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ORIGINAL RESEARCH

What is in a name? Scientific name changes of potentially poisonous plants and fungi in South Africa

CJ Botha,[1] AE van Wyk[2]

[1] *Department of Paraclinical Sciences, Faculty of Veterinary Science, University of Pretoria, South Africa*
[2] *Department of Plant and Soil Sciences, Faculty of Natural and Agricultural Sciences, University of Pretoria, South Africa*
Corresponding author, email: *christo.botha@up.ac.za*

Changes over the past five decades in the scientific names of some potentially poisonous plants and toxigenic fungi in South Africa are briefly reviewed. Some of the reasons why taxonomists change names are highlighted. In recent years, DNA sequencing data have contributed considerably towards establishing phylogenetic relationships among plants, often resulting in changes in generic circumscription and, consequently, the names of species. Philosophical differences between the phylogenetic and the evolutionary schools of plant classification are briefly explained as these may manifest as different classifications for the same group of plants. Although choice of classification remains the prerogative of the end-user of plant names, in this review, the classifications for plants currently adopted by the South African National Biodiversity Institute (SANBI) in its online database, Plants of Southern Africa (POSA), were followed. Noteworthy generic changes include *Pachystigma* to *Vangueria*, *Homeria* to *Moraea*, and *Urginia* to *Drimia*. Following much controversy, the species native to southern Africa that were formerly treated as *Acacia* are now classified in either *Vachellia* or *Senegalia*, with the genus name *Acacia* being retained for the mainly Australian members of the group, the latter commonly known as wattles. Former southern African members of *Acacia* implicated in poisoning include *Vachellia erioloba* (camel thorn), *Vachellia sieberiana* var. *woodii* (paperbark thorn), and *Senegalia caffra* (common hook thorn).

Keywords: poisonous plants, scientific names, toxigenic fungi, *Vachellia*, *Vangueria*

Introduction

The question in the title is a direct quotation from Shakespeare's Romeo and Juliet, in which Juliet utters the words, "*What's in a name? That which we call a rose / By any other name would smell as sweet*" (Shakespeare 2020). During the last five decades, the scientific names of several potentially poisonous plants and fungi have been revised. There are essentially two reasons why taxonomists change scientific names, i.e. to comply with the rules that regulate the scientific naming of plants, algae, and fungi (nomenclature), or because of a better understanding of the status and relationship (classification) of a particular plant or group of plants. We start this review by providing a very brief background on these two reasons for name changes.

In the past, when scientific literature was not readily available to botanists involved in the naming of plants, a common nomenclatural reason for name changes was the discovery of an older, validly published name that had been overlooked. According to the rules (Turland et al. 2018), the oldest name (from a specified commencement date) enjoys priority. Nowadays, the older botanical literature is fairly well studied and name changes, because of purely priority reasons, are rare. According to the rules, special herbarium specimens, so-called types, determine the application of names. The species represented by a particular type specimen is the one to which a name applies. Because of the poor quality of some older type specimens, they were sometimes misidentified with the result that names were applied to the wrong species. When such misapplications of a name are discovered, the mistakes must be rectified.

In recent years, most name changes have been the result of improvements in classifications, a development that has benefited considerably from the use of DNA sequencing data to establish relationships among plants. The results of such studies are usually presented in the form of a phylogenetic tree. Without going into any unnecessary detail in this review, it is important to point out that there are two main philosophical approaches on how to turn the results of a phylogenetic study into a practical plant classification. These are referred to as the phylogenetic and the evolutionary schools of plant classification. Essentially a phylogenetic classification in its groupings emphasises mainly the presumed phylogeny (genealogy) of the organisms, whereas an evolutionary classification is based on both the phylogeny and the evolutionary changes (physical appearance) of organisms (Mayr & Bock 2002). Name changes due to a better understanding of phylogeny are most common at generic level, and considering that a species name consists of the combination of a generic name and a specific epithet, a change in generic classification inevitably results in a change in the species name.

