Swaziland ferns and fern allies
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and
fern allies

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I am grateful to Kate Braun for providing accommodation and sharing invaluable information. Les Powrie is thanked for helping with the preparation of the distribution maps, and Dr Cora Ovens for proofreading the text.
It is recorded that Ernest Galpin was the first person to collect plants in Swaziland. Galpin, a banker and plant enthusiast, was transferred to Barberton in June 1889, where he lived until the end of 1892 before being transferred to Queenstown (Gunn & Codd 1981). During this time he collected numerous plants from the surrounding mountains, which were sent to Kew, Harry Bolus at the Cape, Medley Wood at the Durban Botanical Garden, MacOwan at the South African Museum herbarium, and Zurich. Further collections were made in 1890 by E. Saltmarshe, who visited the Bulembu area, or the Havelock Concession, as it was known at the time. In 1906 Harry Bolus visited Mbabane and collected at Dalriach outside Mbabane and also travelled to the middleveld. Miss Mabel Stewart was the first Swaziland resident who is known to have collected in that country, at first around Mbabane and later at Hlatikhulu where she lived. Her specimens were sent to South African herbaria and many of them are housed in the South African Museum (SAM) herbarium at the Compton Herbarium, Kirstenbosch (Gunn & Codd 1981).

The Englishman Joseph Burtt Davy arrived in South Africa in 1903 and in March that year he took up a post as botanist and agrostologist in the newly formed Transvaal Department of Agriculture, where he worked until his retirement in October 1913 (Gunn & Codd 1981). Burtt Davy was a keen botanist and published *A first check-list of flowering plants and ferns of the Transvaal and Swaziland* in 1912 with the assistance of Pott-Leendertz. This was the first list in which plants from Swaziland were included. In 1919 Burtt Davy returned to England and started working on *The manual of flowering plants and ferns of the Transvaal with Swaziland, South Africa*. Two parts if this proposed four-part publication were published in 1926 and 1932, but Burtt Davy died and the project was terminated (Gunn & Codd 1981). These two parts list 217 plant species for Swaziland (Compton 1966), of which nine are pteridophytes.

Professor R.H. Compton visited Swaziland in 1947 with Dr. G.W. Reynolds and was so excited by the flora that after his retirement in 1953 as Director of the then National Botanic Gardens of South Africa, he moved to Swaziland and settled on the farm Ukutula outside Mbabane (Compton 1966). Two years later he was asked by the Swaziland government to start a botanical survey of the country and was provided with a technical assistant, a four-wheel drive vehicle, and a small herbarium building. Unfortunately, in 1966 his subsidy, transport and herbarium building were withdrawn and fieldwork was stopped. He was able to devote all his attention to this project and the preliminary results of this task were published in 1966 as *An annotated check-list of the flora of Swaziland* (Compton 1966). In this list, 73 pteridophyte species were recorded for the country. For an unknown reason the pteridophytes were omitted from the *Flora of Swaziland* (Compton 1976). Today, this monumental work in which 2 118 species are described, still remains the standard work for the flora of the country. Additions were published by Kemp in 1981. More recently, *A flora checklist for Swaziland* (Kemp 1983) was published, bringing the number of pteridophytes known for the country to 90 species.

During 2001 I conducted a survey of pteridophyte specimens housed in some of the southern African herbaria, and concluded that no pteridophytes are known from large parts of the country. Several species occurring in neighbouring South Africa have never been recorded for Swaziland. As a consequence, an intense pteridophyte survey was carried out in the area during the period 5 to 23 May 2002, during which nearly 400 specimens were assembled. The first set of this collection is housed in the Compton Herbarium (NBG). The aim of the survey was to collect and record the distribution of pteridophytes throughout Swaziland. During this period several species were recorded for the first time in the country bringing the number of species currently known for the region to 112. The season during which the survey was carried out was unfortunately a very dry one and the lowveld and Lubombo region still remain poorly known. It is expected that several more pteridophyte species will be added later.
In this publication the family and generic sequence follows Roux (2001), whilst the species are arranged alphabetically for convenience. In the species descriptions the lower and higher size ranges recorded are bracketed, and statistical means are given for stomata and spores. The statistical mode is given for the number of indurated annulus, epistomium and hypostomium cells per sporangium. Ecological aspects are dealt with under the following headings (definitions for the terms are provided in the glossary):

Habitat preferences
- Substrate preferences (terrestrial, epilithic, epiphyte, or chamaeophyte)
- Soil and moisture conditions
- Light requirements

Figure 1. Map of Swaziland illustrating the topography with contours at 500 m intervals, perennial streams and rivers, and the major mountain ranges.
Adaptive features
- Life forms (mega-, meso-, micro-, nanophanerophytes, hemicryptophytes, geophytes or therophytes)
- Structure of the photosynthetic organs (hygro-, meso-, xeromorphic), hydrostatics (poikilohydry)
- Vegetative reproduction
- Seasonal behaviour
- Fire resistance

To indicate the distribution of species within Swaziland a two-system approach is followed. Global Positioning System (GPS) readings are generally not available for older collections and since the exact locality cannot be plotted, the quarter-degree square in which the plant was collected is shaded. Where GPS readings are available, the collecting locality is indicated by a dot. For distributions outside Swaziland, but still within the African region, the level 3 regional names of Brummit (2001) are followed. Author citations follow the style of Brummitt & Powell (1992), journal abbreviations are given as in Botanico-Periodicum-Huntiarum/Supplement (Bridson 1991), and abbreviations of book titles follow Stafleu & Cowan (1976–1988). Herbarium acronyms are based on Holmgren et al. (1990).

Topography

Swaziland occupies an area of 17 364 km² (± 1 735 300 ha) and is located on the eastern rim of southern Africa, where it lies between the latitudes 25°43’ and 27°19’ S, and the longitudes 30°47.5’ and 32°06’ E (Figure 1). It is situated along the eastern watershed of the Drakensberg running north-south. Four major river systems, the Komati, Mbuluzi, Lusutfu and Ngwavuma rivers, drain the country. These are all perennial rivers originating on the Mpumalanga highveld to the west of the country which form deep valleys as they cut through the mountainous terrain.

The Sondeza, Makhonjwa and Ngwenya mountains along the northern and north-western border of the country form the highest region, reaching 1 837 m at Ngwenya North. To the south, however, the terrain gradually becomes less mountainous, but still forms part of the highveld region, or Inkangala, as it is known to the siSwati, with Lundzi at 1 540 m and Sicunusa at 1 100 m above sea-level. The highveld is the region lying above 1 000 m.

The middleveld occupies the region between 400 and 1 000 m above sea-level. In the western parts of the country it intrudes into the highveld in deep valleys. Although the transition between the highveld and middleveld is usually gradual, the descents from the highveld may also be abrupt, as from Mbabane to the Ezulweni valley, and the descent into the Komati valley on the road between Mbabane and Pigg's Peak. Although still hilly, the region is less undulating, with numerous smaller seasonal and perennial streams originating in or flowing through the region. Infrequent along these drainage channels are small alluvial flats with seasonal marshes. In contrast to the western middleveld, where granite and gneiss are the predominant rock formations, the eastern Lubombo mountain range consists of lavas. The Lubombo region runs parallel to that of the western middleveld, but is less fragmented. However, three gorges are formed where the Mbuluzi, Lusutfu and Ngwavuma rivers cut through the mountain range. The highest point in this region, Isateki, reaches 774 m above sea-level. Streams originating on the Lubombo range are usually seasonal, which, north of the Lusutfu river, drain east and west.

The lowveld, or Ihlandze, is the region which lies below 400 m. This almost featureless region is gently undulating with alluvial flats often forming along the main river systems. The region is currently used for intensive cattle and sugarcane farming, but a small area, the Hlane Wild Life Sanctuary, has been set aside for conservation.

Geology

Rock formations in Swaziland consists of many igneous and volcano-sedimentary types (Keyser 1997). These formations were laid down over an exceptionally long period, which can be divided into a series of Precambrian events which took place during the Swazian and Randian Erathems and a, geologically speaking, more recent Postcambrian or Mesozoic event (Table 1).
The current Swaziland landscape is characterised by a large number of granite and gneiss plutons. These formations extend over large areas and are the predominant rock types in the country. Granite and granitoid rocks are igneous types and are therefore viewed as the base on which other rock formations developed. These overlying formations have eroded and weathered away, exposing the igneous types. The approximately nine gneiss and granite plutons exposed today were formed during the

<table>
<thead>
<tr>
<th>Volcano-sedimentary rocks</th>
<th>Igneous formations</th>
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<tbody>
<tr>
<td><strong>Phanerozoic</strong></td>
<td></td>
</tr>
<tr>
<td>Jozini Formation</td>
<td></td>
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<tr>
<td>Jj [± 200]</td>
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<tr>
<td>Letaba Formation</td>
<td>Dolerite dykes Jd</td>
</tr>
<tr>
<td>Sandstone Trc</td>
<td>Kwetta Granite Rkw [2 780]</td>
</tr>
<tr>
<td>Unidentified lava</td>
<td></td>
</tr>
<tr>
<td><strong>Randian</strong></td>
<td></td>
</tr>
<tr>
<td>Hlelo Granite Suite</td>
<td></td>
</tr>
<tr>
<td>Piet Retief Gobba Suite</td>
<td></td>
</tr>
<tr>
<td>Pongola Sequence</td>
<td>Hlatikulu Granite Rhl [2 875]</td>
</tr>
<tr>
<td>Usushwana Complex Ru [2 900]</td>
<td></td>
</tr>
<tr>
<td><strong>Swazian</strong></td>
<td></td>
</tr>
<tr>
<td>Moodies Group Zm</td>
<td></td>
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<tr>
<td>Fig Tree Group Zf</td>
<td></td>
</tr>
<tr>
<td>Onverwacht Group Zo</td>
<td></td>
</tr>
<tr>
<td>Barberton Sequence [± 3 500]</td>
<td></td>
</tr>
<tr>
<td><strong>Table 1. Stratigraphy of the major volcano-sedimentary and igneous rock formations in Swaziland. (Rock formation codes follow Keyser 1997, whilst the approximate ages are given in square brackets).</strong></td>
<td></td>
</tr>
</tbody>
</table>

- Mlika granodiorite Zml [± 3 150]
- Granodiorite
- Tsawela gneiss Zts [3 458] Hornblende-biotite tonolite gneiss
- Unidentified gneiss Zmg [3 553]
- Ngwane gneiss Zng [3 644] Tonalitic gneiss
Swazian and Randian Erathems and span 921 m.y. The oldest is the Ngwane gneiss pluton, with an age of 3 644 m.y. old, and the Ms watt Granite Suite is the youngest at 2 723 m.y. old (Figure 2).

Formations from the Swazian erathem, >3 100 m.y. old, also consist of volcano-sedimentary types. These rocks belong to the Barberton sequence, also referred to as the Barberton Greenstone belt and are found along the north-western border of Swaziland. As a result of its lithostratigraphy, the formation is subdivided into three groups: the older Onverwacht Group, the Fig Tree Group, and the younger Moodies Group. These rocks have been radiodated to be approximately 3 500 m.y. old (Kent 1980).

The Onverwacht Group consists of a thick succession of mafic and ultramafic lavas overlain by rhyolite (lava which banded as a result of its flow) deposited on an ancient oceanic environ-
ment. This event was followed by a period during which sediments were deposited on the lava, followed by repeated cycles of volcanic activity and sediment deposition. Some of the sedimentary rocks are ocean-floor muds, chert (fine-grained quartz) and carboniferous shale. The carboniferous shales and chert contain primitive microfossils. In this group a number of ultramafic complexes occur as igneous intrusions and in many of these, chrysotile asbestos has been mined at the old Havelock Mine, now Bulembu.

Occupying the central core of the Barberton Group is the Fig Tree Group, which consists of fine-grained sediments with some interbedded pillow lavas. The sediments include banded chert, banded ironstone and shale in the lower part, and greywacke (dark sandstone) in the upper. Again, some of the cherts and shales are carboniferous and contain primitive microfossils. The Fig Tree rocks were deposited in relatively deep water and the sediments were derived from the erosion of oceanic islands.

In contrast, the younger and overlying Moodies Group displays evidence of having been deposited in shallow water, as ripple marks and shrinkage cracks have been observed. The rock succession consists mainly of conglomerates, quartzites, sandstone, shales, banded iron formations, and minor volcanic interlayers.

The Barberton Group has undergone several stages of deformation producing small- and large-scale folds and faults. This deformation was largely caused by the intrusion of several granite bodies, the largest being the Mpuluzi granite batholith which forms part of the Nelspruit suite. The Mpuluzi batholith has been radiometrically dated to be 3 079 m.y. old. During the Swazian Erathem several other igneous formations were also formed (Table 1).

During the Randian Erathem (3 100 – 2 650 m.y.), further volcano-sedimentary and igneous formations were formed. A relatively narrow strip of quartzitic sediments consisting of quartzites, conglomerates, grits and schists with some lavas extends into the south-western part of Swaziland. This, the Pongola Sequence, is stratigraphically subdivided into the lower Nsuze Group and the upper Mozaan Group (Kent & Matthews 1980).

The Nsuze Group is predominantly a volcanic succession composed mainly of altered fine-grained andesites, with a few acid lavas and, rarely, with quartzitic and schist sediments. Lava in the Nsuze group has a radiometric age of ± 3 090 m.y. Xenoliths of Nsuze rocks are frequently found in Hlatikulu Granite in the Hluti area.

The Mozaan Group is composed of a thick succession of alternating quartzites and shales with lavas at or near the top. The quartzites are light coloured and the shales gray to dark grey.

The Pongola Sequence has been intruded by the Usushwana Complex, radiometrically dated at 2 900 to 3 000 m.y. The complex is subdivided into the Piet Retief Gabbro Suite, which consists predominantly of quartz gabbro (coarse-grained dolerite), and the Hlelo Granite Suite, which consists of granodiorite and microgranite (granites with different chemical properties). The Usushwana Complex has intruded some of the older granites and in turn has been intruded by granites dated between ± 2 200 and 2 880 m.y. (Kent 1980).

Apart from erosion, which leads to the exposure of the granitic baserock, no major geological events appear to have taken place during the period from the end of the Randian Erathem to the Phanerozoic and in particular the Jurassic (205—140 m.y.). During this period, basalt poured out over large areas of southern Africa. These basaltic lavas and rheolites form the Lubombo mountains. The Lebombo Group of lavas forms part of the Karoo Supergroup and is divided into the lower Letaba Formation consisting of basalt and the Jozini Formation, which is rhyolitic (Johnson et al. 1980).

**Climate**

The climate of Swaziland, like the topography, can also be divided into the highveld, middleveld, and lowveld regions. The highveld region has a humid near-temperate climate with a mean minimum temperature of 11°C and a mean maximum temperature of 22°C. During
the winter months (May – August), severe frosts may occur in lower-lying areas. The mean annual rainfall for the region is ± 1 270 mm, but at higher altitudes along the Ngwenya mountains it is ± 1 800 mm. In Swaziland most of the precipitation occurs during October to March. The middleveld has a subtropical climate and frosts are rare or absent. The mean minimum temperature for the region is 13°C and the mean maximum temperature is 26°C. The mean annual rainfall for the region is 940 mm. The lowveld has a subhumid, almost tropical climate with a mean minimum temperature of 15°C and a mean maximum temperature of 29°C. The mean annual rainfall for the region is 787 mm.

Vegetation

Acocks (1975) recognises seven vegetation types in Swaziland (Figure 3). Each has been grouped into a broader vegetation type as a result of its affinity with similar types. Four of these vegetation types occur in Swaziland:

I. Coastal tropical forests

II. Inland tropical forest types

III. Tropical bush and savanna types

IV. False grassveld types

Each of the vegetation types occurring in Swaziland is briefly described giving some of its features, distribution, and listing a number of species commonly occurring in it.

I. Coastal tropical forests

Zululand Thornveld

This vegetation type is more or less restricted to the middleveld and occupies the summit and eastern slopes of the Lubombo mountains as well as the Ingwavuma drainage basin in the southern part of Swaziland. In its original state, parts of it probably formed forests and scrub-forests. On the steeper slopes of the Lubombo range, tree species such as *Rauvolfia caffra* Sond., *Aloe barbareae* Dyer, *Euphorbia ingens* E.Mey. ex Boiss., *Albizia adiantifolia* (Schumach.) W.Wight and *Erythrina caffra* Thunb. occur. In the Ingwavuma basin forest thickets of this vegetation type occur as isolated pockets on the more protected slopes and along drainage channels. It has been replaced by grassveld where *Themeda triandra* Forssk., *Heteropogon contortus* (L.) Roem. & Schult., *Eragrostis racemosa* (Thunb.) Steud. and *Hyparrhenia* E. Fourn. form the dominant species.

II. Inland tropical forest types

North-eastern Mountain Sourveld

In Swaziland this vegetation type occurs on the highveld ranging from the area around Forbes Reef southwards to Mbabane, and again on the Mahlangatsha hills. The climax is thought to have been forest, but has largely been replaced by sour grassveld. Small and scattered forest patches are currently restricted to narrow ravines, boulder-forests and along drainage lines where they receive some protection from seasonal veldfires. Slightly larger patches of climax forest still occur near Hhoro and in the Ugu two. Some of the more common tree species include *Podocarpus latifolius* (Thunb.) R.Br. ex Mirb., *Strelitzia caudata* R.A.Dyer, *Rapanea melanophloeos* (L.) Mez, *Syzygium gerrardii* (Harv. ex Hook.f.) Burtt Davy, *Halleria lucida* L. and *Kiggelia africana* L. Whilst *Cyperus albostriatus* Schrad., *Plectranthus* spp., *Dietes* sp., *Begonia* sp. and *Oplismenus hirtellus* (L.) P.Beauv. commonly grow on the forest floor. The grassveld, which replaces the forests, is sour with *Themeda triandra* Forssk. being the dominant species. Other common grasses include *Loudetia simplex* (Nees) C.E.Hubb., *Monocymbium cerisiforme* (Nees) Stapf, *Fristachya bisericata* Stapf, and *Hyparrhenia hirta* (L.) Stapf.

Lowveld Sour Bushveld

Lowveld sour bushveld occurs on the middleveld and covers the foothills of the Swaziland mountains extending into the Komati, Ingwempisi and Mahamba valleys. Although fairly densely forested in some parts, it currently forms a more or less open parkland with well developed trees spaced in tall grass. Trees commonly found in this vegetation type include *Sclerocarya birrea* (A.Rich.) Hochst. *Pterocarpus angolensis* DC., *Diospyros mespiliformis* Hochst. ex A.DC., *Lonchorcarpus capassa* Rolfe and *Terminalia sericea* Burch. ex DC. The grassveld is tall with a fair number of low shrubs. Some of the more common
grasses and shrubs include *Hyparrhenia cymbaria* (L.) Stapf, *Cymbopogon excavatus* (Hochst.) Stapf ex Burtt Davy, *Diospyros galpinii* (Hiern) DeWinter and *Elephantorrhiza elephantina* (Burch.) Skeels.

### III. Tropical Bush and Savanna types

#### Lowveld

As the name implies, the Lowveld vegetation occurs in the lowveld plains in Swaziland. This vegetation type is a typical *Acacia nigrescens*-Sclerocarya-Themeda savanna and has no clear-cut boundaries. It replaces Zululand thornveld and Lowveld sour bushveld. Tree species associated with this vegetation type include *Acacia nigrescens* Oliv., *Sclerocarya birrea* (A.Rich.) Hochst., *Ziziphus mucronata* Willd., *Acacia davyi* N.E.Br. and *Phyllanthus reticulatus* Poir. The dominant grasses include *Themeda triandra* Forssk., *Panicum maximum* Jacq., *Setaria incrassata* (Hochst.) Hack. and *Eragrostis superba* Peyr. Large parts of this vegetation type have been transformed into sugarcane fields.

Figure 3. Distribution of the vegetation of Swaziland following Acocks (1975).
Arid Lowveld

Arid lowveld covers a small area of the southern lowveld region. It is also a typical *Acacia nigrescens*-Sclerocarya savanna, but with *Digitaria* sp. being the dominant grass. Other trees typically associated with this vegetation type are *Spirostachys africana* Sond., *Ziziphus mucronata* Wildl. and *Acacia erubescens* Welw. ex Oliv. Along the Lubombo it forms a dense thicket which includes species such as *Euclea undulata* Thunb., *Spirostachys africana* Sond., *Atalaya alata* (Sim) H.O.Forbes, *Schotia brachypetala* Sond. and *Cladostemon kirkii* (Oliv.) Rax & Gilg. As a result of the poor soils the area is unsuitable for cultivation, but is used for cattle ranching.

VI. False Grassveld types

Piet Retief Sourveld

This vegetation type is restricted to the highveld and is a sour grassveld type with forests and scrub-forests in sheltered places. Forest relics include *Scolopodium mundii* (Eckl. & Zeyh.) Warb., *Faurea speciosa* (Welw.) Welw., *Halleria lucida* L. and *Myrsine africana* L. Typical grassveld species include *Themeda triandra* Forssk., *Eragrostis racemosa* (Thunb.) Steud., *Monocymbium cerisiiforme* (Nees) Stapf, *Heteropogon contortus* (L.) Roem & Schult. and *Hyperrhenia hirta* (L.) Stapf. Large parts of this vegetation type have been lost as a result of afforestation.

Northern Tall Grassveld

This sourveld type is a patchwork of grassveld with scrub and relic forest patches in areas less prone to regular burning. The grassveld is dominated by *Tristachya leucothrix* Nees, *Eragrostis racemosa* (Thunb.) Steud., *Microchloa caffra* Nees, and *Diheteropogon amplexus* (Nees) J.Clayton. Forbes include *Senecio latifolius* DC., *Acalypha angustata* Sond. var. *glabra* Sond., *Indigofera oxytropis* Benth. ex Harv., *Diospyros galpinii* (Hiern) DeWinter, and *Hypoxis argentea* Harv. ex Baker.

Conservation

The conservation and improvement of the natural resources of Swaziland have been called for since 1951 (Compton 1968), but it was only in 1960 that the first national park, the Mlilwane Wildlife Sanctuary, was proclaimed. The King acquired what is now the Hlane Game Reserve during the 1940s as a private ranch, but it was proclaimed as a reserve in 1967. This situation has, however, changed dramatically during the last four decades with the establishment of six nature reserves in various parts of the country (Table 2). These reserves have been located to conserve portions of the different vegetation types occurring in the country and the fauna associated with them.

The reserves cover approximately 3.25% of the land area of the country, which is in stark contrast to the 6.16% used for afforestation (Scharfetter 1987). In an effort to conserve larger areas, a transfrontier park between the Malolotja Nature Reserve and the 49 000 ha Songimvelo Game Reserve in the Mpumalanga Province of South Africa came into being during 2002. Talks with the government of Mozambique are underway to establish a transfrontier

<table>
<thead>
<tr>
<th>Reserve</th>
<th>Date proclaimed</th>
<th>Area (hectares)</th>
<th>Vegetation type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mlilwane Wildlife Sanctuary</td>
<td>1960</td>
<td>4 545</td>
<td>North-eastern Mountain Sourveld &amp; Lowveld Sour Bushveld</td>
</tr>
<tr>
<td>Hlane Game Reserve</td>
<td>1967</td>
<td>14 164</td>
<td>Lowveld</td>
</tr>
<tr>
<td>Malolotja Nature Reserve</td>
<td>1977</td>
<td>18 000</td>
<td>Lowveld Sour Bushveld &amp; Piet Retief Sourveld</td>
</tr>
<tr>
<td>Mlawula Nature Reserve</td>
<td>1980</td>
<td>12 000</td>
<td>Lowveld</td>
</tr>
<tr>
<td>Ndzindza Nature Reserve</td>
<td>1980</td>
<td>5 500</td>
<td>Lowveld</td>
</tr>
<tr>
<td>Mkhaya Nature Reserve</td>
<td>1981</td>
<td>6 000</td>
<td>Lowveld</td>
</tr>
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Swaziland ferns and fern allies
park which will include the Mlawula and Ndzindza Nature Reserves.

Although there is legislation to control burning, the cultivation and destruction of vegetation along streams and rivers, and the collecting or destruction of plant material, the laws are not strictly enforced. As a result, areas falling outside the reserves are regularly burnt, agricultural lands are established within metres of streams and riverbanks, and in some areas the vegetation is severely altered as a result of uncontrolled grazing. The small fragmented evergreen forest patches on the high and middleveld are severely threatened by a number of activities. For example, the uncontrolled grazing of cattle in such forests at Hlathikhulu and Hluti is not only resulting in the erosion of the forest floor, but has led to the almost total destruction of the undergrowth. Regeneration of these forests is therefore not taking place and ultimately they will disappear if this practice is continued. Contributing to this is alien encroachment, in particular by Acacia mearnsii DeWild., and in several areas parts of forests are cleared for the illegal cultivation of dagga (Cannabis sativa L.).

In the lowveld, particularly in the Mbuluzi valley and Mananga mountains, the scrambling shrub Chromolaena odorata (L.) R.M.King & H.Rob. forms impenetrable thickets along streams and riverbanks, smothering the natural vegetation.
Taxonomy

Key to the families:

1a Sporangia variously borne, but not in sori abaxially on the lamina:
   2a Sporangia borne on peltate sporangiophores arranged in a terminal strobilus ..............
   ............................................................................................................................. Equisetetaceae
   2b Sporangia borne at sporophyll axils, adaxially near leaf bases, in a fertile spike inser-
   tned near the base of a sterile lamina, or in nut-like sporocarps at or on the stipe. base:
   3a Sporangia fused to form a 2- or 3-locular synangium, or the sporangia fused to form a
   sporophore inserted at the base of a sterile tropophore:
      4a Synangia borne adaxially at the base of forked sporophylls ............... Psilotaceae
      4b Sporangia borne on a sporophore with as many as 30 sporangium pairs, inserted at
      the base of the sterile tropophore ................................................................. Ophioglossaceae
   3b Sporangia solitary in the sporophyll axils, adaxially near the leaf bases, or in nut-
   like sporocarps:
      5a Sporangia borne in nut-like sporocarps .................................................. Marsileaceae
      5b Sporangia borne singly in sporophyll axils or adaxially near the sporophyll base:
         6a Leaves ligulate; heterosporous ........................................ Selaginellaceae
         6b Leaves eligulate; homosporous ........................................................... Lycopodiaceae
   1b Sporangia borne singly, in pairs, in sori, or in synangia abaxially on the lamina:
   7a Sporangia fused to form synangia ............................................................. Marattiaceae
   7b Sporangia solitary, in pairs, or many grouped in sori:
      8a Sterile fronds simple:
         9a Sterile lamina linear:
            10a Fertile lamina with pectinately arranged fertile segments...... Schizaeaceae
            10b Fertile lamina simple with sporangia in longitudinal grooves.... Vittariaceae
         9b Sterile lamina oblong or narrowly elliptic, acute, acuminate or attenuate:
            11a Sporangia acrostichoid ......................................................... Lomariopsidaceae
            11b Sporangia in circular, elliptic or linear sori:
               12a Indusium reniform; veins forked, free ................................. Oleandraceae
               12b Exindusiate; veins forming a reticulate network .............. Polypodiaceae
      8b Sterile fronds pinnatifid or pinnately compound:
         13a Sporangia not borne in distinct sori, but rather on a highly skeletonised part
         of the lamina:
            14a Sterile lamina 2-pinnate; sporangia borne on the apical pinnae ..............
            ................................................................................................................. Osmundaceae (Osmunda)
            14b Sterile lamina 1-pinnate; sporangia borne on the highly modified erect basal
            pinna pair ........................................................................................ Anemiaceae (Anemia)
         13b Sporangia usually borne in sori, if not, then the lamina not differentiatied:
            15a Lamina pseudodichotomously branched ....................................... Gleicheniaceae
            15b Lamina pinnately branched:
               16a Lamina membranous, one cell layer thick (unistratose) .....................
               ............................................................................................................ Hymenophyllaceae
               16b Lamina herbaceous to coriaceous and always more than one cell layer thick:
                  17a Sori elongate, along a vein abaxially on the lamina, or along a near-
                  marginal vascular commissure; if indusiate, the indusium then linear:
                     18a Sori exindusiate:
                        19a Lamina adaxially and abaxially with hyaline unicellular
                        acicular hairs .................. Thelypteridaceae (Stegnogramma)
                        19b Lamina without acicular hairs:.. Pteridaceae (Pityrogramma)
20a Lamina abaxially with a yellow farina .......................................................... \textbf{Pteridaceae (Pityrogramma)}
20b Lamina abaxially without a yellow farina .......................................................... \textbf{Osmundaceae (Todea)}

18b Sori indusiate:
21a Indusium along a vein abaxially on the lamina:
  22a Lamina flabellately branched. \textbf{Pteridaceae (Actiniopteris)}
  22b Lamina pinnately branched:
    23a Scales clathrate; lamina glabrous or scaled, rarely with hairs .......................................................... \textbf{Aspleniaceae}
    23b Scales not clathrate; lamina variously set with pluricellular hairs .......................................................... \textbf{Woodsia ceae}
  21b Indusium along a near-marginal vascular commissure or a modified lamina margin:
  24a Fronds dimorphic:
    25a Plants free-floating aquatics .................. \textbf{Parkeriaceae}
    25b Plants terrestrial .................................................. \textbf{Blechnaceae}
  24b Fronds monomorphic:
    26a Lamina variously set with hairs only .......................................................... \textbf{Dennstaedtiaceae}
    26b Lamina glabrous or variously set with scales and hairs .......................................................... \textbf{Pteridaceae}

17b Sori uni- or bisporangiate, if plurisporangiate, then elliptic, lunate, circular and abaxially on the lamina, or terminally at the apex of a free vein branch and marginal; if indusiate, the indusium then cupulate, reniform or peltate:
27a Sori uni- or bisporangiate ................................. \textbf{Anemiaceae (Mohria)}
27b Sori plurisporangiate:
  28a Indusium inferior .................................................. \textbf{Cyatheaceae}
  28b Indusium superior or a modified lamina margin:
    29a Sori marginal:
      30a Lamina with acicular pluricellular hairs along the veins .................................................. \textbf{Dennstaedtiaceae (Hypolepis)}
      30b Lamina without acicular hairs along the veins .......................................................... \textbf{Pteridaceae (Adiantum)}
    29b Sori superficial:
      31a Sori exindusiate:
        32a Fronds articulated to short phyllopodia .......................................................... \textbf{Polypodiaceae}
        32b Fronds not articulated to phyllopodia:
          33a Lamina to 1-pinnate, not acroscopically developed .................................................. \textbf{Thelypteridaceae}
          33b Lamina 2 to 3-pinnate, acroscopically developed .................................................. \textbf{Dryopteridaceae (Polystichum)}
    31b Sori indusiate:
      34a Indusium cup-shaped .................................................. \textbf{Dennstaedtiaceae (Microlepia)}
      34b Indusium elliptic, peltate, or reniform:
        35a Pinnae articulated to the rachis .................................................. \textbf{Nephrolepidaceae}
        35b Pinnae not articulated to the rachis:
          36a Lamina never basiscopically developed .................................................. \textbf{Thelypteridaceae}
The Psilotaceae is a family of two genera: Tmesipteris Bernh. is confined to tropical Asia and western Oceania, and Psilotum Sw. has a pantropical distribution. The family has no obvious close affinity to any other group of vascular plants and is best treated as an independent group. Psilotum is often grouped with the extinct Psilophytes, the Rhyniales and Zosterophyllales dating from the Devonian some 400 million years ago. More recently it has been suggested that Psilotum forms part of a lineage which includes the Ophioglossideae and which is basal in the Moniliformopses, a group which includes the eusporangiate and leptosporangiate ferns (Pryer et al. 2001). These plants are all characterised by dichotomously branched stems, the absence of roots, a relatively simple vascular structure and thick-walled, homosporous synangia. The earliest known fossil record of a modern psilophyte fern dates to the early Oligocene.


Plants epilithic or epiphytic. Rhizome short-decumbent, dichotomously branched, rootless, to 1.5 mm in diameter, with rhizoids; stems aerial, chlorophyllose, erect or pendent, once or several times dichotomously branched, to 160 mm long, to 2 mm in diameter, gla-
Figure 4 A & B, *Psilotum nudum*, A, habit, B, section of stem showing synangia; C & D, *Equisetum ramosissimum*, C, habit, D, strobilus.
brous, angular or sulcate; with anomocytic stomata in the sulci. *Leaves* rudimentary, simple, lanceolate, adnate, spaced, estomate, to 1.5 mm long. *Sporangia* fused to form a sessile, 2- or 3-locular, thick-walled synangium borne adaxially at the base of forked sporophylls, to 2.5 mm in diameter, each locule dehisces with a longitudinal slit. *Spores* numerous, achlorophyllaceous, elongate-ellipsoid, monolete, irregularly rugate, 60–75 µm long. Chromosome number based on 2n = 104. Figure 4 A & B.

**Vernacular names:** Whisk fern; Stoffervaring (Afr).

**Ecology:** Epilithic, in shaded, seasonally moist rock crevices, usually along or near streams and in riverine forests. Not edaphically bound, in Swaziland the species grows on granitoid and basaltic rocks. Hemicyrptophyte, mesoxerophytic; branches xeromorphic. Vegetative reproduction by rhizome branching. Seasonal pattern apparently non-existent.

**Distribution:** Rare in Swaziland, but possibly more widespread, but overlooked, occurring between 150 and ± 1 250 m. Widespread in sub-Saharan Africa, pantropical.

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**EQUISETACEAE** Rich. ex DC.

The relationships of the Equisetaceae are controversial—they have been considered as sisters to the angiosperms (Rothwell 1999), sisters to the ferns (Kenrick & Crane 1997), basal to the euphyllophyte lineage (Stevenson & Loconte 1996) and, more recently, in the lineage of eusporangiate ferns (Pryer et al. 2001). The Equisetaceae is a well-defined group of extinct and extant plants not clearly related to any other group of pteridophytes. The group dates back to the Devonian, ± 300 million years ago. *Equisetum* accumulates large quantities of silica, which strengthens the plant, in the epidermal cell walls of the aerial shoots.


*equus* = horse; *seta* = bristle or hair

Generic description as for the family. A near-cosmopolitan genus of about 15 species, most of which occur in America. The genus is absent from Australia and New Zealand.


*Equisetum thunbergii* Wikstr. in Kongl. Svenska Vetensk. Acad. Handl. 2: 4 (1821). Type: Cape Province, Thunberg s.n. (UPS, holo.).


*Equisetum ramosissimum* Desf. var. *dregaeanum* Milde, Monogr. Equiset.: 447 (1865). Type: Promontorium bonae Spei, Drège s.n., Thunberg s.n. (UPS, holo.).
Equisetum ramosissimum Desf. var. arcuatum Milde, Monogr. Equiset.: 448 (1865). Type: Promontorium bonae Spei, ad rivum parvum prope Gekan, Drège s.n. (LZ†).

Equisetum ramosissimum Desf. var. flagelliferum Milde, Monogr. Equiset.: 449 (1865). Type: Ad margines aqueductum urbis Palmarum et alibi insulae Teneriffa, sine coll. s.n. (not located); Natal, in palud. ripae Togela fluvii, Gueinzius s.n. (W, syn.).

Equisetum ramosissimum Desf. var. distortum Milde, Monogr. Equiset.: 451 (1865). Type: Promontorium bonae Spei, Mundt & Maire s.n. (missing).

Equisetum ramosissimum Desf. var. natalense Milde, Monogr. Equiset.: 452 (1865). Type: Natal-Küste, Gueinzius s.n. (missing).


Plants terrestrial. Rhizome subterranean, jointed, 3–6 mm in diameter, roots borne in whorls at the nodes. Stems erect, to 1.5 m tall, to 5 mm in diameter, branches borne in whorls at the nodes, up to 14 in each whorl, to 130 mm long, to 1.5 mm in diameter, main stem and branches ridged, bearing silicaceous tubercules or bands, with regular rows of paracytic sunken stomata in the sulci, in cross section with a prominent central canal and small vallecular (under sinuses) and carinal (under ridges) canals. Leaves membranous to thinly chartaceous, each with a single central vein, whorled, fused into a nodal sheath, to 11 mm long, ending in acuminate teeth, to 2 mm long, turning black with age, margins hyaline, estomate. Sporangia elongate, thin-walled, dehiscing longitudinally, borne on stalked, peltate sporangiophores forming a strobilus terminally on a main stem or branch, to 18 mm long, to 5 mm in diameter, each sporangiophore bears 6–9 sporangia. Spores spheroidal, chlorophyllose, with 4 spatulate hygroscopic elaters. Figure 4 C & D.

ramosissimum = many-branched

Vernacular names: Scouring rush, Horsetail; Bewerasiiegas, Dronkgras, Drilgras, Lidljesgras, Perdestert, Paardestaat (Afr.); Mohlaka-photoane (Ses.); Ishobalehashi, Isikhumukele (Zulu).

Ecology: Terrestrial, generally in humid sand, gravel, mud or silt on floodplains and in stream and riverbeds. Often also invasive in cultivated fields. Exposed or in partial shade. Geophyte, mesoxerophytic; aerial stems meso-xeromorphic. Seasonal pattern apparently non-existent, strobili possible throughout the year. Vegetative reproduction by the subterranean branched rhizome. Pyrophytic.

Distribution: The species is widespread in Swaziland, occurring along most of the major draining systems at altitudes ranging from ± 150 m along the Mlawula River to 800 m on the western highveld. The species is widespread in the eastern parts of west central tropical Africa, east and south tropical Africa, south tropical and southern Africa, Macaronesia, the western Indian Ocean region, Egypt, southern and central Europe and Asia, except Malaysia. Equisetum ramosissimum Desf. subsp. debile (Roxb. ex Vaucher) Hauke occurs from India and southern China through Malaysia to New Caledonia and Fiji.

Uses: Equisetum is of economic importance to the stock farmer as it is poisonous when consumed in large quantities, the toxic principle probably being the enzyme thiaminase that destroys vita-
min B1. This causes livestock to appear drunk and puts them at risk of harming themselves. The Sesotho use the plant for various ailments and rituals. Phillips (1917) reports that the rhizomes are cooked and a decoction is drunk by barren women so that they may become pregnant. The plant is used as a charm to drive caterpillars from the maize fields. This is done by encapsulating some of the caterpillars in clay balls which are then burnt in the fields. The Zulu use the sap from the plant to relieve toothache and it is also applied to the wound after tooth extraction (Gerstner 1939).

**LYCOPODIACEAE**

Lycopodiaceae represents one of three evolutionary lines within the extant Lycopodiopsida. This ancient line of plants was well-established during the Devonian (Collinson 1996), with many species having attained arborescent dimensions during the Carboniferous period. Most phylogenetic studies place the group above the bryophytes (Bremer et al. 1987; Donoghue 1994). Both these groups lack the inverted repetition in the chloroplast genome, which is present in all other extant pteridophytes. The family of more than 400 species has a near-cosmopolitan distribution.

**Key to the genera:**

1a Stems isotomously branched, without elongate indeterminate main stems; roots usually forming a basal tuft; sporophylls and vegetative leaves alike, or the sporophylls, if smaller, persistent ................................................................. *Huperzia*

1b Stems anisotomously branched, branches differentiated into elongate, indeterminate main stems and determinate branchlet systems; roots emerging at intervals on the lower side of the main stem; sporophylls strongly modified and ephemeral:

2a Strobili pendent and sessile, or erect and ending in simple (rarely branched) stems that arise dorsally on the creeping stems, or the strobili erect on the overtopping vegetative shoots ................................................................. *Lycopodiella*

2b Strobili erect, pedunculate, borne terminally or on branchlet stems which arise in a dorsilateral position on the main stem ......................................................... *Lycopodium*


_Huperz_ = after Johann Peter Huperz, a German botanist (?–1816)

A genus of 200 to 300 species with near-cosmopolitan distribution.

Plants epilithic or epiphytic. *Stems* with a basal tuft of roots, erect or pendulous, several times isotomously branched. *Leaves* coriaceous to firmly herbaceous, simple, isophyllous, homophyllous or heterophyllous, firmly herbaceous to coriaceous, acicular or oblong, acute, imbricate. *Sporophylls* coriaceous to firmly herbaceous, simple, not conspicuously differentiated from the vegetative leaves, or gradually or abruptly smaller than the vegetative leaves, broadly ovate. *Sporangia* reniform or subcircular, isovalvate. *Spores* subtriangular, trilete, foveolate.

**Key to the species:**

Plants heterophyllous; leaves oblong, acute; sporophylls gradually or abruptly reduced to form distinct strobili ......................................................... *H. gnidioides*

Plants homophyllous; leaves acicular; sporophylls not conspicuously reduced to form distinct strobili ......................................................... *H. verticillata*

Plananthus gnidioides (L.f.) P.Beauv., Prodr. aethéogam.: 110 (1805).

Urostachys gnidioides (L.f.) Herter ex Nessel, Bärlappgewächse: 187 (1939). Type: Isle de France, Sonnerat per Thouin s.n. (?P, ?iso.).


Lycopodium flagelliforme Schrad. in Gött. Gel. Anz. 1818: 920 (1818). Type: Prom. bon. spei, Hesse s.n. (LE, holo.; GOET, iso.).


**gnidioides** = refers to the imbricate, *Gnidia*-like (Thymeliaceae) leaves

Plants epilithic or epiphytic. **Stems** with a basal tuft of roots, erect with the apices arching, or pendulous, several times isotonically branched, up to 380 mm long, to 5 mm in diameter. **Leaves** isophyllous, heterophyllous; vegetative leaves coriaceous, narrowly oblong, entire, acute to broadly acute, imbricate, to 10 mm long, to 2 mm wide. **Sporophylls** gradually or abruptly smaller than the vegetative leaves, broadly ovate, entire, acute, imbricate, to 3 mm long, to 2 mm wide. **Sporangia** reniform, isovalvate, to 1.5 mm in diameter. **Spores** yellow, subtriangular, trilete, foveolate, (38–)40–42 µm in equatorial diameter, (24–)26–30 µm in polar diameter. Figure 5 A–D.

**Vernacular names:** Hard clubmoss; Harde wolfsklou (Afr.).

**Ecology:** Epilithic, in exposed or shaded, seasonally moist rock crevices or shallow soil pockets. Hemicyryptophyte, mesoxerophyte; leaves mesoxeromorphic. In Swaziland the species is confined to granitoid rocks. Seasonal pattern apparently non-existent. Vegetative reproduction by the formation of stems from near the base of the main stem, rooting when in contact with the substrate. No drought-dormancy.

**Distribution:** Sporadic in the western highveld region of Swaziland, occurring at altitudes ranging between 1 350 and 1 675 m. *Huperzia gnidioides* also occurs in mesic regions of sub-Saharan Africa and the western Indian Ocean region.

Figure 5 A–D, *Huperzia gnidioides*, A, habit, B, leaf, C, abaxial surface of sporophyll, D, adaxial view of sporophyll showing the sporangium; E–G, *H. verticillata*, E, habit, F, leaf, G, adaxial surface of sporophyll showing the sporangium.
Verticillus = whorled

Plants epilithic. **Stems** with a basal tuft of roots, pendulous, several times isomorphously branched, to 520 mm long, to 2 mm in diameter. **Leaves** isophyllous, homophyllous, firmly herbaceous, acicular, loosely imbricate, to 7 mm long, to 0.7 mm wide. **Sporophylls** not conspicuously smaller than the vegetative leaves, firmly herbaceous, acicular, entire, loosely imbricate, to 7 mm long, to 0.7 mm wide. **Sporangia** reniform to subcircular, isovalvate, to 1 mm in diameter. **Spores** yellow, subtriangular, trilete, foveolate, (30–)31(–32) μm in equatorial diameter, (20–)21(–22) μm in polar diameter. Figure 5 E–G.

**Vernacular names:** Weeping clubmoss; Treur wolfsklou (Afr.).

**Ecology:** Epilithic, on moist or seasonally moist moss-covered rocks in evergreen forests, in light or deep shade, usually near water. Often also on rocks in boulder-forests away from water, but then within the mist belt. Hemicryptophyte, mesoxerophyte; vegetative stems mesomorphic. Seasonal pattern pronounced when growing in environments subject to seasonal moisture fluctuations. Vegetative reproduction often occurs by the rooting of stems where in contact with the substrate. No drought-dormancy, but may wilt during the dry winter months. No resistance to fire.

**Distribution:** In Swaziland the species appears to be confined to the north-western corner of the country, occurring at altitudes ranging between 1 000 and 1 400 m. The species is confined to forest patches along streams, in mountain ravines, and in boulder-forests. *Huperzia verticillata* is widespread in sub-Saharan Africa, the western Indian Ocean region, tropical America, and Polynesia.


Lyco = wolf; *pous* = foot

Generic description as for the species. A genus of approximately 40 species with near-cosmopolitan distribution.


Clavatum = club-shaped
Plants terrestrial. *Stems* wide-creeping, rooting at irregular intervals, anisotomously branched, main stems with indeterminate growth, to 2 mm in diameter, isophyllous, lateral branches erect, arising in a dorsilateral position on the main stem, isophyllous, fertile branches erect, anisotomously branched, sparsely leafy, isophyllous, heterophyllous, to 180 mm long. *Leaves* herbaceous, acicular, entire, aristate, patent to imbricate, to 7 mm long, to 1 mm wide. *Strobili* terminal, in groups of 3–5, to 30 mm long, isophyllous, sporophylla ephemeral, herbaceous, subpeltate, often with a basiscopic membranous wing on the stalk, narrowly to broadly ovate, aristate, laciniate, to 4.5 mm long, to 2 mm wide. *Sporangium* reniform, short-stalked, borne adaxially near the sporophyll base, isovalvate, to 1.3 mm in diameter. *Spores* spheroidal to subtriangular, trilete, reticulate, (34–)37.5(–38) µm in equatorial diameter, (30–)31(–34) µm in polar diameter. Figure 6 A–C.

**Vernacular names:** Running clubmoss, Common clubmoss; Algemene wolfsklou (Afr); Inwele (Zulu).

**Ecology:** Terrestrial, on moist or seasonally moist slopes in grasslands, forest margins, and disturbed or man-made habitats such as road cuttings, growing in exposed or partially shaded conditions. Not edaphically bound. Nanophanerophyte, mesoxerophyte; vegetative stems mesoxeromorphic, leaves mesoxeromorphic. Seasonal pattern pronounced; strobili appear to be formed between November and April; no drought-dormancy. Vegetative reproduction by the wide-creeping, many-branched stems.

**Distribution:** In Swaziland the species appears to be confined to the higher-lying western parts of the country, occurring at altitudes of between 125 and 1,500 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.

**Use:** The Zulu use the whole plant for magical purposes (Hutchings et al. 1996), whilst the Sesotho smoke the plant mixed with *Selaginella caffrorum* (Milde) Hieron. to relieve headaches (Jacot-Guillarmod 1971).


*Lycopodiella* = derived from the related *Lycopodium* with the diminutive suffix -ella

A genus of perhaps 40 species with mainly pantropical distribution.

Plants terrestrial. *Stems* procumbent or wide-creeping, rooting at irregular intervals, anisotomously branched, main stems with indeterminate growth, terete or dorsiventrally flattened, isophyllous or anisophyllous, with erect, simple or branched aerial shoots which arise dorsally, or dorsilaterally on the main stems, of determinate growth, isophyllous, heterophyllous. *Leaves* imbricate, appressed or patent and curving upwards, coriaceous to carnose-coriaceous, adnate, acicular, lanceolate or subulate, often carinate, usually entire, those near the strobili often irregularly denticate, often with short hair-like appendages on the basiscopic wing decurrent on the stems. *Strobili* terminal, sessile and pendent or pedunculate and erect, solitary at apex of fertile branches, isophyllous, sporophylls imbricate, coriaceous, adnate, ovate-acuminate to broadly ovate-acuminate, erose to
Figure 6 A–C, *Lycopodium clavatum*, A, habit, B, leaf, C, adaxial view of sporophyll showing the sporangium; D–F, *Lycopodiella cernua*, D, habit, E, leaf, F, adaxial view of sporophyll showing the sporangium; G–J, *L. sarcocaulon*, G, habit, H, dorsal leaf, I, lateral leaf, J, adaxial view of sporophyll showing the sporangium.
lacerate. *Sporangia* sessile, reniform to subglobose, borne adaxially at the sporophyll base, isovalvate or anisovalvate. *Spores* spheroidal, trilete, rugate-reticulate.

