

## SELAGINELLACEAE

### SELAGINELLA NUBIGENA, A NEW SPECIES FROM THE DRAKENSBERG, SOUTH AFRICA

In the southern African pteridophyte literature, the name *Selaginella imbricata* (Forssk.) Spring ex Decne. first appeared in the *Ferns of South Africa* (Sim 1915: 336, 337), but no collections were listed from South Africa. Alston & Schelpe (1952: 155) also list the species, but they too did not provide an indication or reference to any collections made in South Africa and/or Lesotho *per se*. The first supposed record of this plant south of the Zambezi River is a collection made on 12 December 1928 by E.E. Galpin at Devil's Hoek in the Royal Natal National Park, KwaZulu-Natal at  $\pm 1\ 825$  m [6000'] (Letter by T.R. Sim to E.E. Galpin dated 26 December 1928 at PRE). Although the identity was [ $\pm 1\ 825$  m] incorrect, the name for the Drakensberg plant was used by several authors (Jacobsen 1983; Schelpe & Anthony 1986; Burrows 1990; Roux 2001).

Jacobsen (1983: 145) found the high rainfall and disjunct distribution of the species in the Drakensberg puzzling, but never investigated the matter further.

The true *Selaginella imbricata* has a somewhat disjunct distribution, occurring in Arabia, Ethiopia, Eritrea, Somalia, Sudan, Kenya, Mozambique, Namibia, Zambia and Zimbabwe. Since the species occurs along the Namibian side of the Kunene River, it is expected that it may also occur in southern Angola. *S. imbricata* was erroneously reported for Swaziland by Roux (2003a, b). The unnumbered Chase collection listed in *Flora zambesiaca* (Jermy 1970: 26) reported to have come from the high-rainfall Vumba Mountains in eastern Zimbabwe, may be an erroneous location. Although occurring at altitudes ranging from 200 to 3 000 m, it is mostly associated with open woodland. In Eritrea and

TABLE 2.—Main morphological features distinguishing *Selaginella nubigena* from *S. imbricata*

Characters	<i>S. nubigena</i>	<i>S. imbricata</i>
Plant architecture	Primary and secondary stems creeping, unequally dichotomously branched	Primary stems erect, grouped along a creeping stolon, unequally dichotomously branched
Roots	Single root borne at each branching point along primary and secondary stems	Several roots borne at each branching point from stolon; primary stems rootless
Stolon leaves	Stolon absent	Radially arranged, isophyllous, brown
Primary stem leaves	Dorsolaterally arranged; leaves anisophyllous along entire length	Proximally isophyllous and radially arranged, higher up anisophyllous and dorsolaterally arranged
Lateral leaf shape and dimensions	Obliquely ovate, up to 2.2 x 1 mm	Broadly scimitar-shaped, erose, acroscopic convex half of leaf forms a broad wing, which is significantly thinner than basiscopic side of leaf, up to 3 x 1.8 mm
Distribution of stomata on lateral leaves	Adaxially with narrow band of stomata parallel to central vein in distal part of leaf; abaxially with narrow band of stomata parallel to vein extending from near leaf base to near leaf apex	Adaxially with narrow band of stomata parallel to central vein extending from leaf base to near apex; abaxially with narrow band of stomata parallel to vein extending from leaf base to near leaf apex
Median leaf shape and dimensions	Obliquely ovate, up to 2.3 x 0.9 mm	Inaequilaterally ovate to broadly scimitar-shaped, lacerate, up to 2.5 x 1.5 mm
Distribution of stomata on median leaves	Adaxially with narrow band of stomata along central vein extending from lower $\frac{1}{3}$ of leaf to near apex; abaxially with broad central band of stomata extending from base to near apex	Adaxially with short and narrow band of stomata in upper $\frac{1}{3}$ of leaf; abaxially with narrow central band of stomata extending from leaf base to near apex
Sporophyll shape and dimensions	Isophyllous, lanceolate to broadly ovate, weakly carinate, denticulate, up to 2 x 1.2 mm	Isophyllous, ovate, carinate, lacerate, up to 1.3 x 1 mm
Epidermal cell surface	Smooth	With 2 $\pm$ parallel rows of papillae

