ENDEMIC FLORA

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Available information

The following synthesis was compiled from Hahn (2002) "The Endemic flora of the Soutpansberg".

In 2001 Van Wyk and Smith described 19 centres of plant endemism in their book "Regions of Floristic Endemism". The Soutpansberg Centre of Endemism was treated as an aggregated centre comprising both the Blouberg and Soutpansberg. The Blouberg and Soutpansberg do form a coherent whole but nonetheless should be treated as sub entities. For the purpose of this article all entities discussed refer to the Soutpansberg *sensu stricto* except if stated otherwise.

Centre of endemism

To try and define the term "*centre of endemism*" is a perplexing problem! In a biological context, an organism restricted to a localised area is referred to as an endemic. If this localised area has a high occurrence of endemics we generally refer to it as a "centre of endemism". Terrestrial centres of endemism are most easily understood in the context of islands. Islands are relatively isolated as they are surrounded by the sea. The problem comes when one looks at islands in close proximity to one another. As an example, should one see the Galapagos Archipelago as a centre of endemism or should one treat every individual island as a separate centre interacting with the other centres within the archipelago?

The above argument becomes more problematic when one tries to apply the above mentioned concepts of "centres of endemism" on a continental scale. Our first problem would be to try and ascertain natural boundaries to delineate centres of endemism. As an example, the Soutpansberg Centre of Endemism is a well-defined geographic area, which in turn is well delineated by its endemic fauna and flora.

The problem is compounded once one looks beyond the narrow endemic species. There are strong floristic alliances between the Soutpansberg CPE and the Maputuland CPE (van Wyk 1996). Should one consider these plants separately from the rest of the flora and thereby define them as Soutpansberg—Maputuland endemics?

From a biological point of view much can be gained from treating these plants separately. They can give us an indication of the probable evolution of the set biota. If one accepts the Soutpansberg—Maputuland endemics as separately delineated entities, one comes up with the following perplexing problems.

If the two given areas interact in similar ways with other centres of endemism, does one define this group as an archipelago-like concept of endemism, such as the Galapagos (except that the surrounding areas are terrestrial)? What does one call such an archipelago and where are its borders? White (1983) in his Vegetation Map of Africa named a specific floristic region the Afromontane Region defining it as an archipelago-like centre of endemism. Defining floristic regions as centres of endemism poses a problem as it excludes geographic centres of endemism. The above example nonetheless shows that it is possible for isolated regions scattered throughout Africa to interact.

Van Wyk & Smith (2001) made a numerical comparison of the 21 CPE recognized by them. The one entity which stood out was the Soutpansberg's large floral diversity, especially at generic and family level. Comparisons of the number of endemic species is difficult as the 45 (narrow endemic) taxa mentioned were compared to other centres' near-endemics tally which obviously is much higher. It is hoped that future studies based on the above argument can define more meaningful numerical comparisons. In addition data from the following areas is needed to make any meaningful comparison:

- Blouberg mountain (*sensu stricto*)
- Chimanimani mountain (*sensu stricto*)
- Haenertsburg area (extension of the Wolkberg Centre of Endemism?)
- Lebombo mountains (between Swaziland and Pafuri)
- Limpopo Valley
- Magabeng mountain
- Matopo hills
- Pietersburg plateau
- Strydpoortberg
- Waterberg

Summary statistics

Cowling & Hilton-Taylor (1997) pointed out that there is a direct correlation between species richness and high endemism in southern Africa with the exception of Kaokoveld and Karoo Centres.

Approximately 10% of the plants occurring within the Soutpansberg can be considered succulent. 55% of the endemic flora of the mountain can be regarded as succulents. A succulent can be defined as a plant which has the ability to store water in one or more of its morphologic components. The water is used when the plant is unable to absorb moisture through normal means, namely its roots. Nonetheless the plant will need a period where it must replenish its reserves. From this we can deduce that whatever conditions contributed to their evolution had to be

related to periods of water stress. This would suggest that succulent endemics are the progeny of a far distant relative that inhabited the area in times of lower than average moisture precipitation, then became isolated as the climatic situation improved. It therefore becomes clear that the Soutpansberg, throughout its history, has undergone periods of drought leading to the isolation of biological entities.

