*Hypoxis parvula*, Incandu Forest Reserve, Newcastle. Photo: Yashica Singh.

# HYPOXIS

**Yellow stars of horticulture, folk remedies and conventional medicine.**

*by **Yashica Singh,** Natal Herbarium, National Botanical Institute*

*Hypoxis* plants are usually easy to recognize by their bright yellow star-shaped flowers which have become known as yellow stars. For many years *Hypoxis* has been used by traditional healers to treat patients suffering from urinary-tract infections, infertility, impotency, anxiety and insanity. Recently considerable interest has been generated in the therapeutic properties of *Hypoxis* in treating prostatic hypertrophy and AIDS, and all of a sudden, knowledge about the plant is in great demand.

**Classification**

*Hypoxis* was previously placed in the Amaryllidaceae and Liliaceae, families, based on similarity in appearance to members within these families. However, we now know that it is quite different and is currently placed in a small family named after it, the Hypoxidaceae (star lily family). The Hypoxidaceae consists of 9 genera and about 152 species and occurs mainly in the southern hemisphere. About 60% of the 152 species belong to *Hypoxis*. Six of the genera (*Empodium*, *Hypoxis*, *Pauridia*, *Rhodohypoxis*, *Saniella* and *Spiloxene)* occur in southern Africa. All except *Hypoxis* are endemic to the region. *Pauridia*, *Rhodohypoxis*, *Saniella* and *Spiloxene* are restricted to South Africa. *Rhodohypoxis*, a genus with potential in the horticultural trade, is closely related to *Hypoxis* and may be distinguished from it by its white, pink or red flowers.

**Distribution**

*Hypoxis* occurs throughout most of the warm temperate and tropical zones of the world. It is absent from Europe, northern and central Asia, north Africa, extra-tropical South America and Canada. Thus far, no species is known to extend its distribution from one continent to another. In Africa, the genus is widespread south of the Sahara. The largest number of taxa (50) is found in southern Africa, where species are spread throughout the region, except in Botswana and the arid karroid regions of the Northern Cape and southern Namibia. All southern African taxa are represented in South Africa and grow mainly in the summer rainfall area. Seven taxa, (*Hypoxis angustifolia*, *H. argentea*, *H. floccosa*, *H. longifolia*, *H. setosa*, *H. stellipilis* and *H. villosa*) extend their range into the Western Cape. The centre of diversity for *Hypoxis* appears to be KwaZulu-Natal and the Eastern Cape. Each province has about 30 species.

**Habitat**

*Hypoxis* is a typical component of open grasslands. A few species are able to tolerate shaded conditions

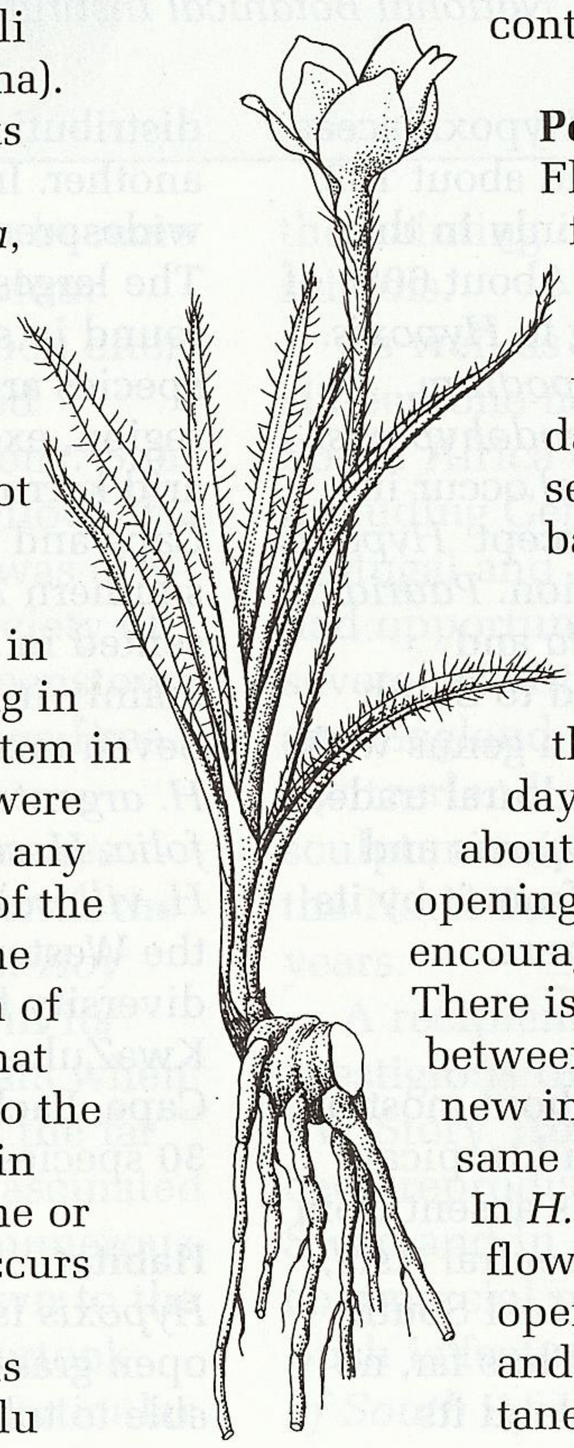
found in forest margins. *Hypoxis filiformis* and *H. acuminata* are examples of species that prefer moist depressions in vleis. Other species such as *H. parvula* and *H. membranacea* inhabit damp grassy banks and crevices in boulders. *Hypoxis* corms have a high tolerance to fire, in fact fire promotes the growth of new leaves and flowering in the genus. Plants of *H. hemerocallidea* (previously called *H. rooperi*) were observed to produce leaves and flowers shortly after a burn, irrespective of the month of burning (March to August). During the regular flowering period (September to January), those plants that had flowered earlier in the year were observed to flower again. The soil-stored seeds of *Hypoxis* also have fire-stimulated germination and it appears that seed dormancy is broken by smoke. Exactly which fire cue (physical or chemical) responsible for seed germination in *Hypoxis* is still unknown.