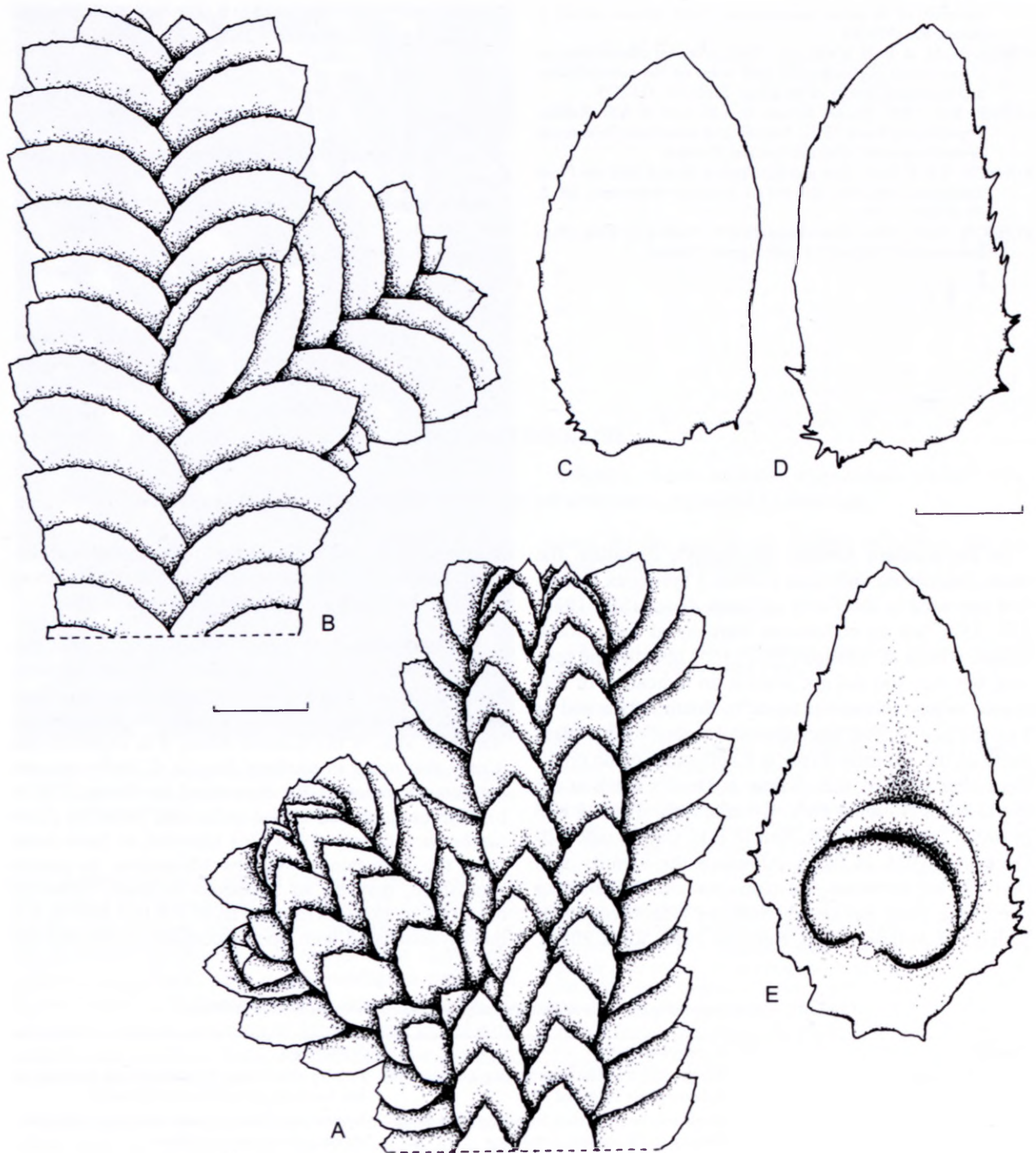


FIGURE 9.—*Selaginella nubigena*, Esterhuysen 30228. A, adaxial view of stem; B, abaxial view of stem; C, lateral leaf; D, median leaf; E, sporophyll. Scale bars: A, B, 1 mm; C–E, 0.5 mm. Artist: J.P. Roux.