Of the 33 (10 as yet undescribed taxa not included) described endemic taxa, no fewer than 18 can be considered succulent, with eight being leaf succulents and nine stem succulents. Eight taxa can be considered trees, that is to say woody or semi-woody plants growing taller than 2 m. The **Asclepiadaceae** with five genera and six species displays the greatest generic diversity within a family. *Aloe* shows the greatest species diversity with five species. The monotypic genus *Zoutpansbergia* is the only genus endemic to the mountain, comprising one species. 19 species are found within the mist-belt with 10 restricted to the mist belt. Of these 10 species confined to the mist belt seven are succulents, one an epiphyte and two are herbs.

Approximately 58% of the endemic species occur within the mist belt region and no fewer than 30% are restricted to it. In times of drought a large percentage of the high altitude mountain flora survives on the mist. Very little is known about mist and its interaction with the environment. At Entabeni mist precipitation has been measured at an average of 1 366 mm per annum (Department of Environmental Affairs 1988). Taking into account Entabeni's average annual rainfall of 1 867 mm, the average total meteorological precipitation is 3 233 mm per annum.

Edaphic speciation has played an important role in the evolution of the southern African endemic flora. In the Cape CPE the highest levels of endemism are associated with fynbos vegetation on nutrient-poor soils largely derived from ancient, sterile quartzites (Cowling 1983). In the Wolkberg 71% of the endemics occur on soils derived from nutrient-poor quartzites (Matthews *et al.* 1993). The Pondoland CPE is exclusively associated with an outcrop of ancient quartzites (van Wyk & Smith 2001). Most of the Maputuland endemics occur on infertile sandy soils mostly associated with sea sand (van Wyk 1996). In both the Eastern Mountain Centre and Wolkberg Centre, most endemics are associated with grassland habitat (Hilliard & Burtt 1987; Matthews *et al.* 1993). Almost all of the Chimanimani endemics occur on quartzites (Wild 1964). As Wild (1964) stated, these soils form an unfavourable habitat from an evolutional perspective.

With the exception of the epiphyte, all taxa mentioned above grow in sandy soils derived from quartzite or sandstone. *Duvalia procumbens*, *Euphorbia rowlandii* and *Ceratotheca saxicola* are apparently restricted to sandy soil derived from Karoo sediments. Except for *Euphorbia aeruginosa* and the previously mentioned three plants all other endemic plants grow on soils derived from Soutpansberg quartzite.

Soutpansberg Endemic flora in the context of southern African centres of endemism

The following is a summary of the endemic flora of the Soutpansberg in relation to the other southern African centres of endemism (van Wyk and Smith 2001).

Cape Floristic Region

None of the endemic species show an affinity to this region.

Succulent Karoo Region

Quite a few Soutpansberg and Soutpansberg–Limpopo species are near endemic to this region. Of the three centres defined within this region only Gariep Centre displays an association with the endemic flora of the Soutpansberg

Gariep Centre

Stapelia clavicorona's floral structure most closely resembles *Tridentea herrei*, endemic to this centre. *Tylophora coddii's* closest ally *T. fleckii* could possibly be assigned to this centre even though it falls just outside its borders.

Maputaland–Pondoland Region

The Soutpansberg shares many near endemic species with the Maputaland centre of endemism but none of the endemic species of the Soutpansberg have close allies in the Maputaland—Pondoland region.

Albany Centre

Aloe angelica morphologically most closely resembles *A. thraskii*, near-endemic to the Albany–Pondoland centre of endemism. *Blepharis spinipes* is closely allied to *B. ilicina* which occurs in the Eastern Cape, and can possibly be ascribed to this centre.

Justicia montis-salinarum belongs to a section of five related species of which *J. orchioides* subsp. *orchioides* is endemic to this centre

Drakensberg Alpine Centre

None of the endemic species of the Soutpansberg show an affinity to this centre.

Barberton Centre

None of the endemic species of the Soutpansberg show an affinity to this centre.

Wolkberg Centre

Aloe petrophila is related to three species namely *A. swynnertonii*, *A. branddraaiensis* and *A. vogtsii*, with *A. branddraaiensis* being endemic to this centre.

Aloe soutpansbergensis is most closely related to *A. thompsoniae*, endemic to this centre.

Aloe vossii is most closely related to *A. verecunda* which displays a disjunct distribution between the Witwatersrand and Wolkberg.

Combretum vendae is most closely related to *C. nelsonii*, a near endemic to the Waterberg and Wolkberg Centres.

Encephalartos hirsutus is related to the complex of species mainly associated with this centre: *E. eugene-maraisii*, *E. dolomiticus*, *E. dyerianus*, *E. lehmannii*, *E. princeps* and *E. middelburgensis*.