**Key to the species:**

Stems wide-creeping, terete, isophyllous ...................................................... *L. cernua*

Stems procumbent, dorsiventrally flattened, anisophyllous ................... *L. sarcocaulon*


cernuus = slightly drooping

Plants terrestrial. **Stems** terete, wide-creeping, rooting at irregular intervals, anisotomously branched, main stems with indeterminate growth, to 3 mm in diameter, isophyllous, aerial shoots arise dorsally on the main stems, erect, to 1 m long, branched, of determinate growth, isophyllous, heterophyllous. **Leaves** coriaceous, acicular, usually entire, those near the strobili often with a few scattered teeth, patent, curving upwards, often with short hair-like appendages on the basiscopic wing decurrent on the stems, to 5 mm long, to 0.5 mm wide. **Strobili** terminal, sessile and pendent, solitary at apex of aerial branches, isophyllous, to 10 mm long, sporophylls coriaceous, ovate-acuminate to broadly ovate-acuminate, lacerate, to 1.6 mm long, to 1 mm wide. **Sporangia** reniform to subglobose, borne adaxially at the sporophyll base, anisovalvate, to 0.5 mm in diameter. **Spores** spheroidal, trilete, the laesura arms usually depressed in a narrow sulcus, proximal face nearly smooth, distal face granulate. Figure 6 D–F.

**Vernacular name:** Nodding clubmoss, Fairy Christmas tree; Wolfsklou (Afr.).

**Ecology:** Terrestrial, along perennial streams, among grasses, sedges and other low-growing scrub in full sun, but less frequently also in full shade in seepage areas on the edge of, or rarely, in evergreen forests, and in man-made habitats such as road cuttings and ditches. Hemicryptophyte, mesophyte; stems mesoxeromorphic, long-lived; leaves mesomorphic. Not edaphically bound. Seasonal pattern apparently non-existent, no drought-dormancy, strobili collected in January, April, May, August, September and December. Vegetative reproduction by the wide-creeping, much-branched stems rooting at irregular intervals. Grows in areas subjected to regular burns, but no fire scars were observed.
**Distribution:** *Lycopodiella cernua* appears to be confined to the more moist higher-lying parts of Swaziland, occurring at altitudes ranging between 912 and 1 400 m. This pantropical species is widespread in sub-Saharan Africa.


*sarco* (Greek) = fleshy; *caulis* = stem

Plants terrestrial. *Stems* epigean, procumbent, rooting at irregular intervals, dorsiventrally flattened, anisotomously branched, to 2.5 mm in diameter, anisophyllous, main stem of indeterminate growth, fertile branches formed laterally on the main or lateral branches, simple, erect, sparsely leafy, isophyllous, heterophyllous, to 280 mm long, to 1.6 mm in diameter. *Leaves* on sterile branches carnose-coriaceous, imbricate, dorsal leaves appressed, adnate, lanceolate to subulate, entire, to 5 mm long, to 1 mm wide, lateral leaves adnate, inequilaterally lanceolate, often falcate, to 12 mm long, to 3 mm wide, fertile branch leaves spaced, coriaceous, adnate, subulate, carinate, entire, to 4.5 mm long, to 1.5 mm wide. *Strobili* terminal on the erect, unbranched stem, isophyllous, to 55 mm long, sporophylls imbricate, coriaceous, adnate, ovate-acuminate, erose, to 4 mm long, to 2.5 mm wide. *Sporangium* reniform, sessile, borne adaxially near the sporophyll base, isovalvate, to 1.8 mm in diameter. *Spores* pale yellow, spheroidal, trilette, rugulate-reticulate, to (40–)44.6(–48) µm in equatorial diameter. Figure 6 G–J.

**Vernacular names:** Fleshy club moss; Vlesige wolfsklou (Afr.).

**Ecology:** Terrestrial, among grasses and sedges in permanently wet sites and seepage areas along perennial streams in higher lying grasslands, usually in poorly drained black turf or peat. In full sunlight or in very light shade of low (grazed) vegetation. Hemicryptophyte, mesophyte; stems mesomorphic; leaves mesomorphic. Seasonal pattern apparently non-existent, no drought-dormancy, found with strobili in May and June. Vegetative reproduction by the creeping many-branched stems. Pyrophytic.

**Distribution:** *Lycopodium sarcocaulon* appears to be confined to the higher-lying areas of north-western Swaziland, occurring at altitudes ranging between 1 200 and 1 400 m. The species is restricted to south tropical Africa and the eastern parts of southern Africa.
Selaginellaceae, together with Lycopodiaceae and Isoetaceae, form one of the three evolutionary lines within the Lycopodiopsida. The Selaginellales and Isoetales are tied together by heterospory and the leaves being ligulate. Selaginellales have a long fossil record from the Devonian onwards, a period of more than 400 million years. Extant Selaginella number approximately 700 species, and are largely confined to the tropical areas of the world.

The root of Selaginella is interesting in that in some species it originates superficially rather than endogenously, has no rootcap until entering the substrate and is capable of developing as a leafy stem under certain conditions. This led to the introduction of the term ‘rhizophore’ for these organs as they show features of both the stem and the root.


Selaginella = the diminutive form of Selago, a name given by Pliny to some coniferous trees, and taken up by Linnaeus for Lycopodium.

Plants terrestrial or epilithic. Stems stout or herbaceous, epigal or subterranean, wide-creeping, rooting at branching points, anisotomously branched, isophyllous or anisophyllous, primary branches prostrate, ascending or erect, anisotomously branched, dorsiventrally flattened or not, isophyllous or anisophyllous, if anisophyllous, then with 2 ranks of median leaves dorsally, heterophyllous. Leaves ligulate, simple, spaced or imbricate, appressed or not, herbaceous to coriaceous, adnate, sessile, or peltate, linear, subulate, lanceolate, oblong-elliptic, ovate, or broadly acinaciform, margins erose, serrulate, fimbriate or ciliate, aristate or not, glabrous or granulate, lateral leaves often patent. Strobili sessile, solitary at the apex of secondary and lower order branches, sporophylls simple, ephemeral or not, isophyllous or anisophyllous, if anisophyllous, then dorsally in 2 ranks, herbaceous to coriaceous, peltate, ovate-acuminate to broadly ovate-acuminate, often carinate, ciliate to lacerate, aristate or not. Sporangia sessile or short-stalked, reniform or spheroidal, borne adaxially at sporophyll base, isovalvate or anisovalvate; megasporangia basal, few; microsporangia apical, more numerous, subtended by a membranous ligule. Megaspores often of 2 sizes, globose, trilette, smooth, punctulate or cristate; microspores globose or subtriangular, trilette, scabrate, echinate or minutely foveo-reticulate.

Key to the species:
1a Strobili anisophyllous; sporophylls in 2 ranks.......................... S. dregei
1b Strobili isophyllous; sporophylls in 4 ranks:
  2a Primary branches erect................................................................. S. imbricata
  2b Primary branches prostrate:
    3a Median leaves to 1.5 mm long; lateral leaves to 2 mm long; leaf surfaces granulate ...................................................... S. mittenii
    3b Median leaves to 2.6 mm long; lateral leaves to 3.2 mm long; leaf surfaces glabrous .................................................. S. kraussiana

Selaginella dregei (C.Presl) Hieron. in Hedwigia 39: 317 (1900).
Type: Südost-Afrika, Pondoland, Buchanan 9 (B!, holo.).

Selaginella dregei (C.Presl) Hieron. var. buchmanniana Hieron. in Hedwigia 39: 317 (1900).
Type: Transvaal, near Pretoria, colles supra Aapiesrivier, Rehmann 4333 [B!, lecto., designated by Tryon (1955)].

Selaginella dregei (C.Presl) Hieron. var. pretoriensis Hieron. in Hedwigia 39: 317 (1900).
Type: Transvaal, Houtbosch, Rehmann 5576 [B!, lecto., designated by Tryon (1955); BOL, K, isolecto.]

Selaginella rupestris sensu Burtt Davy, Man pl. Transvaal 1: 97 (1926).

dregei = after J.F. Drège (1794–1881), a German horticulturist, botanical collector and traveller who collected extensively in South Africa from 1826 to 1834.

Plants terrestrial or epilithic. Stems stout, epigeal, wide-creeping, rooting at branching points, anisotomously branched, isophyllous, primary branches prostrate or ascending, anisotomously branched, to 0.5 mm in diameter, isophyllous, heterophyllous. Leaves imbricate, glaucous, coriaceous, adnate, linear to subulate, ciliate, aristate, abaxially with a tapering groove along the vein housing the stomata, to 2.8 mm long, to 0.5 mm wide. Strobili sessile, solitary at the apex of secondary or lower order branches, to 5 mm long, anisophyllous, sporophylls ephemeral, dorsally in 2 ranks, coriaceous, sessile, ovate-acuminate to broadly ovate-acuminate, ciliate, aristate, abaxially with a tapering groove along the vein housing the stomata, to 2.5 mm long, to 1.25 mm wide. Sporangia sessile, reniform, borne adaxially at sporophyll base, anisovalvate, to 1 mm in diameter; megasporangia basal, few; microsporangia apical, more numerous, subtended by a membranous ligule. Megaspores yellow, globose, trilette ridges indistinct, 350–440 µm in equatorial diameter; microspores yellowish-brown, subtriangular, trilette, scabrate, 40–50 µm in equatorial diameter. Figure 7 A–D.

Vernacular names: Drège’s resurrection fern; Grys opstandingsvaring (Afr.).

Ecology: Terrestrial or epilithic, usually in shallow soil pockets on exposed or lightly shaded sheet rock. Hemicryptophyte, xerophyte; stems and leaves xeromorphic. Not edaphically bound. Seasonal pattern pronounced, actively growing during the rainy season, dormant during the dry winter months, poikilohydrous. Vegetative reproduction by the epigeal, wide-creeping and much-branched stems. Often grows in vegetation subjected to frequent burning.

Distribution: Selaginella dregei is widespread and fairly common throughout Swaziland, occurring at altitudes ranging between 150 and 1 555 m. The species is widespread in sub-Saharan Africa.

imbricatus = overlapping

Plants terrestrial or epilithic. Stems stout, epigeal, wide-creeping, rooting at branching points, anisotomously branched, terete, to 1 mm in diameter, set with brown, imbricate leaves, isophyllous, herbaceous, peltate, ovate, carinate, lacerate, to 2.2 mm long, to 1.3 mm wide; primary branches grouped, erect, anisotomously branched in the upper half, dorsiventrally flattened, anisophyllous, with 2 rows of median leaves dorsally, heterophyllous. Leaves dark green adaxially, paler abaxially, imbricate, appressed, coriaceous, median leaves peltate, inequilaterally ovate or broadly acinaciform, lacerate, glabrous, to 2.5 mm long, to 1.5 mm wide, lateral leaves peltate, broadly acinaciform, erose, the thin convex border acroscopically directed, dry with age, to 3 mm long, to 1.8 mm wide. Strobili sessile, solitary at apex of secondary and lower order branches, square in frontal view, sporophylls spirally arranged, isophyllous, coriaceous, peltate, ovate, carinate, lacerate, to 1.3 x 1 mm. Sporangia short-stalked, spheroidal, isovalvate, to 0.7 mm in diameter, subtended by a membranous, ovate ligule. Megasporangia globose, trilete ridge indistinct, smooth or punctulate, of 2 sizes, 150 µm and 300 µm in equatorial diameter; microspores globose, triletet, minutely foveo-retticate, 70–80 µm in equatorial diameter. Figure 7 E–H.

Vernacular names: Scaled resurrection fern; Skubblaar opstandingsvaring.

Ecology: Terrestrial or epilithic, usually in exposed or lightly shaded shallow soil pockets or rock crevices where it may form small stands. In Swaziland the species is restricted to basaltic soils. Geophyte, xerophyte; xeromorphic. Vegetative reproduction by the creeping and branched rhizome. Seasonal pattern pronounced, actively growing during the rainy season, dormant during the dry winter months or during periods of prolonged drought when the branches become inrolled, poikilohydrous.

Distribution: Sporadic; in Swaziland the species is known from a single collection made in the Mlawula Nature Reserve at an altitude of ± 250 m, in the north-eastern corner of the country. The species occurs in the Arabian peninsula, east and south tropical Africa, southern Africa and the western Indian Ocean region.


Selaginella hortensis Mett., Fil. hort. bot. Lips.: 125, 128 (1856). Type: Cultra in Horto Botanico Lipsiensis (LZ†; K, lecto., designated by Bizzarri (1975); B 120828, iislecto.).
Figure 7 A–D, Selaginella dregei, A, habit, B, lateral view of strobilus, C, abaxial view of leaf, D, abaxial view of sporophyll; E–H, S. imbricata, E, habit, F, lateral leaf, G, dorsal leaf, H, adaxial view of sporophyll showing the sporangium; I–L, S. kraussiana, I, habit, J, dorsal leaf, K, abaxial view of sporophyll, L, lateral leaf; M–O, S. mittenii, M, fertile branch section, N, lateral leaf, O, abaxial view of sporophyll.
*kraussiana* = after F. Krauss (1820–1890), Director of the Natural History Museum in Stuttgart, who travelled in South Africa between 1837 and 1840.

Plants terrestrial or epilithic. *Stems* herbaceous, epigeal, wide-creeping, rooting at branching points, anisotomously branched, anisophyllous, forming loose mats, terete, to 1 mm in diameter, primary branches prostrate or ascending, to 1 mm in diameter, anisophyllous, heterophyllous. *Leaves* pale green, spaced to imbricate, herbaceous to thinly herbaceous, median leaves dorsally in 2 ranks, sessile, lanceolate to ovate-lanceolate, the base inequilateral, the outer lobe largest, serrulate, the midrib raised adaxially, glabrous, to 2.6 mm long, to 1 mm wide, lateral leaves more or less patent, sessile, oblong-elliptic, the base inequilateral, the acroscopic lobe largest, serrulate, the midrib raised adaxially, to 3.2 mm long, to 1.5 mm wide. *Strobili* sessile, solitary at the apex of secondary and lower order branches, to 17 mm long, isophyllous, sporophylls ephemeral, isophyllous, herbaceous, lanceolate to lanceolate-ovate, carinate, serrulate, to 0.6 mm wide. *Sporangia* subtended by a membranous, ovate ligule, spheroidal, megasporangia sessile, in axil of sporophylls, isovalvate, to 0.5 mm in diameter, subtended by a membranous oblong ligule, to 0.2 mm long, microsporangia short-stalked. *Megasporangia* basal in strobilus, pale yellow, 4 per sporangium, globose, trilet, perispore cristate, reticulate, exospore (544–572(–608) μm in diameter; *microspores* yellow, numerous, globose, trilet, echinate, the spine bases joined to form a reticulum of ridges, exospore (34–36.25(–40) μm in diameter. Figure 7 I–L.

**Vernacular names:** Krauss’ spike moss, Forest selaginella, Spreading spike moss; Woud aarmos (Afr.).

**Ecology:** Terrestrial or epilithic, growing in moist to wet conditions in forests where the plants generally form large tangled stands, usually in deep shade. Not edaphically bound. Hemicryptophyte; stems mesomorphic; leaves mesomorphic. Vegetative reproduction by the wide-creeping, many-branched stems. Seasonal pattern apparently non-existent, no drought-dormancy, not capable of withstanding prolonged dry periods; strobili collected in February and May.

**Distribution:** The species appears to be confined to moist ravines and forests in the western half of the country, occurring between 900 and 1 220 m. Elsewhere the species is widespread in sub-Saharan Africa and in Macaronesia.

**Uses:** The species is widely cultivated as a garden ornamental or as a potplant for interior decoration.


*Selaginella welwitschii* Baker in J. Bot. 21: 81, 82 (1883). Type: Angola, on dry rocks of the Pedras of Pungo Andongo, *Welwitsch 43* (K!, holo.).

Selaginella cooperii Baker in J. Bot. 22: 89 (1884). Type: Orange Free State, Cooper 1056 (K!, holo.).

Selaginella tectissima Baker in J. Bot. 22: 89 (1884). Type: Magaliesberg, Sanderson s.n. (K!, holo.).


Plants terrestrial or epilithic. Stems herbaceous, epigeal, wide-creeping, rooting at branching points, anisotomously branched, forming loose mats, terete, to 0.5 mm in diameter, primary branches prostrate, dorsiventrally flattened, anisophyllous, dorsally with 2 ranks of appressed leaves, heterophyllous. Leaves imbricate, green, herbaceous, median leaves sessile, lanceolate to ovate, the base inequilaterally cordate, the outer lobe largest, serrulate, fimbriate towards the base, epidermis granulate, to 1.5 mm long, to 0.8 mm wide, lateral leaves more or less patent, sessile, ovate to broadly ovate, the base inequilateral, the acroscopic lobe largest, amplexicaul, serrate, fimbriate towards the base, to 2 mm long, to 1.8 mm wide. Strobili sessile, solitary at the apex of secondary and lower order branches, to 6 mm long, isophyllous, sporophylls ephemeral, herbaceous, lanceolate, carinate, serrulate, to 1.5 mm long, to 0.8 mm wide. Sporangia globose, sessile, in axil of sporophylls, isovalvate, to 0.8 mm in diameter, subtended by a membranous oblong ligule. Megasporophylls basal in strobilus, yellow, 4 per sporangium, trilete, globose, scabrate, (312–)314(–320) µm in diameter, microspores yellow, numerous, globose, monolete or trilete, colliculate, monolete exospore (184–)211.2(–232) µm in diameter, trilete exospore (136–)154(–176) µm in diameter. Figure 7 M–O.

Vernacular names: Mitten’s spike moss; Dwerg aarmos (Afr.).

Ecology: Terrestrial or epilithic, in permanent or seasonally moist conditions in exposed or sheltered habitats at waterfalls, soil banks along streams, boulder bases, and among grass tussocks in rocky areas. In light or deep shade. Not edaphically bound. Hemicryptophyte, mesophyte; leaves mesomorphic. Seasonal pattern apparently non-existent when growing in relatively stable habitats, but drought-dormant in more exposed conditions, strobili collected in February, April to June and November. Vegetative reproduction by the creeping, many-branched stems. Grows in areas subjected to regular burns and where plants are not adequately sheltered they are scorched or killed.

Distribution: With the exception of the lowveld, Selaginella mittenii is relatively common throughout Swaziland, occurring at altitudes ranging between 650 and 1 560 m. The species is confined to east and south tropical Africa, and southern Africa.
The Ophioglossales form an independent evolutionary line without an obvious affinity to any other pteridophyte group. There is mounting evidence that the Ophioglossales should be placed among the fern allies rather than the true ferns (Wagner 1964; Stevenson & Loconte 1996). Ophioglossaceae have never been a dominant vegetational element and the fossil record is poor. The family, represented by Botrychium Sw., dates back to the Palaeocene (Rothwell & Stockey 1989).


ophios (Greek) = a snake; glossa (Greek) = a tongue

Plants terrestrial. Rhizome fusiform to short-linear, erect, roots few, fleshy, horizontal to subhorizontal, proliferous. Leaves single, rarely two or three; stipe partly subterranean, old stipe bases not persistent; tropophore herbaceous to firmly herbaceous, held at ± 50–90° from the horizontal, simple, elliptic, narrowly elliptic, broadly ovate to suborbicular, acute to obtuse, narrowly cuneate, attenuate, cordate, or truncate, apiculate, flat to canaliculate, or partly folded with undulate margins. Vénation reticulate. Sporophore with up to 30 sporangium pairs, apiculus acute. Spores globose, alete or trilete, muri reticulate, lumina flat-bottomed or subconical, of variable diameter.

Key to the species:
Tropophore elliptic to narrowly elliptic, narrowly cuneate to attenuate, to 35 mm long, to 5 mm wide ................................................................. O. lusoafricanum
Tropophore broadly ovate to suborbicular, cordate to truncate, to 85 mm long, to 62 mm wide ................................................................. O. reticulatum


lusus = a variant; africanum = from Africa.

Plants terrestrial. Rhizome linear, erect, to 28 mm long, to 2 mm in diameter; roots few, fleshy, subhorizontal, proliferous. Leaves single, rarely two; stipe to 50% subterranean, to 80 mm long, old stipe bases not persistent; tropophore firmly herbaceous, green, held at ± 60–90° from the horizontal, elliptic to narrowly elliptic, narrowly cuneate to attenuate, acute, apiculate, flat to canaliculate adaxially, to 35 mm long, to 5 mm wide. Vénation reticulate. Sporophore to 130 mm long, with up to 16 sporangium pairs, apiculus acute. Spores globose, alete or trilete, muri reticulate, narrow, lumina flat-bottomed, of variable diameter, granules lacking, 42–60 µm in equatorial diameter. Figure 8 A.
Figure 8 A, Ophioglossum lusoafriicanum, habit; B, O. reticulatum, habit; C & D, Marattia fraxinea, C, section of fertile pinna, D, synangia.
Ecology: Terrestrial, sheltered among grass tussocks in moist submontane grasslands. Not edaphically bound. Geophyte, mesophyte; leaves mesomorphic, short-lived, from about November to May, deciduous. Vegetative reproduction by the formation of rootbuds. Seasonal pattern pronounced, fertile material collected in March and May.

Distribution: Within Swaziland the species appears to be confined to the submontane grasslands along the western parts of the country, occurring at altitudes of between 1 100 and 1 300 m. The species also occurs in east and south tropical Africa, and the eastern parts of southern Africa with outlying populations on the Angolan highlands.


reticulatum = reticulate or netted

Plants terrestrial. Rhizome fusiform to short-linear, to 16 mm long, to 4 mm in diameter; roots few, fleshy, horizontal, proliferous. Leaves single, rarely two or three; stipe to 60% subterranean, to 125 mm long, old stipe bases not persistent; tropophore herbaceous, bright green, held at 50–80° from the horizontal, broadly ovate to suborbicular, cordate to truncate, acute to obtuse, usually partly folded with undulate margins, to 85 mm long, to 62 mm wide. Venation reticulate. Sporophore to 190 mm long, with up to 30 sporangium pairs. Spores globose, alete or trilete, muri uneven, luminae subconical, pitted, 30–48 µm in equatorial diameter. Figure 8 B.

Vernacular names: Net-veined adder’s tongue; Breëblaar addertong (Afr.).

Ecology: Terrestrial, in submontane grasslands, scrub and forest margins, generally lightly shaded. Not edaphically bound. Geophyte, mesophyte; stems mesomorphic; leaves mesomorphic, deciduous, short-lived, from around November to May. Vegetative reproduction by the formation of rootbuds. Seasonal pattern pronounced, fertile material collected in January, May and November.

Distribution: Within Swaziland the species is confined to the western highveld, occurring at altitudes ranging between 1 100 and 1 220 m. The species is widespread in sub-Saharan Africa, Central America and the western Indian Ocean region.

The Marattiales first appeared in the Upper Carboniferous and during the Lower Permian they became the dominant canopy plants in the tropical wetlands. During this time the Marattiales were graceful, heavily buttressed trees, with unbranched trunks. Their prominence and diversity, however, diminished during the Permian, Mesozoic and Tertiary (Stewart & Rothwell 1993), and
they are represented by a relatively small number of species in the modern vegetation. The Marattiales form an independent evolutionary line and their affinity to any other group of extant ferns is not clear. The Marattiales and Ophioglossales, both being eusporangiate ferns, have been considered a monophyletic group (Rothwell 1996), but such a relationship seems highly unlikely.

**Marattia** Sw., Prodr.: 8, 128 (1788). Type: *Marattia alata* Sw.

Generic description as for the species. A pantropical genus of about 70 species, but is absent from mainland Asia.

Named in honour of the Italian clergyman and botanist Giovanni Francesco Maratti (1723–1777).


**Marattia dregeana** C.Presl, Suppl. tent. pterid.: 9 (1845). Type: Habitat in Capite bonae spei ad rivulum umbrosum vallis saxosae inter Omsamcaba catarractam majorem et Omsamwubo, Drège s.n. (?PRC, holo.; BM, K, L, W, iso.).

*fraxinea* = like the leaves of *Fraxinus* L., the ash tree (Oleaceae).

Plants terrestrial. *Stems* large, erect, to 200 mm in diameter, to 300 m tall, often forming plantlets near the base; roots fleshy. *Fronds* caespitose, arching, to 2.8 m long, up to 12 per plant; *stipe* terete, with persistent fleshy stipules and a basal pulvinus, to 1.7 m long, to 35 mm in diameter, sparsely and minutely tuberculate towards the base, also with simple uniseriate or branched non-glandular hairs, and short-stalked, filiform, many-branched scales; *lamina* to 2-pinnate, paripinnate or imparipinnate, ovate, to 1.1 m wide, with up to 10 pinna pairs; *rachis* adaxially flattened, narrowly winged towards the apex, sparsely tuberculate and sparsely set with scales similar to those on the stipe; *pinnae* petiolate, petiole to 61 mm long, alternate, 1-pinnate, oblong-acute, to 85 mm long, to 310 mm wide, with up to 20 pinnule pairs; *pinna-rachis* with a basal pulvinus, adaxially shallowly sulcate, narrowly winged towards the apex, initially set with indumentum similar to that on the stipe, becoming glabrous later; *pinnules* petiolate, petiole to 3 mm long, alternate, dark green, firmly herbaceous, oblong-acuminate, basiscopically broadly cuneate, acroskopically broadly cuneate to
dimidiate, unevenly serrate to crenate, glabrous, to 170 mm long, to 19 mm wide; costa adaxially raised, shallowly sulcate; aerophores occur as scattered short lines laterally and abaxially along the stipe and rachis, and a continuous line ventral of the secondary rachis wing between the pinnules. Venation simple or forked once, free, ending in the margin in the teeth. Synangia elongate, to 1.5 mm long, submarginal, usually on the anadromous vein branches. Spores ellipsoidal, monolete or trilete, rugate, exospore up to 37 µm long. Figure 8 C & D.

Vernacular names: Pitted potato fern; Oervaring (Afr.).

Ecology: Confined to moist conditions along perennial streams and at waterfalls, in deep shade in evergreen forests. Nanophanerophyte, mesophyte; fronds mesomorphic. Not edaphically bound. Vegetative reproduction by the formation of plantlets at the base of the main stem. Seasonal pattern apparently nonexistent, but the pulvini, which are turgor-sensitive, determine frond and pinna orientation during periods of drought.

Distribution: Sporadic in Swaziland and confined to the western half of the country, occurring at altitudes ranging between 1 200 and 1 750 m. Outside of Swaziland the species occurs throughout the mesic parts of sub-Saharan Africa, the western Indian Ocean region and the paleotropics.

### OSMUNDACEAE Bercht. & J.Presl

The Osmundaceae is considered to be the most primitive of the leptosporangiate ferns as their sporangia are intermediate between eusporangia and leptosporangia (Bierhorst 1971; Gifford & Foster 1989). Most classifications place the Osmundaceae, a group which first appeared during the Permian, as one of the basal groups of the leptosporangiate ferns. Modern Osmunda is known from the Palaeocene (Miller 1971). There are no obvious affinities between the Osmundaceae and any other group of leptosporangiate ferns.

Key to the genera:
Fronds hemidimorphic, 2-pinnate; sporangia confined to the much contracted apical pinnae of the lamina ......................................................... Osmunda
Fronds monomorphic, pinnate-pinnatifid; sporangia confined to the unmodified basal pinnae and segments of the lamina ................................................................. Todea


Osmunda = either for Osmund the waterman or for the Anglo-Saxon equivalent of Thor, god of thunder.

Generic description as for the species. Osmunda is a genus of approximately seven species, most of them confined to the northern hemisphere.


Osmunda capensis C.Presl, Suppl. tent. pterid.: 63 (1845), non L. (1771). Osmunda regalis L. var. capensis (C.Presl) Milde, Fil. Eur.: 179 (1867). Type: Cape of Good Hope, Drège s.n. (PR, holo.).

Ngome, 1937, Getstner 2339 (PRE, holo.).


*regalis* = stately

Plants terrestrial. *Stems* large, erect, to 90 mm in diameter, to 200 mm tall, clothed by a layer of persistent stipe bases and roots. *Fronds* caespitose, erect, to 960 mm long, fertile fronds hemidimorphic, the fertile pinnae apical, up to 10 per plant; *stipe* proximally laterally winged, terete higher up, to 380 mm long, to 6 mm in diameter, initially closely set with pale simple or branched hairs occurring along the axes, becoming glabrous later; *lamina* catadromous, imparipinnate, 2-pinnae, oblong to narrowly ovate, to 680 mm long, to 270 mm wide, with up to 11 pinna pairs; *rachis* stramineous, terete, glabrous; *pinnae* petiolate, petiole to 7 mm long, opposite to alternate, proximally more widely spaced, articulated along the rachis (non-functional), 1-pinnae, sterile oblong-acuminate, to 215 mm long, to 85 mm wide, with up to 11 pinnule pairs, fertile oblong-acuminate, to 110 mm long, to 17 mm wide, with up to 11 pinnule pairs; *pinna-rachis* stramineous, terete, narrowly winged towards the apex, glabrous; *pinnules* herbaceous, alternate, pale green, sessile, spaced, sterile oblong-acuminate to oblong-obtuse, base inequilateral, acrosopically narrowly to broadly cuneate or excavate, basiscopically truncate to broadly cuneate, minutely crenulate, to 54 mm long, to 12 mm wide, fertile strongly contracted, petiolate, petiole to 1 mm long, linear to narrowly oblong, to 27 mm long, to 4 mm wide; *aerophores* absent. *Veneation* catadromous, evident, pinnately branched, free. *Sporangia* borne marginally at vein endings; *sporangium* short-stalked, stout, capsule massive, globose, annulus poorly differentiated. *Spores* numerous, chlorophyllose, spheroidal, trilete, coarsely tuberculate, 72 x 79 µm in diameter. Figure 9 A.

**Vernacular names:** Royal fern, Green fern, Flowering fern; Adelvaring (Afr.).

**Ecology:** Terrestrial, among rocks in light shade along perennial streams in evergreen forests, and among scrub in seepage areas in submontane grasslands. Not edaphically bound. Nanophanerophyte, mesophytes; fronds mesomorphic, the sterile parts long-lived, the apical fertile parts short-lived. Seasonal pattern apparently non-existent, fertile material collected in January, May, July, September and October. Vegetative reproduction by the sparsely branched rhizome resulting in the plants always forming small clonal stands. Pyrophytic in grassland habitats.

**Distribution:** In Swaziland the species appears to be confined to the mountainous western part of the country, occurring at altitudes ranging from 1 050 to 1 400 m. The species is widespread in sub-Saharan Africa, the western Indian Ocean region, temperate Europe, Asia and America.


Generic description as for the species. *Todea* is a genus of two species, namely *T. barbara* (L.) T.Moore occurring in Mozambique, South Africa, Swaziland, Zimbabwe, Australia and New Zealand, and *T. papuana* Hennipman, confined to New Guinea.
Figure 9 A, *Osmunda regalis*, fertile frond section; B, *Todea barbara*, abaxial view of fertile pinna.
Todea = after Heinrich Julius Tode (1733–1797), a German botanist and clergyman.

Todea barbara (L.) T.Moore, Index fil.: cxix, 7 (1857); Sim, Ferns S. Afr.: 228, pl. CXXXIX (1892); Sim, Ferns S. Afr., 2nd edn: 309, pl. 169 (1915); Jacobsen, Ferns Sthn. Afr.: 170, fig. 113a, b, map 21 (1986); Schelpe & Anthony, Fl. S. Afr., Pterid.: 45, fig. 12, map 30 (1986); Burrows, Sthn. Afr. Ferns: 50, t. 48, 48a, pl. 7.4, map (1990); Roux, SABONET Rep. 13: 36, fig. 3H (2001). Type: Habitat in Africa, Adair s.n. Herb. Sloane (BM, holo.).

barbara = foreign

Plants terrestrial. Stem usually a massive unbranched, upright caudex, covered by a thick layer of persistent stipe bases and roots. Fronds caespitose, erect to arching, numerous, to 1.05 m long; stipe rigid, greenish to stramineous, terete, to 340 mm long, to 12 mm in diameter, initially set with unbranched uniseriate hairs, narrow hair-like scales, and broad entire scales of which the apices terminate in large ovoid, non-glandular cells, glabrous later; lamina catadromous, 1-pinnatipinnae, oblong-acute, to 650 mm long, to 200 mm wide, with up to 22 petiolated pinna pairs; rachis stramineous, terete, glabrous with age; pinnae petiolate, petiole to 5 mm long, firmly herbaceous to subcoriaceous, opposite to alternate, proximally more widely spaced, narrowly lanceolate to oblong-acuminate, pectinately lobed, to 230 mm long, to 43 mm wide; pinna-rachis stramineous, narrowly winged towards the apex, pronounced adaxially, glabrous; segments cultrate, set at an angle of 40–50° to the pinna-rachis, serrate, to 35 mm long, to 6 mm wide; aerophores absent. Venation catadromous, evident, forked once, ending at the margin in the teeth. Sporangia massive, with a thick short stalk, confined to the not conspicuously contracted basal pinnae and segments, on all parts of the veins, appear acrostichoid at maturity; annulus a lateral band of thickened cells, poorly developed. Spores numerous, chlorophyllose, globose, trilete, with coarse baculae or tuberculae, set with rod-like elements. Figure 9 B.

Vernacular names: King fern; Koningsvaring (Afr).

Ecology: Terrestrial, confined to the banks of perennial streams, rivers, and seepage areas in forests, growing in light or deep shade. Not edaphically bound. Nanophanerophyte, mesophyte; fronds mesoxeromorphic, long-lived. Vegetative reproduction is slow, usually by the branching of the rhizome. Seasonal pattern apparently non-existent, fertile material collected in May.

Distribution: Confined to the mountainous western half of Swaziland, occurring at altitudes ranging between 1 000 and 1 300 m. The species is widespread in the eastern parts of south tropical Africa and southern Africa, north-eastern and south-eastern Queensland, eastern New South Wales, Victoria, Tasmania and New Zealand.
GLEICHENIACEAE (R.Br.) C.Presl

Gleicheniaceous fossils date back to the Permian, but as they are either sterile or do not show the typical branching pattern, their inclusion into the Gleicheniaceae remains debatable. The first record with conclusive proof of the characteristic gleicheniaceous branching pattern dates from the Cretaceous. Recent fern phylogenies based on morphological information (Stevenson & Loconte 1996), *rbcL* nucleotide sequences (Hasebe et al. 1995), and a combination of morphological and *rbcL* sequences (Pryer et al. 1995), show the gleicheniaceous ferns to be one of the basal branches of the leptosporangiate ferns. These studies suggest that Gleicheniaceae have affinities with the Matoniaceae and Dipteridaceae.

**Key to the genera:**

Rhizome scaled; false dichotomies not flanked by a pair of deflexed accessory branches ................................................................. **Gleichenia**

Rhizome set with stellate hairs; each false dichotomy flanked by a pair of deflexed accessory branches .................................................. **Dicranopteris**

**Gleichenia** Sm. in Mém. Acad. Sci. Turin. 5: 419, t. 9, fig. 10 (1793), *nom. cons.* Type: *Gleichenia polypodioides* (L.) Sm.

*Gleichenia*, after Baron F.W. von Gleichen-Ruswurm (1717–1783), a microscopist.

A genus of about 30 palaeotropical and austral species.

Plants terrestrial or epilithic. *Rhizome* protostelic, wide-creeping, branched. *Fronds* widely spaced, dorsal, uniseriate, scandent, with indeterminate growth; *stipe* with a single almost closed C-shaped stele, terete; *lamina* catadromous, pseudo-dichotomously branched; *rachis* somewhat flattened adaxially, with an arrested bud between the bifurcations; *pinnae* unbranched or several times pseudo-dichotomously branched; *ultimate branches* pinnatifid; *segments* adnate, herbaceous to coriaceous; *stomata* of the anomocytic and diacytic types, hypostomatic; *venation* catadromous, free, forked once. *Indumentum* composed of stellate hairs and fimbriate scales confined to the rhizome and frond axes. *Sori* circular, superficial or immersed, on acroscopic vein branch, with 2 to 14 sporangia per sorus, exindusiate. *Sporangium* stalk multiseriate; annulus oblique, complete. *Spores* numerous, monolete or trilete, if tetrahedral then with prolonged angles, shallowly rugulose, to 48 µm long. Chromosome number based on 2n = 68.

**Key to the species:**

Segments rounded to triangular; sori immersed, single on each segment................................................................. **G. polypodioides**

Segments linear-acute to linear-obtuse; sori superficial, several pairs on each segment.................................................. **G. umbraculifera**


*Gleichenia argentea* Kaulf., Enum. filic.: 36 (1824). Type: Habitat in Promentorio bonae spei, Chamisso s.n. (?LE, holo.; HAL 81865, ?iso.).
Gleichenia glauca Sw., Syn. fil.: 165, 393 (1806). Type: Loco incerto, sine coll. s.n. (S, holo.).

Gleichenia glauca Sw. var. nudiuscula Kunze in Linnaea 10: 490 (1836). Type: Ad Kromrivier, in valle humida umbrosa, secus rivum, 400–800 p., 1838, Drège s.n. [BM!, lecto., designated by Roux (1986); L!, isolecto.].

polypodioides = resembling Polypodium

Plants terrestrial or epilithic. Rhizome rooting at irregular intervals, wide-creeping, irregularly branched, corneous, castaneous, nitid or opaque, to 2.5 mm in diameter, initially moderately set with scales, glabrous later, scales crustaceous, castaneous, stellate to lanceolate, peltate to cordate-imbricate, fimbriate, to 1.5 mm long, to 0.5 mm wide. Fronds spaced, to 150 mm apart, scandent, with indeterminate growth; stipe corneous, castaneous, often nitid, terete, to 410 mm long, to 1.8 mm in diameter, initially sparsely set with scales similar to those on the rhizome, glabrous later; lamina catadromous, pinnately branched, with one or more storeys of consecutive pinna pairs arising from each side of the terminal rachis bud; rachis castaneous, terete, to 1.2 mm in diameter, initially densely set with scales, glabrous later, scales chartaceous, ferrugineous, lanceolate to narrowly ovate, corneous-imbricate, fimbriate, to 2 mm long, to 1.6 mm wide; pinnae pinnately branched, with one or more storeys of consecutive pinna-branch pairs arising each side of the scaled terminal bud; pinna-rachis castaneous, terete, to 1 mm in diameter, initially densely set with scales similar to those on the rachis, glabrous later; pinna-branches pseudo-dichotomously branched, with a scaled dormant bud in the axil, all pinna branches set with spaced ultimate branches, oblong-acuminate to narrowly ovate, to 220 mm long, to 125 mm wide; ultimate branches opposite to alternate, linear-acuminate, to 80 mm long, to 4 mm wide, with firmly herbaceous to coriaceous segments, segments adnate, dark green adaxially, glaucous abaxially, rounded to triangular, to 2 mm long, to 1.2 mm wide. Vénation obscure, pinnately branched in the segments, vein branches simple. Sori circular, immersed, single on each segment, on an acroscopic vein branch, with 3–4 sporangia per sorus, exindusiate. Sporangium short-stalked, multiseriate, annulus oblique, complete. Spores numerous, globose, trilete, with prolonged angles, shallowly rugate, to 33 x 38 µm. Figure 10 A–C.

Vernacular names: Coral fern, Creeping coral fern; Keistervaring (Afr.); Phalatsane (Ses.).

Ecology: Terrestrial, epilithic, or (rarely) epiphytic on Cyathea caudices, in permanently or seasonally moist conditions in light shade on cliffs or along streams. Not edaphically bound. Hemicyrptophyte, mesoxerophyte; fronds xeromorphic, long-lived. Vegetative reproduction by the wide-creeping, many-branched rhizome. Seasonal pattern apparently non-existent, fertile material collected in May, September and December.

Distribution: Sporadic and apparently confined to the mountainous western half of Swaziland, occurring at altitudes ranging between 1 000 and 1 750 m. The species is widespread in south and east tropical Africa, southern Africa and the western Indian Ocean region.

Uses: The Sesotho boil the plant in water as the steam is said to drive away ancestral spirits, especially those which cause headache (Zepp 1982).
Figure 10 A–C, *Gleichenia polypodioides*, A, lamina section, B, rhizome and stipe, C, abaxial view of fertile ultimate branch; D & E, *G. umbraculifera*, D, lamina section, E, abaxial view of fertile segment.

umbraculifera = umbrella-bearing

Plants terrestrial. Rhizome rooting at irregular intervals, wide-creeping, irregularly branched, corneous, castaneous, to 4 mm in diameter, initially closely set with scales, glabrous later, scales chartaceous, ferruginous, lanceolate, cordate to cordate-imbricate, fimbriate, to 5.5 mm long, to 1.2 mm wide. Fronds spaced, to 50 mm apart, erect to scandent, with indeterminate growth; stipe firm, proximally castaneous, stramineous higher up, proximally terete, higher up slightly flattened adaxially, to 1.06 m long, to 4 mm in diameter, initially closely set with scales, glabrous later, scales chartaceous, ferruginous, lanceolate, ovate-cordate, fimbriate, to 5 mm long, to 1.4 mm wide; lamina pinnately branched, with one or more consecutive storeys of pinna pairs arising from each side of the terminal rachis bud; rachis stramineous to greenish, adaxially somewhat flattened, to 4 mm in diameter, initially densely set with scales similar to those on the stipe; pinnae reniform in outline, to 4 times pseudo-dichotomously branched, with a dormant bud in the axil of each bifurcation, pinna branches all variously pinnatifid, pectinate; pinna-rachis branches stramineous, adaxially shallowly sulcate; ultimate branches adaxially convex, moderately scaled adaxially and abaxially, scales chartaceous, ferruginous, sessile or short-stalked, linear to lanceolate, long-fimbriate, to 1.6 mm long, to 1 mm wide; segments herbaaceous, green adaxially, paler green or glaucous abaxially, linear-acute to linear-obtuse, entire, to 21 mm long, to 3 mm wide, glabrous adaxially, abaxially with stramineous, sessile or short-stalked, long-fimbriate scales. Venation catadromous, evident, pinnately branched or forked, simple at the segment apex. Sori superficial, several pairs on each segment, medial on acroscopic vein branches, with 1–4 sporangia in each sorus, exindusiate. Sporangium stalk multiseriate, short, annulus oblique, complete. Spores monolete, granulate. Figure 10 D & E.

Vernacular names: Umbrella coral fern; Sambreelvaring (Afr.).

Ecology: Terrestrial or epilithic, on moist or seasonally moist stream banks, among boulders and in rock crevices on low cliffs in submontane grasslands, often in full sun. Not edaphically bound. Geophyte, mesophyte; fronds mesomorphic, long-lived. Vegetative reproduction by the wide-creeping, many-branched subterranean rhizome. Seasonal pattern apparently non-existent, fertile material collected in February and August. Pyrophytic.

Distribution: Sporadic in the mountainous north-western part of Swaziland, occurring at altitudes ranging between 900 and 1 520 m. Gleichenia umbraculifera is confined to the eastern parts of south tropical Africa and southern Africa.
Dicranopteris Bernh. in Neues J. Bot. 1: 38 (1806), nom. nov. for Mertensia Willd., non Roth (1797).

dicranos (Greek) = two; pteris (Greek) = fern

Generic description as for the species. A genus of about 12 species with pantropical and austral distribution.


linearis = narrow and parallel-sided

Plants terrestrial or epilithic. Rhizome rooting at irregular intervals, wide-creeping, irregularly branched, corneous, castaneous, to 3 mm in diameter, initially moderately set with stellate hairs, glabrous later, hairs crustaceous, castaneous, sessile or short-stalked, rays unicellular, often branched, uniseriate, apical cell of the terminal ray acicular or narrowly obovate and thin-walled, to 2.8 mm long. Fronds spaced, to 105 mm apart, erect or scandent, with indeterminate growth; stipe firm, yellow to brown, stramineous higher up, terete, to 1.1 m long, to 5 mm in diameter, initially closely set with hairs, hairs chartaceous to thinly crustaceous, castaneous, sessile, rays uni- or pluricellular, uniseriate, terminal ray much longer than the rest, of which the apical cell may be acicular or narrowly obovate, to 4 mm long; lamina pinnately branched, with one or more consecutive storeys of consecutive pinna pairs arising from each side of the terminal rachis bud, each bifurcation also flanked by a pair of accessory branches; rachis yellow, brown or stramineous, terete, to 4.2 mm in diameter, initially closely set with scales similar to those on the stipe, also with smaller hairs at the point where the pinnae branch from the rachis, hairs short-stalked, stellate, rays simple or branched, straight or twisted, to 1 mm long; pinnae reniform to transversely broadly elliptic in outline, to 3 times pseudo-dichotomously branched, with a dormant bud in the axil of each bifurcation, pinna-rachis branches terete or adaxially slightly flattened, initially moderately scaled, glabrous later, scales stramineous, stellate, to 1.8 mm long; ultimate branches adaxially convex, pectinately pinnatifid, inequilaterally narrowly lanceolate to linear-acuminate, to 220 mm long, to 40 mm wide, basal acroscopic segments shorter than those higher up, basal basiscopic segment enlarged; rachis and dormant buds densely set with crustaceous, ferrugineous to castaneous, stellate hairs similar to those on the rhizome, each bud subtended by a pair of simple or lobed pseudo-stipules; accessory branch pairs flank each pinna pair and consecutive pinna pseudo-dichotomies, adaxially shallowly sulcate, sessile, pectinately pinnatifid, narrowly lanceolate, to 180 mm long, to 43 mm wide; segments firmly herbaceous, linear-acuminate to linear-obtuse, entire, emarginate, to 20 mm long, to 4 mm wide,
Figure 11 A–D, *Dicranopteris linearis*, A, lamina section, B, rhizome, C, abaxial surface of fertile segment, D, rhizome hair.
glabrous adaxially, abaxially with ferrugineous, stellate scales along the costa and with 2-celled hairs along the veins. Vénation catadromous, pinnately forked, ending in the margin. Sori superficial, inframesial on acroscopic vein branches, with 8–15 sporangia per sorus, exindusiate. Sporangium short-stalked, multiseriate, annulus oblique, complete. Spores yellow, numerous, tetrahedral, trilet, with prolonged angles, rugulose, foveolate, to 45 µm in equatorial diameter. Figure 11 A–D.

Vernacular names: Scrambling fern; Kloutervaring (Afr.).

Ecology: Terrestrial, often forming extensive stands along forest margins, stream banks and on earthbanks along roads and ditches, in full sun or in light shade. Not edaphically bound. Geophyte, mesoxerophytic. Vegetative reproduction by the wide-creeping, many branched, subterranean rhizome. Seasonal pattern apparently non-existent, fertile material collected in March, April, May and June. Pyrophytic.

Distribution: Common in the western half of Swaziland at altitudes ranging between 900 and 1,520 m. The species has a pantropical distribution and is widespread in sub-Saharan Africa and the western Indian Ocean region.

HYMENOPHYLLACEAE Link

Morphological and molecular studies show that the Hymenophyllaceae is a basal lineage to leptosporangiate ferns showing no affinity to any other group of ferns. The Hymenophyllaceae is the most diverse of the basal lineages with more than 600 species occurring nearly worldwide. Although there is much disagreement as to the classification of the Hymenophyllaceae, the monophylly of the group has never been disputed.

Key to the genera:
1a Involucres bivalved to the middle or below; segments serrate; receptacle generally not protruding ................................................................. Hymenophyllum
1b Involucres turbinate, apex truncate; segment margins entire; receptacle generally protrudes far:
   2a Rhizome wide-creeping, <1 mm in diameter; rootless ...................... Crepidomanes
   2b Rhizome short-decumbent, to 2 mm in diameter; rooted ................. Cephalomanes

Hymenophyllum Sm. in Mém. Acad. Sci. Turin. 5: 418, t. 9, fig. 8 (1793). Lectotype: Hymenophyllum tunbridgense (L.) Sm.

hymen (Greek) = membrane; phyllum = leaf

Generic description as for the species. A genus of about 250 species occurring throughout the tropics and temperate parts of the world.

