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SYSTEMATICS

A brief history of *Aloe* discovery and popularisation in southern Africa

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Background – The discovery, description and popularisation of aloes from southern Africa (here defined as Namibia, Botswana, Swaziland, Lesotho and South Africa) has not progressed in a linear manner since the region first started receiving the attention of botanists and plant collectors during the late 17[th] century. New species of *Aloe* continue to be recognised and described in the 21[st] century.
Methods – We track the above historical aspects in relation to several factors: geographic access, horticultural interest, production of accessible, popular books, and the efforts of highly productive individuals such as Gilbert Westacott Reynolds. The influences of his and subsequent illustrated works are considered, particularly as catalysts of further research and botanical exploration in the region.
Results – An analysis of taxa distribution patterns in relation to collector attention and terrain diversity reveals historically overlooked locales which may yet yield further new species.

Key words – *Aloe*, Asphodelaceae / Aloaceae, botanical exploration, history, Reynolds, southern Africa.

INTRODUCTION

The Flora of southern Africa region (FSA: Namibia, Botswana, Swaziland, Lesotho and South Africa) harbours ± 150 members of the genus *Aloe* L., of which around 114 are endemic to the region (Aloes of the World Database 2010). Undoubtedly the foremost researcher on southern African aloes in the modern era is Gilbert Westacott Reynolds (1895–1967). His interest in the group began in about 1930 when he collected his first aloe. In the ensuing twenty years, he travelled over 170,000 km in southern Africa to study and photograph aloes in the wild, all the while collecting herbarium specimens (Walker 2010). This passion for aloes resulted in the publication of a seminal work on the genus, *The Aloes of South Africa* (Reynolds 1950, with three later editions), which covered in detail the 133 aloes then recognised regionally. Reynolds described 26 new aloes from the FSA region that are still regarded as current taxa and with a total of 102 new names published by him for the genus; he was the most prolific publisher of *Aloe* names of all time (Walker 2010). He did not stop his investigation of aloes at the borders of southern Africa, but continued to travel and study them throughout their distribution range. He ultimately produced a total of 122 publications, eight of which were books (Walker 2010). He followed his monumental work *The Aloes of South Africa* with a similarly-styled and complementary publication titled *The Aloes of Tropical Africa and Madagascar* (Reynolds 1966).

This article summarises our perspective on the influences of publications by Reynolds, and subsequent illustrated works by other authors, particularly as catalysts of further research and botanical exploration in the region. Furthermore, an analysis of taxa distribution patterns in relation to terrain diversity and previous collector attention is presented that reveals historically overlooked locales which may yet yield further new species.

PRE 1950

Prior to 1900, a total of 195 names had been published in the genus *Aloe* for plants from southern Africa. However, a mere 43 of these are still regarded as good taxa. In the fifty years (1901–1950) prior to the publication of *The Aloes of South Africa* (Reynolds 1950) a further 149 new *Aloe* names were published for the region, with 81 of these still current. During this period there were six prominent students of the

genus *Aloe* in southern Africa who, between them, published 124 new names, of which 76 are still regarded as current (table 1). Reynolds is, unsurprisingly, foremost amongst these authors.

It was at the beginning of the 20th Century that Alwin Berger (1871–1931), then Curator of Sir Thomas Hanbury's famous La Mortola Gardens near Ventimiglia in Italy, published monographic treatments of the genus (Berger 1905, 1908). An amended form of his proposed infrageneric classification for *Aloe* has survived to the present day, mainly because it was adopted by Reynolds (1950) in his influential publications (Figueiredo & Smith 2010).

POST 1950

On completion of his fieldwork in southern Africa, and in writing up his authoritative work in 1950, Reynolds wrote (p. 67): "The aloes of South Africa have, it seems, been well investigated, and it does not appear that many – if any – new species still remain to be discovered in South Africa". This was a rather bold statement to make and he was indeed proven to be very wrong. However, the gravity with which such a statement from the meticulous and highly respected expert on the genus would have been taken likely lulled taxonomists into a false sense of finality on the taxonomy and diversity of the regional group. Accordingly, in the decade following Reynolds (1950) only one species, *A. modesta* Reynolds, was additionally described. However, *Aloe* scholars eventually awoke to remaining opportunities and in the fifty years (1951–2000) following publication of his book, a further 26 new names were published for southern Africa. Twenty three of these still upheld as current taxa (fig. 1). Notably, only one of these new names was published by Reynolds, who post-1950 almost wholeheartedly dedicated his attention to aloes found elsewhere in Africa, and Madagascar.

The past decade (2001–2010) has seen the publication of a further thirteen new aloe names (all still current) in the FSA region (fig. 1). It is during this recent period, and to some extent the latter half of the 20th century, that joint authorship of new *Aloe* names has become more common practice: seventeen new names published since 1950 were authored by more than one person. The most productive authors during this period are detailed in table 2.

