

## Systematic studies in subfamily Celastroideae (Celastraceae) in southern Africa: two new species of *Gymnosporia* from KwaZulu-Natal and the Eastern Cape

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*Gymnosporia devenishii* M.Jordaan and *G. macrocarpa* M.Jordaan, two new species previously included in the *Maytenus heterophylla* (Eckl. & Zeyh.) N.Robson species complex, are described, illustrated and compared with *G. mossambicensis* (Klotzsch) Loes. and *G. buxifolia* (L.) Szyszyl. Both species have diagnostic fruit characters: small, more or less sulcate capsules in *G. devenishii* and large woody capsules with a rugose surface in *G. macrocarpa*. *G. devenishii* is a rare species restricted to the temperate Afromontane forests of KwaZulu-Natal and the Transkei region of the Eastern Cape. *G. macrocarpa* has a very limited range and is confined to the hot, arid valley bushveld of the Tugela River Basin.

**Keywords:** Celastraceae, Celastroideae, *Gymnosporia*, *Maytenus*, southern Africa, taxonomy.

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### Introduction

*Gymnosporia* (Wight & Arn.) Hook.f., an Old World genus comprising about 80 species, occurs in Africa, Madagascar and adjacent islands, southern Spain, the near Middle East, Pakistan, India, Sri Lanka, extending to the Far East, Malesia, Papua New Guinea, the Philippines, Taiwan, Queensland (Australia) and the Polynesian Islands. It is sometimes regarded as inseparable from *Maytenus* Molina, a generic concept followed by, amongst others, Marais (1960) and Robson (1965, 1966, 1994). We consider morphological characters such as the presence of brachyblasts and spines (modified axillary shoots), dichasial inflorescence types and flowers that are mainly unisexual (plants dioecious) as supportive evidence for reinstating the genus *Gymnosporia* (Wight & Arn.) Hook.f. (Jordaan & Van Wyk 1999).

The purpose of this paper is to describe two new species of *Gymnosporia* from KwaZulu-Natal and the Eastern Cape. Edwards (1967) was the first to suggest that the two taxa may represent undescribed species. During a recent taxonomic revision of the spiny members of subfamily Celastroideae (Celastraceae) (Jordaan 1995), the separate taxonomic status of the two new species was confirmed. Both are shrubs or small trees with short shoots (brachyblasts), spines and highly diagnostic fruit characters. They have a restricted geographical distribution in KwaZulu-Natal and the bordering Transkei region of the Eastern Cape and are poorly represented in herbaria. Hitherto specimens of these species have been filed in herbaria mainly under *Maytenus heterophylla* (Eckl. & Zeyh.) N.Robson *s.l.* and *M. mossambicensis* (Klotzsch) Blakelock.

### Species descriptions

1. *Gymnosporia devenishii* M.Jordaan, sp. nov., *G. buxifoliae* (L.) Szyszyl. affinis, sed foliis distincte petiolatis; capsulis sulcatis laevigatis flavis vel roseis differt.

TYPUS.—KwaZulu-Natal: Greytown District, Farm Keerom near Mt Alland Forest, 2930BA, 4 April 1972, K.H. Cooper 154 (PRE, holotypus; NH, isotypus).

*Maytenus* sp. sensu Edwards: 269 (1967) quoad specimen Edwards 2842.

*Maytenus mossambicensis* sensu Hilliard & Burt: 172 (1987) quoad specimen Hilliard & Burt 15571.

Shrub or small tree up to 8 m tall, spinescent, glabrous. *Brachyblasts* present. *Branches* angular and green when young, becoming terete and grey with age. *Spines* slender, up to 70 mm long. *Leaves* fasciculate or alternate towards tips of branchlets, glabrous, subcoriaceous, dark green, petiolate; lamina elliptic or ovate, 20–27 × 14–18 mm, apex acute, rounded to emarginate, base cuneate or rounded, margin serrate to crenate, venation prominent below when dry, midrib prominently raised on both sides; petiole 2–3 mm long; stipules subulate, ± 2 mm long, apex filiform, margin fimbriate, marcescent. *Inflorescence* a dichasium, shorter than leaves; peduncles 4–6 mm long; pedicels 2–3 mm long. *Flowers* unisexual, 3–9 per cyme. *Sepals* 5, broadly triangular, 0.8 mm long, margin ciliolate. *Petals* 5, white or cream, oblong, 1.0–1.5 mm long, margin uneven. *Male flowers*: stamens 5, slightly shorter than petals; filaments 1.5–2.5 mm long, slender, arising below margin of disc; pistillode small, ridged, with short capitate style. *Disc* 1.5 mm in diameter, narrow, wavy, 10-lobed. *Female flowers*: staminodes 5, shorter than stamens in male flowers; style 1 mm long, stigma 3-branched, spreading; ovary 3-locular, sulcate; ovules 2 per locule. *Capsules* 3-valved, 5–6 mm long, smooth, subglobose, prominently sulcate, with 6–12 ridges, thickly coriaceous, glabrous, yellow or pink. *Seeds* golden brown, 4 mm long; aril yellow, partially covering the seed (Figure 1).