For end-users of plant names, evolutionary classifications are often more logical as the members of a particular genus can be readily identified from their morphology, whereas groups in phylogenetic classifications can at times be very heterogeneous in appearance. Unfortunately, for end-users, principles of the phylogenetic school are currently the more popular for constructing classifications (Van Wyk 2007). It needs to be emphasised that choice of classification is not regulated by any rules or authority, but is the prerogative of the end-user. It is therefore possible that a species can be referred to under different

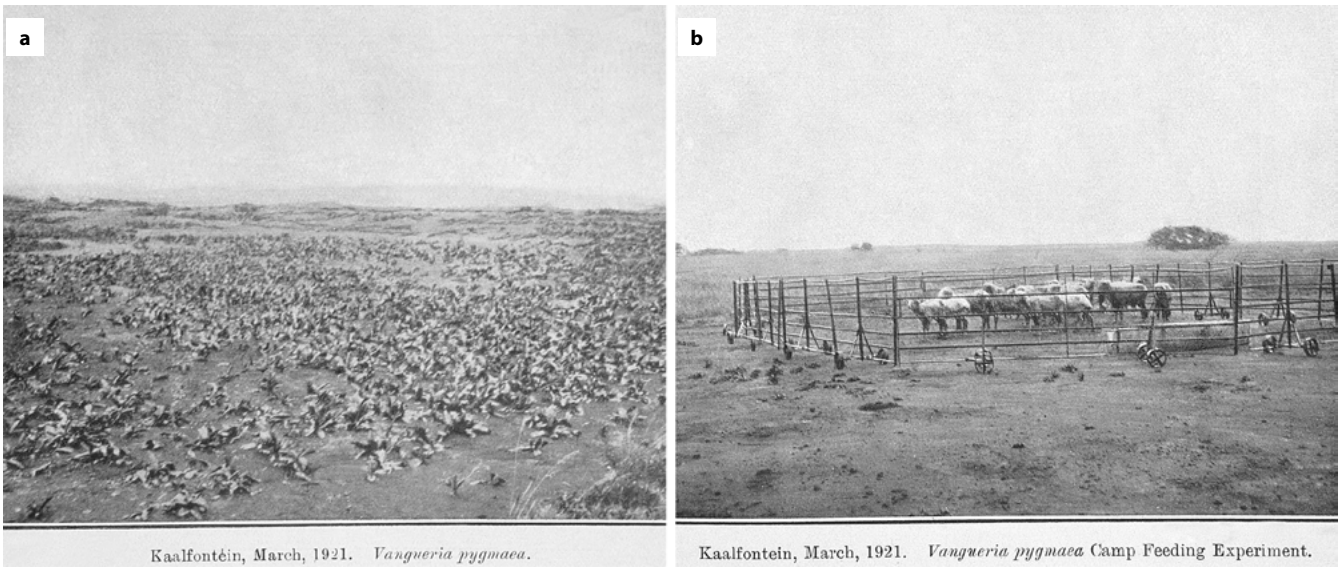

Figure 1a & b: Feeding experiment conducted by Theiler, Du Toit and Mitchell at Kaalfontein to investigate the cause of gousiekte (Theiler et al. 1923)

names depending on the classification that has been adopted. For example, an evolutionary classification may recognise the genus *Pachystigma* Hochst., but in a phylogenetic classification it is treated as a *Vangueria* Juss. (Lantz & Bremer 2005). Hairy gousiektebossie can, therefore, depending on the classification followed, be referred to as either *Pachystigma pygmaeum* (Schltr.) Robyns or *Vangueria pygmaea* Schltr. A species can only have one correct scientific name; however, such a name is dependent on the particular classification that has been adopted. In practice, different authors can consequently use different names for the same species. Hence, to ensure uniformity, editors of scientific journals often require authors to follow a particular classification system. Likewise, national herbaria adopt and recommend, for a group of plants, a classification to serve as guideline for the non-botanical end-users of plant names. Nevertheless, this does not necessarily mean only the recommended classification is "correct" and the others are "wrong".