Ethiopia it is chiefly associated with calcareous rocks, but elsewhere it appears to favour granite and basalt.

*Selaginella imbricata* is characterized by its miniature tree-like habit with 1–3 upright dorsoventrally flattened primary and lower order stems that are intermittently grouped along a creeping stolon, and roots that largely form at or near the branching points. The stolons and proximal stem parts are radially symmetric, and the appressed, scale-like leaves along the stolons and lower primary stem parts are without chlorophyll. These features are not exhibited by the Drakensberg plants and a close examination proved that it represents an as yet

undescribed *Selaginella* species, which until now, was erroneously ascribed to *S. imbricata*. This Drakensberg endemic is here described as *S. nubigena*, referring to its habitat which is regularly shrouded by clouds and mist. The distinguishing features separating *S. nubigena* from *S. imbricata* are listed in Table 2.

***Selaginella nubigena* J.P.Roux, sp. nov.**, a specibus aliis in regione caule repenti anisotomiter furcato foliis lateralibus medianisque imbricatis aliquantum obliquis ovatis coriaceis, foliorum medianorum margine proximali laciniato sed foliorum lateralium margine distali laciniato distinguitur.



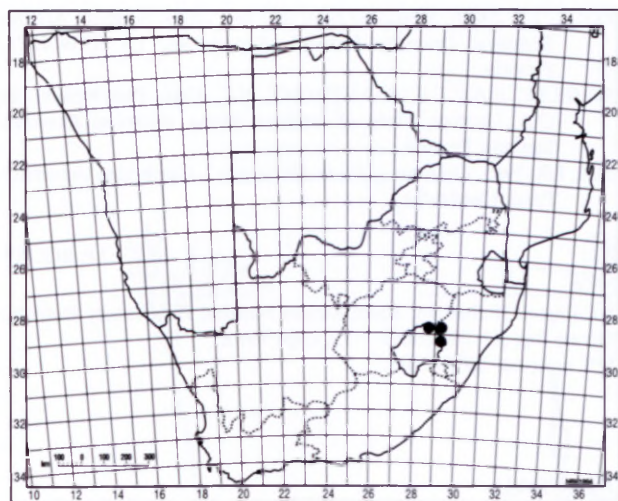


FIGURE 10.—Distribution of *Selaginella nubigena* in the Drakensberg.

The creeping, unequally dichotomously branched stem which has coriaceous, overlapping (imbricate), somewhat oblique ovate lateral and median leaves, separates *Selaginella nubigena* from other species in the region. The proximal margin of the median leaves is lacinate, whereas the distal margin of the lateral leaves is lacinate.

TYPE.—KwaZulu-Natal, 2828 (Bethlehem): Royal Natal National Park, on near vertical, much weathered, basalt cliff, NE aspect, along path up to ridge leading to The Sentinel, (–DB), 8000' [ $\pm 2\,430$  m], 10 July 1963, *Esterhuysen 30228* (BOL!, holo.; PRE!, iso.).