POPULAR ALOE BOOKS POST 1950

The publication of *The Aloes of South Africa* (Reynolds 1950) sparked an interest in aloes that would last for many decades. Arguably the book published in Afrikaans by Groenewald (1941) had primed this interest, albeit within a more restricted sector of society and academia. Aloes quickly gained horticultural interest and are still valued as feature plants, especially for gardens in areas where water is scarce. This ongoing enthusiasm has been fuelled by other illustrated works from various authors that have acted as catalysts for further research on the group, and botanical exploration within the region. These works include:

- *What aloe is that?* (Judd 1967)
- *South African aloes* (Jeppe 1969)
- *Aloes of the South African veld* (Bornman & Hardy 1971)
- *Aloes of South-West Africa* (Jankowitz 1975)
- *Guide to the aloes of South Africa* (Van Wyk & Smith 1996)
- *Aloe* in *Flora of Southern Africa* (Glen & Hardy 2000) [technical publication]

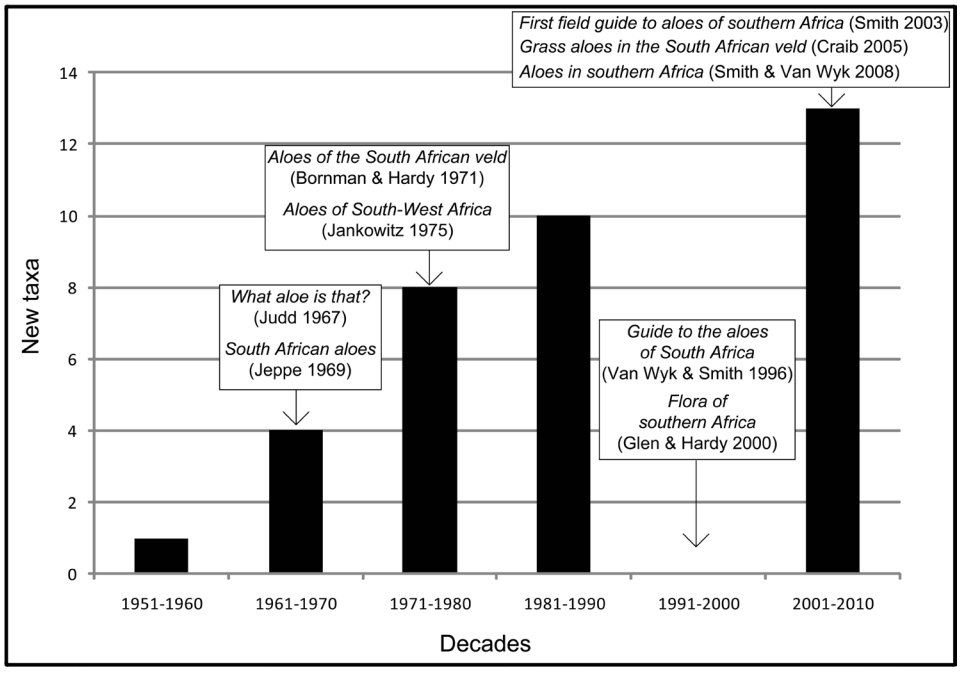

Figure 1 – Number of new *Aloe* taxa (still regarded as current) described for southern Africa in the six decades since publication of Reynolds' *The Aloes of South Africa* in 1950. Other milestone publications on the genus are also plotted on the graph to indicate the effect such publications have had on sustaining and driving an interest in the genus, reflected in the subsequent discovery and description of new taxa.

Table 1 – Six most productive authors of *Aloe* names from the FSA region between 1900 and 1950.

Researcher	Protologue date ranges	Names published	Current taxa
S. Schonland	1903–1911	19	10
A. Berger	1904–1922	24	12
I.B. Pole Evans	1914–1938	18	14
N.S. Pillans	1928–1939	11	9
B.A. Groenewald	1935–1939	14	6
G.W. Reynolds	1936–1950	38	25

- *First field guide to aloes of southern Africa* (Smith 2003)
- *Grass aloes in the South African veld* (Craib 2005)
- *Aloes in southern Africa* (Smith & Van Wyk 2008)

When the publication of these books is plotted on a graph showing the number of aloes described per decade (fig. 1), it becomes apparent that these publications possibly play a major part in sustaining and revitalising the interest in aloes, in both lay and scholarly sectors. Reference works available in print – especially well-illustrated ones – enable the ready identification of novelties and their subsequent referral to scientists for description. In the decade following such a publication, one sees an increase in the number of new taxa described. Conversely, no new books on aloes appeared during the period 1981–1990, and no *Aloe* taxa were described in the subsequent decade (1991–2000). It could, however, merely be coincidence as there are several other factors that may also influence this phenomenon.