In this review, for plants, we have followed the classifications currently adopted by the South African National Biodiversity Institute (SANBI) in their online Plants of Southern Africa (POSA) database (SANBI 2021), and for fungi, the Catalogue of Life database (Bánki et al. 2021). The scientific name changes will be grouped under the target organ or system primarily affected. This review only highlights some scientific name changes of the more common poisonous plants and toxigenic strains of fungi. Author citations are supplied for scientific names at first mentioning in the text. Note that these citations are not part of the scientific name, but are supplied for purposes of precision, for example, to avoid confusion with scientific names with the same spelling but applied to different taxa.

Cardiovascular system

During the period under review, it is noteworthy that scientific names sometimes reverted to their historical forms. When Sir Arnold Theiler and co-workers conducted field experiments in 1921 to investigate the cause of gousiekte at Kaalfontein (an area close to the OR Tambo Airport) the hairy gousiektebossie was known as *Vangueria pygmaea* (Figure 1a & b) (Theiler et al. 1923).

The hairy gousiektebossie became *Pachystigma pygmaeum*, but was changed back to *Vangueria pygmaea* (Figure 2a) in 2005 (Lantz & Bremer 2005). The names of two other *Pachystigma* species were also changed, *viz*. *Vangueria thamnus* (Robyns) Lantz (smooth gousiektebossie) and *Vangueria latifolia* (Sond.) Sond. (large-leaved gousiektebossie). Another gousiekte-

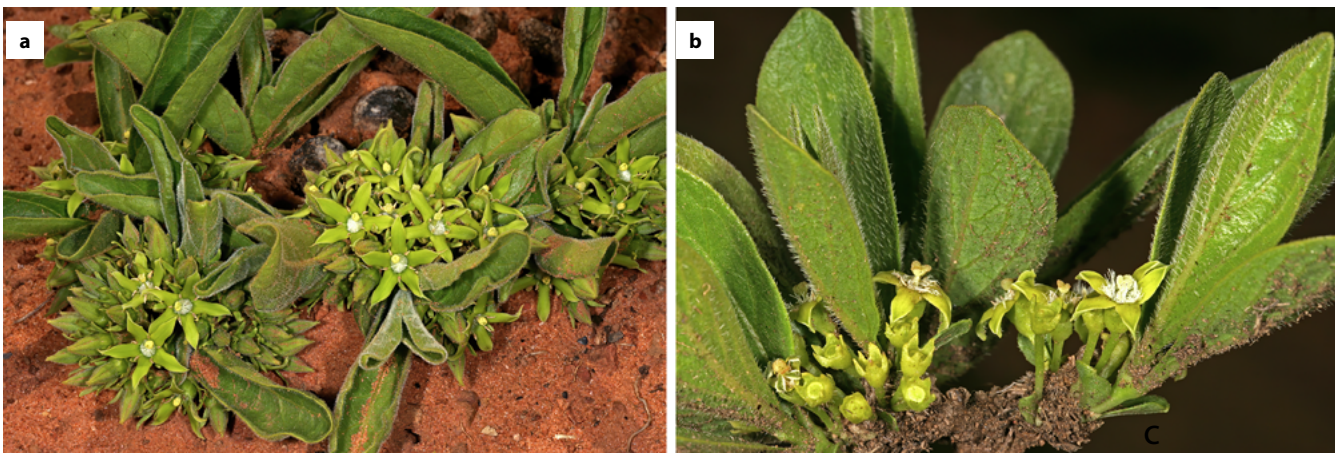

Figure 2: (a) *Vangueria pygmaea* (=*Pachystigma pygmaeum*) and (b) *Bridsonia chamaedendrum* (=*Pygmaeothamnus chamaedendrum*)
Photographs: A.E. van Wyk

causing plant that has undergone a species name change is *Fadogia monticola* Robyns (wild date), which was included in the synonymy of *F. homblei* De Wild. (Verdcourt 1981). The small goorappel, *Pygmaeothamnus chamaedendrum* (Kuntze) Robyns, often confused with gousiektebossies, has been reclassified as *Bridsonia chamaedendrum* (Kuntze) Verstraete & A.E.van Wyk (Figure 2b) (Verstraete et al. 2018). The non-toxic *Pygmaeothamnus zeyheri* (Sond.) Robyns, however, has retained its name (Verstraete et al. 2018).