### Diagnostic characters and relationships

In the herbarium and in the field *G. devenishii* can easily be confused with a sympatric species, *G. mossambicensis* (Klotzsch) Loes. (= *Maytenus mossambicensis*). They resemble each other superficially in habit and leaf characters, but their fruits are quite different. *G. mossambicensis* has semi-fleshy, round, smooth capsules which dehisce completely, the valves becoming reflexed and the inside turning purplish. The new species has prominently sulcate, coriaceous fruits which dehisce incompletely. This is the only known species of *Gymnosporia* with distinctly sulcate fruit.

Both *G. devenishii* and the widespread *G. buxifolia* (L.) Szyszyl. were previously classified in the *Maytenus heterophylla* complex (Robson 1966). *G. buxifolia* can easily be distinguished by its small (shorter than 5 mm), rugose (but not sulcate) capsules and leaves without prominently raised midribs; it is a pioneer tree, usually growing on forest margins or in disturbed



**Figure 1** *Gymnosporia devenishii*. A. Flowering branch,  $\times 1$ ; B. Young branchlet,  $\times 1$ ; C. Female flower,  $\times 6$ ; D. Capsule,  $\times 4$ . A drawn from *Jordaan 2745* (PRE), C from *Jordaan 2699* (PRE) and B & D from *Devenish 1579* (PRE). Artist: Marietjie Steyn.

areas. *G. devenishii* grows almost invariably in the understorey of climax forest.

#### Distribution, habitat and conservation status

*Gymnosporia devenishii* is a rare species, largely confined to patches of moist Afromontane forest at higher elevations (800–2042 m). The known geographical distribution is mainly along the Drakensberg and mountain outliers from Tonti Forest (Mount Ayliff) and Amanzamyama Forest (Mount Frere) in the Eastern Cape to the most northern localities on the farm Nauwhoek (Utrecht District) and Pongola Bush Nature Reserve (Paulpietersburg District) in KwaZulu-Natal (Figure 2). It grows mainly in shade as a forest understorey constituent. Populations are usually small and very localised.

This interesting species with its unique sulcate capsules was apparently first collected by O.B. Miller in 1921 at the Amanzamyama and Buffalo Neck Forests in the Transkei. He was followed by an anonymous collector who gathered herbarium specimens at Tonti Forest in Pondoland in 1930. The first known collection in KwaZulu-Natal was made by O. West in 1939 at Tabamhlope Forest. Then it was collected at intervals of about ten years: D. Edwards (1962) at Kranskop; K.H. Cooper (1972) at Mt Alland (farm Keerom); N.J. Devenish (1982) at farm Nauwhoek, Utrecht District; O.M. Hilliard & B.L. Burt (1982/83) at Bamboo Mountains and Gxalingenwa Forest in the southern KwaZulu-Natal Drakensberg. A.B. Cunningham collected this species in the Pongola Bush Nature Reserve in 1984 (Paulpietersburg District), where it was again collected by the first author in 1994 (Figure 1, *M. Jordaan 2745*). Recently a vigorous population of this rare species has been discovered on the farm Retirement, Utrecht District.

#### Eponymy

The specific epithet honours Mr N.J. (Klaas) Devenish of the farm Nauwhoek in the Utrecht District. As an amateur botanist, he has collected many new plant species and new records of species. We would like to propose the names 'Drakensberg spikethorn' and 'Drakensber-pendoring' as the English and Afrikaans vernacular names respectively.