TAXA DESCRIBED SINCE 1950

The 36 new aloes described since 1950 (that are still regarded as current taxa in the Aloes of the World Database) can be divided into four main categories, with several species falling into more than one of these (table 3). The four categories are:

- *Cryptic taxa*: these are aloes that are easily overlooked. Most grass aloes fall into this category since they usually have deciduous leaves and flower during the summer months. They are thus not obvious during the winter when most people would expect to find aloes flowering in the veld. Very small aloes also fall into this category. They invariably grow in rock crevices and under other plants and are thus easily overlooked. Their leaves also possess cryptic colouration, with spots or blotches that well camouflage them.
- *Localised taxa*: these are aloes that have a very restricted distribution range. Aloes in general tend to have rather small distribution ranges, but taxa that fall into this category are usually restricted to a very small area or mostly only one or two subpopulations. Many of these also grow in remote and often inaccessible areas and this explains why they were not discovered earlier, as they would have been bypassed by Reynolds in the course of his travels (see Reynolds 1950: map p. 68). Their discovery has often been more by luck than design.
- *Cremnophytes*: these are aloes that grow on sheer rock faces. This type of habitat is not accessible to most people and it is only the avid rock climber that will be able to reach and examine these plants. Many cremnophytes are also very localised and thus fall into the previous category as well.
- *Taxonomically challenging*: these are aloes that are difficult to classify and describe, or where there are differences in opinion as to the status of the taxon. Many of them belong to the maculate group, which are notoriously difficult to identify and order.

Table 2 – Six most productive authors of *Aloe* names from the FSA region in the period 1950–2010.

Researcher	Protologue date ranges	Names published	Current taxa
I.C. Verdoorn	1961–1979	4 (1 with D.S. Hardy)	4
W. Giess	1970–1974	3 (1 with H. Merxmüller)	3
J.J. Lavranos	1971–1973	3	2
D.S. Hardy	1971–1987	7 (3 with H.F. Glen; 1 with I.C. Verdoorn)	7
E.J. van Jaarsveld	1981–2009	11 (6 with various co-authors)	11
G.F. Smith	2003–2010	5 (2 with N.R. Crouch; 2 with R.R. Klopper)	5

FUTURE DISCOVERIES

Holland (1978) found that species diversity across the range of the genus *Aloe* increases directly with terrain diversity: 50% of genus diversity could be explained by this environmental variable. The terrain diversity of Holland (1978) was given as a function of local relief, degree of dissection of terrain, steepness or otherwise of slopes and the complexity of the array of slope facets. Two zones of high terrain diversity were shown by Holland (1978) for southern Africa; the first centred on the eastern seaboard, and the second on northern Namaqualand and the Richtersveld.

When, for southern Africa, one overlays these areas of high terrain diversity on a map detailing the number of *Aloe* taxa recorded per quarter degree grid square, a correlation is evident (fig. 2). Effectively, Holland (1978) predicted the site of discovery of new *Aloe* species on the West coast, for most discoveries there have been made subsequent to his publication. Northern Namaqualand and especially the Richtersveld area are fairly rich in aloes that are localised and endemic or near-endemic to this extremely arid and remote region. However, one anticipates that further aloes will be discovered here, based on its high terrain diversity and the limited exploration to date.

In considering fig. 2, there are some regions of high taxon diversity along the eastern seaboard and particularly along the eastern escarpment in Mpumalanga and Limpopo, but there is an obvious gap in the northern part of the Eastern Cape Province. This area of high terrain diversity is, based on collections to date, very poor in aloes. Although histori-

Table 3 – Characteristics of *Aloe* species discovered in southern Africa since 1950.