Above. ***Rhodohypoxis baurii* var. *baurii*, Ngele Nature Reserve, near Kokstad.** **Photo: Rosemary Williams.** Below**. *Rhodohypoxis baurii* var. *platypetala*.** **Drawing by Jill Condy.**

**Etymology**

Linnaeus, father of biological nomenclature, established the generic name *Hypoxis* in 1759. He coined the epithet *Hypoxis* from the Greek words *hypo* (below) and *oxy* (sharp) in reference to the ovary or fruit which is pointed at the base. In southern Africa, various vernacular names include star flower, star grass, gifbol, inkbol and sterretjie (Afrikaans); ilabatheka, inKomfe, inkomfe-enkula (Zulu); moli (Sesotho) and tshuka (Tswana).

In early 1997, media reports on the miracle drug based on *Hypoxis hemerocallidea*, introduced the common name 'African potato' (Afrika-patat in Afrikaans) for the plant. The coined name 'African potato' cannot be traced directly to any common name used in the past. Researchers involved in testing the effect of the drug in improving the immune system in cancer and AIDS patients were unable to afford the author any explanation for the origin of the name 'African potato'. Is the designation an imagination of journalists? It is possible that the word 'African' relates to the variety of uses of *Hypoxis* in African traditional medicine or to the fact that the plant occurs in Africa. *Solenostemon rotundifolius* (Lamiaceae) is aptly referred to as the 'Zulu round potato' or hausa potato as it is used as a substitute for potatoes in West Africa. Use of the term 'potato' for the *Hypoxis* corms is inappropriate as it alludes to a substantial staple food such as *Solanum tuberosum* (Solanaceae) or *Solenostemon rotundifolius*. In contrast, *Hypoxis* corms have an unpleasant bitter taste and it is unlikely that any member of the genus would ever become a food crop. Nevertheless, the designation 'African potato' has no doubt become a favourite among the South African public and despite its inappropriateness it will continue to be used.



**Pollination**

Flowers of *Hypoxis* are fairly short-lived. They open for approximately five to nine hours for one day only. Flowers open sequentially from the base to the apex of the inflorescence.

In *H. hemerocallidea*, mostly one to three flowers open per day with an interval of about an hour between opening which seemingly encourages cross pollination. There is an interval of a week between the development of new inflorescences on the same plant in this species. In *H. obtusa*, up to eight flowers per inflorescence open on the same day and flowers open simultaneously on several inflorescences in a single plant. This flowering strategy gives rise to fields of yellow in the Escourt and Weenen districts in summer. Solitary and honey bees are a common sight in flowers of *Hypoxis* during the early hours of the day. It is not uncommon for a bee to spend much time in the larger flowers such as those of *H. hemerocallidea*, usually with head facing the inside of the flower, loading its pollen sacs. The yellow pollen grains are easily visible through the transparent pollen sacs of bees. In the smaller flowered species, such as *H. argentea* and *H. filiformis* bee visits are expeditious and often impossible to photograph.