Plants epilithic. Stems creeping, terete, often slightly flattened adaxially, up to 1 mm diam., unequally dichotomously branched, anisophyllous, heterophyllous, a single root is borne laterally or abaxially at or near a branching point along stems. Leaves on older stems brown and often torn, closely imbricate and arranged in a dorsoventral plane; lateral leaves set at  $30^{\circ}$ – $45^{\circ}$  to stem axis, obliquely ovate to scimitar-shaped, up to  $2.2 \times 1$  mm, basally truncate to near-truncate, forming a narrow erose collar, acute, bright green adaxially, drying matt green, greyish to greyish green abaxially, coriaceous, outer margin irregularly set with short outgrowths, often somewhat short-fimbriate near base, inner margin entire, but basally slightly folded inwards, clasping stem, and short-fimbriate, adaxially with a narrow band of stomata in distal part of leaf, parallel to central vein, abaxially with a narrow band of stomata parallel to vein extending from near leaf base to near leaf apex; median leaves set at  $60^{\circ}$  or more to stem axis, obliquely ovate, up to  $2.3 \times 0.9$  mm, bright green adaxially, drying matt green, greyish green abaxially, coriaceous, basally truncate to near truncate, forming a narrow erose to short-fimbriate, acute, outer margin irregularly set with short outgrowths, proximal part infolded, clasping stem and short-fimbriate, inner margin irregularly short-fimbriate, adaxially with narrow band of stomata along central vein extending from lower  $\frac{1}{3}$  of leaf to near apex, abaxially with broad central band of stomata extending from base to near apex; ligule near circular, erose. Strobili sessile, solitary at apex of secondary or lower order branches, up to 4 mm long, isophyllous; sporophylls in 4 ranks, coriaceous, peltate, weakly carinate, with narrow repand col-

lar proximally, irregularly serrulate, up to  $2 \times 1.2$  mm. Sporangia sessile, isovalvate, reniform, up to  $1 \times 0.8$  mm. Megaspores pale yellow, 4 per sporangium, colliculate. Microspores unknown. Figure 9.

*Distribution and ecology:* *Selaginella nubigena* is known from the northern parts of the Drakensberg escarpment only (Figure 10), growing in exposed or partially sheltered crevices and on narrow ledges of the predominant east-facing basalt cliffs at altitudes ranging between 1 825 and 3 100 m. The vegetation within this montane zone has been described as uKahlamba Basalt Grassland (Mucina *et al.* 2006: 370). Precipitation within the zone measures  $\pm 1\,234$  mm per annum and comes as summer rains (September to March), whereas several annual snowfalls may occur between April and August. The Drakensberg scarp is also regularly shrouded in mist and this contributes significantly to the annual precipitation. The mean annual day temperature within the region measures  $11.6^{\circ}\text{C}$ .

*Conservation:* plant populations occur along the high, mostly east-facing cliffs unaffected by human activity or pressure within well-managed nature reserves. The current IUCN classification recommended is Least Concerned.

#### Other material studied

KWAZULU-NATAL.—2828 (Bethlehem): Royal Natal National Park, Devil's Hoek, (–DB), 13-12-1928, *Galpin CH3532* (PRE); Witsieshoek Reserve, near parking area, path to The Sentinel, (–DB), 15-01-1981, *Roux 906* (NBG); Witsieshoek, on sheltered basalt ledges near summit, (–DB), *Schelpe 7673* (BOL); Drakensberg, Inner Tower Ravine, (–DD), 16-07-1963, *Esterhuysen 30234* (BOL, PRE); Royal Natal National Park, Devil's Tooth Gully, (–DD), 17-07-1963, *Esterhuysen 30244* (BOL, PRE). 2829 (Harrismith): Bergville District, MnWeni area, outer MnWeni Needle, (–CC), 7-1962, *Esterhuysen 29601* (BOL, PRE); Bergville, ridge leading to Cathedral Peak, (–CC), *Esterhuysen 23028* (BOL); Bergville, Cathedral Peak area, north face of small peak next to The Bell, (–CC), *Esterhuysen 29598* (BOL); Bergville, north ridge of Cathedral Peak overlooking Ntonjelane area, (–CC), 7-07-1974, *Esterhuysen 33583* (PRE). 2929 (Underberg): Bergville District, The Turret and Amphlett, (–AB), 7-1957, *Esterhuysen 26097* (BOL, NBG, PRE); Bergville, Umshlwazine, Cathedral area, (–AB), *Esterhuysen 28510* (BOL).

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