In the 1980s, the Natal yellow tulp, from KwaZulu-Natal and Mpumalanga, was referred to as *Homeria glauca* (J.M.Wood & M.S.Evans) N.E.Br. and the Transvaal yellow tulp was *Homeria pallida* Baker (Vahrmeijer 1981). However, these two species are now united as one species under the *Moraea* Mill. genus with the name *M. pallida* (Baker) Goldblatt (Figure 3a) (Goldblatt et al. 2013). *Homeria miniata* (Andrews) Sweet, the red tulp, is now also classified under *Moraea*, namely *M. miniata* Andrews (Goldblatt et al. 2013). Clinically, *H. pallida* intoxications were usually associated with diarrhoea, whereas *H. glauca* and *H. miniata* usually caused constipation. This might be ascribed to slightly different bufadienolide-type cardiac glycosides contained by these species (Kellerman et al. 2005). This is a case where veterinary evidence may well suggest a reconsideration of the current taxonomic status of these two entities.

The bulbous, bufadienolide-containing *Urginia* Steinh. species of veterinary importance are now *Drimia* Jacq. ex Willd. species, namely *D. sanguinea* (Schinz) Jessop (=*U. sanguinea* Schinz, Transvaal slangkop, sekanama [Figure 3b]), *D. altissima* Hook.f. (=*U. altissima* [L.f.]) Baker, maerman) and *D. physodes* (Jacq.) Jessop (=*U. physodes* [Jacq.] Baker) (Manning et al. 2003).

In 1978, the new genus *Tylecodon* Toelken was established to accommodate a number of species earlier placed in *Cotyledon* L. (Tölken 1978). The name of the new genus is an anagram of *Cotyledon*. Some *Tylecodon* species, such as *T. wallichii* (Harv.) Toelken (Figure 3c) and *T. ventricosus* (Burm.f.) Toelken, contain cumulative, neurotoxic bufadienolides, which are the cause of krimpsiekte (Botha 2016).

The scientific names of some common and often weedy species, widely distributed in South Africa, have also changed. The common milkweed, *Asclepias fruticosa* L. has changed to *Gomphocarpus fruticosus* (L.) W.T.Aiton (SANBI 2021). What was previously regarded as the introduced Mexican poppy, *Argemone subfusiformis* Ownbey, is now identified as *A. ochroleuca* Sweet subsp. *ochroleuca* (*A. subfusiformis* is still recognised, but it does not occur in South Africa) (SANBI 2021). The yellow oleander, an ornamental small garden tree and alien invasive weed long known as *Thevetia peruviana* (Pers.) K.Schum., is now *Cascabela thevetia* (L.) Lippold (Lippold 1980).

Nervous system

There were also name changes of plants that may cause neurological syndromes (Kellerman et al. 2005). The caustic creeper, *Sarcostemma viminale* (L.) R.Br., is now classified as a species of *Cynanchum* L, namely *C. viminale* (L.) L. (Figure 4a) (Meve & Liede-Schumann 2012). The stootsiektebossie has undergone a genus name change from *Matricaria nigellifolia* DC. to *Cotula nigellifolia* (DC.) K.Bremer & Humphries (Figure 4b) (SANBI 2021). *Solanum kwebense* N.E.Br. ex C.H.Wright, the cause of epileptiform seizures due to cerebellar atrophy and colloquially referred to as 'maldronksiekte' (Kellerman et al. 2005), has been synonymised and is now known as *S. tettense* Klotzsch (SANBI 2021).

A toxic fungal strain that may cause a neuromycotoxicosis of which the name has changed is *Stenocarpella maydis* (Berk.) B.Sutton (=*Diplodia maydis* [Berk.] Sacc.) (Bánki et al. 2021), the cause of a paretic/paralytic syndrome in ruminants referred to as diplodiosis. Another fungus, *Fusarium verticillioides* (Sacc.)