Hymenophyllum tunbridgense (L.) Sm., In J.E. Smith & Sowerby, Engl. Bot.: 3, t. 162 (1794); Sim, Ferns S. Afr.: 50, pl. 4, fig. 1 (1892); Sim, Ferns S. Afr., 2nd edn: 79, pl. 3, fig. 1 (1915); Jacobsen, Ferns Sthn. Afr.: 194, fig. 134a, b, map 35 (1983); Schelpe & Anthony, Fl. S. Afr., Pterid.: 78, fig. 20, t. 1, 1a, map 61 (1986); Burrows, Sthn. Afr. Ferns: 97, ill. 20, t. 97–97b, pl. 14.2, map (1990); Roux, SABONET Rep. 13: 41, fig. 5A, B (2001). Type: Habitat in Anglia, Italia. Uncertain; LINN 1253, pt., and 1253.5 are this species, but according to Jackson (1912), were added to LINN after 1753, several illustrations are also cited.
Hymenophyllum dregeanum C.Presl, Hymenophyllaceae: 32, 52 (1843). Type: Cape Province, Cape Peninsula, Table Mountain, Drège s.n., p.p. (?PR, holo.; L, iso.).

tunbridgense = from Tunbridge, a British town in Kent

Plants terrestrial, epilithic or epiphytic. Rhizome rooting at irregular intervals, wide-creeping, branching from frond axils, castaneous, to 0.5 mm in diameter, initially sparsely set with hairs, glabrous later, hairs usually tufted at stipe bases, crustaceous, castaneous to ferruginous, acicular, ventrally attached, 1–4-celled, to 0.8 mm long. Fronds spaced to 31 mm apart, erect to arching, to 205 mm long; stipe firm, castaneous, terete, to 78 mm long, to 0.5 mm in diameter, glabrous or sparsely set with hairs similar to, but paler than those on the rhizome; lamina anadromous, 1-pinnate-pinnatifid, ovate to narrowly ovate, to 70 mm long, to 30 mm wide; rachis castaneous, narrowly winged, convex adaxially and abaxially, sparsely set with hairs similar to those on the stipe; pinnae alternate, proximally more widely spaced, distally often overlapping, bilaterally pinnatifid, with up to 25 linear segments, segments obtuse, serrate, to 1 mm wide. Venation anadromous, pinnately branched, ending near the margin. Sori borne on the acroscopic vein branch of the median to apical acroscopic pinnules, base of sorus not winged by lamina lobes, or weakly so; involucres elliptic, bivalved to the middle or below, serrate to weakly dentate, to 1.7 mm long, to 1 mm wide; receptacle not or only slightly protruding. Sporangium short-stalked, annulus oblique, complete, with (21–)22(–25) indurated annulus cells and a well-defined stomium. Spores chlorophyllose, tetrahedral, trilete, echinulate, (30–)33(–34) µm in diameter. Figure 12 A–C.

Vernacular names: Tunbridge filmy fern; Tunbridge vliesvaring (Afr.).

Ecology: Terrestrial, epilithic, or low-level epiphytes, confined to moist or seasonally moist evergreen forest, usually in deep shade near streams. Often shrivelled or wilted during the dry winter months or during dry spells in summer. Hemicryptophyte, mesophyte; rhizome mesophytic, long-lived; fronds mesophytic, long-lived, poikilohydrous. Seasonal pattern apparently non-existent, but influenced by available moisture. Vegetative reproduction by the wide-creeping, many-branched, subterranean or epigeal rhizome.

Distribution: Rare in Swaziland, confined to the Bulembu region in the north-western corner of the country where it grows on dripping rock faces in deep shade in evergreen forests at altitudes ranging between 1 520 and 1 670 m. The species is widespread in sub-Saharan Africa, the Madagascan region, Macaronesia, and western and southern Europe.

Crepidomanes (C.Presl) C.Presl, Epimel. bot.: 258 (1851). Type: Crepidomanes intramarginale (Hook. & Grev.) C.Presl

krepsis (Greek) = slipper; manes = a kind of cup

Plants epilithic or low-level epiphytes. Rhizome rootless, wide-creeping, branching from frond axils, sparsely set with branched, pluricellular, uniseriate root-like hairs, or closely set with castaneous to black, unicellular adhesive hairs. Fronds widely spaced, uniseriate, erect or pen-
dent; stipe terete, often winged in the upper half, or along the entire length, proximally sparsely to densely set with castaneous, 2-celled hairs of which the apical cell is the largest, or with a fringe of atrocastaneous unicellular hairs which may extend halfway up the stipe; lamina anadromous, unistratose, 1-pinnate-pinnatifid to 2-pinnate, oblong to broadly elliptic, with up to 10 pinna pairs; rachis green to castaneous, terete, narrowly winged, sparsely set with hairs similar to those on the stipe; pinnae membranous, alternate, bilaterally pinnatifid to irregularly pinnatifid, spaced or overlapping, segments linear, entire, obtuse or truncate, often emarginate, adaxially and abaxially initially with scattered 2-celled hairs similar to those on the stipe, internal cell walls straight. Vénation anadromous, evident, pinnately branched, ending in the margin. Sori borne on the acroscopic anadromous vein branches; involucres turbinate, mouth often slightly dilated, truncate; receptacle protrudes far. Sporangia sessile or short-stalked, annulus oblique, complete, with (16–)18(–20) indurated annulus cells and a well-defined stomium. Spores green, spheroidal, trilete, papillate, exospore (44–)48.8(–52) µm in equatorial diameter. Chromosome number based on 2n = 72 and 144.

A genus of approximately 120 species occurring throughout the palaeotropics.

Key to the species:
1a Rhizome hairs multicellular, branched ...................................................... C. borbonicum
1b Rhizome hairs unicellular, unbranched:
   2a Stipe winged in the upper half only, without a fringe of black unicellular hairs ............... ................................................................. C. inopinatum
   2b Stipe winged along the entire length, proximally with a fringe of black unicellular hairs .............................................................. C. melanotrichum


borbonicum = from Bourbon, now Réunion Island

Plants epilithic or epiphytic. Rhizome rootless, wide-creeping, branching from frond axils, castaneous to black, to 0.3 mm in diameter, densely set with black, multicellular, branched hairs, to 3 mm long. Fronds spaced, pendant, to 14 mm apart, to 64 mm long; stipe firm, proximally black, brown higher up, terete, winged in upper half, to 23 mm long, to 0.3 mm in diameter, proximally densely set with hairs similar to those on the rhizome, higher up sparsely set with hairs, hairs basally attached, 2-celled, apical cell narrowly ovate, much larger than the basal cell, to 0.4 mm long; lamina anadromous, 1-pinnate-pinnatifid, irregularly pinnately branched, narrowly to broadly elliptic, to 50 mm long, to 28 mm wide; rachis castaneous, narrowly winged, convex adaxially and abaxially, sparsely set with hairs similar to those on upper parts of the stipe; pinnae alternate, bilaterally irregularly pinnatifid, spaced or overlapping, segments entire, truncate to emarginate, to 1 mm wide. Vénation anadromous, pinnately branched, ending in the margin. Sori borne on the acroscopic anadromous vein branches; involucres turbinate, truncate, to 2.5 mm deep; receptacle long, protruding to 4 mm. Sporangium short-
stalked, annulus oblique, complete, with (16–)18(–20) indurated annulus cells and a well-defined stomium. Figure 12 D–F.

**Vernacular names:** Réunion filmy fern; Réunion vliesvaring (Afr).

**Ecology:** Epilithic, usually on dripping rock faces in deep shade of moist evergreen forests. Not edaphically bound. Hemicryptophyte, mesophyte; fronds mesomorphic, poikilohydrous. Vegetative reproduction by the wide-creeping, many-branched rhizome. Seasonal pattern apparently non-existent, but influenced by available moisture.

**Distribution:** Rare in Swaziland, confined to the Bulembu region in the north-western corner of Swaziland at an altitude of ± 1 520 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.


var. **inopinatum**

*inopinatum* = surprising or unexpected

Plants epilithic. *Rhizome* rootless, wide-creeping, branching from the frond axils, black, to 0.2 mm in diameter, closely set with black, unicellular adhesive hairs, to 0.7 mm long. *Fronds* spaced, pendent, to 20 mm apart, to 40 mm long; *stipe* firm, brown to greenish, narrowly winged along the entire length, to 10 mm long, to 0.3 mm in diameter, sparsely haired, hairs brown, basally attached, 2-celled, apical cell largest, narrowly elliptic, to 0.2 mm long; *lamina* anadromous, 1-pinnate-pinnatifid, pinnately branched, narrowly elliptic, to 35 mm long, to 15 mm wide; *rachis* greenish, terete, narrowly winged, sparsely set with hairs similar to those on the stipe; *pinnae* alternate, bilaterally pinnatifid, spaced or slightly overlapping, segments entire, obtuse to emarginate, to 1 mm wide. *Venation* anadromous, pinnately branched, ending near the margin. *Sori* borne on the acroscopic anadromous vein branches; *involucres* turbinate, the mouth slightly dilated, truncate, to 2.5 mm deep; *receptacle* protrudes far, to 4.5 mm long. *Sporangium* short-stalked, annulus oblique, complete, with (17–)17(–20) indurated annulus cells. Figure 12 G & H.

**Vernacular names:** False black-hair filmy fern; Vals wimpervaring (Afr).

**Ecology:** Epilithic, usually on dripping rock faces in deep shade in moist evergreen forests. Not edaphically bound. Hemicryptophyte, mesophyte; fronds mesophytic, Vegetative reproduction by the wide-creeping, many-branched, subterranean or epigeal rhizome. Seasonal pattern apparently non-existent, but influenced by available moisture. Poikilohydrous.

**Distribution:** Rare in Swaziland, currently known from the Mbabane area only, growing on a
dark rock face in a forest at ± 1 360 m. The species is widespread in west central tropical Africa, east and south tropical Africa, southern Africa and the western Indian Ocean region.


**Vernacular names:** Black-haired filmy fern; Wimper vliesvaring (Afr).

**Ecology:** Epilithic or low-level epiphytes, always in deep shade in moist or seasonally moist evergreen forests. Not edaphically bound. Hemicyrptophyte, mesophyte; fronds mesomorphic, poikilohydrous. Vegetative reproduction by the wide-creeping, many-branched rhizome. Seasonal pattern probably non-existent, but determined by the availability of moisture.

**Distribution:** Sporadic in the mountainous western half of Swaziland, occurring at altitudes ranging between ± 650 and 1 500 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.

*Cephalomanes* C.Presl, Hymenophyllaceae: 17, t. 5 (1843). Type: *Cephalomanes atrovirens* C.Presl
kephale (Greek) = head; manes (Greek) = a kind of cup

Generic description as for the species. A genus of approximately 60 species occurring mainly in the palaeotropics.


rigidum = stiff or inflexible

Plants terrestrial or epilithic. *Rhizome* short-decumbent, closely branched, to 2 mm in diameter, closely set with hairs, hairs crustaceous, atrocastaneous, basally attached, pluricellular, uniseriate, to 1 mm long. *Fronds* caespitose, erect, closely spaced, to 3 mm apart, to 350 mm long; *stipe* black, terete, narrowly winged along the entire length, to 185 mm long, to 1.2 mm in diameter, sparsely haired, hairs crustaceous, ventrally attached, subulate, 2- or 3-celled, to 0.3 mm long; *lamina* anadromous, to 3-pinnate, lanceolate, ovate, or narrowly elliptic, to 165 mm long, to 85 mm wide, with up to 17 pinna pairs; *rachis* terete, narrowly winged, sparsely set with hairs similar to those on the stipe; *pinnae* petiolate, petiole to 1 mm long, thinly herbaceous, opposite to alternate, usually slightly overlapping, to 2-pinnate, lanceolate to narrowly ovate, to 57 mm long, to 17 mm wide, with up to 9 pinnule pairs; *pinna-rachis* narrowly winged, sparsely set with hairs similar to those on the stipe; *pinnules* alternate, sessile, spaced or slightly overlapping, 1-pinnate, lanceolate, narrowly trullate, or oblong, to 15 mm long, to 5 mm wide; *segments* narrowly rhomboid to oblong, to 4 mm long, to 2 mm wide, lobed, lobes to 0.3 mm wide, acute, entire. Vénation anadromous, evident, ending near the margin. *Sori* borne on acrosopic anadromous vein branches of the pinnules; *involucres* turbinate, mouth slightly dilated, to 1.5 mm deep, lobes truncate to obtuse; *receptacle* protrudes far, to 4 mm long. *Sporangium* sessile, annulus oblique, complete, with (16–)18(–20) indurated annulus cells, stomium 2–5-celled. *Spores* green, spheroidal, trilette, 33 x 43 µm. Figure 12 L & M.

**Vernacular names:** Rigid filmy fern; Groot vliesvaring (Afr.).

**Ecology:** Terrestrial or epilithic, confined to permanently moist stream banks, and rocks in light or deep shade in evergreen forests. Not edaphically bound. Hemicyryptophyte, mesophyte; fronds mesophytic, poikilohydrous. Vegetative reproduction by the branched rhizome resulting in the formation of small clonal stands. Seasonal pattern probably non-existent, fertile material collected in May.
**SCHIZAEACEAE**

**Distribution:** In Swaziland the species is currently known from the Mdzimba mountains only, occurring at an altitude of ± 1 300 m. The species is widespread in sub-Saharan Africa, the western Indian Ocean region and tropical America.

**SCHIZAEACEAE** Kaulf.

A monogeneric family with the earliest schizaeoid fossils (*Stachypteris* Pomel) dating back to the Jurassic. Modern *Schizaea* fossils are not known until the Quaternary. The Schizaeaceae and Anemiaceae, as construed here, form part of the schizaeoid stock, one of the basal lines of leptosporangiate ferns. The schizaeoid ferns have no clear affinities with any other group of leptosporangiate ferns, although the Pteridaceae (Wagner 1969; Lovis 1977; Kramer 1990) and heterosporous water ferns (Marsileaceae, Salviniaceae and Azollaceae) (Bierhorst 1971; Pichi Sermolli 1977; Stevenson & Loconte 1996) have been postulated as being closely related.

*Schizaea* Sm. in Mém. Acad. Sci. Turin. 5: 419, t. 9, fig. 9 (1793), nom. cons. Type: *Schizaea dichotoma* (L.) Sm.

Schizo (Greek) = split or deeply divided

Generic description as for the species. A genus of approximately 30 species widely distributed in the tropics and subtropics, especially South America and the Pacific.


Pectinatus = with narrow close-set divisions like a comb

Plants terrestrial or epilithic. *Rhizome* subterranean, short-decumbent, branched, to 2 mm in diameter, densely set with thinly crustaceous, castaneous, pluricellular, uniseriate hairs, apical cell small and thin-walled, to 4 mm long. *Fronds* approximate, dimorphic; *stipe* not differentiated from lamina; *lamina* coriaceous, sterile lamina simple, narrowly linear, to 320 mm long, to 1.2 mm wide, sparsely set with castaneous, unicellular fusiform hairs, fertile lamina with an apical fertile portion, to 1.6 mm long, midrib sulcate adaxially, convex abaxially; *rachis* recurved; *segments* pectinately arranged, up to 15 pairs, simple or forked once, longer towards the middle, to 8 mm long, to 0.6 mm wide, margins long-fimbriate, adaxially glabrous or sparsely set with unicellular hairs similar to those on the lamina, abaxially densely set with castaneous hairs, hairs unicellular, filiform, simple or irregularly branched, to 1.8 mm long. *Sporangia* in a single row on either side of the fertile segment costa, sessile, almost symmetric, ovoid or ellipsoid, with a subapical, uniseriate annulus. *Spores* brown, numerous,
Figure 13 A & B, Schizaea pectinata, A, habit, B, fertile frond; C & D, Anemia dregeana, C, habit, D, pinna showing venation.
ellipsoidal to subglobose, monolete, foveolate, exospore to 95 µm long. Figure 13 A & B.

**Vernacular names:** Toothbrush fern, Curly grass fern, Cockscomb fern; Grasvaring (Afr).

**Ecology:** Terrestrial or epilithic, on seasonally moist grass slopes, among rocks and in vleis. Not edaphically bound. Geophyte, mesoxerophyte; fronds mesoxeromorphic. Vegetative reproduction by the sparsely branched rhizome resulting in the formation of small clonal stands. Seasonal pattern apparently pronounced, fertile material collected in March. Pyrophytic.

**Distribution:** The species is confined to the mountainous north-western part of Swaziland, occurring at altitudes ranging between 1 200 and 1 500 m. *Schizaea pectinata* is confined to east tropical Africa, the eastern parts of south tropical Africa and southern Africa.

**ANEMIACEAE**

Molecular studies by Hasebe *et al.* (1995) suggested that genera within the schizaeoid ferns diverged from each other at an earlier time than did most families and genera of ferns, an observation consistent with the substantial morphological differences among these genera. This supports the classification in which the Anemiaceae and Schizaeaceae are treated as different families.

**Key to the genera:**

- Sporangia borne on two basal, dimorphic and highly skeletonised pinnae; indumentum composed of hairs only .................................................. **Anemia**
- Sporangia borne on almost unmodified apical pinnae; indumentum composed of hairs and scales .......................................................................................................................... **Mohria**

**Anemia** Sw., Syn. fil.: 6, 155 (1806), nom. cons. Type: *Anemia phyllitidis* (L.) Sw.

*aneimon* (Greek) = unclothed or naked

Generic description as for the species. A genus of approximately 100 species, mainly occurring in the warmer parts of North and South America with a few species in Africa, Madagascar and the Indian subcontinent.


Anemia dregeana Kunze forma β Kunze in Linnaea 10: 493 (1836). Type: Inter Omsamwubu et Omsamcaba ad catarractam magnam, *Drège* s.n. [LZ†, K, lecto., designated by Roux (1986); HBG, S, isolecto.].

dregeana = after J.F. Drège (1794–1881), a German horticulturist, botanical collector and traveller who collected extensively in South Africa from 1826 to 1834.

Plants terrestrial or epilithic. *Rhizome* short-decumbent to suberect, to 4 mm in diameter, closely set with roots, persistent stipe bases and hairs, hairs ferrugineous, pluricellular, uniseriate, to 8 mm long. *Fronds* crowded, caespitose, hemidimorphic, to 370 mm long; *stipe* firm, proximally
castaneous, stramineous higher up, shallowly sulcate adaxially, to 150 mm long, to 1.6 mm in diameter, proximally densely set with hairs similar to those on the rhi-
zone, higher up moderately set with similar, but shorter hairs; lamina anadromous and/or catadromous, sterile 1-pinnate, oblong-acuminate to narrowly elliptic, with up to 14 petiolated pinna pairs, to 190 mm long, to 58 mm wide, fertile with a pair of highly modified basal pinnae; rachis stramineous, adaxially sulcate, closely haired, hairs thinly crustaceous, ferrugineous, pluricellular, uniseriate, to 2 mm long; pinnae sterile herbaceous, sessile, broadly ovate to inequilateral-truncate, acute to obtuse, base inequilateral, basiscopically narrowly to broadly cuneate, acroscopically truncate to narrowly cuneate, larger often acroscopically auricled, crenate, to 37 mm long, to 20 mm wide, adaxially and abaxially with hairs similar to those on rachis along veins, to 1.5 mm long, the fertile erect, petiolate, petiole to 125 mm long, to 2-pinnate-pinnatifid, lamina highly skeletonised, to 120 mm long. Vénation anadromous and/or catadromous, free, evident, forked, ending near the margin. Sporangia borne singly at vein endings, sessile, ovoid, with a subapical, uniseriate annulus with a well-defined stomium, dehiscing by a vertical slit. Spores numerous, globose to tetrahedral-globose, trilete, with coarse ridges and grooves, the ridges coarsely tuberculate, exospore 50 x 57 µm in diameter. Figure 13 C & D.

Vernacular names: Drège’s flowering fern, Sorghum fern; Drège-se-blomvaring (Afr.).

Ecology: Terrestrial or epilithic, on moss-covered rocks or in leaf-litter, in moist or seasonally moist conditions in forest and along forest margins, often deeply shaded. Hemicryptophyte, mesophyte; fronds mesomorphic, the sterile parts long-lived, fertile pinnae short-lived. Vegetative reproduction not effective, rhizome rarely sparsely and closely branched. Seasonal pattern apparently non-existent, but could be determined by the availability of moisture. Fertile material collected in May.

Distribution: In Swaziland the species appears to be confined to the Sondeza mountains along the northern border of the country, occurring at altitudes between 500 and 1200 m. The species is restricted to the eastern parts of South Africa and Swaziland.

Mohria Sw., Syn. fil.: 6, 159 (1806). Type: Mohria thurifraga Sw., nom. superfl., now Mohria caffrorum (L.) Desv.

Mohria = after Daniel Matthias Heinrich Mohr (1780–1808), German botanist and later professor of philosophy at Kiel.

Generic description as for the species. A genus of seven species confined to the eastern parts of sub-Saharan Africa and the western Indian Ocean region.


vestitus = clothed
Plants terrestrial or epilithic. **Rhizome** short-decumbent, to 4 mm in diameter, closely set with roots, persistent stipe bases and scales, scales chartaceous, brown to stramineous, sessile, linear-acuminate to narrowly lanceolate, broadly cuneate to cordate, entire to shallowly repand, apex terminates in a small thin-walled cell, to 6.3 mm long, to 1.7 mm wide. **Frods** erect, caespitose, hemidimorphic, fertile longer than the sterile, sterile to 300 mm long, fertile to 600 mm long; **stipe** proximally castaneous, stramineous higher up, firm, terete, sterile to 115 mm long, to 2.5 mm in diameter, fertile to 215 mm long, to 3 mm in diameter, set with navicular to narrowly elliptic, ventrally attached trichomes and scales, scales moderately set, chartaceous, stramineous to castaneous, sessile, linear-acuminate to narrowly lanceolate, cordate to cordate-imbricate, entire or with a few short or long outgrowths at the base, apex terminates in a small thin-walled cell, to 6.8 mm long, to 1.5 mm wide; **lamina** catadromous, herbaceous, sterile narrowly elliptic, to 2-pinnate-pinnatifid, to 255 mm long, to 80 mm wide, with up to 19 pinna pairs, fertile narrowly lanceolate, to 2-pinnate-pinnatifid, to 435 mm long, to 60 mm wide, with up to 27 pinna pairs; **rachis** stramineous, proximally terete, distally shallowly sulcate, moderately set with trichomes and scales similar to those on the stipe; **pinnae** petiolate, pinna to 1 mm long, terete, opposite to alternate, widely spaced proximally, overlapping distally, 1-pinnate-pinnatifid, with up to 7 pairs of pinnaules, sterile ovate, to 45 mm long, to 20 mm wide, fertile ovate to narrowly ovate, to 40 mm long, to 20 mm wide, adaxially set with clavate and navicular trichomes, and sparsely set with ossiform-celled hairs, to 2.2 mm long, abaxially sparsely to moderately set with variable scales, scales chartaceous, stramineous, sessile, filiform to linear, or hastate to narrowly lanceolate, cordate to cordate-imbricate, entire, irregularly crenulate, or with short or long outgrowths from near the base, to 3.2 mm long, to 0.7 mm wide; **pinna-rachis** narrowly winged, adaxially flat or shallowly sulcate; **pinnules** opposite to alternate, generally slightly overlapping, sessile to adnate, pinnatifid, ovate, to 12 mm long, to 8 mm wide, lobed, the lobes broadly elliptic to rectangular, dentate. **Venation** obscure, free, ending in the teeth near the margin. **Sporangia** borne singly or in pairs near the vein endings, short-stalked, massive, capsule globose, annulus terminal, 8–11 celled, stomium well-defined, dehisce by a vertical slit. **Spores** numerous, stramineous, globose, trilete, ridged, the widely spaced ridges and grooves puncticulate, exospore to 116 µm in diameter. **Chromosome number** 2n = 152, tetraploid. Figure 14 A & B.

**Vernacular names:** Scented fern; Brandbossie (Afr).

**Ecology:** Terrestrial or epilithic, in forest margins, scrub, at boulder bases in grassveld and in rock crevices, exposed or shaded. Not edaphically bound. Hemicryptophyte, mesoxerophyte; fronds mesomorphic. Seasonal pattern apparently non-existent, but influenced by soil moisture, fertile material collected throughout the year. Vegetative reproduction by the short, sparsely branched rhizome resulting in the formation of small clonal stands. Pyrophytic.

**Distribution:** Common throughout the western half of Swaziland, growing at altitudes ranging between 500 and 1 400 m. **Mohria vestita** is confined to east and south tropical Africa, southern Africa and the western Indian Ocean region.

**Uses:** The Sesotho use the plant to rid children of worms, and the ground fronds are mixed with fat and used as an ointment against burns (Zepp 1982).
Figure 14 A & B, *Mohria vestita*, A, habit, B, abaxial surface of fertile pinna; C & D, *Ceratopteris thalictroides*, C, habit, D, section of fertile lobe.
Ceratopteris Brongn. has distinctive spores, which can be used to infer a fossil history. Although no plant fossils are known, spores of the genus (as Magnastratites Germeraad, Hopping & Muller), which appear similar to those of Ceratopteris, were first reported in the middle to late Eocene in India and then in the Oligocene in Central America (Dettmann & Clifford 1992). Phylogenetic studies based on morphological (Pryer et al. 1995; Stevenson & Loconte 1996) and molecular information (Hasebe et al. 1995) suggest that Ceratopteris forms part of the pteridoid ferns.


keras (Greek) = horned; pteris = fern

Generic description as for the family. A genus of four or fewer species with a pantropical distribution.


thalictroides = Thalictrum-like (Ranunculaceae)

Plants rooted or free-floating aquatics. Rhizome short, erect, poorly defined, to 5 mm in diameter, set with roots and crowded fronds. Fronds erect, caespitose, dimorphic, fertile overtop the sterile, sterile to 265 mm long, fertile to 420 mm long; stipe green, carnose, terete, sterile to 85 mm long, to 4 mm in diameter, fertile to 145 mm long, to 5 mm in diameter, glabrous or sparsely scaled, scales pale brown to hyaline, membranous, peltate, broadly elliptic to broadly ovate, repand, often with a few unicellular glands on the surface, to 2.4 mm long, to 0.8 mm wide; lamina catadromous, herbaceous, sterile ovate, to 2-pinnate, to 165 mm long, to 130 mm wide, with up to 5 petiolated pinna pairs, fertile broadly ovate, to 3-pinnate, to 275 mm long, to 175 mm wide, with up to 7 petiolated pinna pairs; rachis green, carnose, terete, somewhat flexuose, glabrous or sparsely set with scales similar to those on the stipe; pinnae petiolate, petiole terete, to 13 mm long in sterile lamina, to 26 mm long.
in fertile lamina, alternate, proximally widely spaced, more closely spaced distally, sterile overlapping or not, narrowly ovate, to 80 mm long, to 55 mm wide, with up to 2 petiolated pinnule pairs, fertile overlapping, broadly ovate, to 145 mm long, to 100 mm wide, with up to 5 petiolated pinnule pairs; **pinna-rachis** terete, glabrous or sparsely set with scales similar to those on the stipe; **pinnules** sessile or petiolate, to 2 mm long in sterile lamina, to 8 mm long in fertile lamina, sterile broadly ovate to inequilaterally trullate, irregularly lobed, to 27 mm long to 22 mm wide, fertile to 1-pinnate, subcircular to broadly ovate, to 68 mm long, to 56 mm wide, with up to 2 segment pairs; **segments** deeply divided into linear lobes, to 26 mm long, to 2 mm wide. **Venation** evident, reticulate, areola without included veinlets. **Sori** linear, near-marginal, on veins in lobes often extending to the pinna rachis; **receptacle** nude; **sporangium** sessile, capsule globose in lateral view, with (73–)82(–85) indurated annulus cells, epistomium (9–)15(–18)-celled, of which 5 to 14 cells have conspicuously thickened walls, hypostomium (9–)10(–16)-celled, of which 5 to 11 cells have conspicuously thickened walls; **indusium** marginal, hyaline, linear, entire. **Spores** 32 per sporangium, yellow, tetrahedral-globose, trilete, with course ridges radiating from the angles in nearly parallel alignment, (114–)121.53(–128) µm in equatorial diameter. Figure 14 C & D.

**Vernacular names:** Water sprite; Watervaring (Afr).

**Ecology:** In seasonal rock pools and backwaters of slow-flowing rivers, exposed or partially shaded. Pleustophyte; fronds mesomorphic. Seasonal pattern pronounced, dormant during the dry winter months (June to October). Fertile material collected in February and May. Vegetative reproduction (rarely) by the formation of buds on the living fronds.

**Distribution:** Rare in Swaziland and infrequently found in some rivers flowing through the Mlawula Nature Reserve where it grows in seasonal rock pools, at an altitude of 152 m. Pantropical.

**Uses:** Edible, grown as a commercial crop in Asia and the Philippines.

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**PTERIDACEAE** Rchb.

Morphological (Pryer *et al.* 1995; Stevenson & Lecomte 1996) and molecular (Hasebe *et al.* 1995) information support the view of the pteridoid ferns forming a closely related group within the leptosporangiate ferns. The Pteridaceae, as construed here, are often divided into the Pteridaceae and Adiantaceae.

**Key to the genera:**

1a Sporangia borne along the veins of a modified, strongly recurved margin which the veins enter ................................................................................................................... **Adiantum**

1b Sporangia borne along the veins, at vein endings, along a marginal or near-marginal vascular commissure, or on the lamina tissue; exindusiate or covered by a strongly modified marginal indusium which is not entered by veins:

2a Sporangia grouped along the veins; exindusiate:

3a Lamina dichotomously forked; sporangia borne along veins .......... **Actiniopteris**

3b Lamina pinnately compound; sporangia borne in soral lines at vein apices..............

.................................................................................................................. **Pityrogramma**

2b Sporangia grouped at vein ends, along a marginal vascular commissure or on lamina tissue; exindusiate or covered by a strongly modified marginal indusium:

4a Lamina pedate-pinnatifid ................................................................. **Doryopteris**

4b Lamina pinnately divided:

5a Pinnae and/or ultimate segments articulated ........................................... **Pellaea**

5b Pinnae and/or ultimate segments not articulated:

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6a Ultimate fertile segments with distinct entire to serrate sterile apices ..............

\textit{Pteris}

6b Ultimate fertile segments without distinct sterile apices .............. \textit{Cheilanthes}


\textit{pityro} = bran; \textit{gramma} = a line

Generic description as for the species. A genus of approximately 16 species, most of which occur in the neotropics.

\textbf{Pityrogramma calomelanos} (L.) Link, Handbuch 3: 20 (1833), as ‘calomelas’.


calomelanos = beautiful and black; \textit{aureo} = golden; \textit{flava} = yellowish

Plants terrestrial or epilithic. \textit{Rhizome} short, suberect, closely branched, to 5 mm in diameter, closely set with roots, persistent stipe bases and scales, scales chartaceous, ferrugineous, sessile, linear-acuminate to narrowly lanceolate, cordate, entire, apex terminates in a small thin-walled cell, to 4 mm long, to 0.6 mm wide. \textit{Fronds} crowded, suberect to arching, caespitose, to 810 mm long; \textit{stipe} firm, castaneous, nitid, terete, distally adaxially flattened, to 410 mm long, to 4 mm in diameter, proximally moderately scaled, sparsely scaled to glabrous distally, scales similar to those on rhizome; \textit{lamina} anadromous, firmly herbaceous, ovate to lanceolate, to 2-pinnate, to 465 mm long, to 220 mm wide, with up to 19 pinna pairs; \textit{rachis} castaneous, nitid, adaxially shallowly sulcate, glabrous or set with mainly 2-celled, clavate hairs, to 0.1 mm long; \textit{pinnae} petiolate, petiole to 7 mm long, alternate, widely spaced proximally, often slightly overlapping distally, pinnatifid to 1-pinnate, narrowly lanceolate to linear acuminate, to 122 mm long, to 36 mm wide, with up to 3 petiolated pinnule pairs; \textit{pinnae-rachis} castaneous, nitid, adaxially sulcate, sulcus confluent with that of rachis; \textit{pinules} alternate, sessile or short-petiolate, inequilateral, oblong-acuminate to narrowly trullate, or hastate, basiscopically narrowly cuneate, acroscopically narrowly to broadly cuneate, often auricled, entire to shallowly crenate, to 21 mm long, to 8 mm wide, glabrous adaxially, abaxially closely set with 2- or 3-celled hairs of which the apical cell is glandular, producing a yellow farina, to 0.3 mm long. \textit{Venation} obscure adaxially and abaxially, pinnately branched, ending near the margin. \textit{Sporangia} set along veins; \textit{receptacle} with 2- or 3-celled hairs; \textit{sporangium} short-stalked, stalk simple, 3-seriate below the capsule, capsule globose, with 17(–19) indurated annulus cells, epistemium (3–)4-celled, hypostomium (4–)5(–6)-celled, exindusiate. \textit{Spores} tetrahedral-globose, trilete, with
a prominent equatorial flange, proximal face rugate, distal face hemispherical, rugate, (46–)53.8(–58) µm in equatorial diameter. Figure 15 A & B.

**Vernacular names:** Golden fern; Goue varing (Afr).

**Ecology:** Terrestrial or epilithic, in moist or seasonally moist, usually disturbed habitats such as earthbanks along roads, culverts and ditches, growing in light shade or fully exposed. Not edaphically bound. Hemicryptophyte, mesoxeromorphic; fronds mesomorphic. Vegetative reproduction by the short and closely branched rhizome results in the plants forming small clonal stands. Seasonal pattern non-existent, fertile fronds found throughout the year; no dormancy period.

**Distribution:** This species, introduced from South America, has become well-established and widespread in the western half of Swaziland, occurring at altitudes ranging from ± 700 to 1 500 m. The species has also become naturalised in South Africa and Zambia.

**Uses:** This hardy ornamental fern is ideal in the garden.


*aktinos* (Greek) = ray; *pteris* = fern

Generic description as for the species. A genus of five species confined to Africa, Madagascar, Arabia and the Indian subcontinent.


*Actiniopteris australis* sensu Sim, Ferns S. Afr., 2nd edn: 150, pl. 34, fig. 2 (1915).

*radiata* = radial

Plants terrestrial or epilithic. *Rhizome* short-decumbent, closely branched, to 2 mm in diameter, closely set with roots, persistent stipe bases and bicolorous scales, scales with a crustaceous, black to castaneous central stripe, nitid, and ferrugineous to stramineous, chartaceous to membranous margins, sessile, linear to narrowly lanceolate, base somewhat round-auricled, cordinate, entire to repand, apex terminates in an oblong thin-walled cell, to 4 mm long, to 1 mm wide. *Fronds* crowded, erect, caespitose, homomorphic, to 160 mm long; *stipe* firm, proximally brown, green higher up, narrowly winged along entire length, shallowly sulcate adaxially, to 130 mm long, to 1.2 mm in diameter, sparsely scaled, scales thin-chartaceous, concolorous, stramineous, sessile, linear-hastate, entire or irregularly set with short marginal outgrowths, apex terminates in an oblong thin-walled cell, to 3 mm long, to 0.5 mm wide; *lamina* anadromous, firmly herbaceous, flabellate, edges forming an angle of 150–180°, divided into 2 symmetrical halves by a deep median notch, each to 4 times dichotomously branched, to 32 mm long, muricate adaxially, abaxially initially sparsely
set with scales similar to, but smaller than, those on the stipe, lamina decline when desiccated; segments up to 48 per lamina, linear, of variable length, to 1.2 mm wide, each ending in 3 or 4 acute teeth. Venation adaxially obscure, raised abaxially, dichotomously forked, ending in the teeth. Sori linear, along outer segment veins; receptacle nude; sporangium stalk simple, 3-seriate below capsule, capsule broadly elliptic in lateral view, with (17–)19(–20) indurated annulus cells, epistomium (5–)6(–7)-celled, hypostomium (5–6)-celled; indusium membranous, continuous along segment margin, entire. Spores trilete, tetrahedral-globose, with an equatorial flange, proximal face verrucose, distal face hemispherical, rugate, (46–)56.2(–60)µm in diameter. Figure 15 C.

**Vernacular names:** Fan-leaved fern; Waaierblaarvaring (Afr).

**Ecology:** Epilithic or epiphytic, in rock crevices, at boulder bases, in shallow soil pockets overlaying sheet rock, and among low scrub, in seasonally moist conditions. Exposed or in light shade. Not edaphically bound, but in Swaziland the species is confined to basaltic soils. Hemicyryptophyte, xerophyte; fronds mesoxeromorphic, poikilohydrous. Vegetative reproduction by the short and closely branched rhizome results in the plants forming small clonal stands. Seasonal pattern pronounced, fertile fronds are produced during the rainy season (December to April), usually dormant during the dry winter months.

**Distribution:** In Swaziland the species is known from the northern parts of the Lubombo mountains only, occurring at altitudes ranging from 120 to 170 m. The species is widespread in the drier parts of east and south tropical Africa, southern Africa, Egypt, Macaronesia, Afghanistan, Arabia, Sri Lanka, southern India, Yemen and Madagascar.

**Cheilanthes** Sw., Syn. fil.: 5, 126 (1806), nom. cons. Type: *Cheilanthes micropteris* Sw.

*cheilos* (Greek) = lip; *anthos* = flower

Plants terrestrial or epilithic. *Rhizome* short-decumbent or short and erect to suberect, simple or shortly and closely branched, closely set with roots, persistent stipe bases and scales, scales chartaceous, concolorous or bicolorous, concolorous scales stramineous to ferrugineous, if bicolorous then with a chartaceous to crustaceous central region, castaneous to atrocastaneous, nitid, often multistratose, and chartaceous, ferrugineous to stramineous margins, adnate or sessile, subulate, subulate-caudate, narrowly lanceolate, narrowly cuneate or cordate, entire, shallowly repand, denticulate, or shallowly serrate, apex subulate or short-flagelliform, terminating in a small subulate cell or an ovate, oblong or pyriform thin-walled cell. *Fronds* closely spaced to crowded, caespitose, 6–12 per plant, erect to arching; *stipe* rigid, castaneous, terete or proximally terete, adaxially flattened or shallowly sulcate in the upper half, sulcus flat-bottomed, hisurate or closely to densely set with hairs and scales, often glabrous later, hairs simple, pluricellular, uniseriate, stiff or not, acicular or terminating in an oblong, elliptic or pyriform thin-walled cell, scales membranous to chartaceous, ferrugineous to stramineous, adnate, sessile or short-stalked, acicular, subulate, filiform, linear-acuminate, cuneate to cordate, entire, repand or dentate, apex terminates in a subulate or small oblong thin-walled cell; *lamina* anadromous, thinly to firmly herbaceous or thinly to firmly coriaceous, oblong-acuminate, narrowly lanceolate, linear-acuminate, or pentagonal, to 4-pinnate-pinnatifid, with up to 19 petiolated pinna pairs; *rachis* and lower order
axes rigid, castaneous, terete or adaxially shallowly sulcate, sulci confluent, glabrous to closely set with hairs and/or scales similar to those on the stipe; *pinnae* petiolate. opposite to alternate, widely spaced proximally, more closely spaced distally, overlapping or not, to 3-pinnate-pinnatifid, ovate, or those at the lower half of the lamina often basiscopically developed, inequilaterally ovate, broadly ovate, triangular or deltate, distal *pinnae* narrowly ovate to lanceolate, with up to 17 pinnule pairs; *pinna-rachis* and lower order axes castaneous, terete or adaxially shallowly sulcate, closely set with hairs and/or scales similar to those on the rachis, often glabrous later; *pinnules* petiolate, opposite to alternate, widely spaced to overlapping, to 2-pinnate-pinnatifid, ovate to broadly ovate, or proximally basiscopically developed, inequilaterally narrowly to broadly ovate, often acroskopically auricled, distal *pinnae* ovate, lanceolate or linear-acute, with up to 10 segment pairs; *segments* sessile or petiolate, opposite to alternate, spaced or overlapping, to 1-pinnate-pinnatifid, narrowly ovate, ovate, lanceolate, triangular or oblong-obtuse, often acroskopically auricled, crenate or obtusely lobed, with up to 3 ultimate segment pairs, adaxially glabrous, hirsute or initially closely set with hairs and filiform scales, glabrous later, hairs and scales chartaceous, stramineous, twisted, terminating in an acicular cell or an oblong thin-walled cell, abaxially glabrous, hirsute or densely set with hairs and scales, chartaceous, stramineous to ferrugineous, hairs twisted, terminating in an acicular or oblong thin-walled cell, scales short-stalked, lanceolate-caudate to narrowly ovate-caudate, cordate to cuneate-imbricate, dentate, apex terminates in an oblong thin-walled cell; *ultimate segments* sessile or petiolate, opposite to alternate, spaced to pinnatifid, narrow-elliptic, ovate, hastate, oblong-acuminate or oblong-obtuse, shallowly to deeply lobed, shallowly crenate, adaxially glabrous or moderately set with acicular, pluricellular, uniseriate hairs along the costules and veins, abaxially glabrous or closely set with clavate 2-celled hairs, or moderately set with acicular, pluricellular, uniseriate hairs along the costules and veins. *Venation* evident or obscure, often immersed adaxially, pinnately branched, ending in the teeth near the margin, or near the margin in the sinuses between the teeth, apices often enlarged in the fertile segments. *Stomata* of the anomocytic type, hypostomatic; aerophores poorly developed, a continuous dorsilateral line along the stipe, rachis and lower order axes. *Sori* borne near-marginally at free vein endings, discrete, or along a continuous or near-continuous near-marginal vascular commissure. *Venation* free or often with a marginal vascular commissure; *receptacle* nude, or with 3–5-celled simple, hair-like paraphyses; *sporangia* short-stalked or sessile, stalk simple or occasionally with a simple 2- or 3-celled hair near the base, 3-seriate below the capsule, capsule globose to broadly obovate in lateral view, with (14–)15, 16, 17, 18 or 21(–26) indurated annulus cells, epistomium (4–)5(–6)-celled, hypostomium (4–)5 or 6(–7)-celled, stomium composed of 5–7 narrow cells of which the walls are more thickened than the surrounding annulus cells; *indusium* membranous, marginal or near-marginal, interrupted and lunate to semi-circular, entire to lacerate, or continuous or near-continuous, linear, entire, repand or erose, or exindusiate, developing sporangia protected by the recurved segment margin. *Spores* 32 or 64 per sporangium, brown, tetrahedral-globose, trilite, laesura conspicuous or inconspicuous, rugulose, reticulate-granulose or crenate-echinulate, with an overlaying cristate network.

*Cheilanthes* Sw. is a genus of 150 to 200 species with a world-wide distribution. The genus, as defined here, is morphologically diverse and segregate genera are often recognised.

**Key to the species:**

1a Veins end near the margin in the sinus between the teeth; receptacle paraphysate; indusium continuous, near-marginal:

2a Sori occur along a continuous or near-continuous, near-marginal vascular commissure; lamina 1 to 3-pinnate; segments simple, lanceolate, narrowly elliptic, narrowly obovate to broadly ovate ................................................................. *C. viridis*

2b Sori confined to mainly free vein endings; lamina usually 4-pinnate; segments 1-pinnate, triangular to oblong-acute ................................................................. *C. quadripinnata*
Veins end near the margin in the teeth; sori confined to apices of free vein branches; receptacle nude; indusium interrupted, marginal:

3a Lamina pentagonal; stipe shallowly sulcate in upper half:

4a Segments adaxially glabrous, abaxially closely set with 2-celled clavate hairs; indusium semi-circular

\[ C. \text{multifida} \]

4b Segments adaxially and abaxially moderately set with pluricellular, acicular hairs along the costa and veins; indusium lunate

\[ C. \text{bergiana} \]

3b Lamina oblong-acuminate, lanceolate, or linear acuminate; stipe terete:

5a Segments adaxially and abaxially hirsute

\[ C. \text{hirta} \]

5a Segments adaxially initially closely set with hairs and filiform scales, glabrous to subglabrous later, abaxially densely set with hairs and scales

\[ C. \text{eckloniana} \]


**Cheilanthes elata** Kunze in Linnaea 10: 542 (1836). Type: Koratra, in sylva, 200-300 m, *Drège* s.n. [LZ†; BM!, lecto., designated by Schelpe (1969); B 000402!, isolecto.].

**bergiana** = after Carl Heinrich Bergius (1790–1818), German cavalryman and naturalist.

Plants terrestrial. *Rhizome* short, erect to suberect, generally unbranched, to 4 mm in diameter, closely set with roots, persistent stipe bases and scales, scales chartaceous, bicolorous, with a castaneous central region, nitid, and ferrugineous to stramineous margins, sessile, subulate, entire, apex terminates in a small thin-walled cell, to 9 mm long, to 0.6 mm wide. *Fronds* crowded, caespitose, 6–8 per plant, arching, to 800 mm long; *stipe* firm, castaneous, proximally terete or somewhat flattened adaxially, distally shallowly sulcate adaxially, to 380 mm long, to 4 mm in diameter, closely set with scales and hairs, scales membranous, ferrugineous to stramineous, sessile, linear-acute to filiform, entire, apex terminates in a small thin-walled cell, to 3 mm long, to 0.2 mm wide, hairs stiff, acicular, pluricellular, uniseriate, to 1 mm long; *lamina* anadromous, herbaceous to thinly herbaceous, pentagonal, to 4-pinnate-pinnatifid, to 300 mm long, to 290 mm wide, with up to 12 petiolated pinna pairs; *rachis* castaneous, adaxially shallowly sulcate, closely set with hairs similar to those on the stipe; *pinnae* petiolate, petiole to 7 mm long, alternate, widely spaced proximally, more closely spaced distally, overlapping, to 3-pinnate-pinnatifid, basiscopically developed, inequilaterally broadly ovate, distal pinnae narrow ovate to lanceolate, to 180 mm long, to 125 mm wide, with up to 12 pinnule pairs; *pinna-rachis* and lower order axes castaneous, adaxially shallowly sulcate, closely set with hairs similar to those on rachis; *pinnales* petiolate, petiole to 4 mm long, alternate, widely spaced to overlapping, to 2-pinnate-pinnatifid, the proximal basiscopically developed, inequilaterally ovate, the distal symmetric, ovate to lanceolate, to 94 mm long, to 48 mm wide, with up to 10 segment pairs; *segments* petiolate, petiole to 1 mm long, alternate, spaced or overlapping, to 1-pinnate-pinnatifid, ovate to lanceolate, to 34 mm long, to 17 mm wide, with up to 3 ultimate segment pairs; *ultimate segments* petiolate, petiole to 0.5 mm long, alternate, spaced, to pinnatifid, ovate to ob-
long-acuminate, to 10 mm long, to 0.5 mm wide, divided into oblong lobes, shallowly crenate, adaxially and abaxially moderately set with acicular, pluricellular, uniseriate hairs along the costule and veins. *Venation* evident, pinnately branched, vein branches end near margin in teeth. *Sori* at free vein endings of ultimate segments, discrete; *receptacle* nude; *sporangium* stalk simple, 3-seriate below capsule, capsule obovate in lateral view, with (14–15–18) indurated annulus cells, epistomium (4–5–6)-celled; hypostomium (4–5–6)-celled; *indusium* membranous, lunate, entire to subentire, to 0.6 mm in diameter. *Spores* 64 per sporangium, trilete ridge, inconspicuous, globose, exospore (24–25.7–27) µm in diameter. Figure 15 D & E.

**Vernacular names:** Bergius’s lip fern, Forest lip fern; Woud lipvaring (Afr).

**Ecology:** Terrestrial, in leaf-litter, usually in deep shade on moist evergreen forest floor. Not edaphically bound. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction non-existent, rhizome (rarely) closely branched. Seasonal pattern apparently non-existent in permanently moist conditions, but in less favourable conditions new growth is restricted to the rainy season.

**Distribution:** Rare in Swaziland and known from the Horo forest only, growing at an altitude of ± 400 m. The species is widespread in the wetter regions of east tropical Africa, southern Africa and the western Indian Ocean region.


*Notholaena krebsiana* C.Presl, Tent. pterid.: 224 (1836), nom. nud. Type: Based on Krebs, Pl. cap. exs. 372.

eckloniana = after Christian Frederick Ecklon (1795–1868), German apothecary, plant collector and traveller.

