchidiflorus*, this is a rather variable species with the upper tepals ranging from yellow, with green veins at Caledon and Riviersondend, to brownish or rarely pink farther east. It can be recognized by its erect dorsal tepal, and normally narrow leaf, round in cross-section with four longitudinal grooves.

The dry interior of the southern African winter-rainfall region, from the top of the Hex River Pass through the arid Tanqua Basin and the Roggeveld as far north as Calvinia and Vanrhynsdorp, boasts two more species of dull-coloured kalkoen-tjies, *G. usyiae* and *G. cerestianus*. Like its southern relative, *G. virescens*, both have flowers with erect dorsal tepals. They are low-growing and in most seasons have stems with only one to three flowers. So well camouflaged are the flowers against the rocky, sparsely vegetated background that we have searched for them unsuccessfully only to find them almost underfoot. Again, the sweetly-scented flowers often signal their presence before they are seen. *G. cerestianus* so named because the type collection was made in the Ceres district of the Western Cape, is solitary growing, has narrow leaves, round in cross-section, and hard corn tunics. Nearly identical in its flowers, *G. usyiae* grows in colonies, has sickle-shaped, plane leaves and softly membranous corn tunics. The plants produce slender runners from the corn bases, each terminating in a cornelet. Thus one plant will, over a few seasons, give rise to a large colony if growing conditions are favourable. A means of vegetative reproduction is vital for the survival of the species which grows in open, light clay ground. Its corns, like those of so many geophytes, are a source of food for guinea fowl, porcupines and baboons. Growing in very rocky ground, *G. cerestianus* does not need to depend on vegetative reproduction nearly as much, and it usually produces only one or two cornelets at the base of the parent. Both species are too poorly known to have true common names.

One of the more common colour forms of *Gladiaus virescens* growing near Worcester, hence the common name 'yellow kalkoen-tjie'. Unlike most of its relatives, this species is usually found on heavy shale soils.

*Gladiaus usyiae* found near Papkuilbosfontein on the Bokkeveld Escarpment. The well-camouflaged flowers borne close to the ground are difficult to see, but have a strong scent. Photo: J.C. Manning.
near Hopefield and Porterville to the Koeberg, a short distance north of Cape Town. We were dismayed to discover that there are early records of the plant from the lower slopes of Lion's Head and Ndabeni on the Cape Peninsula, sites now buried by urban development.

There seems no doubt that it has been lost in the south of its range. We quickly came to the conclusion that this was a separate species which we are calling *G. melinusculus*. Not only does *G. melinusculus* differ consistently in its flowers from other *G. melinusculus*, but it appears to flower later than *G. alatus* when they grow nearby. It also has a different pollination strategy. While all the other *G. melinusculus* are pollinated by solitary bees, mostly members of the genus *Anthophora* which use the flowers as a nectar source, *G. melinusculus* seems to be visited mainly by monkey beetles. These hairy beetles, restricted to the arid and winter-rainfall parts of southern Africa, appear to have been overlooked as significant pollinators until recently. (See Goldblatt & Manning in *Veld & Flora* 82[1], 17-19, March 1996.)

One of the features of this pollination strategy is for flowers to have strongly contrasting marks and a flat area on which the insects may alight. Species of *G. melinusculus* rarely fit these requirements, more common in species of *Ixia* (like *I. maculata*) and *Romulea*. *G. melinusculus*, however, seems to be evolving in the direction of beetle pollination and to be converging toward the same color pattern as in *Romulea obscura* and *R. extima*. These two species have dark pink, cupped flowers with dark blotches on the tepals and a pale throat. At the Waylands Wildflower Reserve near Darling all three species grow together and are visited by the same beetle species, *Lepisia rupicola*. The pink colour of the flowers of *G. melinusculus* with broad purple marks edged in yellow on the lower tepals approximates the colouring of the flowers of the two *Romulea* species, apparently the result of pollinator selection.

Along the Cape West Coast grows another of the varieties - *G. alatus* var. *speciosus*, actually named *G. speciosus* (splendid, showy) by the Swedish botanist, C. P. Thunberg, who studied plants at the Cape in the 1770s. Wherever we found it, the plants grew in deep, coarse quartzitic sands unlike the more rocky or granitic sites favoured by *G. alatus* or *G. melinusculus*. Not only does its habitat differ from these two, but it is immediately recognizable by its hooded flower, the dorsal tepal extending forward and downward in a strong arch, filaments only minutely hairy below, and the flat, slightly fleshy leaves. Flower colour and scent also differ. Var. *speciosus* usually has the upper lateral tepals yellow to greenish on the outside, broadly edged in orange, the yellow sometimes darkening to nearly orange with age, and the flowers have a rather heavy, herbal scent. It is also usually a very small plant, only reaching higher than 12 cm under the best growing conditions, and it consistently produces cornets on slender stolons. The above attributes make us confident that

between the seed chambers, become filled with light pithy material that makes the dry capsules appear inflated. The seeds are also unusual. Although broadly winged as in nearly all species of *Gladiolus*, they are extremely large, 9-12 mm long, and there are only one to three per seed chamber. Other *G. melinusculus* have at least 20 much smaller seeds in each seed chamber. This extraordinary adaptation is puzzling. Could the light, inflated capsules act as sails, buoying the dry, dead stems and allowing the whole aerial part of the plant to be dispersed as a unit by wind, rather than the seeds alone?