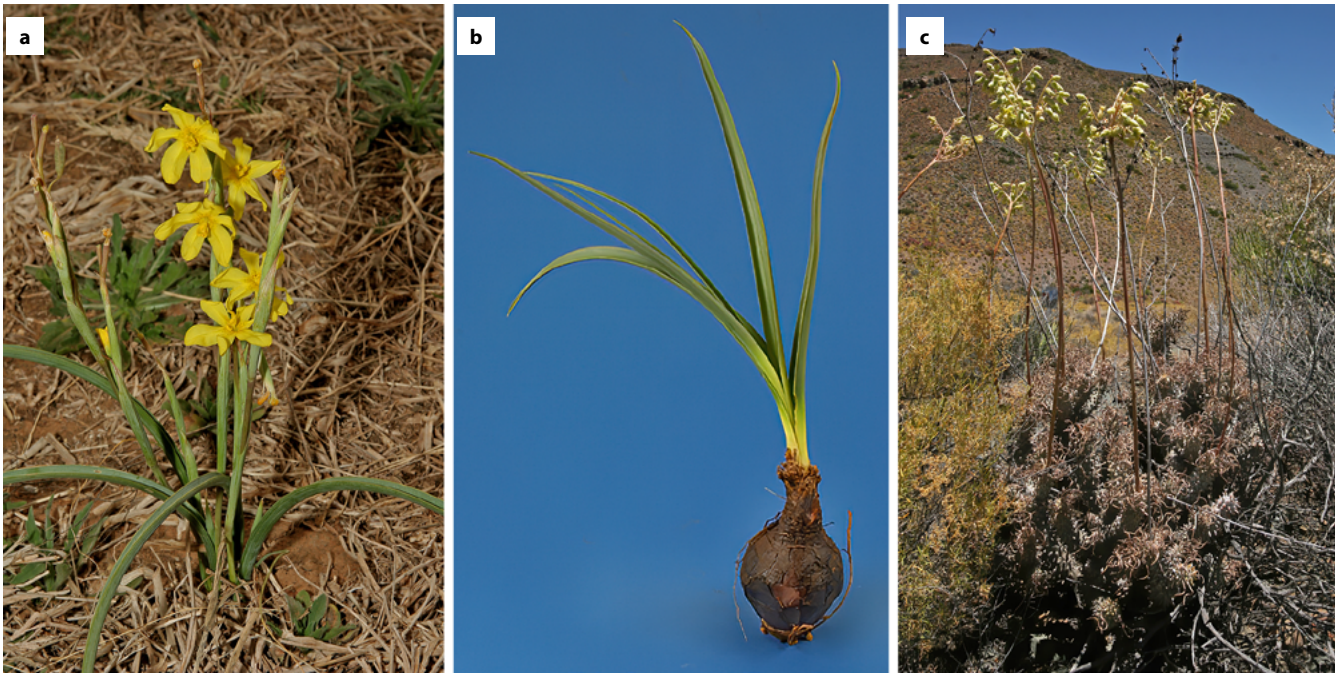

Figure 3: (a) *Moraea pallida* (=*Homeria pallida*), (b) *Drimia sanguinea* (=*Urginia sanguinea*) and (c) *Tylecodon wallichii* (=*Cotyledon wallichii*) Photographs: A.E. van Wyk (a, c) & C.J. Botha (b)

Figure 4: (a) *Cynanchum viminale* (=*Sarcostemma viminale*) and (b) *Cotula nigellifolia* (=*Matricaria nigellifolia*)
Photographs: C.J. Botha (a, b) & A.E. van Wyk (insert a)

Nirenberg (=*F. moniliforme* J.Sheld.) (Bánki et al. 2021), which synthesises fumonisin B_1, may cause a morbid softening of the cerebral white matter or leukoencephalomalacia (LEM) in equids (Kellerman et al. 2005). *Fusarium verticillioides* is classified as a member of the *F. fujikuroi* Nirenberg species complex (A. Jacobs [Mycology, ARC-Plant Protection Research Institute] pers. comm., 20 September 2021).