Plants terrestrial or epilithic. *Rhizome* short-decumbent, branched, to 3 mm in diameter, closely set with roots, stipe bases and scales, scales chartaceous, concolorous or bicolorous, bicolorous scales with a castaneous central region, margins ferrugineous to stramineous, sessile, subulate to narrowly lanceolate, shallowly serrate, apex subulate or short-flagelliform, apical cell short-subulate, to 3 mm long, to 0.8 mm wide. *Fronds* crowded, caespitose, erect, to 400 mm long; *stipe* firm, castaneous, terete, to 260 mm long, to 2.3 mm in diameter, densely set with stramineous to ferrugineous hairs and scales, hairs simple, pluricellular, uniseriate, terminating in an oblong thin-walled cell, to 0.6 mm long, scales chartaceous, sessile or short-stalked, subulate to acicular, cuneate to cordate, dentate, apex terminates in an oblong thin-walled cell, to 4.5 mm long, to 0.4 mm wide; *lamina* anadromous, firmly herbaceous, oblong-acuminate to narrowly lanceolate, to 3-pinnate, to 345 mm
Figure 16 A & B, Cheilanthes eckloniana, A, habit, B, abaxial surface of fertile pinna; C & D, C. hirta, C, habit, D, adaxial surface of pinna.
long, to 130 mm wide, with up to 16 petiolated pinna pairs; *rachis* castaneous, terete, densely set with scales and hairs similar to those on the stipe; *pinnae* petiolate, petiole to 10 mm long, opposite to alternate, widely spaced proximally, more closely spaced and slightly overlapping distally, to 2-pinnate, pinnae on lower half of lamina basiscopically developed, inequilaterally deltate to broadly ovate, distal pinnae lanceolate, to 87 mm long, to 39 mm wide, with up to 5 pinnule pairs; *pinna-rachis* castaneous, adaxially shallowly sulcate, densely set with hairs and scales similar to those on rachis; *pinnules* petiolate, petiole to 1 mm long, alternate, spaced, to 1-pinnate, acroscopic pinnule on basal pinna to 13 mm long, to 7.5 mm wide, basiscopic pinnule on basal pinna to 27 mm long, to 11 mm wide, with up to 2 segment pairs; *segments* sessile, opposite, spaced, narrowly ovate to oblong-obtuse, obtusely lobed, to 6 mm long, to 2 mm wide, adaxially initially closely set with hairs and filiform scales, glabrous later, hairs and scales chartaceous, stramineous, twisted, terminating in an acicular cell or an oblong thin-walled cell, to 0.8 mm long, abaxially densely set with hairs and scales, chartaceous, stramineous to ferrugineous, hairs twisted, terminating in an acicular or oblong thin-walled cell, scales short-stalked, lanceolate-caudate to narrowly ovate-caudate, cordate to cordate-inbricate, dentate, apex terminates in an oblong thin-walled cell, to 1.2 mm long, to 0.3 mm wide. *Vénation* obscure, pinnately branched, ending near the margin. *Sori* discrete, at free vein endings; *receptacle* nude; *sporangium* sessile or short-stalked, capsule globose in lateral view, with (15–)17(–17) indurated annulus cells, epistomium (6–)6(–7)-celled, hypostomium (5–)6(–7)-celled; *indusium* membranous, linear, repand, continuous. *Spores* 64 per sporangium, brown, tetrahedral-globose, trilete, reticulate-granulose, exospore (50–)55.6(–58) µm in equatorial diameter. Figure 16 A & B.

**Vernacular names:** Ecklon's lip fern, Resurrection fern; Ecklon-se-lipvaring (Afr.); Mathomeng (Ses.).

**Ecology:** Terrestrial or epilithic, at boulder bases, in shallow soil pockets on sheet rock and often also in low scrub, exposed or in light shade. Not edaphically bound. Hemicryptophyte, mesoxeromorphic; fronds mesoxeromorphic, poikilohydrous. Vegetative reproduction by the closely branched rhizome results in the formation of small clonal stands. Seasonal pattern is pronounced with new growth taking place during the rainy season only. Pyrophytic.

**Distribution:** Infrequent on the western highveld of Swaziland, occurring in submontane grassveld at altitudes ranging between ±1 000 and 1 520 m. The species is confined to the eastern parts of south tropical Africa and southern Africa.

**Uses:** Smoke from burnt fronds is inhaled to relieve head and chest colds (Watt & Breyer-Brandwijk 1962), and the ashes are applied on sores, especially if they are festering (Zepp 1982).


*Adiantum cafforum* Sw. in J. Bot. (Schrader) 1800(2): 85 (1801), non L.f. (1782). Type: Ex insula Mauritii, *Gröndal* s.n. (S-PA!, holo.).

**Cheilanthes hirta** Sw. var. *intermedia* Kunze in Linnaea 10: 539 (1836). *Myriopteris intermedia* (Kunze) Fée, Mém. foug. 5: 139 (1852). Type: In montib. Witbergen, *Drège* s.n. [LZ; B, lecto., designated by Anthony (1984); SAM!, isolecto.].


*hirta* = rough-haired

Plants terrestrial or epilithic. *Rhizome* short-decumbent to suberect, to 4 mm in diameter, closely set with roots, persistent stipe bases and scales, scales bicolorous, with a thinly crustaceous, castaneous central region, margins chartaceous, ferrugineous to stramineous, sessile, subulate, narrowly cuneate to cordate, entire to shallowly repand, apex terminates in an ovate or pyriform thin-walled cell, to 4 mm long, to 0.6 mm wide. *Fronds* crowded, caespitose, to 12 per plant, erect, to 360 mm long; *stipe* firm, castaneous, terete, to 92 mm long, to 1.2 mm in diameter, hirsute, proximally also with scales, scales similar to those on rhizome, hairs stiff, ferrugineous, pluricellular, uniseriate, apex terminates in an elliptic to pyriform thin-walled cell, to 1.7 mm long; *lamina* anadromous, herbaceous, linear-acuminate to narrowly lanceolate, to 3-pinnate, 280 mm long, to 65 mm wide, with up to 19 petiolated pinna pairs; *rachis* castaneous, terete, hirsute, hairs similar to those on the stipe; *pinnae* petiolate, petiole to 3 mm long, alternate, widely spaced proximally, more closely spaced distally, to 2-pinnate, ovate, to 50 mm long, to 20 mm wide, with up to 6 pinnule pairs; *pinna-rachis* and lower order axes terete, hirsute, hairs similar to those on the stipe; *pinnules* petiolate, petiole to 1.2 mm long, opposite to alternate, overlapping slightly, ovate to broadly ovate, to 1-pinnate, to 11 mm long, to 7 mm wide, usually with a single pair of segments; *segments* ovate to oblong-obtuse, crenate, to 4 mm long, to 1.3 mm wide, adaxially and abaxially hirsute. *Venation* obscure, pinnately branched, free vein branches end near the margin in the teeth. *Sori* at free vein endings, near-marginal; *receptacle* nude; *sporangium* short-stalked, 3-seriate below the capsule, capsule circular in lateral view, with (17–)18(–20) indurated annulus cells, epistomium (5–)6(–7)-celled, hypostomium (5–)6(–7)-
celled, stomium composed of 5 or 6 narrow cells of which the walls are more thickened than those of surrounding cells; exindusiate, the developing sporangia protected by the recurved segment margin. *Spores* 64 per sporangium, brown, tetrahedral-globose, trilete, rugulose with an overlaying cristate network, exospore (32–)37.45(–42) μm in equatorial diameter. Figure 16 C & D.

**Vernacular names:** Parsley fern; Pietersielievaring (Afr.); Mamaoaneng, Lethotho (Ses.); Inkomakoma, Inkamankoma (Zulu).

**Ecology:** Terrestrial or epilithic, at boulder bases, in rock crevices, and in leaf-litter along forest margins and in low scrub, exposed or in light shade. Not edaphically bound. Hemicyryptophyte, mesoxeromorphic, fronds mesoxeromorphic, poikilohydrous. Vegetative reproduction by the sporadically branched rhizome which may result in the formation of small clonal stands. Seasonal pattern pronounced and new growth is restricted to the wetter summer months. In exposed habitats, or during prolonged periods of drought the plants may go dormant. Pyrophytic.

**Distribution:** Frequent and widely distributed within Swaziland, occurring at altitudes ranging from 150 to 1 300 m, but appears to be absent from the central lowveld region. The species is widespread in east and south tropical Africa, southern Africa and the western Indian Ocean region.

**Uses:** A decoction of the plant is taken as a remedy for colds, sore throats and asthma, whilst the powdered rhizome is used as an anthelmintic for tapeworm. Children suffering from sleeplessness and nightmares are made to inhale the smoke of this species and *Mohria vestita* (Watt & Breyer-Brandwijk 1962).

**Cheilanthes multifida** (Sw.) Sw., Syn. fil.: 129, 334 (1806); Sim, Ferns S. Afr.: 87, pl. XXX, XXXI, fig. 3 (1892); Sim, Ferns S. Afr., 2nd edn: 231, pl. 91, t. 3, 113 (1915); Jacobsen, Ferns Sthn. Afr.: 264, fig. 189a, b, map 74 (1983); Anthony in Contr. Bolus Herb. 11: 183, pl. 37, 38, fig. 44, 46 (1984); Schelpe & Anthony, Fl. S. Afr., Pterid.: 136, fig. 44, t. 1, 1a, map 113 (1986); Burrows, Sthn. Afr. Ferns: 150, ill. 36, t. 152, 152a, pl. 24.6, map (1990); Roux, SABONET Rep. 13: 65 (2001).

Type: Promont. bonae spei, Thunberg s.n. [S!, lecto, designated by Schelpe (1969)].

_Adidantum globatum_ Poir., In Lam., Encycl., Suppl. 1: 144 (1810). Type: Cape Peninsula, Table Mountain, _sine coll. s.n._ (P-JU 1433, holo.).

_Cheilanthes multifida_ (Sw.) Kunze in Linnaea 10: 537 (1836). Type: Ad rupes summitatis prope Omsamcaba, _Drège s.n._ [LZ†; B 395D! lecto., designated by Anthony (1984); L, isolecto.].


_Cheilanthes bolusii_ Baker, In Hooker’s Icon. Pl.: t. 1636 (1886); Sim, Ferns S. Afr.: 89, pl. XXV, fig. 2 (1892); Sim, Ferns S. Afr., 2nd edn: 234, pl. 106, fig. 2 (1915). Type: Cape Colony; southwestern district on the banks of the Breede River at Darling bridge, 10/1886, _Bolus_ 2801 (K, holo.; BOL!, iso.).


multi = many; _fidus_ = divided

Plants terrestrial or epilithic. _Rhizome_ short-creeping, to 6 mm in diameter, set with roots, closely set persistent stipe bases, and scales, scales concolorous or bicolored, concolorous scales,
Figure 17 A–C, Cheilanthes multífida, A, habit, B, abaxial surface of fertile pinnule, C, adaxial surface of pinnule showing venation; D & E, C. quadripinnata, D, habit, E, abaxial surface of fertile segment.
chartaceous, stramineous to ferrugineous, bicolorous scales with a crustaceous, castaneous, multistratose central region, margins stramineous, sessile, subulate to subulate-caudate, entire, apex terminates in an oblong thin-walled cell, to 5 mm long, to 1 mm wide. *Fronds* closely spaced, to 8 per plant, erect, to 540 mm long; *stipe* castaneous, proximally terete, sulcate in upper half, sulcus flat-bottomed, to 295 mm long, to 3 mm in diameter, proximally with scales similar to those on the rhizome, higher up sparsely set with stramineous, filiform scales and hairs, apex terminates in an oblong thin-walled cell, to 5 mm long, soon becoming glabrous; *lamina* anadromous, firmly herbaceous to thinly coriaceous, pentagonal, to 3-pinnate-pinnatifid, to 230 mm long, to 170 mm wide, with up to 12 petiolated pinna pairs; *rachis* and lower order axes castaneous, sulcate, sulci confluent, glabrous; *pinnae* petiolate, petiole to 14 mm long, opposite to alternate, widely spaced proximally, more closely spaced distally, overlapping, to 2-pinnate-pinnatifid, basipetrically developed, inequilaterally broadly ovate to ovate, to 130 mm long, to 88 mm wide, with up to 10 petiolated pinnule pairs; *pinnules* petiolate, petiole to 5.5 mm long, alternate, spaced to overlapping slightly, to 1-pinnate-pinnatifid, basipetrically developed, inequilaterally broadly ovate to ovate, acroscopic pinnule on basal pinnae to 25 mm long, basipetric pinnule on basal pinnule to 50 mm long, with up to 5 pairs of petiolated segments; *segments* opposite to alternate, spaced, short-stalked, pinnatifid, narrowly ovate to subulate, basiscopically developed, inequilaterally broadly ovate to ovate, to 130 mm long, to 7 mm wide; *ultimate segments* sessile, oblong-obtuse, shallowly lobed, to 3 mm long, to 2 mm wide, glabrous adaxially, abaxially closely set with clavate, 2-celled hairs, to 0.15 mm long. *Venation* obscure, pinnately branched, free vein branches end in the teeth near the margin. *Sori* at free vein endings of ultimate segments, marginal, discrete; *receptacle* nude; *sporangium* short-stalked, simple, 3-seriate below capsule, capsule circular in lateral view, with (14–15) indurated annulus cells, epistomium (4–5(–7)-celled, hypostomium (4–5(–6)-celled, stomium composed of 5–6 narrow cells of which walls are more thickened than those of surrounding cells; *indusium* membranous, pale, semi-circular, entire to lacerate. *Spores* 64 per sporangium, yellowish-brown, tetrahedral-globose, trilete, smoothly rugulose, exospore (34–38.7(–42) µm in equatorial diameter. Figure 17 A–C.

**Vernacular names:** Cluster fern; Kolonie lipvaring (Afr).

**Ecology:** Terrestrial or epilithic, at boulder bases, in rock crevices and in shallow soil pockets overlying sheet rock, in exposed or partially shaded conditions. Not edaphically bound. Hemicyryptophyte, mesoxerophytic; fronds mesoxeromorphic. Vegetative reproduction by the short, closely branched rhizome results in the formation of clonal stands. Seasonal pattern pronounced and determined by the seasonal precipitation. In exposed habitats, or during prolonged periods of drought the plants may go dorman. Pyrophytic.

**Distribution:** Widespread throughout Swaziland, but more frequent on the western highveld, occurring at altitudes ranging from 760 to 1 672 m. The species is widespread in west central tropical Africa, east and south tropical Africa and southern Africa.


*Cheilanthes triangula* Kunze in Linnaea 10: 536 (1836). Type: Compasberg, in rupestribus umbrosis, 5–6 000 ped., Drège s.n. [LZ†; B 000393, lecto., designated by Anthony (1984); BM!, L, isolecto.].

*Cheilanthes atherstonei* Hook., Sp. fil. 2: 107 (1852), as ‘atherstonii’. Type: Somerset East, *Atherstone* s.n. (K, holo.).

*Cheilanthes firma* T.Moore in J. Bot. 5: 225 (1853). Type: Natal, *Plant* s.n. (BM, holo.).

*Cheilanthes linearis* T.Moore in J. Bot. 5: 226 (1853). Type: Natal, *Plant* s.n. (BM, holo.).

quadri = four; pinna = the primary division of a compound lamina

Plants terrestrial or epilithic. *Rhizome* short-decumbent, closely branched, to 9 mm in diameter, set with roots, closely set persistent stipe bases and scales, scales concolorous or bicolorous, concolorous scales chartaceous, castaneous to ferrugineous, bicolorous scales with a thinly crustaceous, atrocastaneous central region and narrow castaneous, ferrugineous margins, sessile, subulate, entire, apex terminates in a subulate cell or an elliptic thin-walled cell, to 10 mm long, to 0.8 mm wide. *Fronds* crowded, to 8 per plant, erect, to 980 mm long; *stipe* rigid, castaneous, proximally terete, becoming sulcate in the upper half, sulcus flat-bottomed, to 800 mm long, to 7 mm in diameter, proximally closely set with scales similar to those on rhizome, higher up sparsely set with hairs and scales, scales chartaceous, ferrugineous, adnate, subulate to filiform, entire to shallowly repand, apex terminates in a subulate or oblong thin-walled cell, to 7 mm long, to 0.5 mm wide, hairs pluricellular, uniseriate, apical cell narrowly elliptic, thin-walled, soon becoming glabrous, sulcus closely set with 2 and 3-celled hairs, apical cell elliptic to oblong-obtuse, appearing glandular, to 0.2 mm long; *lamina* anadromous, firmly herbaceous to coriaceous, pentagonal, to 4-pinnate, to 500 mm long, to 580 mm wide, with up to 15 petiolated pinna pairs; *rachis* and lower order axes rigid, castaneous, adaxially sulcate, axes sulci confluent, abaxially initially sparsely set with ferrugineous, multicellular hairs, glabrous later, sulci set with hairs similar to those on the stipe; *pinnae* petiolate, petiole to 54 mm long, alternate, widely spaced proximally, more closely spaced distally, to 3-pinnate, basiscopically developed, inequilaterally broadly ovate to triangular, to 365 mm long, to 230 mm wide, with up to 17 petiolated pinnule pairs; *pinnules* petiolate, petiole to 12 mm long, alternate, spaced to slightly overlapping, to 2-pinnate, narrowly ovate to linear-acute, acrosopic pinnule on the basal pinna to 85 mm long, basiscopically pinnule on the basal pinna to 200 mm long, with up to 9 petiolated segment pairs; *segments* sessile or petiolate, petiole to 2 mm long, alternate, spaced, to 1-pinnate, triangular to oblong-acute, to 35 mm long, to 25 mm wide; *ultimate segments* sessile, opposite to alternate, narrowly elliptic, oblong-obtuse, or hastate, crenate, somewhat revolute when fertile, to 12 mm long, to 5 mm wide, glabrous adaxially and abaxially. *Vena-
tion pinnately branched, free, often immersed adaxially, or obscure, abaxially obscure or evident, terminating in the margin in the sinuses between the teeth, apices often enlarged in fertile segments. Sori appear continuous, but confined to the enlarged free vein apices, or sporadically along a commissure formed by a few adjacent vein endings; receptacle with 3- or 4-celled simple, hair-like paraphyses; sporangium short-stalked, simple, 3-seriate below capsule, capsule obovate in lateral view, with (19–)21(–26) indurated annulus cells, epistomium (5–)5(–6)-celled, hypostomium (5–)6(–6)-celled, stomium with 5 to 7 narrow cells with conspicuously thickened walls; indusium membranous, near-marginal, continuous, entire to erose, to 0.6 mm broad. Spores 64 per sporangium, brown, tetrahedral-globose, trilete, granulose with an overlaying stellate-reticulate network, exospore (60–)66.3(–72) µm in equatorial diameter. Figure 17 D & E.

Vernacular names: Four-pinnate lip fern; Vierveerlipvaring (Afr).

Ecology: Terrestrial or epilithic, at boulder bases, in rock crevices, in low scrub and along forest margins, in shaded or exposed conditions. Not edaphically bound. Hemikryptophyte, mesoxerophytic; fronds mesoxeromorphic. Vegetative reproduction by the short, closely branched rhizome results in the formation of small clonal stands. Seasonal pattern pronounced with new growth taking place during the wetter summer months only. Pyrophytic.

Distribution: Widespread in the north-western part of Swaziland, occurring at altitudes ranging between 1 000 and 1 368 m. Widespread in north east tropical Africa, west central, east and south tropical Africa, and southern Africa, as well as the western Indian Ocean region.

Uses: A decoction of the rhizome is injected into the vagina of a cow if it does not get rid of the placenta after calving (Watt & Breyer-Brandwijk 1962). The Sesotho use the crushed rhizomes mixed with milk as a cure for diarrhoea, and for spider bites (Jacot-Guillarmod 1971).


**Key to the varieties:**

1a Simple pinnae in upper part of lamina to 12 mm long, to 5 mm wide, margins generally strongly revolute ....................................................................................... var. glauca

1b Simple pinnae in upper part of lamina >15 mm long, >10 mm wide, margins generally not revolute:

2a Lamina 2 to 3-pinnate; simple pinnae in upper part of lamina to 60 mm long, to 22 mm wide, if larger then strongly hastate ............................................................. var. viridis

2b Lamina 1 to 2-pinnate; simple pinnae in upper part of lamina >60 mm long, >25 mm wide, generally not hastate ....................................................... var. macrophylla


*Pteris hastaefolia* Schrad. in Gött. Gel. Anz. 1818: 917 (1818). Type: Cape, *Hesse s.n.* (GOET!, holo.),


*Pellaea hastata* sensu Sim, Ferns S. Afr.: 101, pl. XXXVIII (1892).
viridis = green

Plants terrestrial. Rhizome short-decumbent, often branched, to 7 mm in diameter, set with roots, closely spaced stipe bases and scales, scales concolorous or bicolorous, concolorous scales chartaceous, ferrugineous, bicolorous scales with a crustaceous, atrocastaneous thickened central region, margins chartaceous, ferrugineous, adnate, subulate-caudate, entire to denticulate, apex terminates in an oblong thin-walled cell, to 6 mm long, to 1 mm wide. Fronds closely spaced, caespitose, erect, to 940 mm long, up to 6 per plant; stipe rigid, castaneous, proximally terete, sulcate in upper half, sulcus flat-bottomed, to 360 mm long, to 5 mm in diameter, proximally closely set with scales and hairs, becoming glabrous higher up, scales chartaceous, ferrugineous, subulate-caudate to filiform, adnate to cuneate, entire to denticulate, apex terminates in an oblong thin-walled cell, to 5 mm long, to 1 mm wide, hairs simple, pluricellular, uniseriate, apical cell oblong, thin-walled, to 1.6 mm long; lamina anadromous, firmly herbaceous, pentagonal, to 3-pinnate, to 480 mm long, to 420 mm wide, with up to 14 petiolated pinna pairs; rachis and lower order axes rigid, castaneous, adaxially sulcate, axes sulci confluent, generally set with ferrugineous, 2- or 3-celled patent hairs where pinnae branch from rachis; pinnae petiolate, petiole to 18 mm long, alternate, proximally widely spaced, more closely spaced distally, overlapping, to 2-pinnate, basiscopically developed, inequilaterally triangular to ovate, to 270 mm long, to 120 mm wide, with up to 9 petiolated pinnule pairs; pinna-rachis variously set with hairs similar to those on the rachis, glabrous later; pinnules petiolate, petiole to 5 mm long, alternate, overlapping, to 1-pinnate, basiscopically developed, inequilaterally developed, broadly ovate to lanceolate, often acroscopically auricled, acroscopic pinnule on basal pinna to 60 mm long, to 32 mm wide, basiscopic pinnule on basal pinnule to 120 mm long, to 60 mm wide, with up to 4 petiolated segment pairs; pinnule-rachis variously set with hairs similar to those on the rachis, glabrous later; segments sessile or petiolate, petiole to 1 mm long, alternate, spaced, closely set with ferrugineous, 2- or 3-celled patent hairs, segments simple, lanceolate to broadly ovate, often acroscopically auricled, crenate, adaxially glabrous, abaxially glabrous or variably set with 2–6-celled hairs, to 0.8 mm long, costa often moderately haired. Venation pinnately branched, immersed adaxially, evident abaxially, terminating near the margin in the sinus between the teeth. Sori forming a continuous line along a near-marginal vascular commissure; receptacle with 3–5-celled simple, hair-like paraphyses; sporangium stalk simple or occasionally with a simple 2- or 3-celled hair near the base, 3-seriate below the capsule, capsule obovate in lateral view, with (13–)16(–19) indurated annulus cells, epistomium (4–)6(–7)-celled, hypostomium 4(–7)-celled, stomium with 4–6 narrow cells with conspicuously thickened walls; indusium membranous, continuous, entire to repand, to 0.7 mm wide. Spores 32 per sporangium, brown, tetrahedral-globose, trilette, crenate-echinulate, exospore (40–)45.78(–52) µm in equatorial diameter. Figure 18 A & B.

Vernacular names: Common lip fern; Raamvaring (Afr.); Ikhambi lesilonda (Zulu).

Ecology: Terrestrial or epilithic, at boulder bases, in rock crevices, in scrub and in leaf-litter on the floor of evergreen forests, in exposed or deeply shaded conditions. Not edaphically bound. Hemicryptophyte, mesoxerophytic; fronds mesoxeromorphic. Vegetative reproduction by the short, closely branched rhizome often results in the formation of small clonal stands. Seasonal pattern pronounced in most habitats with growth generally taking place during the rainy season. During prolonged dry periods the plants may go dormant. Pyrophytic.
**Distribution:** Perhaps one of the most common fern species in Swaziland and widespread throughout the country occurring at altitudes ranging from ± 420 to 1 520 m. The species is widespread in the eastern parts of west central tropical Africa, east and south tropical Africa, southern Africa, Arabia, the western Indian Ocean region, and India.

**Uses:** The Xhosa use ground fronds made into a paste to treat burns (Johnson & Hutchings 1986), whereas the Zulu use the plant for sores and skin complaints (Hutchings et al. 1996).

*Pellaea hastata* (L.f.) Link var. *glauc*a Sim, Handb. ferns Kaffraria: 30, t. 19 (1891); Sim, Ferns S. Afr.: 102, pl. XL (1892). *Pellaea viridis* (Forssk.) Prantl var. *glauc*a (Sim) Sim, Ferns S. Afr., 2nd edn: 209, pl. 97 (1915); Jacobsen, Ferns Sthn. Afr.: 286, fig. 205c, map 83 (1983). Type: South-west of King Williamstown, Sim s.n. (PRE, holo.).


*glauca* = grey-green

Plants terrestrial or epilithic. *Rhizome* short-decumbent, often closely branched, to 5 mm in diameter, set with roots, closely spaced stipe bases and scales, scales concolorous or bicolourous, concolorous scales chartaceous, ferrugineous, bicolourous scales with a crustaceous, atrocastaneous thickened central region, margins chartaceous, ferrugineous, adnate, subulate to filiform, denticulate, apex terminates in an oblong thin-walled cell or a subulate cell, to 4 mm long, to 0.8 mm wide. *Fronds* closely spaced, erect, to 615 mm long, up to 7 per plant; *stipe* rigid, castaneous, proximally adaxially flattened, sulcate in upper half, sulcus flat-bottomed, to 275 mm long, to 2.2 mm in diameter, ridges pale, initially closely set with hairs and scales, subglabrous to glabrous later, hairs stramineous to ferrugineous, uni- and pluricellular, uniseriate, apex terminates in an oblong thin-walled cell, to 0.2 mm long, sulcus moderately set with 2 or more celled hair, scales concolorous or bicolourous, concolorous scales chartaceous, ferrugineous, bicolourous scales confined to the proximal part, with an atrocastaneous thickened central region, crustaceous, margins chartaceous, ferrugineous, adnate, filiform to subulate, widening towards the base, entire or denticulate, apex terminates in an oblong thin-walled cell or a subulate cell, to 4 mm long, to 0.8 mm wide; *lamina* anadromous, firmly herbaceous, pentagonal to deltate, to 3-pinnate, to 350 mm long, to 285 mm wide, with up to 14 pinna pairs; *rachis* and lower order axes rigid, castaneous, adaxially sulcate, axes sulci confluent, sparsely set with ferrugineous hairs of variable length; *pinnae* petiolate, petiole to 14 mm long, alternate, proximally widely spaced, more closely spaced distally, usually overlapping, to 2-pinnate, basiscopically developed, inequilaterally lanceolate to elliptic, to 185 mm long, to 70 mm wide, with up to 9 petiolated pinnule pairs; *pinna-rachis* sparsely set with ferrugineous hairs similar to those on the rachis, glabrous later; *pinnules* petiolate, petiole to 3 mm long, alternate, widely spaced or overlapping, to 1-pinnate, narrowly elliptic to oblong-obtuse, acroscopic pinnule on basal pinna to 22 mm long, to 14 mm wide, basiscopic pinnule on basal
pinna to 44 mm long, to 20 mm wide, with up to 4 segment pairs; *segments* sessile, firmly herbaceous, opposite to alternate, spaced or crowded, simple, narrowly elliptic to narrowly obovate, often acroscopically auricled, or hastate, entire to crenulate, margins generally strongly revolute, to 12 mm long, to 5 mm wide, glabrous adaxially, abaxially sparsely set with clavate, 2- or 3-celled hairs, to 142 \( \mu \)m long. *Vénation* pinnately branched, often immersed adaxially, evident or obscure abaxially; vein branches terminate in sinuses between the teeth. *Sort* at apex of enlarged free vein endings and along an interrupted near-marginal vascular commissure; *receptacle* nude or with a few 2-celled hairs similar to those on the abaxial surface of the lamina; *sporangium* short-stalked, simple, 3-seriate below the capsule, capsule obovate, with (15–)16(–17) indurated annulus cells, epistomium (5–)6(–7)-celled, hypostomium (3–)5(–6)-celled, stomium with 4 or 5 narrow cells with conspicuously thickened walls; *indusium* continuous, membranous, entire to repand, to 0.5 mm wide. *Spores* 32 per sporangium, brown, tetrahedral-globose, trilete, near smooth to cristate-echinulate, exospore (42–)48(–52) \( \mu \)m in equatorial diameter. Figure 18 C.

**Vernacular names:** Hard lip fern; Harde raamvaring (Afr).

**Ecology:** Terrestrial or epilithic, in rock crevices, at boulder bases and among grasses in shallow soil pocketsOverlaying sheet rock, in exposed or partially sheltered Conditions. Not edaphically bound. Hemicryptophyte, xerophytic; fronds xeromorphic. Vegetative reproduction by the short, closely branched subterranean rhizome, which can result in the formation of large clonal stands. Seasonal pattern is pronounced and growth is generally confined to the rainy season. In exposed habitats the fronds may die down entirely during the dry winter months or during prolonged droughts. Pyrophytic.

**Distribution:** Common and widespread throughout Swaziland, occurring at altitudes ranging from ± 400 to 1 620 m. The variety is widespread in east and south tropical Africa and southern Africa.


*macro* (Greek) = large; *phylla* (Greek) = leaf

Plants terrestrial. *Rhizome* short-decumbent, often sparsely branched, to 4 mm in diameter, set with roots, spaced to crowded stipe bases, and scales, scales concolorous or bicolorous, concolorous scales chartaceous, ferrugineous, bicolorous scales with a crustaceous, castaneous central region, margins chartaceous, ferrugineous, adnate, subulate-caudate, entire to denticate, apex terminates in a subulate cell, to 4 mm long, to 0.8 mm wide. *Fronds* closely spaced, caespitose, erect, to 600 mm long, up to 6 per plant; *stipe* rigid, castaneous, nitid, proximally terete, becoming sulcate in the upper half, sulcus flat-bottomed, to 280 mm long, to 2 mm in diameter, sparsely set with scales similar to those on the rhizome, soon becoming glabrous; *lamina anadromous*, firmly herbaceous, lanceolate to pentagonal, 1 or 2-pinnae, to 370 mm long, to 275 mm wide, with up to 9 pinna pairs; *rachis* and lower order axes rigid, castaneous, nitid, adaxially sulcate, axes sulci confluent, glabrous or sparsely set with ferrugineous, pluricellular hairs; *pinnae* petiolate, petiole to 17 mm long, alternate, proximally widely spaced, more closely spaced distally, overlapping,
glabrous or closely set with ferrugineous, patent, 2- or 3-celled hairs, simple or 1-pinnate, pinnae in lower half to two thirds of the lamina basiscopically developed, inequilaterally broadly ovate to triangular, to 170 mm long, to 105 mm wide, with up to 4 pinnule pairs, terminal pinna largest, distal pinnae simple, ovate to lanceolate, often acroscopically auricled, to 110 mm long, to 57 mm wide; pinna-rachis glabrous or the petioles set with ferrugineous, patent, 2- or 3-celled hairs; pinnules petiolate, petiole to 6 mm long, alternate, spaced, glabrous or set with ferrugineous, patent, 2- or 3-celled hairs, simple, basiscopically developed, inequilaterally developed, lanceolate, acroscopic pinnule on basal pinna to 55 mm long, to 18 mm wide, basiscopic pinnule on basal pinnae to 95 mm long, to 55 mm wide. Venation pinnately branched, immersed adaxially, evident abaxially, terminating near margin in sinus between teeth. Sorus forming a continuous line along a near-marginal vascular commissure; receptacle with 3–7-celled simple, hair-like paraphyses, to 0.4 mm long; sporangium short-stalked, simple or haired, 3-seriate below capsule, capsule obovate in lateral view, with (13–)15(–17) indurated annulus cells, epistomium (4–)5(–6)-celled, hypostomium 4(–6)-celled, stomium with 4 or 5 narrow cells with conspicuously thickened walls; indusium membranous, near-marginal, continuous, entire to repand, to 0.5 mm wide. Spores 32 per sporangium, brown, tetrahedral-globose, trilete, cristate-echinulate, exospore (42–)46.5(–50) μm in equatorial diameter. Figure 18 D.

Vernacular name: Coastal common lip fern; Grootblaar raamvaring (Afr.).

Ecology: Terrestrial, usually in deep shade in evergreen forest and along forest margins. Not edaphically bound. Hemicryptophyte, mesoxerophyte; fronds mesomorphic. Vegetative reproduction sporadical by the short, closely branched, usually subterranean rhizome. Seasonal pattern more or less pronounced with new growth restricted to the rainy season.

Distribution: Sporadic and appears to be confined to the north-western part of Swaziland and moist forest patches on the western slopes of the Lubombo mountains, occurring at altitudes ranging between 500 and ± 1 660 m. The species is only known from the eastern regions of South Africa and Swaziland.

Pellaea Link, Fil. spec.: 59 (1841), nom. cons. Type: Pellaea atropurpurea (L.) Link

pelos or pellos (Greek) = black or very dark brown

Plants terrestrial or epilithic. Rhizome short-decumbent, closely branched, densely set with roots, crowded stipe bases, scales and often also hairs, hairs pluricellular, uniseriate, terminating in an oblong thin-walled cell, scales concolorous or bicolorous, concolorous scales chartaceous, stramineous to ferrugineous, bicolorous scales with a crustaceous, castaneous central region, margins chartaceous, ferrugineous, adnate or sessile, linear to subulate, entire or irregularly denticulate, apex terminates in a subulate cell or a broadly elliptic obovate or pyriform thin-walled cell. Fronds crowded, ceaspitose, erect, to 12 per plant; stipe rigid, atrocastaneous to black, nitid, terete, initially set with hairs and scales similar to those on the rhizome, glabrous later, or distally short-pilose adaxially, hairs then ferrugineous, pluricellular, apical cell thin-walled; lamina anadromous, thinly coriaceous to coriaceous, ovate, deltate, triangular, lanceolate or oblong-acute, to 3-pinnate, with up to 52 petiolated pinna pairs; rachis and lower order axes rigid, terete, atrocastaneous to
black, nitid, terete, glabrous or adaxially short-pilose and sparsely haired abaxially, hairs similar to those on the stipe; pinnae petiolate, petiole glabrous or closely set with hairs and scales similar to those on the rachis, opposite to alternate, proximally more widely spaced than distally, spaced or overlapping, simple to 2-pinnate, lower pinnae often basiscopically developed, linear, ovate, rectangular-acute or broadly ovate, glabrous adaxially, abaxially glabrous or with filiform scales and pluricellular, uniseriate hairs along the costa, articulated; pinna-rachis atrocastaneous, terete, glabrous or adaxially short-pilose, hairs similar to those on the rachis; pinnules petiolate, alternate, spaced to overlapping, to 1-pinnate, ovate to oblong-cuneate, entire, glabrous adaxially, abaxially sparsely set with clavate 2-celled hairs; segments petiolate, alternate, cordate, hastate or pentagonal, entire, glabrous adaxially and abaxially, articulated. Venation obscure, repeatedly forked and free in the sterile fronds, or reticulate, free vein branches end near the margin. Sori form a continuous line along a near-marginal vascular commissure; receptacle nude or paraphysate; sporangium short or long-stalked, simple, 3-seriate below capsule, capsule obovate in lateral view, with (13–)14 or 15(–18) indurated annulus cells, epistomium 4–6(–7)-celled, hypostomatus 3- or 4(–6)-celled, stomium with 4–5 narrow cells with conspicuously thickened walls; indusium membranous to chartaceous, continuous, marginal, entire to shallowly crenulate. Spores brown, tetrahedral-globose, triletate, granulate or elliptic and monolete, smooth granulose, 25–70 µm in diameter. Chromosome number based on 2n = 58 or 60.

A genus of approximately 35 species largely confined to the south-eastern United States of America, Mexico, Africa, Madagascar and the Indian subcontinent.

Key to the species:
1a Lamina 1-pinnate ................................................................. P. pectiniformis
1b Lamina 2- to 3-pinnate:
   2a Lamina to 2-pinnate; pinnules oblong-cuneate, to 47 mm long ................. P. dura
   2b Lamina to 3-pinnate; segments cordate, hastate or pentagonal, to 20 mm long ........ P. calomelanos


Pellaea hastata sensu Sim, Ferns S. Afr., 2nd edn: 211, pl. 100 (1915).


calomelanos = beautifully dark

Plants terrestrial or epilithic. Rhizome short-decumbent, closely branched, densely set with roots, crowded stipe bases, hairs, and scales, hairs pluricellular, uniseriate, terminating in an oblong thin-walled cell, to 3 mm long, scales concolorous or bicolorous, concolorous scales chartaceous, ferrugineous, bicolorous scales with a crustaceous, castaneous central region, margins chartaceous, ferrugineous, adnate, subulate, apex terminates in a subulate cell or a thin-walled pyriform cell, to 10 mm long, to 1 mm wide. Fronds crowded, caespitose, erect, to 410 mm long, up to 12 per plant; stipe rigid, atrocastaneous to black, nitid, terete, to 150 mm long, to 2 mm in diameter, initially set with hairs and scales similar to those on the rhizome, glabrous later; lamina anadromous, firmly herbaceous to coriaceous, ovate to deltate, to 3-pinnate, to 340 mm long, to
145 mm wide, with up to 13 pinna pairs; *rachis* and lower order axes rigid, atrocastaneous to black, nitid, terete, glabrous; *pinnae* petiolate, petiole to 13 mm long, alternate, proximally more widely spaced than distally, overlapping, to 2-pinnate, lower pinnae often basiscopically developed, ovate to rectangular-acute, to 110 mm long, to 50 mm wide, with up to 6 pinnule pairs; *pinnules* petiolate, petiole to 5 mm long, alternate, spaced to overlapping, to 1-pinnate, ovate, to 45 mm long, to 22 mm wide, with up to 2 segment pairs; *segments* petiolate, petiole to 1.5 mm long, coriaceous, usually glaucous, alternate, cordate, hastate or pentagonal, entire, glabrous adaxially and abaxially, to 20 mm long, to 20 mm wide, articulated. *Venation* obscure, repeatedly forked, free in sterile segments. *Sori* form a continuous line along a marginal vascular commissure; *receptacle* with 3- or 4-celled, clavate paraphyses, to 0.3 mm long; *sporangium* long-stalked, simple, 3-seriate below capsule, capsule obovate in lateral view, with (13–)15(–16) indurated annulus cells, epistomium (5–)6(–7)-celled, hypostomium 3(–5)-celled, stomium with 4 or 5 narrow cells with conspicuously thickened walls; *indusium* membranous, continuous, marginal, entire to shallowly crenulate, to 0.4 mm wide. *Spores* 32 per sporangium, brown, globose, trilette, rugulose, exospore (46–)52.1(–56) µm in equatorial diameter.

**Vernacular names:** Hard fern; Blou-groen bergvaring (Afr.); Pata-leoana, Lepata-maoa, Phatsoakammohlo (Ses.); Umphasatje (Sis.); Phaladza (Zulu).

**Ecology:** Terrestrial or epilithic, at boulder bases, in rock cervices, or in shallow soil pockets overlying sheet rock, in exposed or partially shaded conditions. Not edaphically bound. Hemichryptophyte, xerophyte; fronds xeromorphic. Vegetative reproduction by the short, closely branched rhizome which often results in the formation of small clonal stands. Seasonal pattern pronounced, with new growth taking place during the rainy season only. May go dormant during prolonged periods of drought, segments articulated. Pyrophytic.

**Distribution:** Common and widespread throughout Swaziland, occurring between 400 and 1 400 m. The species is widespread in west central tropical Africa, east tropical, south tropical and southern Africa, and the western Indian Ocean region.

**Uses:** The species appears to be widely used for a variety of ailments. A decoction of the rhizome is used to relieve boils and mouth sores, whilst the boiled rhizome is used externally to cure sores. A milky decoction is given to frightened children at night, whilst the Xhosa, Zulu, and Sesotho smoke the fronds to relieve head and chest colds (Hutchings *et al.* 1996; Watt & Breyer-Brandwijk 1962). The fronds are also ground and drunk as a cure for diarrhoea (Zepp 1982).


*durus* = hard

Plants terrestrial. *Rhizome* short-decumbent, to 40 mm long, to 4 mm in diameter, set with roots, closely spaced persistent stipe bases and scales, scales concolorous or bicolorous, concolorous scales chartaceous, stramineous or ferrugineous, if bicolored then with a thinly crustaceous, castaneous central region, sessile, linear to subulate, irregularly denticulate, apex terminates in a broadly elliptic to obovate thin-walled cell, to 6 mm long, to 0.5 mm wide. *Fronds* crowded, caespitose, to 7 per plant, erect, to 540 mm long; *stipe* firm, atrocastaneous, nitid, terete, to 300 mm long, to 2 mm in diameter, proximally initially set with scales similar to those on the rhizome, distally short-pilose adaxially, hairs ferrugineous, pluricellular, apical cell thin-walled, to 0.3 mm long; *lamina* anadromous, lanceolate to triangular, to 2-pinnate, to 240 mm long, to 180 mm wide, with up to 14 pinna pairs; *rachis* atrocastaneous, nitid, terete, adaxially short-pilose, sparsely haired abaxially, hairs similar to those on the stipe; *pinnae* petiolate, petiole to 7 mm long, opposite to alternate, usually not more widely spaced towards the base, overlapping, coriaceous, those at the base broadly ovate, 1-pinnate, to 93 mm long, to 74 mm wide, with up to 3 pinnule pairs, distally spaced, simple, oblong-cuneate, entire, to 46 mm long, to 5 mm wide, articulated at the base; *pinna-rachis* atrocastaneous, terete, adaxially short-pilose, hairs similar to those on the rachis; *pinnules* petiolate, petiole to 1 mm long, oblong-cuneate, inequilaterally cordate, entire, to 47 mm long, to 4 mm wide, adaxially glabrous, abaxially sparsely set with clavate 2-celled hairs, to 84 µm long. *Venation* obscure, reticulate, free vein branches ending near the margin. *Sori* form a continuous line along a marginal vascular commissure; *receptacle* nude; *sporangium* short-stalked, 3-seriate below capsule, capsule obovate in lateral view, with 14(–18) indurated annulus cells, epistomium 5(–6)-celled, hypostomium 4(–5)-celled, stomium with 4 narrow cells with conspicuously thickened walls; *indusium* chartaceous, continuous, marginal, entire, to 0.4 mm wide. *Spores* 32 per sporangium, brown, tetrahedral-globose, trilette, granulate, exospore (50–)52.87(–56) µm in equatorial diameter. Figure 19 C & D.

**Vernacular names:** Hard fern; Harde raamvaring (Afr.).

**Ecology:** Terrestrial, in moist rocky habitats along streams, usually in deep shade. Not edaphically bound, but in Swaziland known from granic soils only. Hemicryptophyte, mesophyte; fronds mesomorphic. Appears not to reproduce vegetatively. Seasonal pattern evidently pronounced, with new growth restricted to the rainy season only. No dormant period, pinnae and pinnules articulated.

**Distribution:** Rare in Swaziland and confined to moist wooded ravines in the western part of the country, occurring at an altitude of ± 1 160 m. Widespread in the eastern parts of west central tropical Africa, east and south tropical Africa, southern Africa and the western Indian Ocean region.

*Pellaea pectiniformis* Baker, In Hook. & Baker, Syn. fil., 2nd edn: 147 (1874), nom. nov. for *Pteris pectiniformis* Godet ex Mett., In Kuhn, Filic. afr.: 87 (1868), non Goldm. (1843); Sim, Ferns

*Pellaea goudotii* Kunze ex C.Chr., Index filic.: 480 (1906); Sim, Ferns S. Afr., 2nd edn: 200, pl. 90, fig. 2 & pl. 98, fig. 1 (1915). Type as for *Pellaea pectiniformis*.

**pecten** = comb; **formis** = resembling or shaped

Plants terrestrial or epilithic. *Rhizome* short-decumbent, to 30 mm long, to 5 mm in diameter, set with roots, closely spaced persistent stipe bases and scales, scales thinly crustaceous, ferrugineous, adnate, linear to subulate, irregularly and shallowly dentate, apex terminates in a small thin-walled cell or a short subulate cell, to 6 mm long, to 0.5 mm wide. *Fronds* crowded, erect, to 435 mm long, to 7 per plant; *stipe* rigid, atrocastaneous, terete, to 150 mm long, to 2 mm in diameter, initially densely scaled, scales chartaceous, stramineous to ferrugineous, sessile, filiform to subulate, entire, apex terminates in a small thin-walled cell or a short subulate cell, to 5 mm long, to 0.3 mm wide; *lamina* oblong-acute, 1-pinnate, to 300 mm long, to 90 mm wide, with up to 52 pinna pairs; *rachis* atrocastaneous, terete, initially closely set with hairs and scales similar to those on the stipe; *pinnae* petiolate, petiole to 2 mm long, closely set with hairs and scales similar to those on rachis, opposite to alternate, pectinate, generally more widely spaced basally, coriaceous, linear, entire, cordate to inequilaterally cordate, acute, to 44 mm long, to 3 mm wide, glabrous adaxially, abaxially with filiform scales and pluricellular, uniseriate hairs along costa, to 2 mm long, articulated; *costa* adaxially sulcate. *Venation* obscure, forked, free, branches terminate near the margin. *Sori* forms a continuous line along a marginal vascular commissure; *receptacle* with simple, pluricellular, uniseriate hairs terminating in an orange oblong to clavate cell, to 0.5 mm long; *sporangium* long-stalked, stalk simple, 3-seriate below capsule, capsule globose to obovate in lateral view, with 14(–16) indurated annulus cells, epistomium 4(–6)-celled, hypostomium 4(–6)-celled, stomaticum with 4 narrow cells with conspicuously thickened walls; *indusium* continuous, near-marginal, chartaceous, entire, to 0.4 mm wide. *Spores* 32 per sporangium, brown, smooth-granulose, monolete, elliptic, (66–)68(–72) x (44–)45.33(–48) µm, or tetrahedral-globose, trilete, (50–)54(–64) µm. Figure 19 E & F.

**Vernacular names:** Comb fern; Kamvaring (Afr.).

**Ecology:** Terrestrial or epilithic, at boulder bases and in rock crevices, exposed or partially shaded. Not edaphically bound, but in Swaziland it is known from quartzite only. Hemicyryptophyte, xerophyte; fronds xeromorphic. Vegetative reproduction by the short, closely branched rhizome results in the plants forming small clonal stands. Seasonal pattern pronounced with new growth restricted to the rainy season. No dormant period, but pinnae articulated. Pyrophytic.

**Distribution:** Rare in Swaziland and confined to the south-western part of the country, occurring at an altitude of ± 1 000 m. Widespread in west central tropical Africa, east and south tropical Africa, southern Africa, and the western Indian Ocean region.

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**Doryopteris** J.Sm. in J. Bot. (Hooker) 3: 404 (1841), nom. cons. Type: *Doryopteris palmata* (Willd.) J.Sm., now *Doryopteris pedata* (L.) Fée var. *palmata* (Willd.) Hicken

dorys (Greek) = a lance or spear; pteris = fern

Generic description as for the species. A genus of about 25 species occurring throughout the tropical parts of the world.


**Pellaea geraniifolia** sensu Sim, Ferns S. Afr.: 92, pl. XXXIII (1892), as ‘geraniaefolia’.

concolor = uniform in colour

Plants terrestrial or epilithic. Rhizome short, erect to suberect, to 3 mm in diameter, set with roots, crowded stipe bases and scales, scales chartaceous, bicolorous, with a castaneous central region and ferrugineous margins, adnate, subulate, denticulate, apex terminates in an oblong thin-walled cell, to 5 mm long, to 0.8 mm wide. Fronds caespitose, erect, to 260 mm long, up to 12 per plant; stipe rigid, atrocastaneous, proximally terete, becoming sulcate in upper half, sulcus flat-bottomed, to 160 mm long, to 1.2 mm in diameter, initially moderately set with hairs and scales, glabrous later, hairs ferrugineous, 2-celled, scales bicolorous, with a castaneous central region and ferrugineous, herbaceous margins, sessile, subulate, cuneate to cordate, repand to denticulate, apex terminates in a subulate or oblong thin-walled cell, to 2 mm long, to 0.8 mm wide; lamina anadromous, herbaceous, pentagonal, 2-pinnatifid, to 140 mm long, to 127 mm wide, basal segment basiscopically developed, inequilaterally broadly triangular, to 72 mm long, to 66 mm wide, pinnatifid, acroscopic segment on basal pinna to 17 mm long, basiscopic segment on basal pinna to 57 mm long, shallowly crenulate to deeply lobed, lobes oblong-acuminate, to 6 mm wide, upper segments simple or deeply lobed, glabrous adaxially, abaxially sparsely set with 2-celled hairs. Venation pinnately branched, evident, free in sterile fronds, endings enlarged, end in teeth near margin. Sori discrete, at modified vein endings, or along a marginal vascular commissure; receptacle with 1- or 2-celled broadly elliptic to clavate paraphyses; sporan-
giuim long-stalked, simple, 3-seriate below capsule, capsule obovate in lateral view, with (13–)15(–18) indurated annulus cells, epistomium (5–6)-celled, hypostomium (3–)4-celled, stomium with 4 or 5 narrow cells with conspicuously thickened walls; indusium membranous, marginal, discrete or continuous, entire, to 0.5 mm wide. Spores 64 per sporangium, brown, trilette, globose, cristate- reticulate, exospore (28–)30.09(–32) µm in equatorial diameter. Figure 20 A & B.