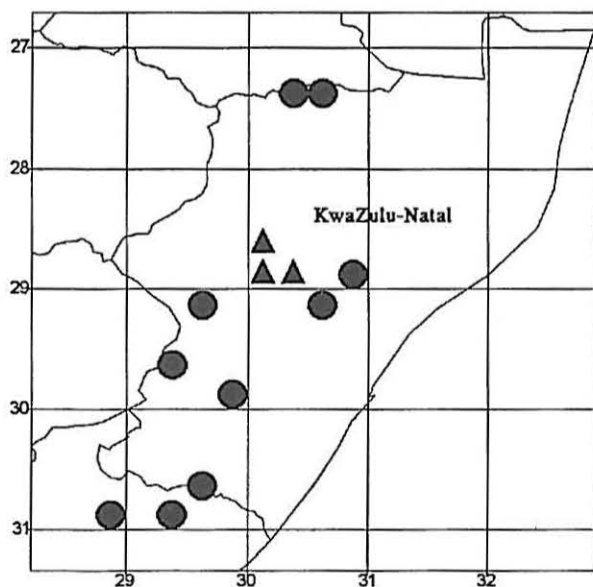


Figure 2 Known distribution of *Gymnosporia devenishii* (●) and *G. macrocarpa* (▲).

#### Specimens examined

##### KWAZULU-NATAL

—2730 (Vryheid): Utrecht District, Farm Nauwhoek (–AD), *Devenish 1579* (PRE), *Jordaan 2680*; Farm Retirement (–AD), *Jordaan 2699, 2795* (NH, PRE); Paulpietersburg District, Pongola Bush Nature Reserve (–AD), *Jordaan 2745* (NH, PRE, PRU); Farm Uitvlugt (–BC), *Cunningham 912* (NU).

—2830 (Dundee): Kranskop (–DD), *Edwards 2842* (PRE).

—2929 (Underberg): Tabamhlope (–BA), *Edwards 694* (NU, PRE), *West 1377* (NH); Bamboo Mountains (–CB), *Hilliard & Burt 15571* (NU), Gxalingenwa Valley (–CB), *Hilliard & Burt 17206* (NU, PRE); Xumeni Forest (–DD), *MacDevette 855* (NH).

—2930 (Pietermaritzburg): Lions River District, Lions Bush (–AC), *Moll 822* (BR, PRE); Greytown District, Farm Keerom near Mt Alland Forest (–BA), *Cooper 154* (NH, PRE).

##### EASTERN CAPE

—3028 (Matatiele): Amanzamyama Forest (–DD), *Miller 3155, 3218* (PRE); Buffalo Neck Forest (–DD), *Miller 3226* (PRE).

—3029 (Kokstad): Mount Ayliff, Tonti Forest (–CD), *Anonymous collector Sub J 76196* (J); Zuurburg, above Ngeli Forest (–DA), *Abbott 7118* (NH, PRU).

2. *Gymnosporia macrocarpa* *M. Jordaan*, sp. nov., *G. buxifoliae* (L.) Szyszyl. similis sed floribus paucioribus in quoque inflorescentia paucioribus; capsulis maioribus, pericarpio crasso lignosa; differt.

TYPUS.—KwaZulu-Natal: Umvoti District, 14 miles from Greytown on Muden road, 2830CD, 14 February 1964, *D. Edwards 3227* (PRE, holotypus; K, NH, isotypi).

*Maytenus* sp. (cf. *Pentz 216*) sensu Edwards: 269 (1967) quoad specimens *Pentz 216, Edwards 2506, 2761, 2800*; excluding specimen *Edwards 2759*.