The range of *G. speciosus* covers almost exactly that of *G. alatus* from the Bokkeveld Escarpment to Melkbosstrand. Interesting historically, *G. speciosus* was one of the first African species of *Gladiolus* to be recorded by Europeans. It was figured in Simon van der Stel’s account of his 1685 expedition to the copper mountains of Namaqualand, sometimes called the *Codex Witsenii*. Plants were found between Piketberg and Lambert’s Bay and called *G. esculentus*. The name *esculentus*, meaning edible, suggests that the corms were eaten by the Khoi people Van der Stel met on the expedition. Based on the illustration in Van der Stel’s report, *G. speciosus* was described in early botanical literature as *Sisyrinchium vipersatum* (the viper-like *Sisyrinchium*) and *S. capense*, *monanthos*, *flore coccullato*, which

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*Gladiolus alatus* growing by the roadside on Houw Hoek Pass, making a brilliant display in the spring. Photo: J.C. Manning.
describes exactly the single-flowered plant with hooded and spooned dorsal tepal of Van der Stel's plant.

Gladiolus alatus var. pulcherri

m (most beautiful) was only recognized as a separate taxon by G. J. Lewis et al. in 1972. It is a tall, often robust plant with branched stems and the bright orange flowers have an erect dorsal tepal. The leaves are flat and sometimes quite broad, so that it can sometimes be confused with G. equatans from Namakuland. Our revised taxonomy of the kalkoentjes makes it necessary to raise this variety to species rank too. As far as we can tell, it is more closely related to G. equatans than to G. alatus and separate species rank is the only acceptable way to deal with the plant. It mostly grows in deep sandy soils, often among clumps of restios, and extends from near Klaver through the Olifants River valley to the sandveld north of Piketberg. Its range thus falls entirely within that of true G. alatus and it shares the same habitat with G. speciosus. In fact, we have seen the two growing virtually side by side, although not flowering simultaneously. Birds of G. pulcherri

mus were just beginning to open as the last blooms of G. speciosus were fading. The two species thus appear to have different flowering times as well as different flower morphology.

Evolutionary considerations

Why are there so many kalkoentjes? The group appears to be a fairly recent one that has diversified in the Western Cape and its interior from ancestors that have a wider distribution in southern Africa. The western Cape has a very rich flora and flowering is concentrated in the spring. At this period, pollinating insects have a vast array of food sources available, thus only the most conspicuous or rewarding plants may be visited. Bee-pollinated plants, like the kalkoentjes, have in consequence to be distinctive and offer ample reward. In the case of the orange kalkoentjes, large, brilliantly coloured flowers are accompanied by strong floral scent and offer sweet nectar. This is not always sufficient, and we suspect that in areas of especially high floral density pollination by bees is not always assured. Hence the shift evident in G. melissinus to beetle pollination.

Bright floral colouration is not as important in dry areas where there are fewer food sources for pollinators. However, floral predation may be high. Bright colours attract flower-eating insects, especially beetles. Can the dull colouration of the flowers in the kalkoentjes of the western Karoo be an adaptation to avoid their being eaten? This would explain the particularly intense fragrance exhibited by these species. There is no need to have visibly conspicuous flowers if you can signal your presence by odour that is not perceived by predators. Bees are sensitive to floral odours and scent alone appears to successfully attract pollinators to the dull-coloured kalkoentjes. The diversity of species of both dull- and orange-flowered kalkoentjes appears to be largely the result of adaptive radiation into different habitats. Only rarely do two species of either group co-occur and then they have either sufficiently different flowers to maintain pollinator fidelity or the flowering times are separated. Either strategy or a combination of both ensures that interspecific pollination does not occur so that species maintain their integrity. The pattern of different habitat preferences and flowering times in the kalkoentjes is a combination that appears to be one of the most important factors allowing the extraordinary diversity in the flowers of the winter rainfall region of southern Africa.

Unique among the kalkoentjes, Gladiolus melissinus, the pink kalkoentjie, has dark purple splashes of colour on the lower tepals, thought to attract monkey beetles, their main pollinator.

The rather strange-looking G. speciosus, the boontkalkoentjie, has a strongly-hooded dorsal tepal and outer tepals with large patches of yellow.

Photo: J. C. Manning.

Acknowledgements

We gratefully acknowledge support from the US National Geographic Society (grant 5409-95) and from our respective institutions, the Missouri Botanical Garden, St. Louis, and the National Botanical Institute of South Africa.

Veld & Flora March 1997