Vernacular names: Geranium fern, Oak-leaf fern; Malvablaar varing (Afr).

Ecology: Terrestrial or epilithic, in deep shade in leaf-litter and on rocks in seasonally moist evergreen forests. Not edaphically bound. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction non-existent, or by the closely branched rhizome. Seasonal pattern pronounced with new growth restricted to the rainy season, no dormant period.

Distribution: Sporadic in Swaziland and currently known from the north-western corner of Swaziland and the Lubombo mountain range only, occurring at altitudes ranging between 500 and 1 065 m. Widespread in sub-Saharan Africa and the western Indian Ocean region.


adiantos (Greek) = untouched by water

Plants terrestrial or epilithic. Rhizome creeping, branched, often producing slender stolon-like branches, set with roots, spaced stipe bases and scales, scales chartaceous, castaneous to ferruginous, sessile, subulate, narrowly lanceolate, cordate to hastate, entire, repand or denticulate, apex terminates in a subulate cell. Fronds crowded or spaced, erect to arching, or pendent; stipe firm, atrocastaneus, nitid, terete, initially sparsely set with scales similar to those on the rhizome, glabrous later; lamina anadromous, ovate, broadly ovate or ovate-deltate, 3- to 5-pinnate, with up to 12 pinna pairs; rachis and lower order axes atrocastaneus, nitid, terete, glabrous, often somewhat flexuose; pinnae petiolate, alternate, basal pinnae largest, widely spaced, more closely spaced distally, spaced or overlapping, 2–4-pinnate, basal pinnae often basiscopically developed, inequilaterally broadly ovate, ovate, ovate-deltate or narrowly elliptic, with up to 9 pinnule pairs; pinnules petiolate, alternate, spaced to overlapping, to 3-pinnate, ovate, broadly ovate, elliptic or narrowly elliptic, with up to 5 segment pairs; segments petiolate, alternate, thinly herbaceous, ovate to elliptic, with up to 3 ultimate segment pairs; ultimate segments petiolate, alternate, thinly herbaceous, flabellate, narrowly to broadly cuneate, variously lobed, lobes oblong-ovate, dentate; glabrous adaxially and abaxially, articulated. Venation flabellately forked, ending in the margin in the teeth or in the sinuses between the teeth. Sori up to 7 per ultimate segment, borne along the outer margin of the segment lobes, on soral flaps which the veins enter, soral flaps suborbicular, reniform, lunate, or oblong; receptacle nude, or with 1–3-celled hairs which often produce a yellow farina; sporangia confined to the veins entering the soral flaps, sessile or short-stalked, stalk simple, 3-seriate below the capsule, capsule circular to obovate in lateral view, with 16, 19 or 21(–22) indurated annulus cells, epistomium (3–4) or 5-celled, hypostomium (3–4) or 5(–6)-celled, stomium with 3–5 narrow cells of which the walls are conspicuously thickened; indusium a somewhat modified reflexed lobe margin, margin and adaxial surface often with capitate glands and 2– or 3-celled hairs, or glabrous. Spores tetrahedral-globose, trilette, rugulate, rugulose or tuberculate, 25–50 µm in diameter. Chromosome number based on 2n = 58 or 60.

Key to the species:
1a Veins end in the teeth of the ultimate segments .................................. A. capillus-veneris
1b Veins end in the sinus between the teeth of the ultimate segments:
2a Sori lunate; ultimate segments articulated .................................................... A. poiretii
2b Sori suborbicular; ultimate segments not articulated ............................... A. raddianum


Adiantum marginatum Schrad. in Gött. Gel. Anz. 1818: 918 (1818). Type: Cape Province, Hesse s.n. (LE, holo.).

Adiantum pseudo-capillus Fée, Mém. foug. 5: 118 (1852). Type: Habitat ad promontorium Bonae Spei, Drège s.n. (missing).

Adiantum paradiseae Baker in Gard. Chron., ser. 3, 6: 558 (1889); Sim, Ferns S. Afr.: 71 (1892); Sim, Ferns S. Afr., 2nd edn: 246 (1915). Type: Cape Province, Bedford District, Paradise s.n. (K, holo.; PRE, iso.).

capillus-veneris = hair of Venus

Plants terrestrial or epilithic. Rhizome creeping, branched, to 4 mm in diameter, set with roots, spaced stipe bases and scales, scales chartaceous, ferruginous, sessile, subulate, cordate to hastate, entire to denticate, apex terminates in a subulate cell, to 5 mm long, to 0.7 mm wide. Fronds to 7 mm apart, erect to arching, or pendent, to 420 mm long; stipe firm, atrocastaneus, nitid, terete, to 215 mm long, to 1.2 mm in diameter, initially sparsely set with scales similar to those on the rhizome, glabrous later; lamina anadromous, ovate to broadly ovate, to 3-pinnate, to 270 mm long, to 240 mm wide, with up to 9 pinna pairs; rachis and lower order axes atrocastaneus, nitid, terete, glabrous; pinnae petiolate, petiole to 23 mm long, alternate, basal pinnae largest, widely spaced, more closely spaced distally, spaced or overlapping, to 2-pinnate, basal pinnae often basiscopically developed, inequilaterally broadly ovate to narrowly elliptic, to 140 mm long, to 80 mm wide, with up to 6 pinnule pairs; pinnules petiolate, petiole to 8 mm long, alternate, spaced to overlapping, broadly ovate to narrowly elliptic, acroscopic pinnule on the basal pinna to 42 mm long, to 32 mm wide, basiscopically pinnule on basal pinna to 62 mm long, to 40 mm wide; segments petiolate, petioles to 3 mm long, alternate, filiform, thinly herbaceous, glabrous, narrowly to broadly cuneate, to 26 mm long, to 25 mm wide, variously lobed, lobes oblong-obtuse, dentate. Vénation flabellately forked, ending in margin in the teeth. Sori borne along outer margin of segment lobes, on soral flaps which veins enter, soral flaps lunate to oblungeto, to 5 mm long, to 1 mm wide; sporangia confined to veins, sessile, capsule circular to obovate in lateral view, with (17–)21(–22) indurated annulus cells, epistomium (3–)4(–5)-celled, hypostomium 4(–5)-celled, stomium with 4 or 5 narrow cells of which walls are conspicuously thickened. Spores 64 per sporangium, brown, tetrahedral-globose, trilette, rugose, exospore (40–)46.82(–52) µm in equatorial diameter. Figure 20 C & D.

Vernacular names: Maidenhair fern, Venus maidenhair; Vrouehaar, Swart vrouehaar (Afr.).

Ecology: Terrestrial or epilithic, usually on moist banks of perennial streams and wet cliffs in light or deep shade. Not edaphically bound. Hemicyryptophyte, mesophyte; fronds mesomorphic.
Vegetative reproduction by the creeping, many-branched rhizome. Seasonal pattern non-existent as the plants generally grow in conditions which sustain continuous growth.

**Distribution:** Frequent and widespread in the highveld and middleveld regions of Swaziland, occurring at altitudes ranging between 600 to 1 370 m. Near-cosmopolitan and widespread in sub-Saharan Africa.

**Uses:** Sesotho herders use the dark rachises as decorations by weaving them into their grass hats. The dried fronds are also burnt and the smoke inhaled as a cure for head and chest colds (Jacot-Guillarmod 1971). The fronds are burnt underground and the smoke is inhaled through a hole in the ground, rather than smoking it through a pipe (Zepp 1982). A tea made from the species is an early Cape remedy for colds and chest ailments (Forbes 1986). Used in Europe to treat inflammation of the mucous membranes, as an ingredient in cough and bronchial medicines, and as a hair tonic (Watt & Breyer-Brandwijk 1962). Widely cultivated as an indoor or garden plant.


*poiretii* = after Jean Louis Marie Poiret (1755–1834), French clergyman and botanist.

Plants terrestrial or epilithic. **Rhizome** short-creeping, branched, to 2.5 mm in diameter, producing slender stolon-like branches, to 50 mm long, to 1.2 mm in diameter, at apex of which is produced the shorter, somewhat thicker, frond-bearing part, set with roots, crowded stipe bases and scales, scales chartaceous to crustaceous, castaneous to ferrugineous, sessile, narrowly lanceolate, cordate, entire to shallowly repand, apex terminates in a short subulate cell, to 5 mm long, to 1.2 mm wide. **Fronds** crowded, erect to arching, to 750 mm long, to 10 per plant; **stipe** firm, atrocastaneus, nitid, terete, to 360 mm long, to 2 mm in diameter, initially sparsely set with scales similar to those on rhizome, glabrous later; **lamina** anadromous, ovate-deltate, to 5-pinnate, to 400 mm long, to 280 mm wide, with up to 12 pinna pairs; **rachis** and lower order axes atrocastaneus, nitid, terete, glabrous, often somewhat flexuose; **pinnae** petiolate, petiole to 34 mm long, alternate, basal pinnae largest, widely spaced, more closely spaced distally, spaced or overlapping, to 4-pinnate, ovate-deltate, to 225 mm long, to 115 mm wide, with up to 9 pinnule pairs; **pinnules** petiolate, petiole to 22 mm long, alternate, spaced or overlapping, to 3-pinnate, ovate to elliptic, to 90 mm long, to 55 mm wide, with up to 5 segment pairs; **segments** petiolate, petiole to 10 mm long, alternate, ovate to elliptic, to 42 mm long, to 22 mm wide, with up to 3 pairs of ultimate segments; **ultimate segments** petiolate, petioles to 4 mm long, alternate filiform, articulated, thinly herbaceous, glabrous, semicircular to reniform, to 12 mm long, to 16 mm.
wide, lobed, lobes dentate to crenulate. Venation flabellately forked, ending in margin in sinuses between the teeth. Sori up to 7 per ultimate segment, along outer margin of lobes, lunate, to 4 mm long; receptacle with 1–3-celled hairs often producing a yellow farina, hairs to 80 mm long, similar hairs also occur on the indusial flap between veins; sporangia confined to veins entering indusial flaps, short-stalked, stalk simple, 3-seriate below capsule, capsule circular to obovate in lateral view, with 16(–19) indurated annulus cells, epistomium (4–)5-celled, hypostomium (3–)4-celled, stomium with 3 or 4 cells with conspicuously thickened walls; indusium a somewhat modified reflexed lobe margin, oblong, to 4 mm long, to 1 mm wide, margin and adaxial surface set with capitate glands and 2- to 3-celled hairs. Spores 64 per sporangium, yellow, globose, trilete, rugose, exospore (40–)43.05(–46) μm in equatorial diameter. Figure 20 E.

Vernacular names: Maidenhair fern; Vrouehaar (Afr.).

Ecology: Terrestrial or epilithic, usually on moist banks of perennial streams in light shade. Not edaphically bound, but in Swaziland it is known from granitic soils only. Hemicyryptophyte, mesophyte; fronds mesomorphic, ultimate segments articulated. Vegetative reproduction by the formation of subterranean stolon-like rhizome branches. Seasonal pattern non-existent as the plants generally grow in conditions which sustain continuous growth.

Distribution: Sporadic in Swaziland and currently known from the north-western part of the country, occurring at altitudes ranging between 1 300 to 1 400 m. Widespread in sub-Saharan Africa, the western Indian Ocean region, India, the mid-Atlantic islands and Central and South America.

Uses: Most likely the same as for Adiantum capillus-veneris.


Type: Raddi, Pl. bras. nov. gen. 1, t. 78, fig. 2 (1815), icon.

raddianum = after Giuseppe Raddi (1770–1829), Italian botanist at Florence.

Plants terrestrial or epilithic. Rhizome short-creeping, irregularly branched, to 50 mm long, to 2 mm in diameter, set with roots, closely spaced persistent stipe bases and scales, scales firmly chartaceous, castaneous, adnate, subulate to narrowly triangular, entire to denticulate, apex terminates in a short subulate cell, to 1 mm long, to 0.3 mm wide. Fronds to 4 mm apart, erect to arching, to 640 mm long; stipe firm, atrocastaneus, nitid, terete, to 350 mm long, to 1.2 mm in diameter, basally set with scales similar to those on rhizome, to 2 mm long, to 0.5 mm wide, glabrous apically; lamina anadromous, ovate to broadly ovate, to 3-pinnate, to 300 mm long, to 220 mm wide, with up to 12 pinna pairs; rachis and lower order axes atrocastaneus, nitid, terete, glabrous; pinnae petiolate, petiole to 25 mm long, alternate, basal pinnae largest, more widely spaced than apically, usually overlapping, to 2-pinnate, ovate, to 130 mm long, to 90 mm wide, with up to 8 pinnule pairs; pinnules petiolate, petiole to 8 mm long, alternate, usually overlapping, ovate, to 55 mm long, to 36 mm wide, with up to 5 segment pairs; ultimate segments petiolate, petioles to 2 mm long, alternate, thinly herba-
Crassulaceae, flabellate, narrowly to broadly cuneate, variously lobed, lobes dentate, to 10 mm long, to 10 mm wide, glabrous adaxially and abaxially. **Venation** evident, flabellately forked, ending in margin in sinus between teeth. **Sori** borne along outer margin of ultimate segment lobes, on soral flaps which veins enter, soral flaps membranous, subcircular to reniform, to 2 mm in diameter; **sporangia** confined to veins, sessile, capsule circular to obovate in lateral view, with 19(–21) indurated annulus cells, epistomium (4–)5-celled, hypostomium (4–)5(–6)-celled, stomium with 3 or 4 narrow cells of which walls are conspicuously thickened; **Spores** brown, tetrahedral-globose, trilete, rugulose, exospore (40–)44(–48) µm in equatorial diameter. Figure 20 F.

**Vernacular names:** Delta maidenhair fern; Vrouehaar (Afr).

**Ecology:** Terrestrial or epilithic, usually in disturbed sites such as earthbanks along roads, but often also in undisturbed habitats, usually in light shade. Not edaphically bound but in Swaziland it is confined to granitic soils. Hemicycle, mesophyte, fronds mesomorphic. Vegetative reproduction by subterranean, short-creeping and branched rhizome. Seasonal pattern non-existent, but determined by the prevailing environmental conditions.

**Distribution:** The species has become naturalised in the north-western part of Swaziland, occurring at altitudes ranging between 1 300 and 1 400 m. A native of South America now naturalised in many parts of sub-Saharan Africa.

**Use:** The species, and many forms of it, is widely cultivated for its ornamental value.

**Pteris** L., Sp. pl. 2: 1073 (1753). **Lectotype:** *Pteris longifolia* L., designated by J. Smith (1875).

**Pteris** = fern

Plants terrestrial or epilithic. **Rhizome** erect, suberect, or short-decumbent, simple or sparsely branched, set with roots, stipe bases and scales, scales chartaceous to crustaceous, concolorous or bicolored, if bicolored, then with a darker central region, sessile, linear, subulate, lanceolate, or narrowly lanceolate, cuneate, cordate, or cordate-imbricate, margins and/or lamina surface closely set with simple or branched, pluricellular, uniseriate hairs, which terminate in an oblong cell or an enlarged obovate thin-walled cell, or entire, apex terminates in an elliptic or oblong thin-walled cell. **Fronds** monomorphic or dimorphic, caespitose, erect, suberect or arching; **stipe** firm, proximally adaxially flattened, sucrate distally, proximally sparsely set with scales similar to, but slightly larger than, those on rhizome, distally set with filiform scales and pluricellular hairs or glabrous; **lamina** anadromous and/or catadromous, herbaceous, pentagonal in smaller fronds, ovate, oblong-elliptic, or oblong-ovate, 1- or 2-pinnate; **rachis** stramineous to yellow, adaxially sulcate, glabrous or closely set with pluricellular hairs; **pinnae** sessile or petiolate, opposite to alternate, basal pair largest or gradually reduced, spaced or slightly overlapping, simple or basal (often also second proximal) pair 1-pinnate basiscopically, strongly inequilaterally ovate or triangular, distal pinnae spaced or slightly overlapping, simple or pectinately lobed, linear-attenuate, narrowly lanceolate, narrowly ovate, or oblong-acuminate, often basiscopically decurrent along rachis, entire or serrate, adaxially glabrous or sparsely set with 2–5-celled hairs along the costa and veins, abaxially variously set with 3–5-celled clavate hairs along and between the veins; **pinna-rachis** adaxially sulcate, sulcus confluent with that of rachis, adaxially with or without prickles; **pinnules** sessile or petiolate, alternate, basiscopically decurrent, simple or pectinately lobed; **lobes** linear-obtuse to linear-acute, often somewhat falcate, entire or serrate in sterile parts, terminal lobe often elongated, entire to repand, adaxially glabrous or sparsely set with 2- or 3-celled hairs along costa and veins, abaxially variously set with 2–6-celled hairs; **costa** adaxially shallowly sulcate, with or without prickles. **Venation** anadromous and/or catadromous, evident, simple or (usually) forked once, free in sterile parts, endings enlarged, terminating near the margin, vein apices anastomose and form a near-marginal vascular commissure in the fertile parts.
**Sori** linear, continuous along a near-marginal vascular commissure, along proximal part of pinnae, pinnules or lobes; **receptacle** paraphysate, paraphyses simple, pluricellular, apical cell slightly enlarged or undifferentiated; **sporangium** long-stalked, simple, 3-seriate below the capsule, capsule elliptic to obovate in lateral view, annulus with (15–)17, 19, 21(–22) indurated annulus cells, epistomium (3–)4–6(–7)-celled, hypostomium 4–6-celled, stomium 2–4-celled, walls conspicuously thickened; **indusium** a recurved margin bearing stomata in lower half, firm, thinly herbaceous, linear, entire to repand. **Spores** 32 or 64 per sporangium, brown, tetrahedral, trilete, with an equatorial flange, rugate or verruculose, or proximal face with low tubercules, distal face reticulate, tuberculate.

A genus of approximately 250 species occurring throughout the tropics and temperate parts of the world.

**Key to the species:**
1a Apical pinnae simple, serrate:
   2a Lamina 1-pinnate, basal pinnae never basiscopically developed ....................... **P. vittata**
   2b Lamina 1- to 2-pinnate, basal pinna pair always basiscopically developed ............ **P. cretica**

1b Apical pinnae pectinately lobed, entire or serrate:
   3a Lobes serrate .................................................................................................... **P. dentata**
   3b Lobes entire:
      4a Costular prickles absent or if present then mere shallow dentations ...... **P. friesii**
      4b Costular prickles present, to 0.6 mm long ............................................ **P. catoptera**


**Key to the varieties:**
Stipe, rachis and lower order axes without prickles (costular spines excluded) ................
............................................................................................................................ var. catoptera
Stipe and rachis irregularly set with short prickles (costular spines excluded) ................
............................................................................................................................ var. horridula


**kato** (Greek) = below; **pteros** (Greek) = wing

Plants terrestrial. **Rhizome** erect to suberect, simple, to 80 mm long, to 7 mm in diameter, set with roots, slightly thickened stipe bases and scales, scales chartaceous, castaneous to ferrugineous, often with a slightly darker central region, sessile, lanceolate, cordinate to cordinate-imbricate, margins and lamina surface closely set with simple or branched, pluricellular, uniseriate hairs, which terminate in an oblong cell or an enlarged obvate thin-walled cell, apex terminates in an oblong thin-walled cell, to 9 mm long, to 2.2 mm wide. **Fronds** caespitose, to 1.84 mm long, arching, to 12 per plant; **stipe** firm, proximally castaneous, stramineous to greenish distally, proximally adaxially flattened, sulcate distally, to 980 mm long, to 8 mm in diameter, proximally sparsely set with scales similar to, but slightly larger than those on rhizome, glabrous distally; **lamina** anadromous, oblong-ovate, 2-pinnate, to 860 mm long, to 630 mm wide, with up to 17 pinna pairs; **rachis** stramineous to yellow, adaxially sulcate, glabrous; **pinnae** petiolate, petiole to 17 mm long, oppo-
Figure 21 A & B, *Pteris cretica*, A, fertile frond, B, section of fertile pinna; C & D, *P. catoptera* var. *catoptera*, C, basal part of lamina, D, fertile lobe; E, *P. catoptera* var. *horridula*, section of frond axes (abaxial surface) showing the prickles.
site to alternate, basal pair largest, spaced or slightly overlapping, basal (often also second proximal) pinna pair with up to 3 pinnules basiscopically, strongly inequilaterally triangular, to 340 mm long, to 205 mm wide, distal pinnae oblong-acuminate, pectinately lobed; *pinna-rachis, costa* and costules adaxially with prickles where lower order axes and veins branch from higher order axes, to 2.2 mm long; *pinnules sessile*, basiscopically decurrent, pectinate, to 195 mm long, to 70 mm wide; *lobes* herbaceous, linear-obtuse, entire, to 45 mm long, to 4 mm wide, terminal lobe often elongated, linear-attenuate, entire to re pand to 47 mm long, to 3.5 mm wide, adaxially sparsely set with 2- or 3-celled hairs along costa and veins, to 180 $\mu$m long, abaxially moderately set with 2–5-celled hairs along and between the veins, to 150 $\mu$m long; *costa* adaxially with prickles to 0.6 mm long where the veins branch from the costa. *Venation* forked once, ending in margin. *Sori* linear, continuous along a near-marginal vascular commissure, along proximal part of lobes; *receptacle* paraphysate, paraphyses simple, pluricellular, apical cell slightly enlarged, to 0.6 mm long; *sporangium* long-stalked, simple, 3-seriate below capsule, capsule elliptic to obovate in lateral view, annulus with (15–)17(–19) indurated annulus cells, epistomium 4(–6)-celled, hypostomium (4–)5(–6)-celled, stomium 2–4-celled, walls conspicuously thickened; *indusium* firm, linear, entire, to 15 mm long, to 0.4 mm wide. *Spores* 64 per sporangium, brown, tetrahedral, trilet, with an equatorial flange, rugate, exospore (32–)37.6(–40) $\mu$m in equatorial diameter. Figure 21 C & D.

**Vernacular names:** Long-tipped brake; Langpunt pteris (Afr).

**Ecology:** Terrestrial, usually in deep shade in leaf-litter on floor of evergreen forests and forest patches. Not edaphically bound, but in Swaziland the species appears to be confined to granitic soils. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the sporadically branched rhizome. Seasonal pattern pronounced with new growth largely restricted to the rainy season.

**Distribution:** The species is widespread in the western half of Swaziland, occurring at altitudes ranging between 600 and 1 520 m. The species is widespread in west central tropical Africa, east and south tropical Africa and southern Africa.


**horridula** = diminutive form of **horridus**, meaning prickly.

Variatel description as for *P. catoptera* var. *catoptera*, but variously set with short prickles abaxially on the stipe, rachis, pinna-rachis and costae. Figure 20 E.
**Vernacular names:** Prickled brake; Stekel ruigtevaring (Afr).

**Ecology:** Terrestrial, in deep shade on seasonally moist evergreen forest floor. Not edaphically bound, but in Swaziland the species is known from granitic soils only. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the sporadically branched rhizome. Seasonal pattern pronounced with new growth largely restricted to the rainy season.

**Distribution:** The species is known from a single collection made on the Ntondozi mountains, occurring at an altitude of 1 360 m. Sporadic in south tropical Africa and the eastern parts of southern Africa.


**Pteris serraria** Sw. in J. Bot. (Schrader) 1800(2): 65 (1801). Type: Brazil, Freyreis s.n. (S, para.).

*cretica* = from Crete

Plants terrestrial or epilithic. *Rhizome* short-decumbent, sparsely branched, to 6 mm in diameter, set with roots, closely spaced stipe bases, and scales, scales confined to rhizome apex, chartaceous, castaneus, sessile, linear, subulate or narrowly lanceolate, cuneate to cordate, entire to subulate, apical cell elliptic, thin-walled, to 5 mm long, to 1 mm wide. *Fronds* closely spaced, erect to arching, dimorphic, to 14 per plant, fertile longer than sterile, sterile to 510 mm long, fertile to 750 mm long; *stipe* proximally castaneus, stramineous higher up, adaxially shallowly sulcate, sterile to 360 mm long, fertile to 575 mm long, to 2.2 mm in diameter, proximally sparsely set with scales similar to those on rhizome, glabrous higher up, ovate, I-pinnate, basal pinnae 2-pinnate, sterile and fertile with up to 4 pinna pairs, sterile to 285 mm long, to 200 mm wide, fertile 305 m long, to 250 mm wide; *lamina* proximally anadromous, catadromous higher up, ovate, I-pinnate, basal pinnae 2-pinnate, sterile and fertile with up to 4 pinna pairs, sterile to 155 mm long, to 75 mm wide, fertile to 205 mm long, to 95 mm wide, fertile 305 m long, to 250 mm wide; *rachis* stramineous, adaxially sulcate, glabrous; *pinnae* petiolate, petiole to 4 mm long, herbaceous, opposite to alternate, basal pinnae largest, proximally widely spaced, more closely spaced higher up, basal (often also the second proximal) pinna pair with up to 2 pinnules basiscopically, strongly inequilaterally triangular, sterile to 155 mm long, to 75 mm wide, fertile to 205 mm long, to 90 mm wide, adaxially sparsely set with 2–5-celled hairs along costa and veins, to 0.5 mm long, abaxially sparsely set with 3–5-celled clavate hairs along and between veins, to 235 µm long, distal pinnae simple, linear-attenuate, cuneate to inequilaterally cuneate, basiscopically decurrent along rachis, serrate, fertile entire, except for sterile apex, sterile to 18 mm wide, fertile to 10 mm wide; *pinna-rachis* adaxially shallowly sulcate, sulcus confluent with that of rachis; *pinnules* sessile, simple, linear-attenuate, acroskopically narrowly cuneate, basiscopically cuneate to decurrent, sterile to 90 mm long, to 11 mm wide, fertile to 135 mm long, to 9 mm wide; *costa* adaxially shallowly sulcate, without costular prickles. *Veniation* evident, simple or forked once, endings enlarged, terminating near the thickened margin. *Sori* linear, continuous along a marginal vascular commissure, extending most of the length of fertile pinnae and pinnules; *receptacle* paraphysate, paraphyses simple,
Plants terrestrial. **Rhizome** erect to suberect, simple or sparsely and closely branched, to 70 mm long, to 12 mm in diameter; closely set with roots, stipe bases and scales, scales chartaceous, ferrugineous, sessile, oblong-acuminate, to narrowly lanceolate, cordate to cordate-imbricate, the margins regularly set with long, simple and branched, pluricellular, uniseriate hairs, of which the apical cell terminates in an oblong cell, the scale apex terminates in a short uniseriate row of cells, the apex terminates in an oblong cell, to 6 mm long, to 1 mm wide. **Frons** caespitose, to 1 m long, suberect to arching, to 7 per plant; **stipe** firm, proximally castaneous, stramineous to yellowish distally, adaxially sulcate, to 410 mm long, to 4.5 mm in diameter, variously set with hairs and scales, the hairs pluricellular, uniseriate, simple or branched, the apex terminates in an oblong thin-walled cell, proximally sparsely set with scales similar to those on the rhizome, glabrous distally; **lamina** anadromous, catadromous towards apex, pentagonal in smaller fronds, ovate when mature, 2-pinnate, to 620 mm long, to 480 mm wide, with

**Vernacular names:** Cretan brake, Avery fern; Kreta ruigtevaring (Afr.); Lesira (Ses.).

**Ecology:** Terrestrial, in light or deep shade, usually in deep leaf-litter in evergreen seasonally moist forests. Not edaphically bound. Hemicryptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the decumbent, frequently branched rhizome. Seasonal pattern pronounced with new growth restricted to the rainy season.

**Distribution:** Sporadic in the western half of Swaziland, occurring at altitudes ranging between 1 190 and 1 370 m. Widespread in west central tropical Africa, east and west tropical Africa, and southern Africa, the western Indian Ocean region, southern Europe, Asia eastwards to Japan.

**Uses:** To ward off bullets, the Sesotho warriors wore the plant as a veil, or they could bathe in water mixed with powdered fronds (Zepp 1982).


dentata = dentate or toothed
Figure 22 A & B, Pteris dentata, A, basal part of lamina; B, abaxial surface of fertile lobe.
up to 9 pinnate or lobed pinna pairs; *rachis* stramineous to yellow, adaxially sulcate, glabrous; *pinnae* petiolate, petiole to 17 mm long, opposite to alternate, basal pair largest, overlapping, basal (often also second proximal) pinna pair with up to 5 pinnules basiscopically and up to 3 acroscopically, inequilaterally ovate to triangular, to 330 mm long, to 200 mm wide, distal pinnae spaced or slightly overlapping, narrowly ovate, pectinately lobed, to 210 mm long, to 72 mm wide; *pinna-rachis* and costa adaxially sulcate, sulci confluent, adaxially with prickles where costae branch from the higher order axes; *pinnules* petiolate, petiole to 7 mm long, alternate, proximal basiscopic longest, narrowly ovate, pectinately lobed, to 180 mm long, to 50 mm wide; *lobes* herbaraceous, linear-acute, often somewhat falcate, widening towards base, basiscopically decurrent, serrate in sterile fronds, entire in fertile parts, to 55 mm long, to 6 mm wide, adaxially glabrous or with a few scattered 2-celled hairs along veins, abaxially sparsely set with simple, 4–6-celled hairs along or near veins, to 320 µm long; *costa* adaxially shallowly sulcate, without, or with short inconspicuous prickles. *Venation* anadromous and/or catadromous, evident, forked once, free in sterile parts, ending near margin, veins anastomose and form a near-marginal vascular commissure in fertile parts. *Sori* linear, continuous along a near-marginal vascular commissure, along proximal part of lobes; *receptacle* paraphysate, paraphyses simple, pluricellular, apical cell enlarged, to 370 µm long; *sporangium* long-stalked, simple or with a simple pluricellular hair near base, 3-seriate below capsule, capsule elliptic to obovate in lateral view, annulus with 17(–18) indurated annulus cells, epistomium 3- or 4-celled, hypostomium 4-celled; *indusium* a recurved margin bearing stomata in lower half, thinly herbaceous, linear, entire to repand, to 0.5 mm wide. *Spores* 64 per sporangium, brown, tetrahedral, trilete, with an equatorial flange, proximal and distal face verruculose, exospore (30–)31(–32) µm in equatorial diameter. Figure 22 A & B.

**Vernacular names**: Pungent brake, Toothed brake; Saagtand pteris (Afr).

**Ecology**: Terrestrial, in leaf-litter in light shade in seasonally moist evergreen forests. Not edaphically bound. Nanophanerophyte, mesophytic; fronds mesomorphic. Vegetative reproduction rarely by the closely branched rhizome. Seasonal pattern pronounced with new growth restricted to the rainy season.

**Distribution**: Rare in the north-western corner of Swaziland, occurring at an altitude of ± 1 200 m. Widespread in sub-Saharan Africa, the Arabian peninsula, the western Indian Ocean region and St Helena.


Plants terrestrial. *Rhizome* erect to suberect, simple, to 90 mm long, 10 mm in diameter, set with roots, stipe bases and scales, scales crustaceous, bicolorous, centrally with a broad atrocastaneous region, sessile, narrowly lanceolate, margins hyaline, closely set with pluricellular, uniseriate hairs terminating in a pyriform apical cell, apex terminates in an oblong or pyriform cell, to 5 mm long, to 0.7 mm wide. *Fronds* caespitose, arching, to 1.9 m long, to 7 per plant; *stipe* firm, proximally castaneous, stramineous to greenish distally, adaxially sulcate, to 1.2 m long, to 6 mm in
diameter, proximally sparsely set with scales similar to those on rhizome, glabrous distally; lamina anadromous, ovate, to 2-pinnate, to 800 mm long, to 520 mm wide, with up to 14 free pinna pairs; rachis brown to stramineous, adaxially sulcate, glabrous; pinnae petiolate, petiole to 10 mm long, opposite to alternate, basal pinna pair largest, spaced, with a single pinnule basiscopically, strongly inequilaterally triangular, to 260 mm long, to 170 mm wide, distal pinnae linear-acuminate to narrowly lanceolate, pectinate; pinna-rachis adaxially shallowly sulcate, with prickles where costae branch from higher order axes, pronounced abaxially; pinnules sessile or petiolate, petiole to 2 mm long, narrowly lanceolate, pectinate, to 170 mm long, to 45 mm wide; lobes firmly herbaceous, linear-acuminate to linear-obtuse, entire, to 29 mm long, to 6 mm wide, adaxially sparsely set with 3–5-celled hairs mainly along costule and veins, to 0.3 mm long, abaxially sparsely set with 3–5-celled hairs, to 0.2 mm long; costa adaxially shallowly sulcate, without prickles, or shortly dentate. Venation evident, forked once, ending in margin, free in sterile fronds. Sori linear, continuous along a marginal vascular commissure, extending from near lobe base close to apex; receptacle paraphysate, paraphyses simple, pluricellular, apical cell slightly enlarged, to 0.6 mm long; sporangium long-stalked, simple, 3-seriate below capsule, capsule elliptic to obovate in lateral view, annulus with (16–)17–19 indurated annulus cells, epistomium 4(–6)-celled, hypostomium 4(–5)-celled, stomium 2-celled, walls conspicuously thickened; indusium firm, brown, linear, repand, to 0.4 mm wide. Spores 32 per sporangium, brown, tetrahedral, trilette, with an equatorial flange, rugate, (56–)61.17–66 µm in equatorial diameter. Figure 23 A–C.

Vernacular names: Fries’s brake; Fries-se-ruigtevaring (Afr).

Ecology: Terrestrial, in deep shade in evergreen forests, usually in wet conditions along banks of perennial streams. Not edaphically bound. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction non-existent or sporadic. Seasonal pattern apparently non-existent, but may be influenced by the prevailing conditions.

Distribution: With the exception of the lowveld region, the species occurs sporadically throughout Swaziland, at altitudes ranging between 635 and 1 200 m. The species is widespread in west central tropical Africa, east and south tropical Africa, and the eastern parts of southern Africa.


Pteris longifolia sensu Sim, Ferns S. Afr.: 106, pl. XLII (1892); Sim, Ferns S. Afr., 2nd edn: 252, pl. 125 (1915).

vittata = striped lengthwise

Plants terrestrial or epilithic. Rhizome short-decumbent, closely branched, to 7 mm in diameter, set with roots, crowded stipe bases, and scales, scales chartaceous, ferruginous to stramineous, sessile, subulate to narrowly lanceolate, entire, apex terminates in an oblong thin-walled cell, to 8
Figure 23 A–C, *Pteris friesii*, A, basal part of lamina, B, fertile pinna lobes, C, adaxial surface of pinna section showing venation and prickles along the pinna-rachis; D–F, *P. vittata*, D, frond, E, section of pinna showing venation, F, abaxial surface of fertile pinnae.
mm long, to 1.4 mm wide. *Fronds* caespitose, erect to arching, to 1.7 m long, to 8 per plant; *stipe* firm, stramineous, proximally adaxially flattened, sulcate distally, to 470 mm long, to 6 mm in diameter, proximally densely set with stramineous scales similar to, but slightly larger than, those on rhizome, distally set with filiform scales and pluricellular hairs; *lamina* catadromous, elliptic-oblong, 1-pinnae, to 1.2 m long, to 300 mm wide, with up to 60 free pinna pairs; *rachis* stramineous, adaxially sulcate, closely set with stramineous pluricellular hairs, to 0.3 mm long; *pinnae* sessile, alternate, reduced towards base, linear-attenuate, base inequilateral, acroscopically broadly cuneate to cordate, basiscopically broadly cuneate to cordate, serrate, to 140 mm long, to 9 mm wide, adaxially sparsely set with 3–5-celled hairs, to 0.3 mm long, abaxially closely set with 3–5-celled hairs along costa and veins, hairs to 0.4 mm long; *costa* adaxially shallowly sulcate, pronounced abaxially. *Venation* evident, forked once or twice, ending in teeth in margin, free in sterile fronds. *Sori* linear, continuous along a marginal vascular commissure extending from near base to near apex; *receptacle* paraphysate, paraphyses simple, pluricellular, apical cell not conspicuously enlarged, to 0.8 mm long; *sporangium* long-stalked, simple, 3-seriate below capsule, capsule elliptic to obovate in lateral view, annulus with (18–)19(–21) indurated annulus cells, epistomium (5–)6(–7)-celled, hypostomium (4–)6-celled, stomium 2-celled, walls conspicuously thickened; *indusium* linear, brown, repand, to 0.7 mm wide. *Spores* 64 per sporangium, brown, tetrahedral, trilete, with a equatorial flange, proximal face with low tubercules, distal face reticulate, tuberculate, (50–)68.22 (–68) µm in equatorial diameter. Figure 23 D–F.

**Vernacular names:** Chinese ladder brake, Chinese brake, Ladder brake; Leervaring (Afr).

**Ecology:** Terrestrial or epilithic, in exposed conditions among rocks and on earthbanks of road cuttings and in light shade of scrub along streams, growing in moist or seasonally moist conditions. Not edaphically bound occurring in granitic and basaltic soils within Swaziland. Hemicyryptophyte, mesoxerophytic; fronds mesoxeromorphic. Vegetative reproduction by the closely branched rhizome. Seasonal pattern pronounced with active growth restricted to the rainy season.

**Distribution:** Frequent and widespread within Swaziland, but appears to be absent from the lowveld region, occurring at altitudes ranging between 300 to 1,560 m. Widespread in sub-Saharan Africa and throughout the temperate parts of the Old World.

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**VITTARIACEAE** Sm.

Phylogenetic studies based on morphological (Pryer et al. 1995, Stevenson & Loconte 1996) and molecular (Hasebe et al. 1995) information show that Vittariaceae is a sister group to *Adiantum*, a genus here included in the Pteridaceae.

**Vittaria** Sm. in Mém. Acad. Sci. Turin. 5: 413, t. 9, 5 (1793). Type: *Vittaria lineata* (L.) Sm.; *Pteris lineata* L.
vittaria = ribbon

Generic description as for the species. A genus of approximately 60 species with a pantropical distribution.


**Vittaria gueinzii** Trevis. in Atti Ist. Veneto 2: 167 (1851). Type: South Africa, *Gueinzius* s.n. (K, holo.; S, iso.).

**Vittaria sarmentosa** Ruiz ex Fée, Mém. foug. 3: 17 (1852). Type: South Africa, *Mundt & Maire* s.n.; *Gueinzius* s.n. (K; S, syn.); *Drège* s.n. (BM; K, syn.).

**Vittaria tenera** Fée, Mém. foug. 3: 17, fig. 2, t. 1 (1852). Type: Port Natal, *Gueinzius* s.n. (K, holo.; S, iso.).


**Vittaria lineata** sensu Sim, Ferns S. Afr.: 216, pl. CXXIX, fig. 1 (1892).

isoetii = *Isoetes*-like; folia = leaves

Plants epilithic or epiphytic. *Rhizome* short-decumbent, to 2 mm in diameter, set with roots, short, closely spaced persistent stipe bases and scales, scales chartaceous, ferrugineous to castaneus, sessile, subulate, cuneate to cordate, dentate, to 8 mm long, to 1 mm wide. *Fronds* crowded, pendent, to 720 mm long; *stipe* poorly differentiated, to 4 mm long, initially sparsely set with scales similar to, but smaller than, those on rhizome; *lamina* carnose-coriaceous, simple, linear, entire, to 716 mm long, to 3 mm wide, glabrous adaxially and abaxially. *Venation* obscure. *Sori* along a near-marginal vascular commissure, sunken in two submarginal grooves extending the entire length of the lamina; *receptacle* paraphysate, paraphyses branched, branch apices terminate in a clavate, indurated cell; *sporangium* long-stalked, simple, capsule globose in lateral view, with 14–16 indurated annulus cells, epistomium (3–)4(–5)-celled, hypostomium (3–)4(–5)-celled, stomium with 4 narrow cells of which walls are conspicuously thickened. *Spores* brown, ellipsoidal, monolete, smooth, (52–)58.37(–70) x (30–)34.75(–38) µm. Figure 24 A–E.

**Vernacular names:** Bootlace fern, Ribbon fern; Vetervaring (Afr).

**Ecology:** Epilithic or epiphytic, in deep shade in seasonally moist evergreen forests, growing on the caudices of *Cyathea dregei*. Not edaphically bound. Hemicryptophyte, mesophytic; fronds
Figure 24 A–E, *Vittaria isoetifolia*, A, habit, B, section of lamina showing sori, C, rhizome scale, D, section of rhizome scale showing cellular structure, E, paraphyse.
mesoxeromorphic. Vegetative reproduction by the short, closely branched rhizome. Seasonal pattern apparently pronounced with active growth restricted to the rainy season.

**Distribution:** Rare in Swaziland and currently known from a single collection in the north-western corner of the country, occurring at an altitude of ± 1 400 m. Widespread in east and south tropical Africa, southern Africa and the western Indian Ocean region.

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**CYATHEACEAE**

The earliest known fossil which can be ascribed to the Cyatheaceae is *Cyathocaulis* Ogura and dates from the Cretaceous (Cleal 1993). The modern genera of Cyatheaceae, however, only appeared during the late Tertiary (Collinson 1996). The interrelationship of the tree ferns with other fern groups remains unresolved, but affinities with the gleichenioid ferns have been suggested (Stokey 1930).

*Cyathea* Sm. in Mém. Acad. Sci. Turin. 5: 416 (1793). Lectotype: *Cyathea arborea* (L.) Sm., designated by J. Smith (1875).

*cyathea* = derived from *kyatheion* (Greek), a little cup

A genus of approximately 600–650 species occurring throughout the tropics with 14 species occurring in Africa (Holttum 1982).

Plants terrestrial. *Caudex* stout or slender, erect, to 3 m tall, simple, or infrequently with a few short side branches, densely covered by adventitious roots. *Fronds* to 30 per plant, caespitose, arching; *stipe* adaxially shallowly sulcate, variously tuberculate or not, proximally densely set with hairs and scales, smaller scales sessile, irregularly branched, with glands near the point of attachment, the larger scales centrally chartaceous, margins membranous, sessile, subulate to narrowly lanceolate-acuminate, cordate, margins closely and irregularly fimbriate, apex terminates in a castaneous seta, or apical cell not differentiated; *stipe* higher up closely set with hairs of two kinds, 2-celled hairs with the apical cell much enlarged and variously shaped, and pluricellular, irregularly branched hairs of which the apical cell is not differentiated; *lamina* proximally anadromous, catadromous distally, ovate to elliptic, 2-pinnate-pinnatifid; *rachis* variously tuberculate or not, adaxially shallowly sulcate, sparsely set with scales similar to those at the stipe base; *pinnae* petiolate, alternate, basal pinna pair (aphlebia) curled, ovate, to 2-pinnate, segments thinly herbaceous, much reduced, pinnae higher up overlapping, 1-pinnate-pinnatifid, lanceolate to oblunco-acuminate; *pinna-rachis* terete, pronounced abaxially, initially closely set with hairs similar to those on the rachis, or moderately scaled, scales thinly herbaceous, sessile, oblunco, the margins closely and variably set with simple and branched fimbriae, apical cell crustaceous, subulate; *pinnules* sessile, firmly herbaceous, pinnatifid, oblunco-acuminate, adaxially glabrous, or initially set with simple, pluricellular hairs along the costa and costule, abaxially closely set with scales and hairs along the costa, costule and veins, the scales chartaceous to thinly chartaceous, sessile, costule to ovate, bullate, margins closely and variable set with simple and branched fimbriae, apical cell crustaceous, subulate, the hairs simple or branched; *costa* adaxially raised, pronounced abaxially; *segments* linear-acute to linear-obtuse, often somewhat falcate, shallowly dentate to crenate; *aerophores* pale brown, in short lines dorsilaterally along the stipe and rachis. *Venation* evident, pinnately branched in the segments, branches forked once or twice, terminating in the margin. *Sori* circular, at a vein fork or inframedially on an acroscopic vein branch; *receptacle* raised, paraphysate, paraphyses pluricellular, simple, uniseriate to pluriseriate, apical cell thin-walled, glandular, or undifferentiated; *sporangium* short-stalked, simple, 4-seriate, simple, laterally attached, capsule obtriangular in lateral view, annulus complete, with (16–)18 or
19(–20) indurated annulus cells; indusium inferior, cupulate to flabellate, surrounding the receptacle base, repand to irregularly lobed. Spores 16 per sporangium, brown, tetrahedral, trilete, papillate, with echinulate ridges.

Key to the species:
Basal pinna pair (aphlebia) much divided and forming a tangled mass in the crown .................. C. capensis
Basal pinna pair not much divided and not forming a tangled mass in the crown .................. C. dregei


Trichomanes incisum Thunb., Prodr. pl. cap.: 173 (1800). Type: Cape Province, Grootvadersbosch, Thunberg s.n. (UPS, holo.).


Trichomanes cormophyllum Kaulf., Enum. filic.: 266 (1824). Type: Habitat in Promentorio bonae spei. (not located).

capensis = from the Cape

var. capensis

Plants terrestrial or epilithic. Caudex slender, to 3 m tall, to 100 mm in diameter, frequently with few short side branches, densely covered by adventitious roots. Fronds to 16 per plant, caespitose, arching, to 1.8 m long; stipe greenish-brown, adaxially shallowly sulcate, to 80 mm long, to 8 mm in diameter, proximally densely set with smaller and larger scales, smaller scales sessile, irregularly branched, with glands near the point of attachment, larger scales chartaceous, bicolorous, the central region crustaceous, castaneous to atrocastaneous, nitid, margins membranous, stramineous, sessile, narrowly lanceolate-acuminate, cordate, margins closely and irregularly fimbriate, apex terminates in a castaneous seta, to 12 mm long, to 1.5 mm wide; lamina proximally anadromous, catadromous distally, ovate to elliptic, 2-pinnate-pinnatifid, to 1.6 m long, to 670 mm wide, with up to 14 petiolated pinna pairs; rachis castaneous to stramineous, adaxially shallowly sulcate, sparsely set with scales similar to those on the stipe base; pinnae petiolate, petiole to 18 mm long, alternate, the basal pinna pair (aphlebia) curled, ovate, to 2-pinnae, segments thinly herbaceous, much reduced, to 170 mm long, to 110 mm wide, pinnae higher up 1-pinnate-pinnatifid, lanceolate to oblanceolate, to 340 mm long, to
130 mm wide, with up to 20 petiolated pinnule pairs; **pinna-rachis** terete, moderately scaled, scales thinly herbaceous, ferrugineous, sessile, oblong, closely and variably set with simple and branched fimbriae, apical cell crustaceous, castaneus, subulate, to 1.3 mm long, to 0.3 mm wide; **pinnules** sessile, firmly herbaceous, pinnatifid, linear-acuminate, to 65 mm long, to 13 mm wide, adaxially glabrous, abaxially often scaled along the costae and costules, scales chartaceous, ferrugineous, sessile, cordate, bullate, margins closely and variably set with simple and branched fimbriae, apical cell crustaceous, castaneus, subulate, to 1.6 mm long, to 0.5 mm wide; **costa** adaxially raised, pronounced abaxially; **segments** linear-acute, serrate, to 8 mm long, to 2 mm wide. **Venation** evident, pinnately branched in the segments, vein branches simple or forked, ending in the margin. **Sori** up to 3 pairs on each segment, circular, if single then inframedial on acroscopic vein branch; **receptacle** raised, paraphysate, paraphyses pluricellular, simple, uniseriate to pluriseriate, apical cell thin-walled, glandular; **sporangium** with a short 4-seriate stalk, simple, laterally attached, capsule obtriangular in lateral view, annulus complete, with (16–)18(–19) indurated annulus cells; **indusium** inferior, cupulate to flabellate, repand to irregularly lobed. **Spores** 16 per sporangium, brown, tetrahedral, trilete, tuberculate, with echinulate ridges, exospore (40–)44.46(–50) µm in diameter. Figure 25 A–C.

**Vernacular names:** Slender tree fern; Cape tree fern; Forest tree fern; Bosboomvaring (Afr.).

**Ecology:** Terrestrial, in moist conditions along perennial streams, in deep shade in evergreen forests. Not edaphically bound. Mesophanerophyte, mesophytic; fronds mesomorphic. Vegetative reproduction evidently non-existent. Seasonal pattern non-existent, as a result of habitat preferences, growth takes place throughout the year.

**Distribution:** Localised in Swaziland and currently known from the Bulembu and Hlathikhulu areas only, occurring between 1 200 and 1 520 m. The species is restricted to east and south tropical Africa and southern Africa.