Taxon by decade, and year of protologue	Cryptic	Localised	Cremnophytes	Taxonomically challenging
1951–1960				
A. modesta Reynolds (1956)	●	●		
1961–1970				
A. monotropa I.Verd. (1961)		●		●
A. soutpansbergensis I.Verd. (1962)	●	●		
A. prinslooi I.Verd. & D.S.Hardy (1965)				●
A. namibensis Giess (1970)		●		
1971–1980				
A. buhrii Lavranos (1971)		●		
A. erinacea D.S.Hardy (1971)		●		●
A. esculenta L.C.Leach (1971)				●
A. chlorantha Lavranos (1973)		●		
A. dewinteri Giess (1973)			●	
A. argenticauda Merxm. & Giess (1974)				●
A. pictifolia D.S.Hardy (1976)		●	●	
A. corallina I.Verd. (1979)			●	
1981–1990				
A. dabenorisana Van Jaarsv. (1981)			●	
A. meyeri Van Jaarsv. (1981)			●	
A. reitzii Reynolds var. *vernalis* D.S.Hardy (1981)		●		
A. komaggasensis Kritz. & Van Jaarsv. (1985)		●		
A. inconspicua Plowes (1986)	●	●		
A. cooperi Baker subsp. *pulchra* Glen & D.S.Hardy (1987)	●	●		●
A. fouriei D.S.Hardy & Glen (1987)	●			
A. hardyi Glen (1987)		●	●	
A. marlothii A.Berger subsp. *orientalis* Glen & D.S.Hardy (1987)				●
A. ciliaris Haw. var. *redacta* S.Carter (1990)		●		●
2001–2010				
A. craibii Gideon F.Sm. (2003)	●	●		
A. kouebokkeveldensis Van Jaarsv. & A.B.Low (2004)		●		
A. omavandae Van Jaarsv. & A.E.van Wyk (2004)			●	
A. arborescens Mill. subsp. *mzimnyati* Van Jaarsv. & A.E.van Wyk (2005)		●	●	
A. chalissii Van Jaarsv. & A.E.van Wyk (2006)	●		●	●
A. kaokoensis Van Jaarsv., Swanepoel & A.E.van Wyk (2006)		●		
A. vanrooyenii Gideon F.Sm. & N.R.Crouch (2006)				●
A. pavelkae Van Jaarsv., Swanepoel, A.E.van Wyk & Lavranos (2007)			●	
A. juddii Van Jaarsv. (2008)		●		
A. hahnii Gideon F.Sm. & Klopper (2009)				●
A. kamnelii Van Jaarsv. (2009)		●		
A. neilcrouchii Klopper & Gideon F.Sm. (2010)		●		●
A. nicholsii Gideon F.Sm. & N.R.Crouch (2010)	●	●		●

cally quite remote and fairly inaccessible, the improvement in road infrastructure in recent years allows much better access. Further exploration in this region will undoubtedly lead to the discovery of new aloes.

Most *Aloe* novelties represented by herbarium specimens have been described; although taxonomic problems still exist in a few groups, most notable of which are the maculates and some populations of members of *Aloe* Section *Purpurascentes* Salm-Dyck. Further new descriptions are likely to flow from active fieldwork in rugged environments. In venturing forth in a directed manner botanists should bear in mind the statement by Reynolds that "…the little botanical knowledge that [I] have managed to acquire [on *Aloe*] has been gained the hard way – in the veld."

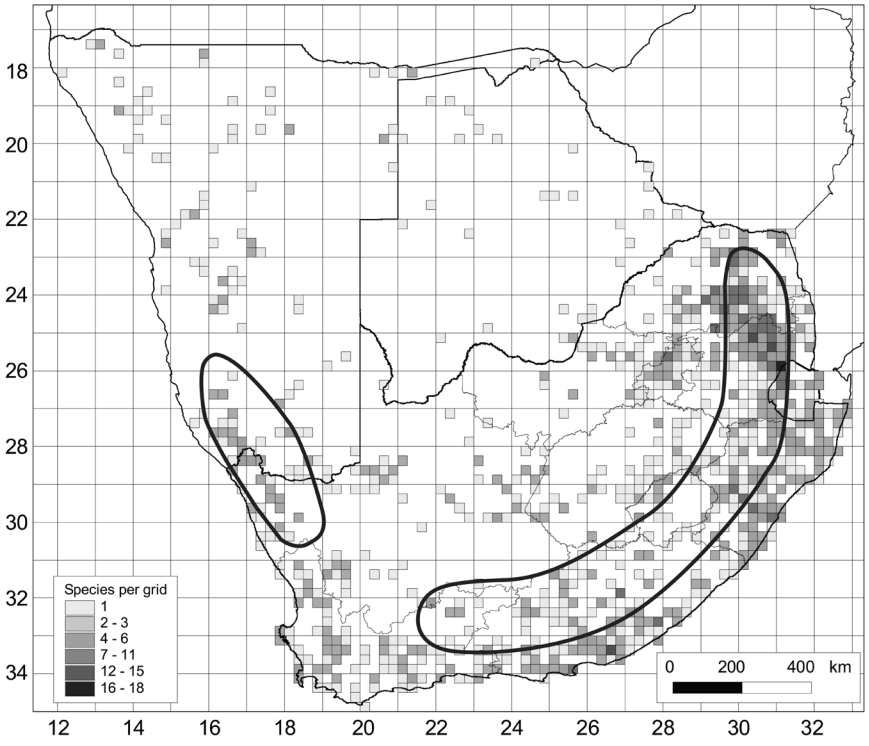

Figure 2 – Number of *Aloe* taxa per quarter-degree grid square in southern Africa, with an overlay of the two areas of high terrain diversity identified by Holland (1978), indicated by closed loops.

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