Hepatic system

A fungus, *Pseudopithomyces chartarum* (Berk. & M.A.Curtis) Jun F. Li, Ariyaw. & K.D.Hyde (Ariyawansa et al. 2015), previously *Pithomyces chartarum* (Berk. & M.A.Curtis) M.B.Ellis, synthesises the mycotoxin, sporidesmin, which is responsible for bile duct necrosis, periductal fibrosis and subsequent obliteration of bile ducts and secondary photosensitisation known as facial eczema (Kellerman et al. 2005). Another plant that may cause hepatogenous photosensitisation in karroid areas is the vuursiektebossie or *Athanasia minuta* (L.f.) Källersjö subsp. *minuta*, previously known as *Asaemia axillaris* Harv. (Källersjö 1991).

Gastrointestinal system

The bushveld chincherinchee, *Ornithogalum prasinum* Ker Gawl., is now referred to as *Albuca prasina* (Ker Gawl.) J.C.Manning & Goldblatt (Figure 5a) (Manning et al. 2009), although the Star-of-Bethlehem (Figure 5 b & c) and a few other chincherinchees are still being retained in *Ornithogalum* L. The correct species name for the native southern African taxon that has long

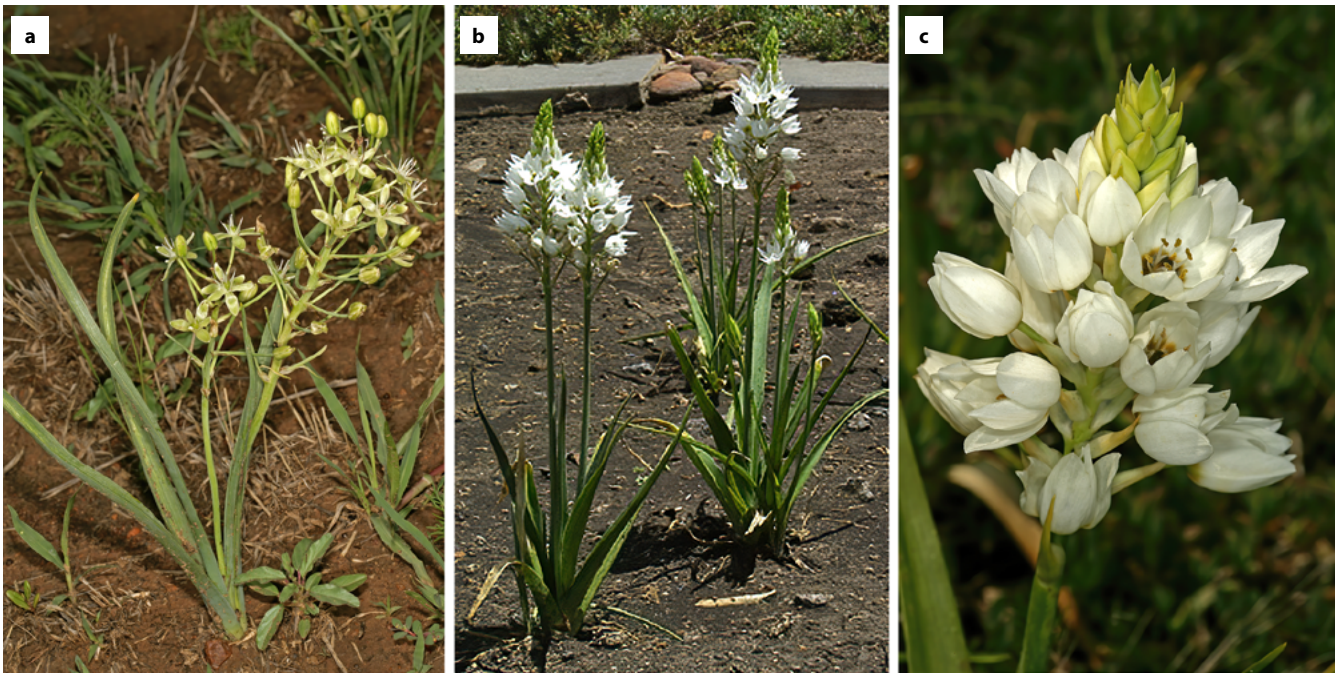

Figure 5: (a) *Albuca prasina* (=*Ornithogalum prasinum*) or bushveld chincherinchee, and (b & c) *Ornithogalum thyrsoides* (Star-of-Bethlehem)
Photographs: A.E. van Wyk (a, c) & C.J. Botha (b)

Figure 6: (a) *Lasiosiphon burchellii* (=*Gnidia burchellii*) and (b) *Chrysocoma ciliata* (=*C. tenuifolia*)
Photographs: P.C. Zietsman (a) & C.J. Botha(b)

been misidentified as *Solanum incanum* L. (bitter apple) is *S. lichtensteinii* Willd. (SANBI 2021).