**Cyathea burkei** Hook., Sp. fil.: 1: 23, t. 17B (1844). Type: S. Africa, Macalisberg, **Burke s.n.** (K. holo.).

dregei = after Johann Fran(t)z Drège (1794–1881), a German horticulturist, botanical collector and traveller who collected extensively in South Africa from 1826 to 1834.

Plants terrestrial. **Caudex** stout, erect, simple, to 3 m tall, to 450 mm in diameter, densely covered with adventitious roots. **Fronds** to 30 per plant, caespitose, arching, to 2.2 m long; **stipe** greenish-brown, adaxially shallowly sulcate, variously tuberculate, to 410 mm long, to 15 mm in diameter, proximally densely scaled, scales firmly chartaceous, castaneus, sessile, subulate, cordate, margins short-fimbriate, apical cell not differentiated, to 25 mm long, to 5.5 mm wide, higher up closely set with stramineous to ferrugineous hairs of two kinds; 2-celled hairs with the apical cell much enlarged and variously shaped, and pluricellular, irregularly branched hairs of which the apical cell is not differentiated, to 0.6 mm long; **lamina** proximally anadromous, catadromous distally, elliptic, to 2-pinnate-pinnatifid, to 2 m long, to 700 mm wide, with up to 18 petiolated pinna pairs; **rachis** brown, often variously tuberculate, adaxially shallowly sulcate, initially set with scales and hairs similar to those on the stipe, glabrous later; **pinnae** petiolate, petiole to 5 mm
long, alternate, overlapping, 1-pinnate-pinnatifid, oblong-acute to lanceolate, to 430 mm long, to 150 mm wide, with up to 20 pinnule pairs; pinna-rachis terete, initially closely set with ferrugineous hairs similar to those on the rachis; pinnules sessile, firmly herbaceous, pinnatifid, oblong-acuminate, to 80 mm long, to 24 mm wide, adaxially initially set with simple, pluricellular hairs along the costa and costule, abaxially closely set with scales and hairs along the costa, costule and veins, scales and hairs thinly chartaceous, ferrugineous, sessile, ovate, fimbriate, hairs simple or branched, to 1.5 mm long, to 0.4 mm wide; costa adaxially raised, pronounced abaxially; segments linear-acute to linear-obtuse, often somewhat falcate, shallowly dentate to crenate, to 10 mm long, to 3 mm wide; aerophores pale brown, in short lines dorsilaterally along the stipe and rachis. Vénation evident, pinnately branched in the segments, vein branches once or twice forked, ending in the margin. Sori up to 9 pairs per segment, circular, often confluent at maturity, at a vein fork or inframedially on an acroscopic vein branch; receptacle raised, paraphysate, paraphyses simple, pluricellular, uniseriate, apical cell not differentiated; sporangium short-stalked, simple, laterally attached, capsule obtriangular in lateral view, annulus complete, with (17–)19(–20) indurated annulus cells; indusium inferior, cupuliform, surrounding receptacle base. Spores 16 per sporangium, brown, tetrahedral, trilette, papillate, exospore (38–)40.5(–44) µm in equatorial diameter. Figure 25 D–F.

**Vernacular names:** Tree fern, Common tree fern, Eastern tree fern; Boomvaring (Afr.); Inkomankoma (Sis.); isi-Hihi (Xhosa); Inkomankoma, Isikhoma(n)khoma, Isikhomane (Zulu).

**Ecology:** Terrestrial, in moist conditions along streams, at boulder bases in seasonally moist conditions, and in sinkholes in open grassveld, in exposed conditions or in light shade in forests. Not edaphically bound. Mesophanerophyte, mesoxerophytic; fronds mesomorphic. Vegetative reproduction non-existent. Seasonal pattern non-existent in temperate habitats, but strictly seasonal in more exposed habitats. Pyrophytic.

**Distribution:** Common and widespread in the western half of the country, occurring at altitudes ranging between 400 and 1 520 m, but appears to be absent from the lowveld and Lubombo mountain range. The species is widespread in sub-Saharan Africa and Madagascar.

**Uses:** Gerstner (1941) reports that the Zulu use unspecified parts of the plant as ingredients in infusions known as *inembe*, which are taken regularly during pregnancy to ensure easy childbirth; dried roots are used as anthelmintics. The Xhosa use the plant as an infusion known as *isikhomakhoma*, which is taken to counter the effects of witchcraft (Hutchings 1996).

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**DENNSTAEDTIACEAE** Pic.Serm.

The earliest known fossil records of dennstaedtioid ferns date from the Palaeocene (Collinson 1996). Among the higher leptosporangiate ferns the Dennstaedtiaceae occupy a phylogenetically basal position in phyletic schemes based on morphological (Mickel 1973; Lovis 1977; Pichi Sermolli 1977; Stevenson & Loconte 1996) and molecular information (Hasebe *et al.* 1995; Wolf 1995). Most of these schemes suggest that the Pteridaceae is a sister group of the Dennstaedtiaceae.
Key to the genera:

1a Venation reticulate in sterile fronds; sori semi-circular to lunate, confined to the segment and lobe sinuses ................................................................. Blotiella

1b Venation free in sterile fronds; sori linear or circular along a continuous or near-continuous near-marginal vascular commissure:

2a Sori terminally on abbreviated vein branches; sterile vein branches end in the margin in the sinus between the teeth ......................................................... Microlepia

2b Sori terminal on unabbreviated vein branches or along a continuous or near-continuous near-marginal vascular commissure; sterile vein branches end in the margin or near the margin in the teeth:

3a Sori linear, along a continuous or near-continuous marginal vascular commissure. ................................................................. Pteridium

3b Sori circular, at free vein endings near the margin in the lobes .......... Hypolepis

Microlepia C.Presl, Tent. pterid.: 124, 125, t. 4, fig. 21–23 (1836). Lectotype: Microlepia polypodioides (Sw.) C.Presl; Dicksonia polypodioides Sw. (now Microlepia speluncae (L.) T.Moore; Polypodium speluncae L.).

mikros (Greek) = small; lepis = scale

Generic description as for the species. A genus of approximately 45 species occurring mostly in tropical Asia.


spelunca = cave

Plants terrestrial. Rhizome subterranean or epigeal, wide-creeping, irregularly branched, set with roots, widely spaced persistent stipe bases and hairs, the hairs ferrugineous, simple, pluricellular, uniseriate, to 2.8 mm long. Fronds spaced, to 35 mm apart, erect, to 2.07 m long; stipe firm, proximally castaneous, stramineous to greenish higher up, terete, to 475 mm long, to 7 mm in diameter, closely set with hairs similar to, but shorter than, those on the rhizome; lamina anadromous, ovate to oblong-ovate, to 3-pinnate-pinnatifid, to 2.6 m long, to 1 m wide, the basal 1 to 2 pinna pairs reduced or not, with up to 25 pinna pairs; rachis and lower order axes stramineous, shallowly sulcate adaxially, sulci not confluent, closely set with hairs similar to those on the stipe; pinnae petiolate, petiole to 12 mm long, alternate, basally spaced, slightly overlapping apically, to 2-pinnate-pinnatifid, often slightly basiscopically developed, oblong-cuneate to narrowly elliptic, to 535 mm long, to 135 mm wide, with up to 24 pinnule pairs;
Figure 26 A & B, *Microlepia speluncae*, A, pinna section, B, abaxial surface of fertile segment; C & D, *Pteridium aquilinum* subsp. *aquilinum*, C, basal pinna section; D, abaxial surface of fertile segment.
Pinnules petiolate, petiole to 1.5 mm long, alternate, basally spaced, slightly overlapping towards the apex, several basal pairs often reduced, to 1-pinnate-pinnatifid, usually slightly acroscopically developed, triangular, oblong-cuneate, or ovate, to 77 mm long, to 32 mm wide, with up to 8 petiolated and sessile segment pairs; segments petiolate, petiole to 1 mm long, alternate, basally spaced or overlapping, adnate towards the apex, pinnatifid to lobed, acroscopically developed, inequilaterally ovate to oblong-obtuse, to 17 mm long, to 8 mm wide, lobes shallowly dentate, adaxially closely set with hairs along the veins, the hairs hyaline to stramineous, acicular, pluricellular, uniseriate, to 0.5 mm long, abaxially closely set with similar hairs along and between the veins. Venation pinnately branched, vein branches end in the margin in the sinus between the teeth, sorus-bearing veins abbreviated, the endings enlarged. Sori circular, terminal on primarily the acroscopic anomalous vein branches of the segments, to 1 mm in diameter; receptacle paraphysate, paraphyses simple, pluricellular, uniseriate, apical cell elliptic, gland-like, to 320 mm long; sporangium short-stalked, simple, capsule broadly elliptic in lateral view, with (16–)18(–22) indurated annulus cells, epistomium (4–)5(–7)-celled, hypostomium (4–)5(–6)-celled; indusium cup-shaped, membranous, to 1 mm wide, opening outwards. Spores 64 per sporangium, stramineous, tetrahedral-globose, prominently lobed, echinulate, (32–)35.72(–38) µm in equatorial diameter. Figure 26 A & B.

Vernacular names: Cave fern; Grotvaring (Afr.).


Distribution: Rare in Swaziland and known from a single collection made in the Sondeza range at an altitude of ± 500 m. This pantropical species is widespread in sub-Saharan Africa and the western Indian Ocean region.

Pteridium Gled. ex Scop., Fl. carniol.: 169 (1760), nom. cons. Type: Pteridium aquilinum (L.) Kuhn

From the diminutive of pteris (Greek), meaning a fern.

Generic description as for the family. A genus of one cosmopolitan species with several subspecies and varieties often recognised.


aquilinum = resembling an eagle

Plants terrestrial. Rhizome subterranean, wide-creeping, irregularly branched, set with widely spaced roots and stipe bases, densely set with hairs, the hairs ferrugineous, pluricellular, uniseriate, ending in an undifferentiated subulate cell, to 1.7 mm long. Fronds widely spaced, erect, the apical part often arching, to 1.1 m long; stipe rigid, brown, or the proximal part often atrocastaneus, adaxially sulcate, to 830 mm long, to 8 mm in diameter, subterranean part closely set with hairs similar to those on the rhizome, section above the ground initially closely set with appressed, basifixied or dorsifixied unicellular and pluricellular acicular hairs; lamina proximally catadromous, anadromous higher up, oblong-ovate, to 3-pinnate-pinnatifid, to 600 mm long, to 800 mm wide, with up to 14 free pinna pairs; rachis and lower order axes brown, shallowly sulcate adaxially, sulci of the axes all confluent, initially closely set with hairs similar to those on the stipe; pinnae petiolate, petiole to 40 mm long, opposite to alternate, overlapping, often held horizontally, to 2-pinnate-pinnatifid, deltate to broadly ovate, to 400 mm long, to 320 mm wide, basal pinna pair longest or slightly shorter than the next pair above, with up to 15 petiolated pinnule pairs; pinnules petiolate, petiole to 13 mm long, alternate, overlapping or spaced, 1-pinnate-pinnatifid, ovate to oblong-acute, to 20 mm long, to 85 mm wide, with up to 11 free segment pairs; segments petiolate, petiole to 1 mm long, opposite to alternate, pinnatifid, pectinate, oblong-acute to oblong-acuminate, to 48 mm long, to 17 mm wide; ultimate segments coriaceous, oblong-acute to oblong-obtuse, entire, margins usually revolute, to 9 mm long, to 3 mm wide, adaxially sparsely set with simple, pluricellular hairs, abaxially densely haired, hairs ferrugineous to stramineous, simple, pluricellular, uniseriate, to 1.6 mm long. Venation adaxially immersed, obscure abaxially, pinnately branched in the ultimate segments, branches once or twice forked, ending near the margin. Sori linear, along a continuous or near-continuous marginal vascular commissure; receptacle nude; sporangium long-stalked, simple, 3-seriate below capsule, capsule elliptic in lateral view, annulus with (12–)15 indurated annulus cells, epistomium (3–)4(–6)-celled, hypostomium (3–)4(–5)-celled, stomium 2-celled, the walls not conspicuously thickened; indusium marginal, the outer linear, stramineous to hyaline, fimbriate, to 0.9 mm long, the inner indusium partly developed, composed of groups of closely spaced acicular hairs. Spores 64 per sporangium, brown, tetrahedral-globose, trilete, granulate, (34–)37.64(–42) µm in equatorial diameter. Figure 26 C & D.

Vernacular names: Bracken, Brake; Adelaarsvaring (Afr.); Luhlindzefuku (Sis.); Umbewe, Umhlashoshana (Zulu).

Ecology: Terrestrial, in exposed open grasslands, forest margins, and in thickets where the original woody vegetation has been destroyed, rarely in deep shade. Not edaphically bound, occurring on a wide range of soils within Swaziland. Geophyte, meseochemotic; fronds xeromorphic. Vegetative reproduction by the wide-creeping, branched rhizome. Seasonal pattern well pronounced, plants in exposed habitats may go dormant during the dry winter months, with new fronds being pro-
duced with the onset of the rainy season. Pyrophytic.

**Distribution:** Common throughout the western half of Swaziland, occurring at ± 500 to 1 500 m, but appears to be absent from the lowveld and eastern Lubombo range. Widespread in sub-Saharan Africa, the western Indian Ocean region and temperate Europe.

**Uses:** In Africa various parts of the plant are used as a cure for an array of ailments in humans and livestock; the roots as a vermifuge (Gerstner 1939), a decoction of the roots mixed with *Vernonia neocorymbosa* Hilliard is given for menstrual irregularities and as an abortifacient (Watt & Breyer-Brandwijk 1962). The Tswana use the rhizome as an anthelmintic for livestock, the sap for chronic septic sores, and for stomach ache and diarrhoea in humans (Roberts 1990). Young fronds and rhizomes are cooked and eaten by the Zulu and Tswana (Roberts 1990), but their consumption in Japan has been associated with an increased incidence of oesophageal and stomach tumors (Pamukcu et al. 1980). The plants have also been suspected of causing carcinomas and neuroplasms in livestock. The carcinogen can be passed onto humans when they drink the milk of cows grazing on bracken-infested pastures (Evans et al. 1972).

**Hypolepis** Bernh. in Neues J. Bot. 1, 2: 34 (1806). Type: *Hypolepis tenuifolia* (G.Forst.) Bernh. ex C.Presl

*hypo* (Greek) = under; *lepis* = scale

Generic description as for the species. A genus of approximately 40 species occurring throughout the tropics and southern temperate areas of the world.


**Cheilanthes aspera** Kaulf. in Linnaea 6: 186 (1831). *Hypolepis aspera* (Kaulf.) C.Presl, Tent. pterid.: 162 (1836). Type: In einer Kluft bei dem Wasserfall auf der östlichen Seite des Teufelsberges, -/01/1820, Ecklon s.n. (LZ†, holo.; L, iso.).

**Cheilanthes anthriscifolia** Schltdl., Adumbr. pl. 5: 52 (1832), *quoad spec.* Mundt & Maire, *non* Willd. (1810). *Hypolepis anthriscifolia* (Schltdl.) C.Presl, Tent. pterid.: 162 (1836); Sim, Ferns S. Afr.: 76, pl. XXII (1892).

**Cheilanthes commutata** Kunze in Linnaea 10: 542 (1836). Type: Inter Plettenbergsbaai et Langkloof prope Roodemuur, in valle sylvatica ad rivulum, 500 m, *Drège* s.n. [B!, lecto., designated by Roux (1986); K!, isoelecto.].

*sparsus* = scattered; *sorus* = pertaining to the sori

Plants terrestrial. Rhizome wide-creeping, subterranean or epigal, terete, to 8 mm in diameter, initially densely set with dark brown to ferrugineous, pluricellular, uniseriate acicular hairs, to 1.5 mm long. Fronds to 110 mm apart, arching, straggling in large plants, to 3 m long; stipe firm, proximally castaneus to ferrugineous, stramineous higher up, adaxially shallowly sulcate, to 1.2 m long, to 15 mm in diameter, initially closely set with soft pluricellular, uniseriate acicular hairs, often becoming subglabrous or glabrous later; lamina anadromous to catadromous, ovate-deltate, to 4-pinnate-pinnatifid, to 2.5 m long, to 2 m wide with up to 15 petiolated pinna pairs; rachis stramineous, adaxially shallowly sulcate, sulcus confluent with that of the lower order axes, initially closely set with fine pluricellular, uniseriate acicular hairs, often glabrous later; pinnae
Figure 27 A & B, Hypolepis sparsisora, A, pinna section, B, fertile segment; C & D, Bliotiella glabra, C, pinna section, D, abaxial surface of fertile segment.
petiolate, petiole to 65 mm long, ovate to lanceolate, opposite to alternate, basally widely spaced, imbricate or not, more closely spaced distally, often somewhat imbricate, to 4-pinnate-pinnatifid, basal pinnae not, or conspicuously basiscopically developed, to 1 m long, to 500 mm wide, with up to 17 petiolated pinnule pairs; *pinna-rachis* adaxially sulcate, to 6 mm in diameter, set with hairs similar to those on the rachis, lower order axes also with oblong pluricellular, uniseriate hairs; *pinnules* anadromous or catadromous, petiolate, petiole to 30 mm long, ovate to lanceolate, opposite to alternate, closely to widely spaced, to 3-pinnate-pinnatifid, to 430 mm long, to 330 mm wide, with up to 14 segment pairs; *segments* petiolate, petiole to 10 mm long, lanceolate to oblong-acuminate, alternate, closely to widely spaced, to 2-pinnate-pinnatifid, to 160 mm long, to 70 mm wide; *ultimate segments* petiolate, petiole to 2 mm long, membranous to thinly herbaceous, ovate to oblong-acuminate, opposite to alternate, closely to widely spaced, lobed to pinnatifid, to 35 mm long, to 13 mm wide, adaxially and abaxially set with acicular pluricellular, uniseriate hairs along the costules and veins; *lobes* oblong-obtuse, to 8 mm long, to 4 mm wide, obtusely dentate. *Venation* anadromous or catadromous, evident, free, the branches simple or forked, ending in the teeth near the margin. *Aerophores* in a narrow, continuous dorsilateral line along the axes. *Sori* near-marginal, proximal on the lobes, at or near the ending of a simple, or anadromous branch of a forked vein, singly or up to 2 pairs per lobe, to 1.2 mm in diameter when mature; *indusium* a strongly modified lobe tooth, erose to fimbriate; *receptacle* nude; *sporangium* long-stalked, simple, 3-seriate below the capsule, capsule with (12–)13(–19) indurated annulus cells. *Spores* 64 per sporangium, yellow, ellipsoidal, monolectic, echinulate, (24–)29.14(–38) x (15–)19.63(–26) µm. Figure 27 A & B.

**Vernacular names:** False bracken; Vals adelaarsvaring (Afr).

**Ecology:** Terrestrial, usually in marshy areas along perennial streams in forests, forest clearings and forest margins, in exposed or shaded conditions, forming large tangled thickets. Not edaphically bound. Hemicyryptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the wide-creeping, branched rhizome. Seasonal pattern not pronounced, but influenced by the prevailing environmental conditions.

**Distribution:** Sporadic in the western half of Swaziland, occurring at altitudes ranging between 500 and 1 520 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.


Named in honour of Marié-Laure Tardieu-Blot (1902–23/03/1998), French pteridologist at the Natural History Museum, Paris

Generic description as for the species. A genus of approximately 12 species occurring in Africa and adjacent islands with one species extending to the neotropics.

**Blotiella glabra** (Bory) R.M.Tryon in Contr. Gray Herb. 191: 99 (1962); Jacobsen, Ferns Sthn. Afr.: 204, fig. 143, map 41 (1983); Schelpe & Anthony, Fl. S. Afr., Pterid.: 81, fig. 21, t. 2, map 65 (1986); Burrows, Sthn. Afr. Ferns: 102, ill. 21, t. 103–103c, pl. 15.4, map (1990); Roux, SABONET

*Lonchitis stenochlamys* Fée, Mém. foug. 5: 142 (1852). Type: Habitat in Promontorium Bonae Spei, Drège s.n. (BM, K, iso.).

*Lonchitis pubescens* sensu Sim, Ferns S. Afr.: 75, pl. XX (1892); Sim, Ferns S. Afr., 2nd edn: 261, pl. 131, 132 (1915), *non* Willd. ex Kaulf. (1824).

glabra = glabrous or naked

Plants terrestrial. Rhizome massive, erect to suberect, to 300 mm long, to 25 mm in diameter, set with roots, closely spaced stipe bases and hairs, hairs ferrugineous, acicular, pluricellular, uniseriate, to 6 mm long. *Fronds* crowded, caespitose, arching, to 6 per plant, to 2.2 m long; *stipe* proximally castaneous, stramineous to greenish higher up, adaxially shallowly sulcate, to 930 mm long, to 10 mm in diameter, initially densely set with hairs, hairs rigid, ferrugineous, pluricellular, uniseriate, apical cell acicular, to 10 mm long; *lamina* proximally anadromous, catadromous higher up, oblong-ovate to elliptic, basal pinnae reduced, 1-pinnate-pinnatifid, to 1.3 m long, to 700 mm wide, with up to 12 petiolated pinna pairs; *rachis* stramineous to greenish, adaxially shallowly sulcate, sulcus not confluent with that of the pinna-rachis, closely set with hairs similar to those on the stipe, to 3 mm long; *pinnae* petiolate, petiole to 4 mm long, alternate, overlapping, lanceolate to elliptic-acuminate, pinnatifid, incised to nearly the same depth from the apex to the base, to 430 mm long, to 200 mm wide; *pinna-rachis* stramineous, adaxially shallowly sulcate, pronounced abaxially, winged along the entire length, closely set with pale hairs similar to those on the rachis; *segments* adnate, narrowly lanceolate to oblong-acuminate, to 105 mm long, to 26 mm wide, lobed, lobes entire to crenate, to 14 mm long, to 7 mm wide, adaxially and abaxially set with acicular hairs along the veins and segment margins, pluricellular hairs, to 1 mm long. *Vénation* catadromous or isodromous, evident, reticulate, secondary rachis, costal and costular areola elongate, rarely with a free included veinlet, free vein branches end in or near the margin. *Sori* semi-circular to lunate, confined to the segment and lobe sinuses, along a C-shaped near-marginal vascular commissure, to 3 mm in diameter; *indusium* a poorly modified reflexed margin, to 0.3 mm wide, entire; *receptacle* paraphysate, paraphyses simple, pluricellular, uniseriate, apical cell oblong to elliptic, to 0.4 mm long; *sporangium* long-stalked, simple, 3-seriate below the capsule, capsule globose to ovoid in lateral view, with (13–)14(–15) indurated annulus cells, epistomium (3–)4(–6)-celled, hypostomium (4–)5(–7)-celled. *Spores* 64 per sporangium, brown, ellipsoidal, monolete, echinate. Figure 27 C & D.

**Vernacular names:** Moon fern; Sekelmaanvaring (Afr).

**Ecology:** Terrestrial, in leaf litter on seasonally moist evergreen forest floor, deeply shaded. Not edaphically bound, but in Swaziland it is restricted to soils derived from the Barberton sequence. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the shortly branched rhizome. Seasonal pattern apparently pronounced with new growth restricted to the rainy season.

**Distribution:** Rare in Swaziland and known from the north-western corner of the country only, occurring at an altitude of ± 1 520 m. Widespread in sub-Saharan Africa and the western Indian Ocean region.
No fossils are known that can confidently be ascribed to the Polypodiaceae. Phylogenetic studies with morphological (Stevenson & Loconte 1996) and molecular data (Hasebe et al. 1995) suggest that the Polypodiaceae, Nephrolepidaceae, Oleandraceae and Davalliaceae share a common recent ancestor. The Polypodiaceae have a near-cosmopolitan distribution with the greatest species diversity in the tropics, especially Asia. Few genera occurring in the Old World also occur in the New World.

**Key to the genera:**

1a Lamina pinnatifid ................................................................. **Polypodium**

1b Lamina simple:

2a Sori linear, at an acute angle to the costa, in a single row on either side of the costa .... **Loxogramme**

2b Sori round to oval, in a single row on either side of the costa:

3a Lamina abaxially moderately to densely set with appressed, clathrate, peltate, circular to lanceolate, denticulate scales ........................................... **Pleopeltis**

3b Lamina abaxially sparsely set with hairs and scales, the scales usually restricted to the costa, sessile or short-stalked, but never peltate:

4a Rhizome terete, to 2.5 mm in diameter; receptacle with clathrate, peltate scales . ................................................................. **Lepisorus**

4b Rhizome dorsiventrally flattened, to 5 mm in diameter; receptacle with simple, pluricellular, uniseriate paraphyses .................................. **Microgramma**

**Lepisorus** (J.Sm.) Ching in Bull. Fan Mem. Inst. Biol. 4: 47 (1933). Type: **Lepisorus thunbergianus** (Kaulf.) Ching

lepis (Greek) = scale; sorus = sorus

Generic description as for the species. A genus of approximately 25 species confined to the palaeotropics and Hawaii.


**schraderi** = after Heinrich Adolph Schrader (1767–1836), German botanist and director of the Göttingen botanical garden.

Plants epilithic or epiphytic. **Rhizome** wide-creeping, to 2.5 mm in diameter, laterally branched, with closely to widely spaced phyllopodia dorsally, phyllopodia to 5 mm apart, to 2 mm long, initially densely scaled, scales crustaceous, bicolorous, with a black to castaneus central region,
Figure 28 A, Lepisorus schraderi, habit; B & C, Polypodium polypodioides subsp. ecklonii, B, habit, C, abaxial surface of a fertile lobe.
margins paler, clathrate, sessile, ovate-acuminate, peltate, cordate, or cordate-imbricate, denticulate, apex terminates in a small thin-walled cell, to 4 mm long, to 1.5 mm wide. Fronds monomorphic, erect to arching, simple, to 290 mm long; stipe articulated to the phyllopodia, terete, to 30 mm long, or estipitate, to 1.2 mm in diameter, glabrous; lamina herbaceous, simple, narrowly elliptic-acuminate to linear-acuminate, attenuate, entire, to 260 mm long, to 25 mm wide, adaxially sparsely set with 2-celled hairs, apical cell enlarged, elliptic, to 130 µm long, abaxially sparsely set with appressed scales and hairs, hairs similar to those on the adaxial surface, scales usually restricted to the costa, crustaceous, black to castaneous, clathrate, sessile or short-stalked, ovate-acuminate, cordate to cordate-imbricate, denticulate, apex terminates in a small thin-walled cell, to 1.8 mm long, to 0.8 mm wide; costa adaxially raised, pronounced abaxially. Venation obscure, reticulate, secondary veins anadromous and/or catadromous, areola with simple and branched included and excurrent veinlets ending in a hydathode. Sori circular, at a vascular plexus, in a single row parallel, and on both sides of the costa on the distal part of the lamina, to 5 mm in diameter; exindusiate; receptacle scales clathrate, peltate, long-stalked, circular to broadly elliptic, denticulate to erose, with a single, elliptic, thin-walled cell along the margin; sporangium long-stalked, simple, 3-seriate below the capsule, capsule ellipsoid in lateral view, with (13–)14(–16) indurated annulus cells, epistomium (3–)4-celled, hypostomium (3–)4(–5)-celled. Spores 64 per sporangium, pale yellow, ellipsoidal, monolete, rugate, (74–)76(–82) x (42–)49 µm. Figure 28 A.

Vernacular names: Smooth lance-fern; Naakte lansvaring (Afr); Gebeleweni (Sis.).

Ecology: Epilithic or epiphytic, in deep shade in evergreen forests, and partially shaded on rocks and in rock crevices in boulder-forests. Not edaphically bound, but in Swaziland it is restricted to granitic rocks. Hemicyryptophyte, mesoxerophyte; fronds mesomorphic, poikilohydrous, articulated. Vegetative reproduction by the wide-creeping, branched rhizome. Seasonal pattern apparently pronounced with new growth restricted to the rainy season.

Distribution: Sporadic in the western half of Swaziland, occurring at altitudes ranging between 1 060 and 1 520 m. Widespread in the eastern part of west central tropical Africa, east tropical Africa, the eastern parts of south tropical and southern Africa.


poly (Greek) = many; pod (Greek) = foot

Generic description as for the species. A cosmopolitan genus of approximately 80 species.


Polypodium incanum sensu Sim, Ferns S. Afr.: 194, pl. CXI (1892).


*poly* (Greek) = many; *podioides* (Greek) = diminutive of feet

Plants epilithic or epiphytic. **Rhizome** wide-creeping, to 2 mm in diameter, laterally branched, with widely spaced phyllopodia dorsally, phyllopodia to 40 mm apart, to 2 mm long, densely set with appressed clathrate scales, scales crustaceous, bicolourous, centrally castaneous, margins membranous, hyaline, peltate, lanceolate, erose, apex terminates in a small thin-walled cell, to 4.5 mm long, to 0.7 mm wide. **Fronds** monomorphic, arching, to 280 mm long; **stipe** articulated to the phyllopodia, terete, to 110 mm long, to 1.2 mm in diameter, densely set with appressed scales, scales concolorous or bicolourous, peltate, concolorous scales circular to broadly ovate, to 2.5 mm long, to 1.5 mm wide, bicolourous scales similar to those on the rhizome, to 3 mm long, to 1 mm wide; **lamina** firmly herbaceous to coriaceous, pinnatifid, pectinate, to 170 mm long, to 78 mm wide, lobes spaced, alternate, linear-obtuse to linear-acute, to 40 mm long, to 5 mm wide, adaxially sparsely set with 2-celled hairs, abaxially closely to densely set with appressed scales, scales brown, appressed, centrally darker than the margins, peltate, circular-caudate to ovate-caudate, erose, apex terminates in a small thin-walled cell, to 0.5 mm wide; **costa** adaxially shallowly sulcate. **Vénation** obscure, free, pinnately branched in the lobes, branches forked once or twice, ending in a hydathode near the margin. **Sori** circular, at the apex of the acroscopic vein branches on the distal part of the lobes, in a single row parallel to the margin, on both sides of the costule, to 1.5 mm in diameter; exindusiate; **receptacle** set with simple, pluricellular uniseriate hairs, apical cell somewhat enlarged, to 0.3 mm long; **sporangium** long-stalked, simple, 3-seriate below the capsule, capsule circular in lateral view, with (12–)13(–14) indurated annulus cells, epistomium 4-celled, hypostomium 4-celled. **Spores** 64 per sporangium, pale yellow, ellipsoidal, monolete, rugate, (62–)64.9(–68) x (36–)37.81(–40) µm. Figure 28 B & C.

**Vernacular names:** Ecklon’s polypody; Ecklon-se-polypodie (Afr).

**Ecology:** Epilithic or epiphytic, in deep shade in evergreen forests and in partial shade on moss-covered rocks in boulder-forests. Not edaphically bound, but within Swaziland the species appears to be restricted to granitic rocks. Hemicryptophyte, mesoxerophyte; fronds mesoxeromorphic, poikilohydrous, articulated. Vegetative reproduction by the wide-creeping, many-branched rhizome. Seasonal pattern pronounced with new growth restricted to the rainy season. Often dormant during prolonged periods of drought.

**Distribution:** Sporadic in the western half of Swaziland occurring at altitudes ranging between 1 060 and 1 520 m. Confined to the wetter parts of east and south tropical Africa and the eastern parts of southern Africa.

**Microgramma** C.Presl, Tent. pterid.: 213, t. 9, fig. 7 (1836). Type: *Microgramma persicariifolia* (Schrad.) C.Presl
Figure 29 A & B, *Microgramma mauritiana*, A, habit, B, venation of fertile frond; C & D, *Pleopeltis macrocarpa*, C, habit, D, abaxial surface of lamina showing the appressed peltate scales; E, *Loxogramme abyssinica*, habit.
Generic description as for the species. A genus of approximately 15 species confined to the neotropics with one species in Africa and the western Indian Ocean region.


*Microgramma lycopodioides* auct.

*mauritiana* = from Mauritius

Plants epilithic or epiphytic. *Rhizome* wide-creeping, dorsiventrally flattened, to 5 mm in diameter, laterally branched, dorsally with two alternate rows of short, widely spaced phyllopodia, phyllopodia to 27 mm apart, to 2 mm long, densely set with appressed scales, scales chartaceous, centrally dark brown, paler towards the margin, peltate, lanceolate, margin set with apically directed oblong cells, apical cell oblong, thin-walled, to 10 mm long, to 1.5 mm wide. *Fronds* hemidimorphic, fertile marginally longer and narrower than the sterile, erect, to 200 mm long; *stipe* articulated to the phyllopodia, adaxially shallowly sulcate, to 38 mm long, to 1 mm in diameter, glabrous; *lamina* herbaceous, simple, entire, sterile ovate-acute, to 170 mm long, to 50 mm wide, fertile narrowly lanceolate, acute to cuneate, to 155 mm long, to 30 mm wide, adaxially glabrous, abaxially with appressed scales along the costa, the scales, simple and branched, to 1.5 mm long; *costa* adaxially convex, pronounced abaxially. *Vénation* obscure, reticulate, tertiary veins anadromous, areola with or without simple free included veinlets. *Sori* circular to oval, positioned at a plexus of predominantly quaternary veins in a single row on either side of the primary vein or costa, to 3 mm in diameter, exindusiate; *receptacle* paraphysate, paraphyses simple or apically with a few small thin-walled cells, to 0.7 mm long; *sporangium* long-stalked, simple, 3-seriate below the capsule, capsule with (12–)14(–15) indurated annulus cells, epistomium (3–)4(–5)-celled, hypostomium (3–)4(–5)-celled. *Speros* 64 per sporangium, yellow, ellipsoidal, monolete, verrucose, (46–)53.8(–60) x (30–)33.9(–40) μm. Figure 29 A & B.

**Vernacular names:** Rockrunner; Blinkblaar rotskruiper (Afr.); Gebeleweni (Sis.); Ikhambilentwala (Zulu).

**Ecology:** Epilithic, on partially shaded rocks, often near streams or rivers. Not edaphically bound, occurring on shale, granite and basaltic rocks within Swaziland. Hemicryptophyte, mesoxerophyte; fronds mesomorphic, articulated. Vegetative reproduction by the wide-creeping, many-branched rhizome. Seasonal pattern pronounced with new growth restricted to the rainy season.

**Distribution:** Sporadic in north-western Swaziland, and the central parts of the Lubombo mountains, occurring at altitudes ranging between 450 and 700 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.
Uses: Whole plants are used against pubic lice on humans and to prevent the lice from being transferred from one person to another. The transfer of these lice is reputed to be inflicted by witchcraft (Hutchings et al. 1996).


pleón (Greek) = much or more; pelta = small shield

Generic description as for the species. A genus of approximately 10 species, all of them occurring in tropical and South America and with one also occurring in Africa, India, Sri Lanka and the western Indian Ocean region.


Polypodium adspersum Schrad. in Gött. Gel. Anz. 1818: 915 (1818). Type: Cape, Hesse s.n. (LE, holo.).

Pleopeltis ensifolia Carm. ex Hook., Exot. fl. 1: t. 62 (1823). Type: Cape, Carmichael s.n. (K, holo.).

Polypodium lepidotum Willd. ex Schltdl., Adumbr. pl.: 17, t. 8 (1825); Pleopeltis lepidota (Willd. ex Schltdl.) C.Presl, Tent. pterid.: 193 (1836). Drynaria lepidota (Willd. ex Schltdl.) Fée, Mém. foug. 5: 270 (1852). Type: Cape, Aubert du Petit-Thouars s.n. (B-W 19612, holo.).

Polypodium lanceolatum sensu Burtt Davy, Man pl. Transvaal 1: 91 (1926).

macro (Greek) = large; carpa (Greek) = fruited


Plants epilithic or epiphytic. Rhizome wide-creeping, to 2 mm in diameter, laterally branched, dorsally with closely to widely spaced phyllopodia, phyllopodia to 24 mm apart, to 2 mm long, densely scaled, scales appressed, clathrate, ovate, cordate-imbricate to peltate, erose, apex terminates in a small thin-walled cell, with filiform trichomes abaxial on the scale lamina near the point of attachment, to 2 mm long, to 1 mm wide. Fronds monomorphic, erect to arching, to 295 mm long; stipe articulated to the phyllopodia, convex adaxially, to 52 mm long, to 1.2 mm in diameter, moderately scaled, scales similar to, but slightly paler than, those on the rhizome, also with circular, appressed, peltate scales; lamina firmly herbaceous, simple, entire, linear-cuneate, attenuate, to 210 mm long, to 14 mm wide, adaxially moderately to sparsely set with hairs and scales, hairs 2-celled, clavate, apical cell enlarged, to 120 µm long, scales appressed, clathrate, peltate, circular to lanceolate, denticulate, apex terminates in a small thin-walled cell, to 1.5 mm long, to 0.5 mm wide, abaxially moderately to densely set with hairs and scales similar to, but slightly larger than, those on the adaxial surface; costa adaxially convex,
pronounced abaxially. \textit{Venation} obscure, anadromous and catadromous, reticulate, forming a series of narrow costal, dome-shaped areola, and one or two rows of small marginal areola, with or without simple or branched excurrent or recurrent free veinlets, endings often enlarged. \textit{Sori} circular to oval, one per primary areole, innervated by simple or branched free veins or veinlets from secondary vein connectives, in a single row on either side of the primary vein or costa, to 4 mm long, exindusiate; \textit{receptacle} with long-stalked, clathrate, peltate scales, erose, to 1.6 mm in diameter; \textit{sporangium} long-stalked, simple, 3-seriate below the capsule, capsule circular to elliptic in lateral view, with (12–)14 indurated annulus cells, epistomium 4(–5)-celled, hypostomium (3–)4(–5)-celled. \textit{Spores} 64 per sporangium, stramineous, ellipsoidal, monolette, verrucose, (62–)68.2(–76) x (40–)43.3(–46) \textmu m. Figure 29 C & D.

\textit{Pleopeltis macrocarpa} var. \textit{laciniata} Stolze is confined to Peru and \textit{P. macrocarpa} var. \textit{interjecta} (Weath.) A.R.Sm. to Mexico and Guatemala.

\textbf{Vernacular names:} Lance fern, Scaly lance-fern; Lansvaring (Afr); Gebeleweni (Sis.).

\textbf{Ecology:} Epilithic or epiphytic, usually in deep shade in moist evergreen forests. Not edaphically bound, but in Swaziland the species appears to be restricted to granitic rocks. Hemicyrptophyte, mesoxerophyte; fronds mesomorphic, poikilohydrous, articulated. Vegetative reproduction by the wide-creeping, many-branched rhizome. Seasonal pattern pronounced with new growth restricted to the rainy season, frequently dormant during the dry winter months.

\textbf{Distribution:} Frequent in the western half of Swaziland, occurring at altitudes ranging between 1 150 and 1 520 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.

\textbf{Loxogramme} (Blume) C.Presl, Tent. pterid.: 214, t. 9, fig. 8 (1836).

\textit{loxós} (Greek) = oblique; \textit{gramma} (Greek) = line

Generic description as for the species. A genus of approximately 22 species occurring throughout the tropics and warm temperate regions of the world with the largest concentration of species in Asia and one species in Central America.


\textit{Loxogramme lanceolata} auct.

\textit{abyssinica} = from Abyssinia (Ethiopia)

Plants epilithic or epiphytic. \textit{Rhizome} wide-creeping, dorsiventrally flattened, to 1.3 mm in diameter, laterally branched, set with roots, the roots closely set with ferrugineous unacellular adhesive hairs, to 0.5 mm long, dorsally with two alternate rows of phyllopodia, to 2 mm long, to 44 mm apart, and scales, scales chartaceous, castaneous, adnate, subulate, cordate, entire to denticate, often with unicellular thin-walled cells proximally along the margin, apical cell subulate or small and thin-walled, to 3 mm long, to 1 mm wide. \textit{Fronds} monomorphic, erect to arching, to 235 mm long; \textit{stipe} articulated to the phyllopodia, poorly defined, terete, narrowly winged along the entire length, to 28 mm long, basally sparsely scaled, scales similar to those on the rhizome; \textit{lamina} firmly herbaceous, simple, entire, narrowly elliptic-cuneate, to oblong-cuneate, attenuate, to 210 mm long, to 22 mm wide, adaxially glabrous, abaxially sparsely set with clavate 2-celled hairs;
costa adaxially raised, convex. Vénation anadromous and catadromous, obscure, reticulate, areolae with or without included free veinlets. Sori linear, at a vascular plexus at an acute angle on either side of the costa, to 16 mm long, exindusiate; receptacle with simple, pluricellular; uniseriate hairs ending in a gland-like cell, to 0.3 mm long; sporangium long-stalked, simple, 3-seriate below the capsule, capsule globose in lateral view, with (12–)13(–14) indurated annulus cells, epistomium 4-celled, hypostomium (3–)4-celled. Spores 64 per sporangium, pale brown, ellipsoidal, monolete, rugate, (52–)61.04(–68) x (34–)41.42(–46) µm. Figure 29 E.

Vernacular names: Gilled lance-fern; Kiewvaring (Afr.); Gebeleweni (Sis.).

Ecology: Epilithic or epiphytic, usually in deep shade in moist or seasonally moist evergreen forests, but also on moss-covered rocks in forest pockets. Not edaphically bound, but in Swaziland the species is restricted to granite. Hemicyryptophyte, mesophyte; fronds mesomorphic, poikilohydrous, articulated. Vegetative reproduction by the wide-creeping, many-branched rhizome. Seasonal pattern pronounced with new growth restricted to the rainy season, frequently dormant during the dry winter months.

Distribution: Rare in Swaziland and known from the Mbabane area only, occurring at an altitude of ± 1 370 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.

**Nephrolepidaceae Pic.Serm.**

**Nephrolepis** Schott, Gen. fil. 1, t. 3 (1834). Lectotype: *Nephrolepis exaltata* (L.) Schott, designated by J. Smith (1875).

*nephrós* (Greek) = kidney; *lepis* = scale

Generic description as for the species. A genus of approximately 30 species occurring throughout the warmer parts of the world, but with the greatest number of species concentrated in south-east Asia.


exaltata = lofty or raised high

Plants terrestrial, epilithic or epiphytic. *Rhizome* short-decumbent to erect, to 4 mm in diameter, stoloniferous and tuber-forming, closely set with stiff, brown roots, crowded stipe bases and scales, tubers ovate to elliptic, to 22 mm long, to 13 mm in diameter, densely scaled, scales chartaceous, stramineous to ferrugineous, peltate, lanceolate, entire to irregularly denticulate, regularly set with capitate glandular hairs, apex terminates in an aciculate cell, to 6 mm long, to 1 mm wide.
Figure 30 A & B, *Nephrolepis exaltata*, A, habit, B, abaxial surface of fertile pinna; C–E, *Ampelopteris prolifera*, C, lamina portion, D, rhizome, E, fertile pinna section.
Fronds caespitose, erect to arching, to 1.1 m long, up to 18 per plant; stipe rigid, brown, adaxially sulcate, to 140 mm long, to 3.5 mm in diameter, initially densely scaled, glabrous to subglabrous later, scales chartaceous, stramineous, sessile, lanceolate to lanceolate-caudate, cordate-imbricate to peltate, irregularly denticate, also with capitate glandular hairs, basal margin irregularly long-fimbriate, apex terminates in an acicular cell, to 8 mm long, to 1 mm wide; lamina 1-pinnate, linear-acute, attenuate, to 1.1 m long, to 80 mm wide; rachis adaxially sulcate, moderately to densely set with ferrugineous scales similar to those on the stipe; pinnae articulated to the rachis, somewhat imbricate, sessile, oblong-obtuse to oblong-acute, acropetally auricled, truncate to cordate, dentate, to 38 mm long, to 11 mm wide, adaxially sparsely set with 2- or 3-celled hairs of which the apical cell is glandular, to 140 µm long, abaxially with simple and branched hairs along the costa and veins, apical cell clavate, thin-walled; costa adaxially shallowly sulcate. Venation obscure, appears isodromous, free, pinnately branched in the pinnae, branches forked once near the costa, ending in a hydathode in the teeth near the margin. Sori reniform, at the end of a shortened acropetal vein branch, in a single row on both sides of the costa; indusium reniform, castaneus at the point of attachment, margins hyaline, entire, to 1.2 mm in diameter; receptacle nude; sporangium long-stalked, simple, 3-seriate below the capsule, capsule globose to elliptic in lateral view, with (12–)13 indurated annulus cells, epistomium 4-celled, hypostomium 4-celled. Spores 64 per sporangium, brown, ellipsoidal, monolete, irregularly tuberculate, (26–)27.2(–28) x (18–)18.7(–20) µm. Figure 30 A & B.

Vernacular names: Sword fern; Stoepvaring (Afr.).

Ecology: Terrestrial or epilithic, in deep shade along moist forest margins and on dry and exposed road cuttings, often forming large monospecific stands. Not edaphically bound, but in Swaziland the species is restricted to the greenstone belt. Nanophanerophyte, mesophyte; fronds mesomorphic, pinnae articulated along the rachis. Vegetative reproduction by rhizome branching, but more successfully by tuber-forming stolons. Seasonal pattern pronounced in less favourable environments with new growth restricted to the rainy season.

Distribution: A native of tropical America, but now introduced to many parts of the world. In Swaziland the species is known from the Bulembu and Mbabane areas only, occurring at altitudes ranging between 1 200 and 1 500 m.

Uses: The species, and numerous cultivars of it, is widely cultivated as a garden ornamental from where it has escaped.

THELYPTERIDACEAE Pic.Serm.

The earliest known fossil record for the family was described as Abacopteris by Barthel (1976) and spans the Eocene to Pliocene in Europe. The family apparently has no close relatives, and its affinities are not known. The family is a large one, with approximately 1 000 species occurring throughout the temperate and tropical regions of the world. Generic classifications for the family are diverse, some workers recognise one (Tryon & Tryon 1982), whilst Pichi Sermolli (1977) recognises 32. Holttum (1971), who is followed here, recognises 25.
Key to the genera:
1a Fronds proliferous, buds either irregular along the rachis, or with one or two buds near the lamina apex:
   2a Rhizome wide-creeping; with up to 7 vein pairs of adjacent lobes anastomosing below the sinus; proliferous buds axillary, occurring irregularly on the lamina, these are confined to the pinna axils ........................................... Amauropelta
   2b Rhizome short, erect to suberect; with up to 4 vein pairs of adjacent lobes anastomosing below the sinus; proliferous buds adaxially on the rachis and confined to the lamina apex ........................................... Pneumatopteris

1b Fronds never proliferous:
   3a Vein branches in the lobes forked ......................................................... Thelypteris
   3b Vein branches in the lobes always simple:
      4a Sori linear; exindusiate ........................................................... Stegnogramma
      4b Sori circular; indusiate or exindusiate:
         5a With a single pair of veins of adjacent lobes anastomosing below the sinus, the excurrent vein ending in the sinus between two adjacent lobes:
            7a Rhizome wide-creeping, with widely spaced (to 300 mm apart) fronds; costa abaxially with scattered scales, lamina adaxially and abaxially glabrous between the veins .................................................. Cyclosorus
            7b Rhizome decumbent, suberect or erect with closely spaced to crowded fronds; costa abaxially without scales; lamina adaxially and abaxially with acicular hairs between the veins ........................................... Christella
         5a Vein branches all free:
            6a Lamina abaxially with acicular and uncinate (hooked) hairs on and between the veins .................................................. Amauropelta
            6b Lamina abaxially with acicular hairs on and between the veins, and with unicellular oblong glands between the veins .................................................. Christella


ampelos (Greek) = a vine; pteris = a fern


Plants terrestrial. Rhizome wide-creeping, to 8 mm in diameter, irregularly branched, set with roots, spaced stipe bases, and sparsely set with scales, scales chartaceous, castaneous, sessile, ovate, cordate to cordate-imbricate, repand, often irregularly set with oblong thin-walled cells, apex terminates in an oblong thin-walled cell, to 2.5 mm long, to 1.5 mm wide. Fronds to 15 mm apart, straggling, to 1.3 mm long; stipe proximally black, brown to strawmuneous distally, adaxially shallowly sulcate, to 325 mm long, to 4 mm in diameter, set with hairs and scales, hairs are unicellular and acicular, to 0.3 mm long, scales sparsely set, chartaceous, ferrugineous, sessile,
lanceolate to ovate, cordate-imbricate, margins variously set with oblong thin-walled cells, unicellular acicular cells and uniseriate hairs several cells long, of which the apical cell is enlarged, apex terminates in an oblong thin-walled cell, to 4.5 mm long, to 0.6 mm wide; lamina 1-pinnate, oblong-acute, to 1 m long, to 165 mm wide, with up to 22 free pinna pairs, the basal pinnae often significantly reduced, irregularly proliferous along the rachis; rachis stramineous, adaxially sulcate, sulcus not open to that of the costa, closely set with hairs similar to that on the stipe, also with 2-celled glandular hairs, sparsely scaled, scales chartaceous, ferrugineous to stramineous, sessile, ovate, cordate to cordate-imbricate, margins closely set with unicellular acicular hairs, apex terminates in an oblong thin-walled cell, to 1.5 mm long, to 0.4 mm wide, proliferating buds confined to the pinna axils, scaled, scales chartaceous, ferrugineous, similar to, but larger than, those on the rachis, to 1.5 mm long, to 0.5 mm wide; pinnae herbaceous, alternate, short-stalked, stalk to 1 mm long, oblong-acute, obtuse to truncate, often slightly inequilateral, crenate, to 103 mm long, to 17 mm wide, adaxially glabrous, abaxially with hyaline, unicellular, acicular hairs along the costa and veins, sparsely scaled, scales chartaceous, ferrugineous, sessile, cordate, margins set with acicular hairs, apex terminates in an oblong cell, to 0.8 mm long, to 0.4 mm wide; costa adaxially shallowly sulcate, variously set with unicellular acicular hairs, abaxially pronounced, variously set with acicular hairs and scales similar to those on the rachis. Venation anadromous to catadromous, evident, pinnately branched in the lobes, veins simple, with up to 7 vein pairs of adjacent lobes anastomosing, the flexuose excurrent vein running to the sinus between two adjacent pinna lobes, the 2 to 5 free vein branch pairs end in the margin. Sori long, medial or inframedial on the anastomosing and free vein branches, sori often confluent and then without an excurrent vein, exindusiate; receptacle with simple, pluricellular hairs of which the apical cell is yellow and significantly enlarged; sporangium short-stalked, simple or occasionally with a hair similar to that on the receptacle, 3-seriate below the capsule, capsule globose to obovate, with (16–)18(–19) indurated annulus cells, epistomium (3–)4(–5)-celled, hypostomium 4(–6)-celled. Spores 64 per sporangium, brown, ellipsoidal, monolete, echinulate.