Huernia nouhuysii in most closely related to *Huernia quinta* var. *quinta* near endemic to the Wolkberg—Waterberg Centre and *H. quinta* var. *blyderiverensis*, endemic to this centre

Khadia borealis is most closely related to *K. media*, endemic to the Haenertsburg area. The Haenertsburg area is presently not included in this centre but should be included as a sub-centre.

Orbeanthus conjunctus is most closely related to *O. hardyi*, endemic to this region.

Steptocarpus parviflorus subsp. *soutpansbergensis* is most closely related to *S. p*. subsp. *parviflorus* near endemic to the Soutpansberg and Wolkberg Centres.

Sekhukhuneland Centre

The Soutpansberg shares many near endemic species with this region, especially succulents.

Euphorbia zoutpansbergensis is most closely related to *E. sekukuniensis*, endemic to this centre.

Soutpansberg Centre sensu latu

The following endemic plants are shared between the Soutpansberg *sensu stricto* and the Blouberg:

- *Aloe angelica*
- *Combretum vendae sensu lato*
- *Dicoma montana*
- *Euphorbia aeruginosa*
- *Euphorbia zoutpansbergensis*
- *Huernia whitesloaneana*
- *Orbeanthus conjunctus*
- *Rhus magalismontana* subsp. *coddii*
- *Streptocarpus caeruleus*
- *Tylophora coddii*
- *Zoutpansbergia caerulea*

Chimanimani—Nyanga Centre

The delimitation of this centre is too broad. The Chimanimani and Nyanga should be classified as sub-centres.

Great Dyke Centre

None of the endemic species show an affinity to this region.

Kaokoveld Centre

None of the endemic species show an affinity to this region.

Griqualand West Centre

None of the endemic species show an affinity to this region

Waterberg centre (not defined by van Wyk and Smith 2001)

Euphorbia rowlandii said to be affiliated to *E. waterbergensis*, endemic to the Waterberg centre.

Encephalartos hirsutus is related to the complex of species of which *E. eugene-maraisii* is endemic to this centre.

This is a centre of divergence of the *Rhus magalismontana* complex of which subsp. *coddii* is endemic to the Soutpansberg.

Conclusion

- The Soutpansberg is a centre of biological endemism
- The endemic flora has not sprung up as a result of a single group diversifying into a multitude of forms.
- Succulents are the most dominant component of the endemic flora.
- No endemic annuals have been recorded.
- No endemic bulbs have been recorded.
- Only 30% of the endemic taxa could be considered habitat specific.

Major studies and publications

COWLING, R.M. & HILTON-TAYLOR, C. 1997. *Phytogeographic flora and endemism in Vegetation of southern Africa*, ed. R.M. Cowling, D.M. Richardson & S.M. Piers. Cambridge University Press, United Kingdom.

COWLING, R.M. 1983. Phytochorology and vegetation history in the eastern Cape. South Africa. *Journal of Biogeography* 10: 393–419.

DEPARTMENT OF ENVIRONMENTAL AFFAIRS 1988. *Soutpansberg Hiking Trail*. Compiled for the National Hiking Way Board.

HAHN, N. 2002. *The Endemic Flora of the Soutpansberg*. MSc Thesis University of Natal, South Africa.

HILLIARD, O. M. & BURTT, B. L. 1987. *The Botany of the Southern Natal Drakensberg*. National Botanical Gardens, Cape Town

MATTHEWS, W.S., VAN WYK, A.E. & BREDENKAMP, G.J. 1993. Endemic flora of the north-eastern Transvaal escarpment, South Africa. *Biological Conservation* 63: 83–94.

VAN WYK, A. E. & SMITH, G. F. 2001. *Regions of floristic endemism in southern Africa: A review with emphasis on succulents*. Umdaus Press, Pretoria.

VAN WYK, A. E. 1996. Biodiversity of the Maputaland Centre. *The Biodiversity of African Plants* 198–207.

WHITE, F. 1983. The vegetation of Africa: a descriptive memoir to accompany the UNESCO/ AETFAT/ UNISO vegetation map of Africa. *Natural Resources Research* 20. UNESCO, Paris.

WILD, H. 1964. The Endemic Species of the Chimanimani Mountains and their Significance. *Kirkia* 4: 125–157.