Nowadays, it is sometimes more difficult to decipher and translate the Latin name as a guide to remember the plant, for example, the genus name *Lasiosiphon*, which means "woolly tube", aptly described the flowers of the harpuisbos (*L. burchellii* Meisn.) (Figure 6a) and Januariebos (*L. polycephalus* [EMey. ex Meisn.] H.Pearson) . The genus names for a while have changed to *Gnidia* L., e.g. *Gnidia burchellii* (Meisn.) Gilg and *G. polycephala* (E.Mey. ex Meisn.) Gilg ex Engl., but at the time of writing SANBI again refers to them as *L. burchellii* and *L. polycephalus* (Beaumont et al. 2009). Furthermore, the species name for *Chrysocoma tenuifolia* P.J.Bergius, meaning "thin leaves", appropriately described the narrow, recurved leaves of the bitter bush, nevertheless, its name has changed to *Chrysocoma ciliata* L. based on the fact that these two species are regarded as conspecific (Figure 6b) (Wijnands 1985).

Haemopoietic system

There used to be much controversy on the renaming of the South African species of *Acacia* Mill. (e.g. Moore et al. 2010), but the dust has started to settle and the new classification has been widely adopted. In the revised classification, the traditionally broadly defined genus *Acacia* was split into five separate genera to better reflect evolutionary relatedness, a classification that in itself has much merit. But instead of using an existing generic name (*Racosperma* Mart.) for the largest genus containing the mostly unarmed Australian wattles, a proposal to reserve the name *Acacia* for the wattles was approved during a special vote at an International Botanical Congress (a procedure allowed by the rules of nomenclature). The acacias native to Africa are now classified in the genera *Vachellia* Wight & Arn. (which, before the vote that brought about the change, would have stayed *Acacia*) and *Senegalia* Raf. (Kyalangalilwa et al. 2013). Some South African species can contain high concentrations of cyanogenic glycosides (Kellerman et al. 2005). Suggested changes to the genus name of some acacias species are: *Acacia erioloba* E.Mey. to *Vachellia erioloba* (E.Mey.) P.J.H.Hurter (camel thorn); *A. sieberiana* DC. var. *woodii* (Burtt Davy) Keay & Brenan to *Vachellia sieberiana* (DC.) Kyal. & Boatwr. var. *woodii* (Burtt Davy) Kyal. & Boatwr. (paperbark thorn) and *A. caffra* (Thunb.) Willd. to *Senegalia caffra* (Thunb.) P.J.H.Hurter & Mabb. (common hook thorn) (Kyalangalilwa et al 2013).

Available resources

The following websites are useful to check for the currently accepted names of taxa, but keep in mind they may not always agree on the choice of classification:
South African National Biodiversity Institute https://newposa.sanbi.org (including a link to the official annual release of the South African National Plant Checklist).
African Plants Database
http://www.ville-ge.ch/musinfo/bd/cjb/africa/index.php
http://www.plantsoftheworldonline.org
https://www.catalogueoflife.org
http://worldfloraonline.org (include the e-Flora of South Africa)
http://www.indexfungorum.org
https://www.mycobank.org

Dedication

This brief review is dedicated to the memory of Johannes (Hans) Vahrmeijer (1942/10/25–2021/07/17). Hans Vahrmeijer was a qualified botanist with a keen interest in poisonous plants. In 1981, he published an illustrative guide '*Poisonous plants of southern Africa that causes stock losses*', Tafelberg Publishers.

Conflict of interest

The authors declare that no competing interest exists.

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ORCID

CJ Botha https://orcid.org/0000-0003-1535-9270

AE van Wyk https://orcid.org/0000-0002-0437-3272

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