**Horticulture**

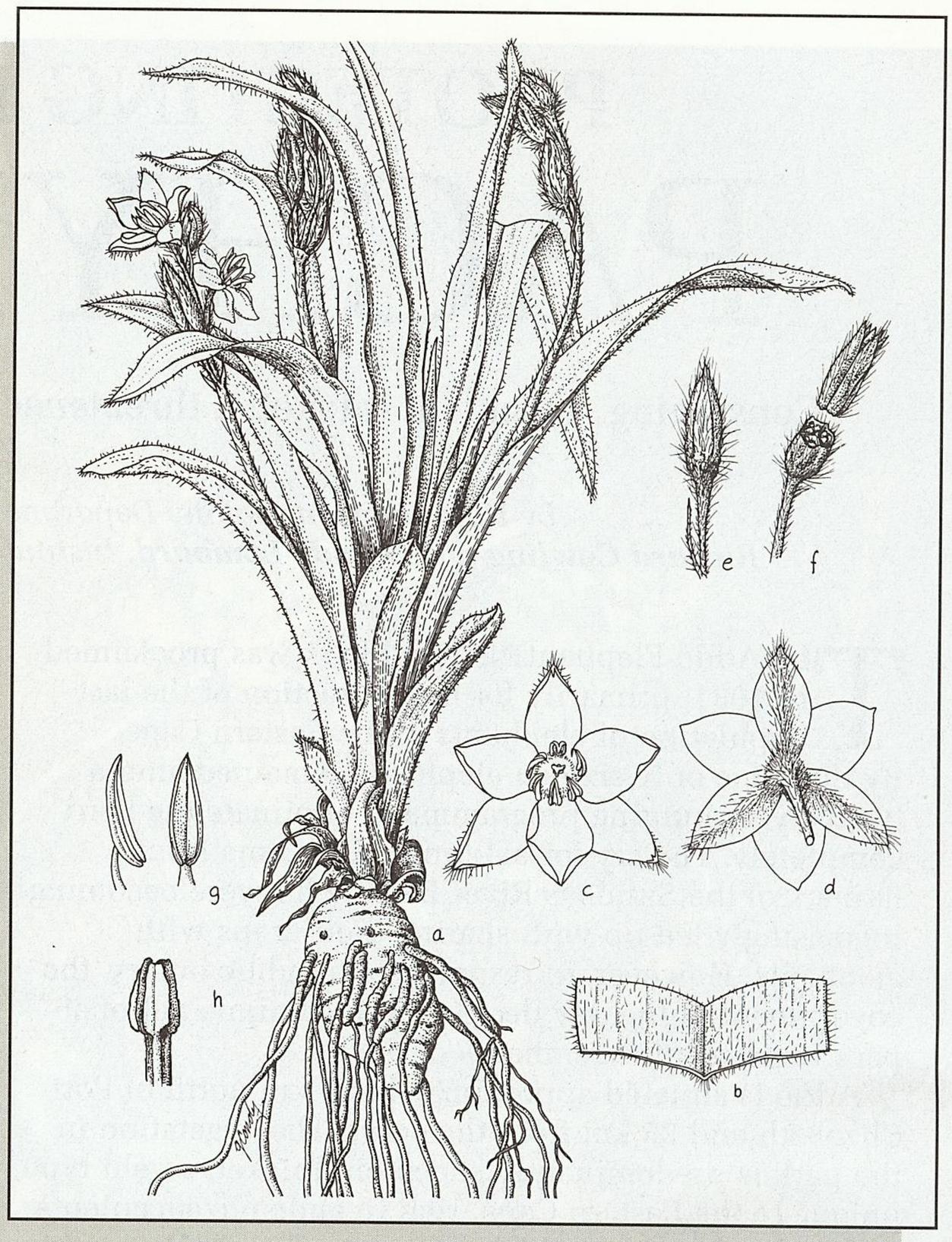
Yellow stars are used as garden ornamentals because of their showy flowers and their tolerance of dry conditions. At present only a few species of *Hypoxis* are in cultivation. *H. hemerocallidea*, *H. colchicifolia* and *H. angustifolia* have thus far entered the nursery trade. For showiness of colour, *H. obtusa* would also be worth promoting as a garden plant. Once in cultivation, yellow stars are relatively simple to maintain. It is however, difficult to rapidly germinate *Hypoxis* seeds under standard nursery conditions. Untreated seeds remain dormant for about one year before germination. Corm division is a more rapid and guaranteed form of propagation. *Hypoxis parvula* (with white or yellow flowers) and *H. membranacea* (white-flowered) hybridize with *Rhodohypoxis* in nature.