Annex 1: Endemic Flora of the Soutpansberg

Acanthaceae

Blepharis spinipes K. Vollesen
Blepharis (**Acanthaceae**) A taxonomic revision: 130 (2000).
Type: Vancollers Pass, 1990-6-25, *Balkwill 5888* (K, holo.; J, iso.).

Justicia montis-salinarum A. Meeuse
in Bothalia 7(2): 407 (1960).
Type: Southern entrance of Sandrivierspoort, about 6,4 km north of main road bridge, *Meeuse 10 213* (PRE, holo.!).

Anacardiaceae

Rhus magalismontana Sond. subsp. *coddii* (R. & A. Fernandes) Moffett
in Flora of southern Africa 19(3): 57 (1993).
Type: Venda, near Sambondou, 40 km north east of Sibasa, alt. 580 m, 20-02-1952, *L. E. Codd 6902* (PRE, holo.!).

Apocynaceae

Duvalia procumbens R. A. Dyer
in Flowering Plants of South Africa 31: plate 1218 (1956).
Type: Kruger National Park, Pafuri, ridge near Seekoegaat, 16-2-1955, *van der Schiff 3618* (PRE, holo.!).

Huernia nouhuysii Verdoorn
in Flowering Plants of South Africa 11: t. 412 (1931).
Type: Wylie's Poort, *van Nouhuys s.n*. PRE 8 757 (PRE, holo.?). Lectotype: Flowering Plants of South Africa 11: plate no. 412 (1931).

Huernia whitesloaneana Nel
in Cactus and Succulent Journal of the Cactus and Succulent Society of America 8(1): 9 (1936).
Type: Entabeni Forest Station, 1 370 m, June 1935, *Nel s.n.* (STE).

Orbeanthus conjunctus (White & Sloane) Leach
in Excelsa Taxonomic Series no. 1: 73 (1978).
Type: Mara, A. H. Crundall Comm. H. Herre; clonotype cult. PRE, *A. H. Crundall* (PRE).

Stapelia clavicorona Verdoorn
in Flowering Plants of Southern Africa 11: plate 407 (1931).
Type: Wylie's Poort, *Van Nouhuys s.n.* PRE 8 756 (PRE!).

Tylophora coddii Bullock
in Flowering Plants of Africa 36: plate 1435 (1964).
Type: South end of Wylie's Poort on dry rocky slopes at 1050 m, January 1954, *L. E. Codd 8350* (PRE, holo.!; K, iso.).

Asphodelaceae

Aloe angelica Pole Evans
in Flowering Plants of South Africa 14: plate 554 (1934).
Type: Wylie's Poort, 16 June 1932, *Pole Evans s.n.* sub PRE 13040 (PRE, holo.!).

Aloe petrophila Pillans
in South African Gardening & Country Life 23: 213 (1933).
Type: Wylie's Poort, rock-cliffs, flowered in cultivation May 1933, *P. R. Frames* (PRE !).

Aloe soutpansbergensis Verdoorn
in Flowering Plants of Africa 35: plate 1391 (1962).
Type: 56 km west of Louis Trichardt, 1942, *A. H. Crundall s.n.* in PRE 27035 (= PRE 29005) (PRE, holo.!).

Aloe vogtsii Reynolds
in Journal of South African Botany 2: 11 (1936).
Type: Farm Franzhoek [Clydesdale], 16 km north-east of Louis Trichardt, *L.E. Vogts* sub. *Reynolds 1488* (PRE, holo.!).

Aloe vossii Reynolds
in Journal of South African Botany 2: 65 (1936).
Type: Farm Schyffontein, 8 km north of Louis Trichardt, fl. 12 February 1936, in Johannesburg, *Reynolds 557* (PRE, holo.!).

Asteraceae

Dicoma montana Schweickerdt
in Kew Bulletin 1935: 207 (1935).
Type: Blouberg, on the way to Malabogs Kraal, alt. 1524–1555 m, 9-05-1933, *A. C. Leeman 69* (PRE!).

Zoutpansbergia caerulea Hutch.
in a Botanist in southern Africa 350 (1946).
Type: Crewe Farm, northern slopes of mountains, alt. 1585 m, 23 August 1930, *Hutchinson & Gillett 4435* (K, holo.).

Combretaceae

Combretum vendae Van Wyk
in South African Journal of Botany 3(2): 125–134 (1984).
Type: Venda, Vuvha, north-east of Tengwe, near the village Muledzhi, *van Wyk 3913* (PRU, holo.!).