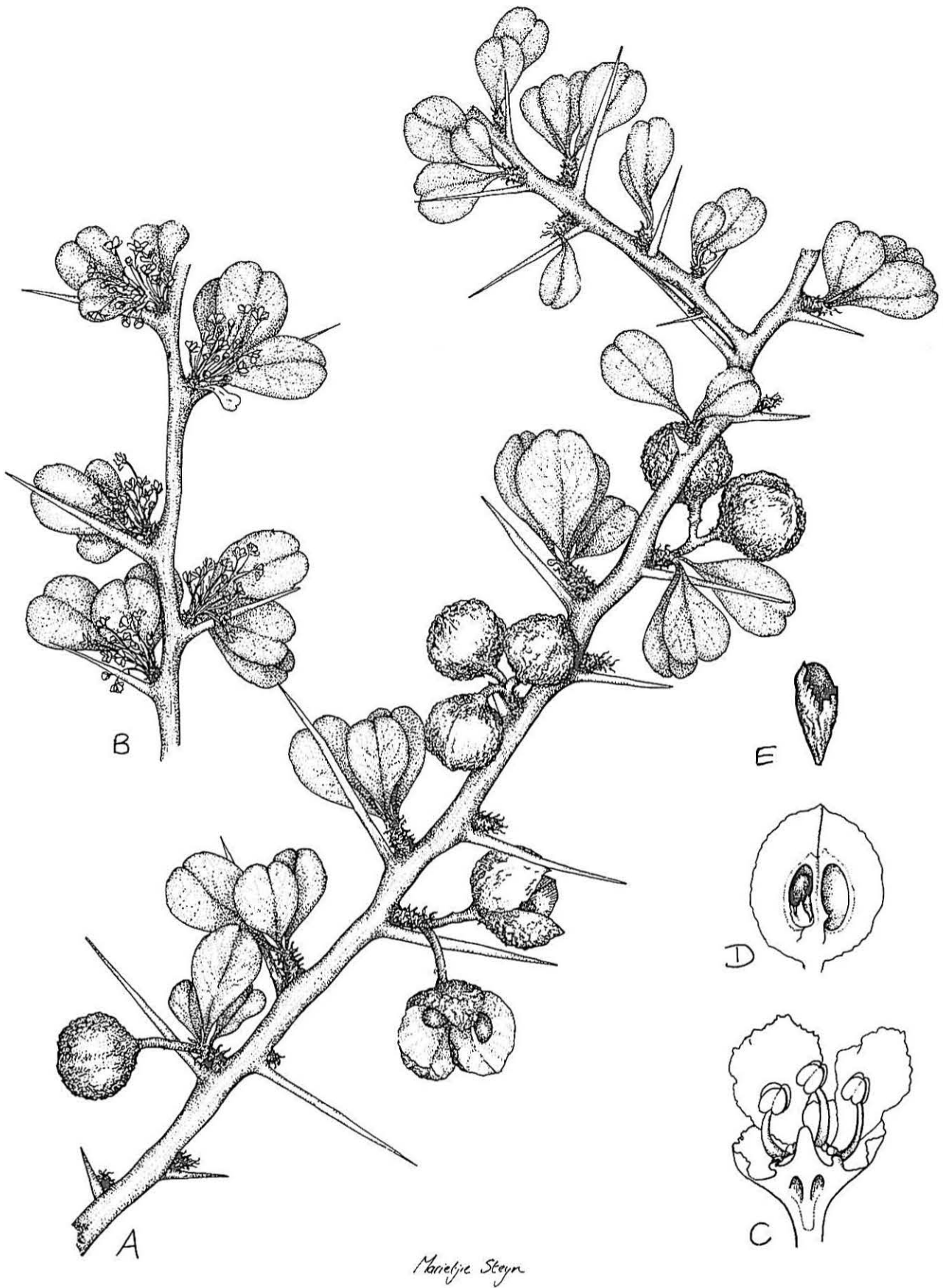
Shrub up to 2 m tall, rarely a small tree up to 4 m tall, many-branched, spinescent, glabrous. *Brachyblasts* well developed, up to 20 mm long. *Branches* terete, grey, occasionally with insect galls (thickened areas). *Bark* smooth and flaky. *Spines* robust, up to 40 mm long. *Leaves* fasciculate, chartaceous, green, shortly petiolate, glabrous; lamina obovate, 15–60 × 10–30 mm, apex round to emarginate, base cuneate, margin serrate, venation more obvious below; petiole ± 0.5 mm long; stipules subulate, ± 1 mm long, margin fimbriate, marcescent. *Inflorescence* a few-flowered dichasium, much shorter than leaves; peduncle 4–8 mm long; pedicels 1–2 mm long. *Flowers* unisexual, 3–7 per cyme. *Sepals* 5, broadly triangular, ± 1 mm long, margin lacinate. *Petals* 5, white or cream, obovate, 1.5–2.0 × 1.0 mm, erect, margin uneven. *Disc* ± 1 mm diam., flat. *Male flowers*: stamens 5, slightly shorter than petals; filaments ± 1 mm long, slender, arising below margin of disc; pistillode small, globose, style very short, unbranched. *Female flowers*: staminodes 5, shorter than stamens of male flowers; ovary 3(4)-locular, globose; style as long as ovary; stigma 3- or 4-branched, spreading. *Capsules* (3)4-valved, globose, 12–15 mm long, rugose, woody, pale brown with darker reddish brown patches, with stalks thickened; styles deciduous in fruit. *Seeds* dark brown, glossy, ± 4 mm long; aril yellow, partially covering the seed (Figure 3).