## THE MORPHOLOGY OF *HYPOXIS* using *H. hemerocallidea* as an example

*Hypoxis* plants are perennial geophytic herbs that are able to survive unfavourable conditions in the form of an underground vertical rootstock which is called a corm **(a).** During favourable conditions (spring and summer) roots, leaves and flowering stems are produced from the rootstock. Corms are fleshy, mucilaginous and mostly single. In some species a corm may develop lateral branches and each branch in turn bears an aerial shoot thus creating a clump effect above the ground. Branching in corms may also arise when the apical point of a corm is damaged. Internally, corms are white, yellowish green, bright yellow or orange and the colour blackens with oxidation.

Leaves arise directly from the apex of the corm and are generally arranged one above the other in three defined vertical rows that radiate outwards from the centre of the plant. Leaf bases in some species are enclosed in a sheath which creates a column effect, known as a pseudostem or false stem. Leaves range from linear to broadly lanceolate, are erect or prostrate and are usually hairy **(b)**; except in a few species where hairs are lacking.
In some species younger leaves are markedly hairy which implies that at maturity hairs are deciduous while in other taxa, hairs are persistent in mature leaves.

Flowering stems are contemporary with leaves, axillary, hairy and are usually unbranched. The number of flowers per inflorescence varies from two to twelve. In a cluster, flowers may be opposite, alternate or in a whorl of three. Flowering stems may be broadly classified into two types: those with more than four flowers and those with less than four flowers. Each flower is borne on a short pedicel and is supported by a narrow hairy bract. Flowers are symmetrical, with usually six free tepals - three inner and three outer **(c).** In open flowers, tepals are yellow or occasionally white on the upper surface and, green and hairy on the lower surface. Outer tepals are narrower and have a higher degree of greenness and hairiness on the lower surface than the inner tepals **(d).** Six free stamens **(g)** are inserted at the base of the tepals. Generally, the style is short and thick, equal to or shorter




that the robust stigma **(h).** In contrast, *H. parvula* and *H. membranacea* are characterized by a long narrow style which is two or more times the length of the minute stigma. Both species have been noted to hybridize naturally with members of *Rhodohypoxis*.

The fruit in *Hypoxis* is referred to as a pyxis (a capsule in which the apical section splits off as a lid at maturity). In *Hypoxis*, the apical section is formed by a crown of persistent tepals **(e)** which drops off at dehiscence **(f).** Seeds are subglobose, hard, black, glossy and smooth, or dull and papillate.

These intergeneric hybrids may well be worthy of cultivation as pot plants since many cultivars of *Rhodohypoxis* are already popular in Europe as pot plants.

**Medicinal and other uses**
For centuries *Hypoxis* species have been utilized as muthi by the different tribes in southern Africa. Roots or corms of *Hypoxis*, for instance are used by Zulu traditional healers in their treatment of intestinal parasites, infertility, urinary infections, heart weakness, cough, nausea, vomiting, palpitations and nervous disorders. An infusion of the tuber of *H. colchicifolia* (earlier name *H. latifolia*) is taken as an emetic against fearful dreams which is indicative of heart weakness. The Sotho use *Hypoxis* as a charm against thunder, lightning and storms. Leaves of *H. rigidula* and *H. hemerocallidea* are used to make rope. Local people in the Escourt area make a black polish from corms of *H. obtusa* which they apply to the floors of their huts (according to Fred Smith of Bushmansriver Gifts). In times of famine, corms of some species of *Hypoxis* are boiled or roasted for food by the Sotho and Xhosa people.

Sterols and sterolins from corms of *Hypoxis* boost the immunity of patients suffering from various ailments. One such sterol, hypoxoside is readily converted to rooperol, a biologically active compound that inhibits the proliferation of certain cancer cells and HIV-1. Around 1970, a drug based on B-Sitosterol-D-Glucoside, isolated from *Hypoxis* corms, proved to be effective in the treatment of prostate hypertrophy and became available in West Germany under a registered trade name. In 1997, the South African public was introduced, through the media (including the World Wide Web) to a miracle drug called 'Moducare'. This immunity booster is claimed to help patients suffering from prostatic hypertrophy, AIDS, TB, ME, arthritis and psoriasis. 'Moducare', which is advertised as the 'African Potato Plant' extract or tablet, is available from health shops and pharmacies without prescription. The drug was originally based on phytosterol extracts from corms of *H. hemerocallidea*. It is important to note that contrary to continual reports and advertising, sterols from *H. hemerocallidea* are no longer used in the manufacture of 'Moducare' capsules. Instead isolates from various other plant sources such as soya beans are being used in the production of this drug.

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