Convolvulaceae

Ipomoea bisavium A. Meeuse
in Bothalia (1958).
Type: Soutpansberg, 3,2 km south of Wylie's Poort, 02-04-1957, *Meeuse 10181* (PRE, holo.!).

Crassulaceae

Kalanchoe crundallii Verdoorn
in Flowering Plants of Africa 25: plate 967 (1946).
Type: Lejuma (collected July 1938), (cultivated Pretoria fl. March 1943) *Crundall* in PRE 27157 (PRE, holo.!).

Euphorbiaceae

Euphorbia aeruginosa Schweik.
in Kew Bulletin 1935: 205 (1935).
Syntype: Farm Zoutpan, on rocky ledge behind homestead, November 1932, *Obermeyer, Schweickerdt & Verdoorn 151* (PRE!) & April 1934, *Schweickerdt & Verdoorn 688* (PRE!).

Euphorbia rowlandii R. A. Dyer
in Bothalia 7(1): 28–29, t. 2 (p. 38) (1958).
Type: Kruger National Park, Punda Maria, on sandstone ridges, 12,87-15, 29 km, *Rowland Jones 48* (PRE, holo.!).

Euphorbia zoutpansbergensis R. A. Dyer
in Flowering Plants of South Africa plate 18: 715 (1938).
Type: On rocky slopes at the southern entrance of Wylie's Poort, *Dyer* in PRE number 23393 (PRE, holo.!).

Fabaceae

*Rhynchosia venda*e C. H. Stirton
in Bothalia 14(1): 76 (1982).
Type: Kruger National Park, Punda Maria, *van der Schijff 3596* (PRE, holo.!).

Gesneriaceae

Streptocarpus caeruleus Hillard & Burtt
Streptocarpus, an African plant study 261 (1971)
Type: Blouberg, cult. R. B. G. Edinburgh (collected, 1960, *R. Story 6512*), C. 3824 (E, holo.; NU! iso.)

Streptocarpus parviflorus Hook. f. subsp. *soutpansbergensis* Weigend & T. J. Edwards
in Sendtnera 2: 369 (1994).
Type: Waterpoort, 12 km from Mountain Inn to Bluegumspoort, *Stirton 10572* (PRE, holo.).

Mesembryanthemaceae

Delosperma zoutpansbergense L. Bol.
in the Journal of South African Botany 25: 372 (1959).
Type: Summit of Clouds End, above Mountain Inn, 31 December 1958, flowered April, *A.O.D. Mogg* (NBG 2/59).

Khadia borealis L. Bol.
in Notes on the Mesembryanthemum and allied Genera 3: 6 (1936).
Type: Farm Lejuma, *Crundall s.n.* (BOL, lecto.) & farm Franzhoek, *Vogts s.n*. BOL 21638 (BOL, paralecto.).

Orchidaceae

Mystacidium brayboniae Summerh.
in Kew Bulletin 1949: 442 (1949).
Type: Near Louis Trichardt, 1350 m alt., November 1948, cult. K, *Mrs. H. Braybon* (K).

Pedaliaceae

Ceratotheca saxicola E. A. Bruce
in Bothalia 5(1): 233 (1951).Type: Kruger National Park, 51,5 km north-east of Punda Maria, alt. 304,8 m, in sandstone krantze overlooking the Luvuvhu River, May, *Codd 5535* (PRE, holo.!).

Poaceae

Panicum dewinteri J. G. Ander.
in Bothalia 9(2): 341 (1967).
Type: Lejuma, near Louis Trichardt, 14-02-1967, *B. de Winter 6006* (PRE, holo.!).

Rubiaceae

Pavetta tshikondeni N. Hahn
in Bothalia 29(1): 109 (1999)
Type: Makhuya Park, Worlds View, 22° 30' 24,1" south and 31° 01' 59,6" east, 300 m, 27-01-1997, *N. Hahn 1367* (K, holo.!; PRE!, ZPB!, iso.).

Vangueria soutpansbergensis N. Hahn
in Bothalia 27(1): 45 (1997).
Type: Farm Studholme, 22° 56' 52,4" south and 30° 01' 18,8" east, 1440 m, 28-11-1995, (in flower), *N. Hahn 1112* (PRU, holo.!; K, PRE, ZPB, iso.).

Zamiaceae

Encephalartos hirsutus P. J. Hurter
South African Journal of Botany 62(1): 46-48 (1996)
Type: Venda, 1000 m alt., 7 June 1994 (frond and male cone), *P. J. H. Hurter 94R/1* (PRE, holo.!).