#### Diagnostic characters and relationships

Although its general morphology suggests a close affinity with the widespread *Gymnosporia buxifolia*, *G. macrocarpa* can easily be distinguished by its larger, rugose, woody capsules (12–15 mm long), well-developed brachyblasts up to 20 mm long, and restricted geographical distribution.

#### Distribution and habitat

*Gymnosporia macrocarpa* has a very restricted distribution range. It is endemic to the 2830 degree grid and is confined to a



**Figure 3** *Gymnosporia macrocarpa*. A. Fruiting branch,  $\times 1$ ; B. Flowering branch,  $\times 1$ ; C. Section of male flower,  $\times 8$ ; D. Section of capsule,  $\times 2$ ; E. Seed partially enveloped by an aril,  $\times 2$ . A, D & E from Edwards 2800 (PRE) and B & C from Venter 1839 (PRE). Artists: A, B & E illustrated by Marietjie Steyn and C & D by Gill Condy.



small area in the Lower Tugela River Basin in KwaZulu-Natal. Plants grow in hot, arid thornveld or valley bushveld (Figure 2).

#### Etymology

The specific epithet alludes to the distinctive large capsules and is a compound of the Greek elements *macro* = large, and *carpos* = fruit. As English and Afrikaans vernacular names we propose 'Tugela spikethorn' and 'Tugela-pendoring' respectively.

#### Specimens examined

##### KWAZULU-NATAL

—2830 (Dundee): Farm Zingela, Weenen District, Tugela River (—CA), *Balkwill & Balkwill 5087* (J); Farm Kaisha, Tugela River Valley (—CA), *Balkwill & Balkwill 5038* (J); Kaisha River main camp (—CA), *Williams 579* (NH, PRE); Weenen District, Blauwkrans River (—CC), *Pentz 23, 216* (PRE); Farm Roodebokvlakte, Umvoti District (—CD), *Balkwill et al. 5304* (J); Umvoti District, Muden (—CD), *Balkwill et al. 5356* (J, M); Greytown to Muden (—CD), *Edwards 2761* (PRE), 3227 (K, NH, PRE), *Pienaar 408* (PRE); Muden Valley, Umvoti District (—CD), *Edwards 2506* (NU, PRE); Muden to Keats Drift (—CD), *Edwards 2800* (PRE); Greytown to Ngubevu (—CD), *Venter 1839* (PRE).

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#### References

- EDWARDS, D. 1967. A plant ecology survey of the Tugela River Basin, Natal. *Mem. bot. Surv. S. Afr.* 36: 1–285.
- HILLIARD, O.M. & BURTT, B.L. 1987. The botany of the southern Natal Drakensberg. *Ann. Kirs. Bot. Gdn.* Vol. 15. Cape Town.
- JORDAAN, M. 1995. A taxonomic revision of the spiny members of subfamily Celastraceae (Celastraceae) in southern Africa. M.Sc. thesis, University of Pretoria, Pretoria.
- JORDAAN, M. & VAN WYK, A.E. 1999. Systematic studies in subfamily Celastraceae (Celastraceae) in southern Africa: reinstatement of the genus *Gymnosporia*. *S. Afr. J. Bot.* 65: 177–181.
- MARAIS, W. 1960. An enumeration of the *Maytemus* species of southern Africa. *Bothalia* 7: 381–386.
- ROBSON, N.K.B. 1965. New and little known species from the Flora zambesiaca area XVI. *Bolm Soc. broteriana, ser. 2.* 39: 6–25.
- ROBSON, N.K.B. 1966. Celastraceae. In: Flora zambesiaca, eds A.W. Exell, A. Fernandes & H. Wild, Vol. 2, pp. 355–418. Crown Agents for Oversea Government and Administrations, London.
- ROBSON, N.K.B. 1994. Celastraceae. *Maytemus*. In: Flora of tropical East Africa, Celastraceae, ed. R.M. Polhill, pp. 1–21. Balkema, Rotterdam.