Vernacular names: Riverine scrambler; Oewer kloutervaring (Afr.).

Ecology: Terrestrial, between stones and boulders in riparian thickets and Phragmites along stream and riverbanks, partially shaded or exposed. Not edaphically bound, occurring on granitic and basaltic soils within Swaziland. Geophyte or hemicryptophyte, fronds mesomorphic. Vegetative reproduction by the wide-creeping, much branched rhizome and proliferous fronds. Seasonal pattern apparently non-existent, no dormant period.

Distribution: Sporadic in Swaziland and known from the banks of the Komati and Mbuluzi rivers only, occurring at altitudes ranging between 100 and 600 m. The species is widespread throughout the palaeotropics.

Cyclosorus Link, Hort. berol. 2: 128 (1833). Type: Cyclosorus gogylodes (Schkuhr) Link

kuklos (Greek) = a circle; sorus = sorus

Generic description as for the species. A genus of about three species with a pantropical distribution.


Type: e Cap. b. Spei, Thunberg s.n. (UPS-THUNB 24724!, holo.).

Aspidium ecklonii Kunze in Linnaea 10: 546 (1836). Type: In dumetis ad fluv. Zwartkopsrivier (distr. Uitenhage), Ecklon s.n. (LZ†, syn.); Inter Omtendo et Omsamculo in umbrosis, 400 p., 1838, Drège s.n. [LZ†; BM!, lecto., designated by Roux (1986)].

Nephrodium unitum sensu Sim, Ferns S. Afr.: 178, pl. XCVIII (1892).


interruptus = interrupted or not continuous

Plants terrestrial. Rhizome subterranean, wide-creeping, to 6 mm in diameter, irregularly branched, set with roots, spaced stipe bases and scales, scales sparsely set, chartaceous, castaneous, sessile, ovate to lanceolate, margins set with unicellular acicular hairs and clavate or elliptic gland-like cells, apex terminates in an elliptic thin-walled cell, to 6 mm long, to 1.5 mm wide. Fronds to 300 mm apart, erect, to 1.7 m long; stipe firm, proximally purple-brown, stramineous distally, adaxially sulcate, to 780 mm long, to 5 mm in diameter, proximally sparsely set with scales similar to those on the rhizome, glabrous higher up; lamina 1-pinnate, narrowly elliptic, to 800 mm long, to 450 mm wide, with up to 38 petiolated pinna pairs, basal pinnae often slightly reduced; rachis stramineous, adaxially sulcate, sulcus not open to that of the costa, densely set with hyaline, unicellular, acicular and oblong hairs, sparsely set with ferrugineous scales similar to, but smaller than, those on the rhizome; pinnae sessile or short-stalked, if stalked then to 1 mm long, herbaceous to thinly coriaceous, alternate, spaced or overlapping, linear-cuneate, to 225 mm long, to 28 mm wide, lobed to 4 mm from the costa, lobes triangular-obtuse to triangular-cuspidate, entire, adaxially variously set with hyaline, unicellular, acicular hairs along the costa, veins, and pinna margin, abaxially closely set with hyaline, unicellular, acicular hairs along the costa, veins and area between the veins, to 1.8 mm long; costa adaxially shallowly sulcate, pronounced abaxially. Vénation evident, pinnately branched in the lobes, vein branches simple, with a single pair of veins from adjacent lobes anastomosing below the sinus, excurrent vein terminates in the sinus between the lobes, second vein pair terminates in the sinus or just above, free vein branches end in the lobe margin. Sori circular, medial on the veins, often also on the excurrent vein; indusium chartaceous, brown, reniform, set with unicellular acicular hairs along the margin and surface, also with scattered unicellular hairs along the margin, to 0.6 mm in diameter, and the cells oblong; receptacle nude; sporangium long-stalked, 3-seriate below the capsule, simple or with a long uniseriate trichome ending in a large globose cell on the stalk, capsule globose, with 15–19 indurated annulus cells, epistomium (3–)4-celled, hypostomium (3–)4(–5)-celled. Spores 64 per sporangium, brown, ellipsoidal, monolete, with short perforated ridges, (46–)52.7(–58) µm. Figure 31 A–E.
Figure 31 A–E, *Cyclosorus interruptus*, A, lamina section, B, lamina apex, C, rhizome, D, sterile pinna section showing the venation pattern, E, fertile pinna section; F & G, *Amauropelta bergiana* var. *bergiana*, F, frond, G, fertile pinna section.
Vernacular names: Robust marsh fern; Groot moerasvaring (Afr.).


Distribution: Common and widespread throughout Swaziland, occurring at altitudes ranging between 100 and 1 520 m. This pantropical species is widespread in sub-Saharan Africa.

Amauropelta Kunze, Farrnkräuter 1: 86, 109, t. 51 (1842). Type: Amauropelta breutelii Kunze

amauros (Greek) = obscure; pelta = small shield

Generic description as for the species. A genus of approximately 200 species occurring mainly in the neotropics with a few species in Africa and the western Indian Ocean region.


bergiana = after Carl Heinrich Borgius (1790–1818), German cavalryman and naturalist.


Plants terrestrial. Rhizome erect to suberect, simple, to 70 mm long, to 5 mm in diameter, densely set with roots, crowded stipe bases, and scales, scales chartaceous, castaneous to ferrugineous, sessile, lanceolate, cordate, margins and scale surfaces set with unicellular acicular hairs, margins also with unicellular oblong and globose, thin-walled cells, apex terminates in a large thin-walled cell, to 7 mm long, to 2 mm wide. Fronds crowded, caespitose, erect to arching, to 740 mm long, to 10 per plant; stipe firm, purple-brown, adaxially sulcate, to 155 mm long, to 3 mm in diameter, proximally densely set with scales similar to those on the rhizome, sparsely scaled distally, densely set with hyaline, unicellular, acicular or unicinate hairs, to 0.4 mm long; lamina 1-pinnate, narrow-elliptic to lanceolate, to 575 mm long, to 190 mm wide, with up to 18 free pinna pairs, several pairs gradually reduced towards the base; rachis pur-
ple-brown, adaxially sulcate, sulcus not open to that of the costa, densely set with hairs similar to those on the stipe; *pinnae* herbaceous, alternate to opposite, spaced, those at the base more widely spaced than those higher up, sessile, oblong-cuneate, to 105 mm long, to 18 mm wide, deeply lobed, lobes dentate to crenulate, to 8 mm long, to 4 mm wide, adaxially closely set with hairs similar to those on the rachis.

*Costa* adaxially sulcate, pronounced abaxially, set with hairs similar to those on the rachis.

*Venation* proximally anadromous, distally catadromous, evident, pinnately branched in the lobes, branches simple, free, ending in the margin in the sinus between the teeth. *Sori* circular, medial on the veins, up to 9 pairs per lobe; *indusium* chartaceous, brown, reniform to subcircular, with unicellular, acicular hairs along the margin and on the indusium surface, to 1 mm in diameter; *receptacle* nude; *sporangium* long-stalked, 3-seriate below the capsule, simple, capsule circular in lateral view, with 13(–14) indurated annulus cells, epistomium (3–)4(–5)-celled, hypostomium (3–)5(–6)-celled. *Spores* 64 per sporangium, brown, ellipsoidal, monolete, irregularly reticulate, (48–)54.87(–62) x (28–)29.62(–32) µm. Figure 31 F & G.

**Vernacular names:** Bergius’s wood fern; Bergius-se-woudvaring (Afr.).

**Ecology:** Terrestrial, in shade in moist or seasonally moist scrub and forest undergrowth, often also in wet conditions at waterfalls. Not edaphically bound, also occurring in deep leaf-litter. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction irregular by the sparsely and closely branched rhizome. Seasonal pattern pronounced, with new growth restricted to the rainy season.

**Distribution:** Sporadic in the western half of Swaziland, occurring at altitudes ranging between 600 and 1 520 m. Widespread in west central tropical Africa, east tropical Africa and the eastern parts of south tropical and southern Africa and the western Indian Ocean region.

**Thelypteris** Schmidel, Icon. pl. (Ed. J.C. Keller): 3, 45, t. 11, 13 (1763), nom. cons. Type: *Thelypteris palustris* Schott

*thelys* (Greek) = female; *pteris* = fern

Generic description as for the species. A genus of approximately three species occurring in the north and south temperate regions of the world.


*Nephrodium thelypteris* sensu Sim, Ferns S. Afr.: 179, pl. XCIX (1892).


confluens = confluent, or running together
Plants terrestrial. **Rhizome** wide-creeping, irregularly branched, to 2.2 mm in diameter, set with roots, widely spaced stipe bases and scales, scales chartaceous, castaneous, sessile, ovate to broadly ovate, cordate to cordate-imbricate, margins regularly set with unicellular capitate glands, similar glands also occur on the scale lamina, apex terminates in an oblong thin-walled cell, to 2.2 mm long, to 1.3 mm wide. **Fronds** spaced, to 70 mm apart, to 950 mm long; **stipe** proximally castaneous to atrocastaneous, stramineous higher up, shallowly sulcate adaxially, to 465 mm long, to 2.5 mm in diameter, sparsely set with scales similar to those on the rhizome, closely set with pale unicellular acicular hairs, to 0.5 mm long; **lamina** 1-pinnate-pinnatifid, narrow-elliptic to oblong-cuneate, to 385 mm long, to 175 mm wide, with up to 18 free pinna pairs, basal pinnae not or slightly reduced; **rachis** castaneous, adaxially sulcate, not confluent with that of the costa, closely set with soft, stramineous to ferrugineous, unicellular, acicular hairs, to 0.6 mm long; **pinnae** petiolate, petiole to 1 mm long, herbaceous, opposite to alternate, proximally more widely spaced than distally, linear-cuneate, to 100 mm long, to 17 mm wide, pinnatifid, segments oblong-obtuse to oblong-acute, entire, to 9 mm long, to 4 mm wide, adaxially sparsely set with soft, unicellular, acicular hairs along the costa and veins, and scales along the costa, scales chartaceous, pale brown, sessile, lanceolate to ovate, cordate, margins regularly set with capitate glands along the margin, apex terminates in an oblong thin-walled cell, to 1.5 mm long, to 0.5 mm wide, abaxially set with glands, hairs, and scales, glands unicellular, capitate, to 165 μm long, occurring along and between the veins, hairs soft, unicellular, acicular, to 0.6 mm long, occurring along the costa, veins and lamina margin, scales sessile, broadly ovate, cordate, margins set with unicellular, capitate glands along the margin and scale surface, apex terminates in an oblong thin-walled cell, to 1.2 mm long, to 1 mm wide, occurring along the costa and veins; **costa** adaxially sulcate, pronounced abaxially. **Venation** proximally anadromous, catadromous distally, evident, pinnately branched in the segments, vein branches forked, simple near the apex, ending in the margin. **Sori** circular, medial on the veins, up to 9 pairs per lobe; **indusium** chartaceous, stramineous, reniform to irregularly shaped, regularly set with obovate and acicular hairs along the margin and surface, to 1 mm in diameter; **receptacle** nude; **sporangium** long-stalked, 3-seriate below the capsule, simple, with (15–)19(–19) indurated annulus cells, epistomium (3–)4(–5)-celled, hypostomium (3–)4(–5)-celled. **Spores** 64 per sporangium, brown, ellipsoidal, monolete, verrucose, (40–)41.75(–44) x (26–)27.25(–30) μm. Figure 32 A & B.

**Vernacular names:** Marsh fern, Bog fern; Moerasvaring (Afr.).

**Ecology:** Terrestrial, among grasses and sedges in marshes, vleis and in seepage areas along streams, usually in exposed conditions. Not edaphically bound, but generally occurring in deep humus. Geophyte or hemicyryptophyte, helophyte; fronds mesomorphic. Vegetative reproduction by the wide-creeping, many-branched rhizome. Seasonal pattern pronounced with new growth restricted to the warmer summer months. In lower-lying areas the fronds may be damaged by frost. Pyrophytic.

**Distribution:** Frequent in the western half of Swaziland, occurring at altitudes ranging between 600 and 1 340 m. Widespread in the eastern parts of west central tropical Africa, east and south tropical Africa and southern Africa, and the western Indian Ocean region.

stegnón (Greek) = cover; gramma = line

Generic description as for the species. A genus of approximately 15 species mainly in the palaeotropics, but with a few species extending to the neotropics.


pozoi = after D.G. del Pozo who first collected the species in Spain.

Plants terrestrial or epilithic. Rhizome suberect to erect, rarely branched, to 55 mm long, to 6 mm in diameter, set with roots, crowded stipe bases, and sparsely set with scales, scales chartaceous, castaneous, adnate, triangular to broadly ovate, margins irregularly set with unicellular acicular hairs, clavate unicellular hairs, and 2- or 3-celled hairs of which the apical cell is globose and much enlarged, to 2.5 mm long, to 1.5 mm wide. Fronds crowded, caespitose, erect to arching, to 660 mm long, to 12 per plant; stipe firm, castaneous to ferrugineous, matt, adaxially shallowly sulcate, to 230 mm long, to 2.5 mm in diameter, sparsely set with scales similar to those on the rhizome, closely set with hyaline, unicellular acicular hairs of two lengths, shorter hairs to 100 mm long, longer hairs to 0.8 mm long; lamina anadromous, catadromous towards the apex, 1-pinnate-pinnatifid, narrow-elliptic, to 435 mm long, to 200 mm wide, with up to 7 sessile pinna pairs, those higher up progressively basiscopically decurrent,
adnate at apex, basal 3 or 4 pinna pairs slightly and gradually reduced; *rachis* greenish, adaxially shallowly sulcate, not confluent with that of the costa, closely set with hyaline, unicellular, acicular hairs similar to those on the stipe; *pinnae* sessile, herbaceous, opposite to alternate, proximally widely spaced, more closely spaced distally, linear-cuneate, to 105 mm long, to 18 mm wide, lobed, lobes obtuse, shallowly crenulate, to 6 mm long, to 6 mm wide, adaxially moderately set with hyaline, unicellular hairs along the costa, veins and on the lamina between the veins, and sparsely set with 3-celled hairs of which the apical cell is much enlarged and globose, to 140 µm long, abaxially more densely set with stiff, hyaline, unicellular hairs along the costa, veins and on the lamina between the veins, longer hairs restricted to the costa and veins, to 0.9 mm long, and 3–5-celled hairs if which the apical cell is much enlarged and globose, to 140 µm long; *costa* adaxially sulcate, pronounced abaxially. *Venation* proximally anadromous, catadromous distally, evident, pinnately branched in the segments, free, vein branches simple, ending near the margin. *Sori* linear, to 3 mm long, medial to inframedial on veins, up to 6 pairs per lobe; *exindusiate; receptacle* nude; *sporangium* short-stalked, 3-seriate below the capsule, simple, capsule globose in lateral view, setose, with 2 or 3 unicellular acicular hairs, with (14–16–17) indurated annulus cells, epistomium 3-celled, hypostomium (3–)4(–5)-celled. *Spores* 64 per sporangium, atrocastaneus, ellipsoidal, monolete, echinate, exospore (34–)36.5(–40) x (20–)22.8(–26) µm. Figure 32 C & D.

**Vernacular names:** Pozo’s marsh fern; Pozo-se-woudvaring (Afr).

**Ecology:** Terrestrial, confined to the banks of perennial streams and marshy areas in deep shade in evergreen forests. Not edaphically bound. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the short, rarely branched rhizome. Seasonal pattern apparently non-existent.

**Distribution:** Rare in Swaziland and currently known from the north-western corner of the country only, occurring at an altitude of ± 1 300 m. Widespread in west central tropical Africa, east and south tropical Africa, southern Africa and the western Indian Ocean region, Macaronesia and northern Spain.

**Pneumatopteris** Nakai in Bot. Mag. (Tokyo) 47: 179 (1933). Type: *Pneumatopteris callosa* (Blume) Nakai

*pneuma* (Greek) = wind or breath; *pteris* = fern

Generic description as for the species. A genus of approximately 70 species occurring throughout the tropics and subtropics of the Old World and Hawaii, most of them Malesian.

Plants terrestrial. *Rhizome* short, erect to suberect, simple, to 90 mm long, to 7 mm in diameter, set with wiry roots, closely spaced stipe bases, and few scales at the apex, scales crustaceous to chartaceous, castaneous, sessile, broadly ovate, cordate, margins irregularly set with unicellular capitate glands, apex terminates in an oblong thin-walled cell, to 3.5 mm long, to 3 mm wide. *Fronds* caespitose, erect to arching, to 1.7 m long, to 10 per plant; *stipe* firm, proximally castaneous, stramineous higher up, adaxially sulcate, to 565 mm long, to 6 mm in diameter, sparsely set with scales similar to those on the rhizome; *lamina* 1-pinnate, narrowly elliptic to oblong-cuneate, to 1.4 m long, to 460 mm wide, with up to 31 pinna pairs, several basal pairs gradually reduced; *rachis* stramineous, adaxially sulcate, sulcus not open to that of the costa, closely set with stramineous to pale ferrugineous, unicellular, acicular hairs, to 190 µm long, proliferous near the apex; *pinnae* sessile, herbaceous, opposite to alternate, spaced, those at the base more widely spaced, linear-cuneate, to 230 mm long, to 29 mm wide, obtusely lobed, lobe margins entire to shallowly crenulate, adaxially glabrous, abaxially moderately to closely set with unicellular, acicular hairs along the costa and veins, sparsely scaled along the costa, scales chartaceous, stramineous, sessile, cordate, margins irregularly set with capitate glands, apex terminates in an oblong thin-walled cell, to 1.8 mm long, to 0.8 mm wide; *costa* adaxially sulcate, pronounced abaxially. *Vénation* anadromous, catadromous towards the apex, evident, pinnately branched in the lobes, vein branches simple, with up to 4 pairs of veins from adjacent lobes anastomosing below the sinus, excurrent vein terminating in the sinus between the lobes, free vein branches terminate in the margin. *Sori* circular to elongate, inframedial on vein branches, to 8 pairs per lobe; exindusiate; *receptacle* nude; *sporangium* long-stalked, 3-seriate below the capsule, with a 2- or 3-celled hair on the stalk, capsule globose in lateral view, with (13–)14(–16) indurated annulus cells, epistomium 3(–4)-celled, hypostomium 4(–5)-celled. *Spores* 64 per sporangium, brown, ellipsoidal, monolette, irregularly broadly winged, (40–)41.16(–44) x (26–)27.83(–30) µm. Figure 33A–C.

**Vernacular names:** Mother wood fern; Moeras moedervaring (Afr).

**Ecology:** Terrestrial, among rocks along perennial streams or seepage areas in evergreen forests, usually in deep shade. Not edaphically bound. Nanophanerophyte, helophyte; fronds mesomorphic. Vegetative reproduction by the shortly and closely branched rhizome and fronds which are proliferous near the apex. Seasonal pattern apparently non-existent.

**Distribution:** Sporadic in the higher-lying areas of Swaziland, occurring at altitudes ranging between 1 200 and 1 520 m. The species is widespread in the eastern parts of west central tropical Africa, east and south tropical Africa and the eastern parts of southern Africa.


**Christella =** in honour of Konrad Hermann Heinrich Christ (1833–1933), Swiss pteridologist and phytogeographer.
Figure 33 A–C, *Pneumatopteris unita*, A, pinnae, B, proliferous lamina apex, C, fertile pinna lobes; D & E, *Christella dentata*, D, basal part of lamina, E, fertile pinna lobes.
Plants terrestrial. *Rhizome* decumbent, suberect to erect, simple or branched, closely set with roots, stipe bases, and scales, scales chartaceous, sessile, subulate to lanceolate, cordate, margins irregularly set with pluricellular hairs terminating in an oblong or globose thin-walled cell, and unicellular oblong and acicular hairs occurring along the margin and often on the scale surface, scale apex terminates in an oblong thin-walled cell. *Frondes* closely spaced to crowded, erect to arching; *stipe* adaxially sulcate, proximally sparsely to moderately scaled, scales chartaceous, sessile, lanceolate, margins irregularly set with pluricellular, recurrent hairs terminating in an oblong thin-walled cell, unicellular oblong-acute to oblong-obtuse, entire to shallowly dentate, often somewhat falcate, adaxially closely to moderately set with unicellular, acicular hairs along and between the veins, those along the costa and veins often slightly longer, often also with unicellular capitulate glands on the lamina between the veins, abaxially closely to densely set with unicellular, often also tricellular acicular hairs along and between the veins, often also with unicellular oblong, or capitulate glands between the veins; *costa* adaxially sulcate, pronounced abaxially, set with hairs similar to those on the rachis. *Vénation* proximally anadromous, distally catadromous, evident, pinnately branched in the lobes, branches simple, ending in the margin, free or with a single pair of veins anastomosing below the sinus, with the excurrent vein terminating in the sinus between the lobes. *Sori* circular, medial on the veins, up to 9 pairs per lobe; *indusium* chartaceous to firmly chartaceous, brown, persistent, semicircular to reniform, with unicellular, acicular hairs, often also with oblong glands along the margin and surface; *receptacle* nude; *sporangium* long-stalked, 3-seriate below the capsule, simple or glandular, capsule circular to broadly ovate in lateral view, with 13, 14, 16 indurated annulus cells, epistomium (2–)3(–4)-celled, hypostomium (3–)4(–5)-celled. *Spores* 64 spores per sporangium, ellipsoidal, monolete.

A genus of approximately 110 species occurring throughout the tropical and temperate parts of the world.

**Key to the species:**

1a Veins all free ................................................................. *C. gueinziana*

1b With a single pair of veins from adjacent lobes anastomosing below the sinus, with the excurrent vein terminating in the sinus between the lobes:
   2a Rhizome decumbent; pinnae abaxial with unicellular acicular hairs along and between the veins ................................................................. *C. dentata*

   2b Rhizome suberect to erect; pinnae abaxial with uni- and pluricellular acicular hairs along and between the veins, also with unicellular capitulate glands on the lamina between the veins ................................................................. *C. hispidula*


*Nephrodium hispidulum* Peter in Feddes Repert. Spec. Nov. Regni Veg.: 40, 1: 58, Descr. 10, t. 4a, b (1929). Type: Rhodesia, *Peter s.n.* (B, holo.).
dentata = dentate or toothed

Plants terrestrial. Rhizome decumbent, simple or branched, to 200 mm long, to 6 mm in diameter, closely set with roots, stipe bases, and scales, scales chartaceous, ferrugineous, sessile, lanceolate, margins irregularly set with pluricellular, recurrent hairs terminating in an oblong thin-walled cell, and unicellular acicular hairs occurring along the margin and on the scale surface, scale apex terminates in an oblong thin-walled cell, to 10 mm long, to 1.5 mm wide. Fronds closely spaced, to 10 mm apart, erect to arching, to 1.5 m long; stipe firm, purple-brown, adaxially sulcate, to 445 mm long, to 6 mm in diameter, proximally moderately scaled, scales chartaceous, ferrugineous, sessile, lanceolate, margins irregularly set with pluricellular, recurrent hairs terminating in an oblong thin-walled cell, unicellular oblong cells and unicellular, acicular hairs, which also occur on the scale lamina, closely set with stramineous, unicellular, acicular hairs; lamina 1-pinnate-pinnatifid, elliptic, to 1.05 m long, to 450 mm wide, with up to 30 free pinna pairs, at least the 4 basal pinna pairs gradually reduced; rachis purple-brown, adaxially sulcate, sulcus not open to that of the costa, closely set with hairs similar to those on the stipe; pinnae sessile, herbaceous, opposite to alternate, spaced, but often overlapping towards the apex, oblong-cuneate, basal pinnae often acroscopically auricled, to 220 mm long, to 25 mm wide, deeply lobed, lobes oblong-acute, often somewhat falcate, to 13 mm long, to 4.5 mm wide, adaxially moderately set with hyaline, unicellular, acicular hairs along the costa, veins, and between the veins, abaxially densely set with hyaline, unicellular, acicular hairs along and between the veins, to 0.6 mm long; costa adaxially sulcate, pronounced abaxially, set with hairs similar to those on the rachis. Venation proximally anadromous, distally catadromous, evident, pinnately branched in the lobes, branches simple, ending in the margin, with a single pair of veins anastomosing below the sinus, with the excurrent vein terminating in the sinus between the lobes. Sori circular, medial on the veins, up to 7 pairs per lobe; indusium chartaceous, brown, persistent, reniform, with unicellular, acicular hairs along the costa, veins, and between the veins, abaxially densely set with hyaline, unicellular, acicular hairs along and between the veins, to 1 mm in diameter; receptacle nude; sporangium long-stalked, 3-seriate below the capsule, simple or glandular, capsule circular in lateral view, with (13–)14(–16) indurated annulus cells, epistomium (2–)3(–4)-celled, hypostomium (3–)4-celled. Spores 64 spores per sporangium, dark brown, ellipsoidal, monoletes, closely set with narrow reticulate ridges, (36–)38.1(–42) x (24–)27.1(–28) µm. Figure 33 D & E.

Vernacular names: Downy wood fern; Donsige moerasvaring (Afr.).

Ecology: Terrestrial, along stream banks in forest, on forest floor, and frequently also in disturbed sites such as road cuttings, mostly in light shade, but often also in full sunlight. Not edaphically bound, in Swaziland occurring in granitic and pyroclastic soils. Hemicyryptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the decumbent, branched rhizome, resulting in the formation of small clonal stands. Seasonal pattern apparently pronounced with new growth restricted to the rainy season.

Distribution: Common in the western half of Swaziland, occurring at altitudes ranging between 500 and 1 500 m. A pantropical species that is widespread in sub-Saharan Africa.

**THELYPTERIDACEAE**

gueinzianum** Mett. in Abh. Senckenberg. Naturf. Ges. 2: 367, 368 (1858), as ‘gueintzianum’.

**Lastrea**
gueinziana** (Mett.) T.Moore, Index fil.: 93 (1858). **Nephrodium**
gueinzianum** (Mett.) Hieron. in Bot. Jahrb. Syst. 28: 341 (1900). **Thelypteris**

gueinziana = in honour of Wilhelm Gueinzius (1814–1874), German apothecary and naturalist, who arrived at the Cape in 1838 and later moved to KwaZulu-Natal.

Plants terrestrial. **Rhizome** short-decumbent to erect, rarely branched, to 6 mm in diameter, closely set with roots, crowded stipe bases and scales, scales chartaceous, ferruginous, sessile, lanceolate, margins set with recurved, uniseriate hairs several cells long, and often bearing oblong glandular cells, of which the apical cell is globose. Unicellular oblong glands and unicellular acicular hairs, also occur on the scale surface, scale apex terminates in an enlarged thin-walled cell, to 11 mm long, to 3.5 mm wide. **Fronds** crowded, erect to arching, to 890 mm long, to 12 per plant; **stipe** firm, proximally castaneous, stramineous higher up, adaxially sulcate, to 280 mm long, to 4 mm in diameter, proximally sparsely set with scales similar to those on the rhizome, densely set with fine, hyaline, unicellular, acicular hairs, to 0.5 mm long; **lamina** 1-pinnate-pinnatifid, elliptic, to 610 mm long, to 210 mm wide, to 30 free pinna pairs, four or more of the basal ones gradually reduced; **rachis** stramineous, adaxially sulcate, sulcus not open to that of the costa, closely set with hairs similar to those on the stipe; **pinnae** sessile, herbaceous, opposite to alternate, spaced, but often overlapping towards the apex, linear-cuneate, proximal acrosopic and basiscopic lobes often enlarged, to 103 mm long, to 15 mm wide, deeply lobed, lobes oblong-obtuse, entire, often somewhat falcate, to 9 mm long, to 3 mm wide, adaxially with unicellular glands and closely set with hyaline acicular hairs, those along the costa and veins longer than those between the veins, abaxially sparsely set with unicellular oblong glands between the veins, closely set with hyaline acicular hairs on and between the veins, to 0.5 mm long; **costa** adaxially sulcate, pronounced abaxially. **Veination** proximally anadromous, catadromous towards the apex, evident, pinnately branched in the lobes, veins simple, free, ending in the margin. **Sori** circular, medial in the veins, up to 9 pairs per lobe; **indusium** chartaceous, brown, persistent, semicircular to reniform, with unicellular oblong glands and unicellular acicular hairs along the margin and surface, to 1 mm in diameter; **receptacle** nude; **sporangium** long-stalked, 3-seriate below the capsule, simple or glandular, capsule circular in lateral view, with (14–)16 indurated annulus cells, epistomium 3(–4)-celled, hypostomium (3–)4(–5)-celled. **Spores** 64 per sporangium, dark brown, ellipsoidal, monolete, with short narrow ridges and verrucae, (38–)40.62(–42) x (26–)26.75(–30) µm. Figure 34 A & B.

**Vernacular names:** Common wood fern; Gueinzius-se-moerasvaring (Afr.).

**Ecology:** Terrestrial, confined to perennial stream banks in light or deep shade in scrub and forests. Not edaphically bound. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the branched rhizome. Seasonal pattern apparently pronounced with new growth restricted to the rainy season.
Figure 34 A & B, Christella gueinziana, A, basal part of lamina, B, fertile pinna lobes; C & D, C. hispidula, C, basal part of frond, D, rhizome, E, fertile pinna lobes.
Distribution: Sporadic in the western half of Swaziland, occurring at altitudes ranging between 600 and 1,520 m. Widespread in east and south tropical Africa and the eastern parts of southern Africa, and the western Indian Ocean region.


hispid = covered with rigid erect hairs

Plants terrestrial. Rhizome suberect to erect, to 45 mm long, to 12 mm in diameter, densely set with roots, crowded persistent stipe bases and scales, scales chartaceous, castaneous, sessile, subulate, cordate, margins set with short filiform outgrowths, unicellular gland-like hairs and acicular hairs, apex terminates in a thin-walled cell, to 12 mm long, to 1.5 mm wide. Fronds crowded, erect to arching, to 970 mm long, to 13 per plant; stipe firm, stramineous, adaxially sulcate, to 425 mm long, to 3.5 mm in diameter, set with hairs and scales, hairs closely set, hyaline, acicular, to 0.3 mm long, scales usually restricted to the stipe base, similar to those on the rhizome; lamina 1-pinnate-pinnatifid, elliptic, to 540 mm long, to 250 mm wide, with up to 20 sessile pinna pairs; rachis stramineous to green, adaxially sulcate, sulcus not open to that of the costa, closely set with hyaline, unicellular acicular hairs, to 1.2 mm long; pinnae sessile, adnate towards the apex, herbaceous, oblong-cuneate, opposite to alternate, basally slightly more widely spaced, the 2 or 3 basal pinna pairs slightly and gradually reduced, to 140 mm long, to 17 mm wide, lobed, oblong-acute, falcate, crenulate, to 9 mm long, to 4 mm wide, adaxially with hyaline, unicellular acicular hairs along and between the veins, to 1.2 mm long, and with unicellular capitate glands on the lamina between the veins, to 80 µm long, abaxially set with hyaline, unicellular and pluricellular acicular hairs along and between the veins, and with unicellular capitate glands on the lamina between the veins, to 80 mm long; costa adaxially sulcate, closely set with hyaline hairs similar to those on the rachis. Venation proximally anadromous, catadromous towards the apex, evident, pinnately branched in the segments, vein branches simple, with a single pair of veins anastomosing below the sinus, with the excurrent vein terminating in the sinus between the lobes. Sori circular, to 0.8 mm in diameter, medial on the veins, up to 8 pairs per segment; indusium firmly chartaceous, brown, persistent, reniform, to 0.5 mm in diameter, closely set with hyaline, unicellular acicular hairs, to 0.6 mm long; receptacle nude; sporangium long-stalked, 3-seriate below the capsule, usually with a single yellow-capped glandular cell, capsule broadly obovate in lateral view, with 13(–15) indurated annulus cells, epistomium 3-celled,
hypostomium 4(–5)-celled. Spores 64 per sporangium, brown, elliptic to spheroidal, monoletic, (28–)28.66(–34) x (18–)19.73(–22) µm. Figure 34 C–E.

Vernacular names: Hispid marsh fern; Borselhaar moerasvaring (Afr).

Ecology: Terrestrial, among rocks and boulders along perennial streams in evergreen forests, usually in light shade. Not edaphically bound. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the rarely branched rhizome. Seasonal pattern apparently pronounced with new growth restricted to the rainy season.

Distribution: Rare in Swaziland and currently known from the Sondeza Range only, occurring at an altitude of ±600 m. Christella hispidula is a pantropical species widespread in sub-Saharan Africa.

DRYOPTERIDACEAE Ching

The earliest known fossil record of a dryopteroid fern (Onoclea L.) dates from the Palaeocene (Rothwell & Stockey 1991). Phylogenetic studies based on morphological (Stevenson & Loconte 1996) and molecular (Hasebe et al. 1995) information support the affinity of the Dryopteridaceae to the Lomariopsidaceae. The Dryopteridaceae is a large family with near-cosmopolitan distribution.

Key to the genera:
1a Pinnae conspicuously acroscopically developed; indusium circular, peltate, or exindusiate

.............................................................................................................................. Polystichum

1b Pinnae symmetric or conspicuously basiscopically developed, if acroscopically developed the indusium then reniform, or centrally attached and elongate, never exindusiate:

2a Sori oval with a centrally attached elongated indusium .................... Didymochlaena

2b Sori reniform, marginally attached:

3a Lamina hairs unistratose at the base ....................................................... Dryopteris

3b Lamina hairs multistratose at the base .............................................. Nothoperanema


notho (Greek) = false; Peranema = a fern genus

A genus of five species occurring in northern India, southern China, Taiwan, sub-Saharan Africa and the western Indian Ocean region.


squama = scale; seta = bristle
Plants terrestrial. Rhizome erect to suberect, usually unbranched, to 60 mm long, to 8 mm in diameter, closely set with roots, stipe bases, and scales, scales chartaceous, castaneous, adnate, narrowly triangular to subulate, margins regularly set with short multicellular, uniseriate hairs and unicellular capitate glands, capitate glands also occur on the scale surfaces, apex terminates in a short uniseriate series of cells, to 11 mm long, to 2 mm wide. Fronds suberect to arching, to 925 mm long, to 8 per plant; stipe firm, proximally castaneous, brown to stramineous higher up, adaxially sulcate, to 460 mm long, to 5 mm in diameter, closely set with patent scales, scales chartaceous, castaneous, adnate, narrowly triangular to subulate, entire, or those near the base often with short multicellular, uniseriate hairs and unicellular capitate glands, glands often also occur on the scale surface, apex terminates in a short uniseriate series of cells, to 11 mm long, to 2 mm wide; lamina proximally anadromous, catadromous towards the apex, to 3-pinnate, ovate, to 460 mm long, to 390 mm wide, with up to 10 petiolated pinna pairs; rachis stramineous, adaxially sulcate, sulcus open to that of the pinna-rachis, closely set with scales similar to, but smaller than, those on the stipe; pinnae petiolate, petiole to 13 mm long, opposite to alternate, overlapping, basal pinna pair strongly basiscopically developed, inequilaterally narrowly ovate, lanceolate to oblong-acute towards the apex, to 220 mm long, to 125 mm wide, 1-pinnate-pinnatifid to 2-pinnate, with up to 5 pairs of free pinnules; pinna-rachis stramineous, adaxially shallowly sulcate, moderately scaled, scales patent, chartaceous, castaneous, adnate, subulate, to 3 mm long; pinnules catadromous, petiolate, petiole to 2 mm long, alternate, spaced or overlapping, oblong-acute to oblong-attenuate, acroscopic pinnule on basal pinnae to 44 mm long, to 17 mm wide, basiscopic pinnule on basal pinnae to 82 mm long, to 24 mm wide, pinnatifid to 1-pinnate; segments herbaceous, trapeziform to inequilaterally oblong-obtuse, often acroscopically auricled, basiscopically decurrent along the costa towards the pinnule apex, lobed to crenulate, to 14 mm long, to 6 mm wide, adaxially with simple, proximally multistratose subulate hairs along the veins, to 1.2 mm long, abaxially with proximally multistratose subulate hairs and clavate, pluricellular, uniseriate hairs, to 0.85 mm long, and unicellular capitate glands to 30 μm long, along the veins. Vénation anadromous, evident, pinnately branched, free vein branches end near the margin. Sori circular, usually restricted to the pinnule and segment apices, medially to inframedially on unmodified vein branches, to 1.5 mm in diameter; indusium firmly herbaceous, brown, persistent, reniform to subcircular, entire, to 1.2 mm in diameter, adaxially with numerous unicellular capitate glands; receptacle nude; sporangium long-stalked, simple or with a long uniseriate trichome, 3-seriate below the capsule, capsule globose, with 13(–15) indurated annulus cells, epistomium 4(–5)-celled, hypostomium 4(–5)-celled. Spores 64 per sporangium, brown, ellipsoidal, monolette, with prominent folds, tuberculate, (32–)35(–36) x (18–)20.4(–22) μm. Figure 35 A & B.

Vernacular names: Scaly wood fern; Stekelhaar woudvaring (Afr.).

Ecology: Terrestrial or epilithic, among rocks in perennially moist areas in evergreen forests, deeply shaded. Not edaphically bound. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the rarely branched rhizome. Seasonal pattern apparently non-existent.

Distribution: Rare in Swaziland and known from the north-western corner of the country only, occurring at an altitude of ± 1 520 m. The species is widespread in sub-Saharan Africa, with the exception of west tropical Africa, and the western Indian Ocean region.
Figure 35 A & B, *Notoperanema squamiseta*, A, basal pinnae, B, fertile segment; C & D, *Dryopteris athamantica*, C, basal pinnae, D, fertile segment.
**Dryopteris** Adans., Fam. pl. 2: 20, 551 (1763), nom. cons. Type: *Dryopteris filix-mas* (L.) Schott; *Polypodium filix-mas* L.

drys (Greek) = oak; pteris = fern

A genus of approximately 225 species with near-cosmopolitan distribution.

Plants terrestrial or epilithic. *Rhizome* decumbent to suberect, rarely branched, set with roots, crowded stipe bases, and scales, scales chartaceous, stramineous to ferrugineous, adnate, linear, linear-acuminate, oblong, oblong-acuminate, narrowly ovate, ovate, to narrowly lanceolate, truncate, cuneate, or cordate, entire or variously set with multicellular filiform outgrowths, and often with pyriform glands, apex filiform, terminating in a uniseriate series of cells, or an oblong thin-walled cell. *Frons* caespitose, erect, suberect, or arching; *stipe* firm, castaneous, stramineous to greenish higher up, proximally adaxially flattened, shallowly sulcate higher up, moderately to densely scaled, often subglabrous later, scales chartaceous, stramineous to ferrugineous, adnate or short-stalked, narrowly lanceolate, linear-acuminate, oblong-acuminate, ovate or filiform, cuneate to cordate, entire or denticulate, often with long, twisted, pluricellular filiform outgrowths, or with a few scattered glandular cells (which may also occur on the scale surface), apex filiform, terminating in an oblong thin-walled cell; *lamina* anadromous, isodromous, or catadromous towards the apex, herbaceous to firmly herbaceous, narrowly ovate, ovate, or deltate, 2- to 3-pinnate, with up to 23 petiolated pinna pairs; *rachis* stramineous to greenish, adaxially sulcate, becoming narrowly winged towards the apex, eglandular or sparsely to densely set with glands, moderately to sparsely set with scales and hairs, scales chartaceous, ferrugineous to stramineous, broadly attached, sessile, or short-stalked, narrowly lanceolate, linear-acuminate, ovate or filiform, cuneate to cordate, entire or irregularly set with filiform outgrowths, apex filiform, terminates in an oblong thin-walled cell; *pinnae* petiolate, opposite to alternate, widely spaced at the base, usually somewhat imbricate towards the apex, basal pinnae inequilaterally triangular, narrowly to broadly ovate, or deltate, those higher up equilaterally lanceolate, oblong-acuminate, or ovate, 1- or 2-pinnate, basal pinna pair shorter or longer than the pair above, usually basiscopically developed, with up to 9 petiolated pinnule pairs; *pinna-rachis* adaxially shallowly sulcate, sulcus confluent with that of the rachis, narrowly winged for most of its length, sparsely scaled, scales similar to, but smaller than, those on the rachis; *pinnules* petiolate, inequilaterally narrowly triangular, ovate-obtuse, oblong-obtuse, or lanceolate, to 1-pinnate, acroscopically or basiscopically developed, usually somewhat imbricate; *costa* adaxially shallowly sulcate, narrowly winged; *segments* inequilaterally narrowly trullate, narrowly triangular, narrowly rhomboid or oblong-obtuse, cuneate, basiscopically decurrent, spaced, often shallowly lobed, lobes denticulate to crenate, adaxially glabrous, with isocytic hairs, and/or with a few filiform scales along the costae, abaxially sparsely set with filiform scales, uniseriate hairs bearing one or more glandular cells near the base, isocytic hairs, and often also with 1- or 2-celled hairs. *Vénation* anadromous, becoming catadromous towards the lamina and pinna apex, pinnately branched in the segments, vein branches pinnately bracted, forked or simple, evident, ending in the teeth near the margin, the endings often slightly enlarged. *Sori* circular, inframedial on the predominantly anadromous vein branches, discrete or touching at maturity; *sporangium* long-stalked, 3-seriate below the capsule, stalk simple, glandular, or bearing one or more uniseriate simple hairs; capsule globose to obovoid, with (9–)13, 14(–22) indurated annulus, epistomium (3–)4, 6(–8)-celled, hypostomium (3–)6(–8)-celled; *indusium* reniform, simple or with unicellular clavate cells along the margin, often also on the surface. *Spores* ellipsoidal, monolet, with prominent folds and inflated tubercules, 20–70 μm long. *Chromosome number* based on 2n = 82.

**Key to the species:**

1a Pinnae usually set at about 45° or less to the rachis; segments narrowly trullate, narrowly triangular, narrowly rhomboid, or oblong-obtuse, obtusely dentate to crenate..................

.......................................................... .......................... .......................... .......................... D. athamantica
1b Pinnae usually set at 45° or more to the rachis; segments ovate, oblong-obtuse, or oblong-acute, dentate to serrate:
2a Segments abaxially with unicellular glands and 2-celled hairs along the veins; stomata (34–)53(–72) mm long ................................................................. D. pentheri

2b Segments abaxially eglandular or with unicellular glands, never with 2-celled hairs; stomata (30–)42(–62) mm long:
3a Rhizome short-creeping, to 14 mm in diameter; basal pinnae usually reduced; indusium usually with unicellular glands along the margin and on the surface … D. inaequalis

3b Rhizome short-decumbent, to 25 mm in diameter; basal pinnae not reduced; indusium glabrous ............................................................................ D. lewalleana


Lastrea plantii T.Moore in J. Bot. 5: 227 (1853). Type. Natal, Mooi River, Plant 313 (BM, holo.).


The derivation of the specific epithet, athamantica, is unclear.

Plants terrestrial or epilithic. Rhizome decumbent to suberect, rarely branched, to 150 mm long, to 13 mm in diameter, set with roots, crowded stipe bases, and scales, scales chartaceous, ferrugineous, adnate, oblong-acuminato narrowly lanceolate, entire, apex filiform, terminating in an oblong thin-walled cell, to 18 mm long, to 2 mm wide. Fronds crowded, erect, to 1.31 m long; stipe firm, proximally castaneous, stramineous higher up, adaxially shallowly sulcate, to 540 mm long, to 14 mm in diameter, moderately to densely scaled, often subglabrous later, scales chartaceous, ferrugineous, adnate, linear-acuminato to oblong-acuminato, cuneate, entire, with long, twisted, pluricellular filiform outgrowths, or with a few scattered glandular cells, apex filiform, terminating in an oblong thin-walled cell, to 24 mm long, to 2.5 mm wide; lamina anadromous, isodromous, or catadromous towards the apex, firmly herbaceous, narrowly ovate, to 2-pinnate-pinnatifid, to 780 mm long, with up to 23 petiolated pinna pairs; rachis stramineous to greenish, adaxially sulcate, becoming narrowly winged towards the apex, moderately to sparsely set with scales and hairs, scales chartaceous, ferrugineous to stramineous, twisted, sessile, linear to filiform, cuneate, entire, apex terminates in an oblong thin-walled cell, to 6 mm long, to 0.6 mm wide; pinnae petiolate, petiole to 12 mm long, basal pinnae inequilaterally broadly ovate, those higher up equilaterally
lanceolate, 1-pinnate to 1-pinnate-pinnatifid, basal pinna pair usually the longest, usually basiscopically developed, to 185 mm long, to 123 mm wide, opposite to alternate, widely spaced at the base, usually somewhat imbricate towards the apex, with up to 8 petiolated pinnule pairs; pinna-rachis set at an angle of 45° or less to the rachis, adaxially shallowly sulcate, sulcus confluent with that of the rachis, narrowly winged for most of its length, sparsely scaled, scales chartaceous, ferrugineous to stramineous, sessile, linear to filiform, entire, apex terminates in an oblong thin-walled cell, to 4 mm long, to 0.4 mm wide; pinnules petiolate, petiole to 2 mm long, inequilaterally lanceolate, pinnatifid, acroscopically developed, acroscopic pinnule on the basal pinnae to 48 mm long, to 28 mm wide, basiscopic pinnule on the basal pinnae to 72 mm long, to 30 mm wide, usually somewhat imbricate; costa adaxially shallowly sulcate, narrowly winged; segments inequilaterally narrowly trullate, narrowly triangular, narrowly rhomboid or oblong-obluse, cuneate, basiscopically decurrent, spaced, to 20 mm long, to 7 mm wide, often shallowly lobed, lobes denticulate to crenate, adaxially glabrous or with a few filiform scales along the costae, abaxially sparsely set with filiform scales, uniseriate hairs bearing one or more glandular cells near the base, isocytic hairs, and often also with unicellular glands, (54–72.95–112) µm long. Vénation anadromous, becoming catadromous towards the lamina and pinna apex, pinnately branched in the segments, vein branches pinnately branched, forked or simple, evident, ending in the teeth near the margin, the endings often slightly enlarged. Sori circular, inframedial on the predominantly anadromous vein branches, discrete or touching at maturity, to 1.6 mm in diameter at maturity; sporangium stalk simple or haired, capsule with (11–)14–(22) indurated annulus cells, epistomium (3–)4–(6)-celled, hypostomium (4–)6-celled. Indusium firmly herbaceous, brown, reniform, entire to erose, to 1.7 mm in diameter. Spores ellipsoidal monolete, the perispore with narrow to broad reticulate ridges, granulate, (40–)45–(50) x (30–)32.65–(36) µm. Chromosome number: 2n = 80 ± 2 (Vida, in Widén et al. 1973). Figure 35 C & D.

**Vernacular names:** Grassland fern; Grasveld varing (Afr); Inkomankoma, Inkomankomane (Zulu).

**Ecology:** Terrestrial, among rocks, at boulder bases and in sinkholes near streams, usually in open grassveld, exposed or partially shaded. Not edaphically bound. Hemicryptophyte, mesoxerophytic, fronds mesoxeromorphic. Vegetative reproduction by the decumbent, closely branched rhizome resulting in the formation of small clonal stands. Seasonal pattern pronounced with new growth restricted to the rainy season, dormant during the dry winter months. Pyrophytic.

**Distribution:** Relatively common and widespread in the western half of Swaziland, occurring at altitudes ranging from 760 to 1 520 m. *Dryopteris athamantica* is widespread in sub-Saharan Africa.

**Uses:** The Zulu use the plant as a general anthelmintic (Gerstner 1939), whilst the Sesotho use a decoction of cooked rhizomes for cows where the placenta is retained after calving (Jacot-Guillarmod 1971).


*inaequalis* = unequal

Plants terrestrial or epilithic. Rhizome short-creeping, sparsely branched, to 14 mm in diameter, set with roots, closely to widely spaced stipe bases and scales at the rhizome apex, scales stramineous to ferrugineous, chartaceous, broadly attached, ovate to linear-acuminate, cuneate to cordate, margins entire, or with a few widely spaced, uniseriate, multicellular hairs, and pyriform glands,
scale apex filiform, terminating in a short uniseriate series of cells, to 18 x 4 mm. *F. suberectum* to arching, to 1 350 mm long; *stipe* proximally castaneous, stramineous to greenish higher up, proximally adaxially flattened, shallowly sulcate higher up, to 670 mm long, to 7 mm in diameter, proximally densely scaled, higher up sparsely to moderately scaled, scales stramineous to ferrugineous, chartaceous, larger scales broadly attached, smaller scales sessile or short-stalked, ovate to narrowly lanceolate, or filiform, cordate to cuneate, margins entire or denticulate, often with a few widely spaced, multicellular hairs, and pyriform glands (which may also occur on the surface), marginal hairs on the smaller scales are mostly confined to the basal region, scale apex filiform, terminating in a short uniseriate series of cells, to 45 x 9 mm; *lamina* herbaceous to firmly herbaceous, ovate to deltate, 2- or 3-pinnate, adaxially shallowly sulcate, sulcus confluent with that of the rachis, pronounced abaxially, narrowly winged for most of the length, wing proximally less conspicuous, sparsely to densely set with glands, abaxially sparsely to moderately set with hairs and scaled, hairs and scales stramineous to ferrugineous, membranous to chartaceous, sessile or short-stalked, narrowly lanceolate to filiform, cordate to narrowly cuneate, margins entire or denticulate, often with a few widely spaced twisted filiform outgrowths, mostly from near the base, and glands, which may also occur on the surface, scale apex filiform, terminating in a short uniseriate series of cells, to 8 x 1.5 mm; *pinnae* petiolar, petiole to 14 mm long, basal pinna pair inequilaterally triangular to broadly ovate, or deltate, oblong-acuminate, ovate or lanceolate towards the lamina apex, to 2-pinnate, basal pair shorter or longer than the next pair above, to 280 mm long, to 180 mm wide, opposite to alternate, basally widely spaced, often somewhat imbricate higher up, with up to 9 pairs of petiolated pinnules; *pinna-rachis* adaxially shallowly sulcate, sulcus confluent with that of the rachis, pronounced abaxially, narrowly winged for most of the length, wing proximally less conspicuous, sparsely to densely set with glands, abaxially sparsely to moderately set with hairs and scaled, hairs and scales stramineous to ferrugineous, membranous to chartaceous, sessile or short-stalked, narrowly lanceolate to filiform, cordate to narrowly cuneate, margins entire or denticulate, often with a few widely spaced twisted filiform outgrowths, mostly from near the base, and glands, scale apex filiform, terminating in a short uniseriate series of cells, to 4 x 1 mm; *pinnales* petiolar, petiole to 2 mm long, equilaterally to inequilaterally narrowly triangular, ovate-obtuse, or oblong-obtuse, basiscopically decurrent, to 1-pinnate, acroscopic pinnule on the basal pinnae to 72 mm long, to 21 mm wide, basiscopic pinnule on the basal pinnae to 110 mm long, to 30 mm wide, widely spaced, often somewhat imbricate, with up to 3 pairs of petiolated segments; *costa* adaxially shallowly sulcate, pronounced abaxially, narrowly winged, wing continuous with that of the pinna-rachis, glandular or eglandular, variously set with isocytic or moniliform hairs and scales, hairs often bear one or more glands near the base; *segments* spaced, inequilaterally narrowly ovate-obtuse to oblong-obtuse, basiscopically decurrent, to 23 mm long, to 9 mm wide, shallowly to deeply lobed, lobes serrate, adaxially glabrous or with a few filiform scales along the costa, abaxially with uniseriate hairs often bearing one or more gland-like cells near the base, mostly occurring along the costa, and/or simple isocytic or moniliform hairs, occurring on the veins and lamina, and/or glands (50–100.28–164) µm long, occurring on the costa, veins and/or lamina near the veins, or eglandular. *Vénation* anadromous, becoming catadromous towards the lamina and pinna apex, pinnately branched in the segments, vein branches pinnately branched, forked, or simple near the apex, evident, ending in the teeth near the margin, endings slightly enlarged. *Stomata* of the anomocytic and polycytic types, (30–)42.3(–62) µm long. *Sori* circular, medial on the predominantly anadromous vein branches, discrete, to 1.6 mm in diameter at maturity, essentially
Figure 36 A–D, *Dryopteris inaequalis*, A, habit, B, fertile pinnule, C, indusium, D, indusium section showing the glandular cells.
uniseriate; *sporangium* stalk simple, with one or more glandular cells, or with a long uniseriate hair, capsule with (9–)13(–21) indurated annulus cells, epistomium (3–)4(–6) celled, hypostomium (3–)6(–7) celled. *Indusium* persistent, brown, firmly herbaceous, reniform, glabrous, or with unicellular glands along the margin or on the surface, margin often strongly revolute, to 1.6 mm in diameter. *Spores* ellipsoidal, monolete, perispore folded into low tubercules or reticulate ridges, finely rugose to ruminate, (30–)37.59(–50) x (20–)25.73(–31) µm. Figure 36 A–D.

**Vernacular names:** Thin-stemmed forest fern; Dunstam woudvaring (Afr).

**Ecology:** Terrestrial, infrequent in light or deep shade in seasonally moist evergreen forests or in moist rock overhangs, usually in leaf-litter. Not edaphically bound. Hemicyryptophyte, mesophyte, fronds mesomorphic. Vegetative reproduction by the closely branched rhizome. Seasonal pattern pronounced with new growth restricted to the rainy season.

**Distribution:** Infrequent in the western part of Swaziland, occurring at an altitude ranging between 1 200 and 1 300 m. The species is restricted to the southern, eastern and northern parts of South Africa.


*lewallleana* = after J. Lewalle, a Belgian botanist.
14 petiolated pinna pairs; *rachis* stramineous, adaxially shallowly sulcate, becoming narrowly winged towards the apex, eglandular or sparsely to densely set with glands, and sparsely to moderately set with scales and branched hairs, scales similar to, but smaller than, those on the stipe, to 8 mm long, to 1.5 mm wide; *pinnae* petiolate, petiole to 14 mm long, basal pinna pair inequilaterally triangular to broadly ovate, or deltate, oblong-acuminate, ovate or lanceolate towards the lamina apex, to 2-pinnate, basal pinnae shorter or longer than the next pair above, to 280 mm long, to 180 mm wide, opposite to alternate, basally widely spaced, often somewhat imbricate higher up, with up to 9 petiolated pinnule pairs; *pinna-rachis* adaxially shallowly sulcate, sulcus confluent with that of the rachis, pronounced abaxially, narrowly winged for most of the length, wing proximally less conspicuous, sparsely to densely set with glands, abaxially sparsely to moderately set with hairs and scaled, hairs and scales membranous to chartaceous, stramineous to ferrugineous, sessile or short-stalked, narrowly lanceolate to filiform, cordate to narrowly cuneate, margins entire or denticulate, often with a few widely spaced twisted filiform outgrowths, usually from near the base, and glands, *apex* filiform, terminating in a short uniseriate series of cells, to 4 mm long, to 1 mm wide; *pinnules* petiolate, petiole to 2 mm long, equilaterally to inequilaterally narrowly triangular, ovate-obtuse, or oblong-obtuse, basiscopically decurrent, to 1-pinnate, acroscopic pinnule on the basal pinnae to 72 mm long, to 21 mm wide, basiscopic pinnule on the basal pinnae to 110 mm long, to 30 mm wide, widely spaced, often somewhat imbricate, with up to 3 petiolated segment pairs; *costa* adaxially shallowly sulcate, pronounced abaxially, narrowly winged, wing continuous with that of the pinna-rachis, glandular or eglandular, variously set with isocytic or moniliform hairs and scales, hairs often bear one or more glands near the base; *segments* spaced, inequilaterally narrowly ovate-obtuse to oblong-obtuse, basiscopically decurrent, to 23 mm long, to 9 mm wide, shallowly to deeply lobed, lobes serrate, adaxially glabrous or with a few filiform scales along the costa, abaxially with uniseriate hairs often bearing one or more gland-like cells near the base, usually occurring along the costa, and/or simple isocytic or moniliform hairs, occurring on the veins and lamina, and/or glands (50–)100.28(–164) µm long, occurring on the costa, veins and/or lamina near the veins, or eglandular. *Stomata* of the anomocytic and polycytic types, (30–)42.3(–62) µm long. *Venation* anadromous, becoming catadromous towards the lamina and pinna apex, pinnately branched in the segments, vein branches pinnately branched, forked, or simple near the apex, evident, ending in the teeth near the margin, endings slightly enlarged. *Sori* circular, medial on the predominantly anadromous vein branches, discrete, to 1.6 mm in diameter at maturity; mainly uniseriate; *sporangium* stalk simple, with one or more glandular cells, or with a long uniseriate hair, capsule with (9–)13(–21) indurated annulus cells, epistomium (3–)4(–6)-celled, hypostomium (3–)6(–7)-celled. *Indusium* firmly herbaceous, brown, persistent, reniform, glabrous or with unicellular glands along the margin or superficially, the margin often strongly revolute, to 1.6 mm in diameter. *Spores* ellipsoidal, monolete, perispore folded into low tubercules or reticulate ridges, finely rugose to ruminate, (30–)37.59(–50) x (20–)25.73(–31) µm. Figure 37 A & B.

### Vernacular names:

*Broadleaved forest fern*; *Breëblaar woudvaring* (Afr.).

### Ecology:

Terrestrial, frequent in light or deep shade in seasonally moist evergreen forests, usually in leaf-litter on the forest floor. Not edaphically bound. Hemicryptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the closely branched rhizome. Seasonal pattern pronounced with new growth restricted to the rainy season.

### Distribution:

Frequent in the north-western part of Swaziland, occurring at an altitude ranging between 1 200 and 1 520 m. The species is widespread in west central, east, and south tropical Africa and the eastern parts of southern Africa.

### Uses:

The native tribes make no distinction between this species, *D. inaequalis* and *D. pentheri*, and both the Zulu and Xhosa use the rhizome as an anthelmintic (Watt & Breyer-Brandwijk **DRYOPTERIDACEAE**
Figure 37 A & B, *Dryopteris lewalleana*, A, section of basal pinna, B, fertile pinnule; C & D, *D. pentheri*, C, basal pinna, D, fertile pinnule.
1962); the Sesotho inhale the smoke of burning plants as a charm against unknown disasters (Jacot-Guillarmod 1971).


*pentheri* = after Arnold Penther (1865–1931), Italian-born zoologist who collected in South Africa and Zimbabwe.

Plants terrestrial or epilithic. *Rhizome* decumbent, sparsely branched, to 300 mm long, to 20 mm in diameter, set with roots, closely spaced stipe bases, and scales, scales chartaceous, stramineous to ferrugineous, adnate, linear, oblong or narrowly ovate, base truncate, margins irregularly set with long, twisted, pluricellular filiform outgrowths, apex filiform, twisted, to 37 mm long, to 6 mm wide. *Fronds* caespitose, erect to arching, to 1.8 mm long; *stipe* firm, proximally castaneous, brown to stramineous higher up, proximally adaxially flattened, shallowly sulcate higher up, to 485 mm long, to 10 mm in diameter, proximally densely scaled, scales higher up fugaceous, chartaceous, stramineous to ferrugineous, larger adnate, smaller sessile or short-stalked, narrowly lanceolate to filiform, cordate to cuneate, margins irregularly set with long, twisted, pluricellular filiform outgrowths and often also with scattered glands, apex filiform, to 40 mm long, to 7 mm wide; *lamina* anadromous, catadromous towards the apex, herbaceous to firmly herbaceous, ovate to ovate-triangular, 2- or 3-pinnate, to 780 mm long, with up to 16 petiolated pinna pairs; *rachis* stramineous, adaxially shallowly sulcate, becoming narrowly winged towards the apex, initially moderately scaled, scales fugaceous, adnate or short-stalked, narrowly lanceolate to linear, cuneate, margins irregularly set with long, filiform outgrowths, often also with scattered glands, apex filiform, twisted, to 7 mm long, to 2 mm wide; *pinnae* petiolate, petiole to 18 mm (rarely to 38 mm) long, basal pinna pair inequilaterally ovate to narrowly ovate, narrowly lanceolate to oblong-acuminate towards the lamina apex, to 2-pinnate, basal pair the longest, usually basiscopically developed, to 315 mm long, to 185 mm wide, opposite to alternate, basally widely spaced, often somewhat imbricate higher up, with up to 9 petiolated pinnule pairs; *pinna-rachis* adaxially shallowly sulcate, sulcus confluent with that of the rachis, pronounced abaxially, narrowly winged distally, abaxially moderately to sparsely set with scales and hairs, scales and hairs chartaceous to membranous, stramineous to ferrugineous, adnate or short-stalked, narrowly to broadly cuneate, margins irregularly set with long pluricellular, filiform outgrowths, apex filiform, twisted, to 5 mm long, to 1.6 mm wide, hairs are of three types: 1) unicellular oblong glands, 2) bicellular hairs with straight or oblique transverse walls, and, 3) pluricellular simple or branched, usually isocytic hairs; *pinnules* petiolate, petiole to 3 mm long, equilaterally to inequilaterally lanceolate to oblong-acuminate, basiscopically decurrent, 1-pinnate to lobed, acroscopic pinnule on the basal pinnae to 90 mm long, to 35 mm wide, basiscopic pinnule on the basal pinnae to 112 mm long, to 42 mm wide, widely spaced or imbricate; *costa* adaxially shallowly sulcate, pronounced abaxially, narrowly winged, wing continuous with that of the pinna-rachis, variously set with scales, isocytic and 2-celled hairs; *segments* widely spaced to imbricate, ovate to oblong-obtuse, basiscopically decurrent, to 22 mm long, to 9 mm wide, lobed, lobes serrate, adaxially glabrous or with a few pluricellular usually isocytic hairs along the costule,
abaxially sparsely set with unicellular oblong glands (60–)137(–260) µm long, 2-celled hairs, and isocytic and/or moniliform hairs, those near the segment base often with a glandular cell near the base, and filiform scales, scales short-stalked, stalk often with one or more glandular cells, hairs and scales usually occur along the costule and veins. Venation anadromous, becoming catadromous towards the lamina and pinna apex, pinnately branched in the segments, vein branches pinnately branched, forked or simple near the apex, evident, ending in the teeth near the margin, endings slightly enlarged and often conspicuous adaxially. Stomata of the anomocytic and polycytic types, (34–)53(–72) µm long. Sori circular, medial on the predominantly anadromous vein branches, discrete, to 1.8 mm in diameter at maturity, mainly uniseriate; sporangium stalk simple, or with one or more glandular cells, but usually with a long uniseriate hair, capsule with (11–)13(–20) indurated annulus cells, epistomium (3–)6(–8)-celled, hypostomium (3–)6(–8)-celled. Indusium firmly herbaceous, persistent, pale brown, reniform, entire or repand, to 1.8 mm in diameter. Spores ellipsoidal, monolet, perispore folded into tubercules or reticulate ridges, finely rugose to ruminate, (38–)45.08(–60) x (27–)31.32(–40) µm. Chromosome number: 2n = c. 164 (Vida, in Widén et al. 1973). Figure 37 C & D.

Vernacular names: Penther’s wood fern; Breëblaar bergvaring (Afr); Koma-koma, Mong a lebitso (Ses.).

Ecology: Terrestrial, in light shade along forest margins, in scrub and at boulder bases in open grassveld. Not edaphically bound. Hemicryptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the closely branched rhizome, resulting in the formation of small clonal stands. Seasonal pattern pronounced with new growth restricted to the wetter summer months. Pyrophytic.

Distribution: Frequent in the western half of Swaziland, occurring at altitudes ranging between 1 190 and 1 520 m. The species is widespread in sub-Saharan Africa.

Uses: The Sesotho believe that if the smoke is inhaled it is a charm against danger (Zepp 1982).


poly (Greek) = many; stichos (Greek) = order

Plants terrestrial, epilithic, or rarely low-level epiphytes. Rhizome short, erect to suberect and usually simple, wide-creeping, or decumbent and sparsely branched, densely set with roots, closely to widely spaced persistent stipe bases, and scales, scales membranous to chartaceous, short-stalked or adnate, narrowly ovate, ovate, narrowly lanceolate or lanceolate, narrowly triangular to subulate, truncate, cordate or cordate-imbricate, margins subentire, repand or erose, with long twisted uniseriate, gland-tipped hairs along the apical margin and surface, or proximally with numerous long and twisted uniseriate hairs, distally with widely spaced apically and basally directed marginal outgrowths that become smaller apically, apex flagelliform, terminating in a small thin-walled cell. Fronds crowded or widely spaced, caespitose, 4–16 per plant, suberect to arching; stipe adaxially sulcate, scaled, scales membranous to chartaceous, concolorous or bicolorous, short-stalked or adnate, ovate, narrowly ovate, narrowly oblong, narrowly oblong, narrowly triangular or subulate, cordate, cordate-imbricate or hastate, entire, minutely erose to short-fimbriate, or variously set with short and/or long marginal outgrowths, apex flagelliform, terminating in a small thin-walled cell or a long acicular cell; lamina 1 to 3-pinnate, with up to 37 petiolated pinna pairs, firmly herbaceous to coriaceous, oblong, narrowly elliptic, or narrowly to broadly ovate, proximal pinnae slightly reduced, often somewhat deflexed; rachis adaxially sulcate, scaled, scales membranous, chartaceous or crustaceous, sessile or short-stalked, oblong, narrowly oblong, ovate, narrowly ovate, narrowly lanceolate, narrowly triangular to subulate, cordate to hastate, cordate-imbricate
or hastate, margins erose or variously set with multicellular and unicellular hairs some of which terminate in a thin-walled cell, apex long-attenuate to flagelliform, terminating in an acicular cell or an oblong thin-walled cell; pinnae short-stalked, simple, 1- or 2-pinnate, with up to 24 petiolated pinnule pairs, narrowly ovate-acuminate, narrowly oblong-attenuate or lanceolate, proximally widely spaced, distally often somewhat overlapping; pinna-rachis adaxially sulcate, sparsely to densely scaled, scales similar to, but less complex than, those on the rachis; pinnules sessile or short-stalked, opposite to alternate, widely spaced to slightly imbricate, proximal acroscopic pinnule the largest, often significantly longer than the next, inequilateral, ovate, ovate-oblong, ovate-rhomboid, narrowly trullate or rhomboid, basiscopically cuneate, acroscopically truncate and auricled, often somewhat falcate, shallowly to deeply incised, lobate-serrate, aristate; costa adaxially sulcate, glabrous or sparsely scaled, abaxially sparsely to densely scaled, scales chartaceous, similar to but smaller than, those on the rachis. Vénation obscure or evident, pinnately branched. Sori circular, medial to inframedial on unabbreviated vein branches, or terminal or nearly terminal on abbreviated vein branches, mainly uniseriate, discrete at maturity; sporangium long stalked eglandular or glandular, 3-seriate below the capsule, capsule globose in lateral view, with (10–)12, 13, 16(–28) indurated annulus cells, epistomium (3–4)(–6)-celled, hypostomium (3–4)(–6)-celled; indusium peltate, circular to irregular, entire, repand, erose or crenulate, often with flabellate central processes, persistent. Spores 32 or 64 per sporangium, brown, perispore unevenly folded to form narrow and broad reticulate ridges, the ridges often crested, ridges and areas between ridges echinulate or variously granulate, often closely perforated, echinulate, spiculate or verruculose. Chromosome number 2n = 123, apogamous, 164, or 328. Figure 37 C & D.

A genus of approximately 220 species with near-cosmopolitan distribution.

**Key to the species:**
1a Sori exindusiate ................................................................. P. transkeiense  
1b Sori indusiate:  
  2a Lamina 1-pinnate ............................................................... P. macleae  
  2b Lamina to 2-pinnate-pinnatifid:  
    3a Rhizome erect to suberect, rarely branched; fronds to 0.93 m long; rachis scales atrocastaneous to black, chartaceous to crustaceous, narrowly triangular to subulate, coriaceous or hastate ................................................................. P. luctuosum  
    3b Rhizome decumbent, frequently branched; fronds to 1.4 m long; rachis scales stramineous to ferrugineous, membranous, narrowly triangular to narrowly ovate, coriaceous to coriaceous-imbricate ............................................. P. pungens


*luctuosum* = mourning

Plants terrestrial, epilithic, or rarely low-level epiphytes. Rhizome short, erect to suberect, to 10 mm in diameter, densely set with roots, persistent stipe bases, and scales, larger scales chartaceous, castaneous, adnate, ovate, narrowly ovate, or lanceolate, coriaceous, with long twisted uniseriate, gland-tipped hairs on the apical margin and surface, apex flagelliform, terminating in an oblong thin-walled cell, to 10.5 mm long, to 3.3 mm wide, smaller scales short-stalked, narrowly triangu-
lar to subulate, cordate, margins proximally with numerous long and twisted uniseriate hairs, distally with widely spaced apically and basally directed marginal outgrowths that become smaller apically, apex flagelliform, terminating in a small thin-walled cell. *Fronds* crowded, caespitose, 7–16 per plant, suberect to arching, to 0.93 m long; *stipe* proximally castaneous, stramineous distally, adaxially sulcate, to 450 mm long, to 5 mm in diameter, densely scaled, proximal scales chartaceous, castaneous, adnate, ovate, cordate, proximally entire or with a few short and/or long uniseriate hairs, distally with numerous multicellular hairs as for rhizome scales, distal scales short-stalked, narrowly oblong, narrowly triangular or subulate, cordate to hastate, margins bearing a few long and/or short multicellular hairs proximally, distally with widely and irregularly spaced outgrowths reduced in size and number towards the apex, apex flagelliform, terminating in a small thin-walled cell, to 15 mm long, to 1.5 mm wide; *lamina* 2-pinnate to 2-pinnate-pinnatifid, with up to 25 petiolated pinna pairs, to 480 mm long, firmly herbaceous to coriaceous, olive-green adaxially, paler abaxially, narrowly ovate to ovate, proximal pinnae slightly reduced, often somewhat deflexed; *rachis* stramineous, adaxially sulcate, densely scaled, scales chartaceous to crustaceous, dark brown to black, glossy, short-stalked, narrowly triangular to subulate, cordate to hastate, auricles usually bearing long and twisted multicellular and unicellular hairs some of which terminate in a thin-walled cell, margins either with short, widely and irregularly spaced outgrowths that reduce in size and number towards the apex, or more or less entire smaller scales, to 7 mm long; *pinnae* short-stalked, 1-pinnate to 1-pinnate-pinnatifid, with up to 12 petiolated pinnule pairs, narrowly lanceolate, proximally widely spaced, distally often somewhat overlapping, to 173 mm long; *pinna-rachis* stramineous, adaxially sulcate, densely set with scales similar to, but less complex than, those on the rachis; *pinnules* widely spaced to overlapping, proximal acroscopic pinnule the largest, often significantly longer than the next, to 40 mm long, to 12 mm wide, inequilateral, narrowly trullate to rhomboid, basiscopically cuneate, acroscopically truncate and auricled, often somewhat falcate, lobate-serrate, aristate; proximal pinnules short-stalked, often acroscopically incised to, or nearly to, the costa; *costa* adaxially sulcate, glabrous, abaxially sparsely scaled, scales chartaceous, castaneous, narrowly triangular-hastate to subulate-hastate, cordate to cordate-imbricate, proximally with long and/or short filiform outgrowths often terminating in a thin-walled cell, apex always terminates in a small thin-walled cell, to 0.3 mm long. *Venation* obscure, pinnately branched. *Sori* circular, to 1.2 mm in diameter, terminal or nearly terminal on abbreviated vein branches, mainly uniseriate; *sporangium* stalk eglandular, capsule globose in lateral view, with (10–)13(–19) indurated annulus cells, epistomium (3–)4(–5)-celled, hypostomium (3–)4(–5)-celled; *indusium* peltate, circular, entire, repand or crenulate, persistent, brown, pale brown and often dark-centred before drying, cupulate when dry, maximum radius (0.5–)0.73(–0.95) mm. *Spores* 32 per sporangium, brown, perispore unevenly folded to form narrow and broad reticulate ridges, the ridges and areas between ridges echinulate, spiculate or verruculose, exospore (30–)38.84(–50) x (22–)28.2(–36) µm. *Chromosome number* 2n = 123, apogamous. Figure 38 A & B.

**Vernacular names:** Mourning shield fern; Treurskildvaring (Afr.).

**Ecology:** Terrestrial or epilithic, usually in deep shade on the floor of seasonally moist forests, in leaf litter or on rocks. Not edaphically bound. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the rarely branched rhizome. Seasonal pattern pronounced with new growth restricted to the wetter summer months, no dormant period.
Figure 38 A & B, *Polystichum luctuosum*, A, lamina, B, fertile pinnule; C & D, *P. macleae*, C, lamina section, D, fertile pinna section.
**Distribution:** In Swaziland the species is known from the Mbabane area only, occurring at an altitude ranging between 1 050 and 1 220 m. *Polystichum luctuosum* also occurs in Lesotho, South Africa, Zimbabwe, the western Indian Ocean region, Asia and Japan.


*macleae* = after John Hunter McLea (1836–1878), horticulturist in South Africa during the late 1850s.

Plants terrestrial, epilithic, or rarely epiphytic. *Rhizome* decumbent, to 200 mm long, to 20 mm in diameter, densely set with roots, persistent stipe bases, and scales, scales membranous to chartaceous, ferrugineous, narrowly ovate or lanceolate, to 7 mm long, to 2 mm wide. *Fronds* caespitose, arcuate, to 1.47 m long, to 7 per plant; *stipe* proximally castaneous, stramineous distally, adaxially sulcate, to 670 mm long, to 8 mm in diameter, proximally densely scaled, larger scales adnate, concolorous or bicolorous, concolorous scales ferrugineous, bicolorous scales centrally dark brown or black, ovate, narrowly ovate, or narrowly oblong, cordate, entire or with short and/or long marginal outgrowths proximally, apex flagelliform, terminating in a long filiform cell or an oblong thin-walled cell, to 37 mm long, to 8 mm wide, smaller scales membranous, concolorous, ferrugineous, narrowly ovate, lanceolate, narrowly triangular, narrowly oblong to acicular, cordate, cordate-imbricate, or short-stalked, proximally erose and/or with long twisted, filiform outgrowths, apex flagelliform, terminating in a filiform cell or an oblong thin-walled cell; *lamina* 1-pinnate (rarely 1-pinnate-pinnatifid), oblong to narrowly elliptic, with up to 37 petiolated pinna pairs, to 840 mm long, proximal pinnae slightly reduced, usually deflexed; *rachis* stramineous, adaxially sulcate, moderately scaled, scales membranous to chartaceous, ferrugineous, short-stalked, narrowly ovate, narrowly lanceolate, or oblong to subulate, cordate, cordate-imbricate, proximally usually erose and/or with a few short or long twisted marginal outgrowths, apex long-attenuate to flagelliform, terminating in an acicular cell or an oblong thin-walled cell, to 3 mm long; *pinnae* short-stalked, firmly herbaceous, olive-green adaxially, paler abaxially, generally not overlapping, narrowly oblong-attenuate, straight, auriculate acroscopically, base unequally broad-cuneate to truncate, doubly serrate, to 168 mm long, to 16 mm wide, acroscopic auricle on proximal pinnae often free, ovate to trullate, to 24 mm long, to 22 mm wide; *costa* adaxially sulcate, sparsely scaled, scales taeniform, sessile or short-stalked, entire, apex terminating in an acicular cell or an oblong thin-walled cell, to 3 mm long, abaxially moderately to densely scaled, scales membranous, ferrugineous, narrowly lanceolate to narrowly trullate, often bullate, cordate to cordate-imbricate, margin proximally with short and/or long irregular outgrowths, entire distally, apex terminating in an acicular cell or an oblong thin-walled cell, to 2.4 mm long. *Vénation* evident, pinnately branched. *Sori* circular, to
1.5 mm in diameter, variable in size, those closest to the costa largest, discrete at maturity, medial to inframedial on unabbreviated vein branches; sporangium stalk eglandular, capsule with (12–)16(–28) indurated annulus cells, epistomium 4(–6)-celled, hypostomium (4–)4(–6)-celled; indusium brown, persistent, peltate, circular to irregular, repand to erose, often with flabellate central processes, maximum radius (0.29–)0.49(–0.7) mm. Spores 64 per sporangium, brown, perispore folded to form a sparse reticulum of low compressed ridges, variously granulate, verruculose to echinulate, closely perforated, exospore (40–)51.31(–66) x (28–)37.89(–48) \( \mu m \). Chromosome number \( 2n = 164 \). Figure 38 C & D.

**Vernacular names:** McLea’s shield fern; Oostelike skildvaring (Afr).

**Ecology:** Terrestrial, in light to deep shade in seasonally moist evergreen forests, usually in deep leaf-litter. Not edaphically bound. Hemicyrptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the closely branched rhizomes resulting in the formation of small clonal stands. Seasonal pattern pronounced with new growth restricted to the wetter summer months, no dormant period.

**Distribution:** In Swaziland the species is restricted to the Ngwenya Hills and Bulembu areas in the west, occurring at an altitude of ± 1 520 m. *Polystichum maclea* is restricted to Swaziland and the Drakensberg escarpment in the Mpumalanga and Limpopo provinces of South Africa.


*pungens =* terminating in a sharp point

Plants terrestrial or epilithic. Rhizome decumbent, sparsely branched, to 370 mm long, to 20 mm in diameter, set with roots and closely to widely spaced persistent stipe bases, older parts nude, apical part densely scaled, scales chartaceous, castaneous to ferrugineous, adnate, narrowly lanceolate to narrowly ovate, truncate to cordate, margins subentire to erose, apex flagelliform generally terminating in a small thin-walled cell, to 17 mm long, to 3 mm wide. Fronds 5–6 per plant, suberect to arching, to 1.4 m long; stipe proximally castaneous, stramineous distally, adaxially sulcate, to 685 mm long, to 7 mm in diameter, sparsely to densely set with conspicuous larger and smaller scales, larger scales more frequently proximal and widely spaced, smaller scales usually distal, chartaceous, proximally castaneous, distally ferrugineous, adnate, narrowly to broadly ovate, often oblique, cordate to cordate-imbricate, margins minutely erose to short-fimbriate, apex flagelliform, terminating in a long acicular cell or a small oblong thin-walled cell, to 21 mm long, to 6 mm wide, smaller scales chartaceous to membranous, ferrugineous to stramineous, short-stalked, narrowly triangular, narrowly lanceolate to narrowly ovate, cordate to cordate-imbricate, margins proximally erose or with short and/or long, straight or curved outgrowths, apex entire, flagelliform, terminating in a long acicular cell or a small oblong thin-walled cell; lamina 2-pinnate to 2-pin-
nate-pinnatifid, with up to 21 petiolated pinna pairs, firmly herbaceous, adaxially dark green, abaxially slightly paler, ovate to broadly ovate, to 704 mm long, pinnae more widely spaced proximally, often slightly imbricate distally, the most proximal pinna pair slightly reduced, often somewhat deflexed; rachis stramineous to greenish, adaxially sulcate, sparsely to densely scaled, scales sessile or short-stalked, membranous, ferrugineous to stramineous, ovate, narrowly ovate to narrowly triangular, cordate to cordate-imbricate, proximal margins erose to sparsely fimbriate or with short and/or long, curved or angular, often branched outgrowths that reduce in size and number towards the apex, apex flagelliform, terminating in a long acicular cell or a small thin-walled cell; pinnae 1-pinnate to 1-pinnate-pinnatifid, with up to 24 petiolated pinnule pairs, narrowly ovate-acuminate to narrowly oblong-attenuate, to 272 mm long, to 48 mm wide; pinna-rachis stramineous, adaxially sulcate, moderately to densely scaled, scales membranous, ferrugineous to stramineous, short-stalked, narrowly triangular, cordate-imbricate, proximal margins with short and/or long, often branched outgrowths reduced in size and number towards the apex, apex flagelliform, twisted, terminating in an acicular cell or a small thin-walled cell, to 4.5 mm long, each pinna often subtended by one or more large, often bullate, broadly ovate, cordate, minutely erose to fimbriate scales; pinnules opposite to alternate, widely spaced to slightly imbricate, proximal margins acroscopic pinnule the largest, often significantly longer than the next, especially towards the middle of the lamina, each subtended by one or more large, often bullate, broadly ovate scales, similar to, but smaller than, those on the rachis, inequilateral, ovate, ovate-oblong to ovate-rhomboid or trullate, often somewhat falcate, basiscopically cuneate, acroscopically cuneate to truncate and auricate, larger pinnules commonly deeply incised near to the costa forming a nearly free auricle acroscopically, margins serrate to lobate-serrate, sharp-tipped, rarely aristate; costa proximally adaxially sulcate, most proximal acroscopic pinnule to 50 mm long, to 19 mm wide, often reaching beyond pinna-rachis above, adaxially sparsely set with scales chiefly along the costa, filiform to taeniform, margins entire or proximally with a few short curved or long angular outgrowths, apex terminates in a long acicular cell or a small thin-walled cell, to 6 mm long, abaxially sparsely to moderately scaled, scales membranous, stramineous, short-stalked, subulate, narrowly triangular to narrowly ovate, cordate to cordate-imbricate, margins proximally with short and/or long, angular outgrowths, apex entire, filiform, terminating in a long acicular cell or a small thin-walled cell, to 3.7 mm long. Venation adaxially obscure, evident abaxially, pinnately branched. Sori circular, to 1 mm in diameter, terminal or near-terminal on abbreviated vein branches, mainly uniseriate, discrete at maturity; sporangium stalk eglandular, capsule globose in lateral view, with (10–)12.8(–19) indurated annulus cells, epistomium (3–)4(–5)-celled, hypostomium 4(–6)-celled; indusium peltate, stramineous, castaneous or black, nitid, amorphous to circular, entire to repand, the maximum radius (0.26–)0.5(–0.8) mm in diameter, persistent, brown. Spores pale brown, 64 per sporangium, perispore folded to form inflated reticulate ridges, ridges crested, ridges and areas between sparsely to densely echinate, variously porate, exospore (30–)49.31(–62) x (28–)38.08(–56) µm. Chromosome number 2n = 328. Figure 39 A & B.

**Vernacular names:** Forest shield fern; Woud skildvaring (Afr.).

**Ecology:** Terrestrial, in light or deep shade in, or along the margins of seasonally moist evergreen forests. Not edaphically bound, but in Swaziland the species is restricted to granitic soils. Hemikryptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the branched rhizome, generally resulting in the formation of small clonal stands. Seasonal pattern pronounced with new growth restricted to the wetter summer months.

**Distribution:** Rare in Swaziland and confined to the Mbabane and Enkaba areas, occurring at an altitude ranging between 1 200 and 1 370 m. The species is confined to the southern and eastern parts of South Africa and Swaziland.

Plants terrestrial or epilithic. *Rhizome* prostrate, wide-creeping, branched, to 10 mm in diameter, set with roots, closely to widely spaced persistent stipule bases, and scales (which are restricted to apical region), scales chartaceous, stramineous to castaneous, adnate, narrowly lanceolate, cordate to cordate-imbricate, margins repand to erose, generally without thin-walled hair-like cells, apex often flagelliform, usually terminating in a thin-walled cell, to 8.5 mm long, to 1.5 mm wide. *Fronds* usually widely spaced, arching, to 1.34 m long, 4–6 per plant; *stipe* firm, adaxially sulcate, proximally castaneous, stramineous distally, to 710 mm long, to 4 mm in diameter, proximally densely scaled, scales chartaceous, castaneous to stramineous, narrowly to broadly ovate, cordate to cordate-imbricate, margins repand, erose to fimbriate, with or without thin-walled cells, apex often flagelliform, terminating in a thin-walled cell, to 7 mm long, to 2.5 mm wide, distally sparsely scaled, becoming glabrous with age; *lamina* 2- or 3-pinnate, with up to 22 petiolated pinna pairs, firmly herbaceous, adaxially dark green, somewhat paler abaxially, ovate to broadly ovate, to 655 mm long, proximal pinna pair reduced in size; *rachis* stramineous to greenish, adaxially sulcate, sparsely scaled, scales chartaceous to membranous, stramineous, short-stalked, narrowly oblong to narrowly ovate, cordate to hastate, margins proximally repand, erose, or set with short and/or long irregular outgrowths, often with filiform outgrowths terminating in a thin-walled cell, distally repand to entire, flagelliform, terminating in a filiform cell or a thin-walled cell, to 6 mm long, to 1 mm wide; *pinnae* 1-pinnate or 2-pinnate, with up to 20 petiolated pinnule pairs, proximally widely spaced, usually not overlapping, distally frequently overlapping, proximal pinnae narrowly ovate to narrowly oblong-attenuate, those towards the middle of the lamina ovate, narrowly oblong to oblong-attenuate, to 240 mm long, to 75 mm wide; *pinna-rachis* stramineous, adaxially sulcate, sparsely to densely scaled, scales chartaceous to membranous, stramineous, short-stalked, linear, narrowly triangular to narrowly ovate, cordate to hastate, margins proximally with short and/or long irregular outgrowths often terminating in a thin-walled cell, distally entire, twisted, apex terminating in a filiform or thin-walled cell; *pinnules* short-stalked, opposite to alternate, widely spaced to overlapping, proximal acrosopic pinnule the largest, proximal basiscopic pinnule on basal pinna pair generally significantly smaller than the next basiscopic pinnule, inequilateral, ovate, ovate-oblong to ovate-rhomboid, acuminate to obtuse, acroscopically auricled, shallowly to deeply incised, lobate-serrate, lobes oblong, proximal acrosopic auricle obovate, sharp-tipped to aristate; *costa* adaxially proximally sulcate, sparsely scaled, scales membranous, stramineous, twisted, simple or proximally with short or long angular outgrowths, apex terminating in a filiform or a thin-walled cell, to 2.6 mm long, abaxially sparsely to moderately scaled, scales short-stalked, membranous, stramineous, narrowly triangular to narrowly ovate, cordate to cordate-imbricate, margins proximally erose or with short and/or long angular outgrowths or with long filiform outgrowths terminating in a thin-walled cell, distally entire, flagelliform, twisted, apex terminating in a filiform or thin-walled cell, to 1.5 mm long. *Venation* evident, pinnately branched. *Sori* circular, to 1 mm in diameter, near or at the apex of abbreviated
Figure 40 A & B, Didymochlaena truncatula, A, pinnae, B, fertile pinnule; C & D, Tectaria gemmifera, C, basal part of lamina, D, section of fertile lobe.
veins, discrete at maturity; *sporangium* long-stalked, simple or glandular, capsule globose, with (10–)13(–19) indurated annulus cells, epistomium (3–)4(–5)-celled, hypostomium (4–)5(–6)-celled; *indusium* absent. *Spores* 64 per sporangium, brown, the perispore folded to form a reticulum of inflated ridges, the ridges with a high crest, variously but usually sparsely echinulate, minutely perforated, the exospore (32–)38.8(–46) x (22–)28.4(–36) µm. *Chromosome number* 2n = 164. Figure 39 C & D.

**Vernacular names:** Transkei shield fern; Transkeise skildvaring (Afr.).

**Ecology:** Terrestrial, in deep shade in moist evergreen forests, usually in leaf-litter. Not edaphically bound, but in Swaziland the species appears to be restricted to soils weathered from the greenstone belt. Hemicryptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the branched, decumbent rhizome, resulting in the formation of clonal stands. Seasonal pattern appears to be pronounced with new growth restricted to the wetter summer months, no dormant period.

**Distribution:** Rare in Swaziland and the species appears to be restricted to the north-western corner of the country, occurring at an altitude of ± 1 520 m. The species is restricted to the eastern parts of South Africa and Swaziland.

**Didymochlaena** Desv. in Ges. Naturf. Freunde Berlin Mag. Neuesten Entdeck. Gesammten Naturk. 5: 303, t. 7, fig. 6, 6a (1811). Type: *Didymochlaena sinuosa* Desv. (now *Didymochlaena truncatula* (Sw.) J.Sm.; *Aspidium truncatum* Sw.).

didymos (Greek) = twin or double; claina = cover

Generic description as for the species. A monotypic genus with pantropical distribution.


*Didymochlaena dimidiata* Kunze in Linnaea 18: 122 (1844). Type: In montium faucibus sylvaticis umbrosissimis infra catarractam magnam inter Omfondi et Tagela fluvios Portus Natalensis, 02–04/1842, Gueinzius s.n. (LZ†, holo.; K, L, iso.).

*Didymochlaena lunulata* Desv. sensu Sim, Ferns S. Afr.: 164, pl. LXXXVIII (1892).

truncatula = cut off straight

Plants terrestrial. *Rhizome* erect, to 200 mm high, to 26 mm in diameter, closely set with roots, crowded stipe bases and scales, scales chartaceous, castaneous, adnate, lanceolate to narrowly ovate, with long filiform outgrowths along the margin, to 20 mm long, to 3 mm wide. *Fronds* crowded, caespitose, erect, to 2 m long; *stipe* firm, castaneous, sulcate adaxially, to 645 mm long, to 13 mm in diameter, densely scaled, scales similar to those on the rachis; *lamina* anadromous or isodromous, 2-pinnate, oblong-ovate, to 1.4 m long, to 460 mm wide, with up to 32 pinna pairs; *rachis* stramineous, adaxially sulcate, sulcus not confluent with that of the pinna-rachis, densely scaled, scales chartaceous to thinly chartaceous, castaneous, ferrugineous or stramineous, sessile, filiform, simple or with numerous filiform outgrowths along the margin, apex terminates in an oblong thin-walled cell; *pinnae* articulated to the rachis, non-functional, opposite to alternate, 1-pinnate, basal pinnae slightly more widely spaced than those towards the lamina apex, often slightly overlapping distally, linear-acute, to 320 mm long, to 46 mm wide, with up to 26 pinnule
pairs; pinna-rachis stramineous, adaxially sulcate, initially densely scaled, scales similar to those on the rachis, adaxially with several spine-like outgrowths at and near the point of the pinnule attachment; pinnules sessile, articulated to the pinna-rachis, opposite to alternate, firmly herbaceous to subcoriaceous, dimidiate, parallelogram-shaped, to 24 mm long, to 12 mm wide, adaxially with a few scales along the costa, scales chartaceous, stramineous, filiform, simple or with outgrowths along the margin, to 4 mm long, abaxially sparsely scaled, scales thinly chartaceous, stramineous to ferrugineous, sessile, filiform, simple or with long filiform outgrowths along the margin, apex terminates in an oblong thin-walled cell, to 4 mm long, to 0.4 mm wide. Venation anadromous, obscure, pinnately branched, free, vein branches terminate near the margin. 

Sori elliptic, at the apex of an abbreviated anadromous vein branch, to 3 mm long, to 8 per pinnule; sporangium long-stalked, simple, 3-seriate below the capsule, capsule globose in lateral view, with (13–)15(–16) indurated annulus cells, epistomium (2–)3-celled, hypostomium (2–)4-celled; indusium firmly herbaceous, brown, elliptic, entire, centrally attached along an elongated receptacle, to 3 mm long, to 1 mm wide; receptacle nude. Spores 64 per sporangium, brown, ellipsoidal, monolete, perispore with large inflated tubercules, echinulate. Figure 40 A & B.

Vernacular names: Tree maidenhair fern; Blinkblaar woudvaring (Afr.).

Ecology: Terrestrial, in deep shade, always along perennial streams in moist evergreen forests. Not edaphically bound, but in Swaziland the species is confined to soils weathered from the greenstone belt. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction evidently non-existent. Seasonal pattern apparently non-existent.

Distribution: Rare in Swaziland and the species appears to be restricted to the north-western corner of the country, occurring at altitudes ranging between 1 300 and 1 520 m. The species, which has a pantropical distribution, is widespread in sub-Saharan Africa.

Uses: This highly ornamental fern has recently become available in the horticultural trade for use in landscaping and as an indoor plant. The species requires high humidity and permanently moist conditions.

TECTARIACEAE Panigrahi

Genera here included in the Tectariaceae are generally included in the Dryopteridaceae (Jacobsen 1983; Schelpe & Anthony 1986; Burrows 1990). Molecular studies by Wolf et al. (1994), and Hasebe et al. (1995) show that Tectaria does not cluster with the Dryopteridaceae, but has a close relationship with the Oleandraceae. The family has a near-cosmopolitan distribution.

Key to the genera:
Venation reticulate ......................................................... Tectaria
Venation pinnately branched and free ................................ Megalastrum

tectus = hidden

Generic description as for the species. A genus of approximately 210 species, most occurring in the palaeotropics, and with about 40 species in the neotropics.


**gemmifera** = bud-bearing

Plants terrestrial. *Rhizome* erect to suberect, to 100 mm long, to 12 mm in diameter, set with roots, crowded persistent stipe bases and scales, scales chartaceous, concolorous or bicolorous, if bicolorous then centrally castaneous with paler margins, adnate, lanceolate, margins closely set with unicellular, bicellular, and simple and branched hairs along the margin, also with unicellular hairs on the scale surface, to 15 mm long, to 5 mm wide. *Fronds* crowded, caespitose, arching, to 1.6 m long; *stipe* firm, proximally castaneous, stramineous higher up, adaxially sulcate, to 750 mm long, to 9 mm in diameter, initially densely scaled at the base, sparsely scaled higher up, scales similar to those on the rhizome; *lamina* catadromous, ovate-deltate, 2-pinnate-pinnatifid, to 850 mm long, to 900 mm wide, with up to 4 petiolated pinna pairs, pinnatifid towards the apex; *rachis* stramineous, adaxially sulcate, sulcus not open to that of the lower order axes, closely set with pluricellular, acicular hairs, to 0.25 mm long, winged for most of the length, often with several proliferous buds dorsally near the apex; *pinnae* opposite to alternate, proximal pinna pair basiscopically developed, 1-pinnate-pinnatifid, inequilaterally ovate to oblong-cuneate, to 520 mm long, to 340 mm wide, generally with a single sessile or short-stalked pinnule pair, pinnatifid towards the apex, usually slightly overlapping; *pinna-rachis* convex adaxially, densely set with stramineous acicular hairs to 250 mm long, sparsely haired abaxially, often with several proliferous buds dorsally near the apex; *pinnales* sessile or petiole to 2 mm long, opposite to alternate, herbaceous, narrowly lanceolate to oblong-cuneate, acroscopic pinnule on the basal pinna to 138 mm long, to 40 mm wide, basal pinnule on the basal pinna to 295 mm long, to 90 mm wide, pinnatifid to lobed, shallowly repand, adaxially sparsely set with pluricellular acicular and 3-celled clavate hairs along the veins, abaxially sparsely set with 2-celled acicular hairs along the veins and 2-celled clavate hairs between the veins. *Venation* anadromous and catadromous, basiscopical primary vein in the upper pinnae/pinnales usually arises from the rachis or secondary rachis, reticulate, areolae usually without included free veinlets, the free vein branches end in the costae near the margin in slightly enlarged endings. *Sori* circular, to 1.5 mm in diameter, on a vein, at a vein plexus, or on a single or branched included free veinlet, in a single row on either side of the costule; *sporangium* long-stalked, 3-seriate below the capsule, with 2 or 3 usually 3-celled hairs below the sporangium, capsule globose in lateral view, with (12–)13(–14)
indurated annulus cells, epistomium (3–)4-celled, hypostomium (3–)4-celled; indusium pale brown, firmly herbaceous, circular, reniform, variously set with oblong 1–5-celled hairs along the margin and surface, to 1.2 mm in diameter; receptacle nude. Spores 64 per sporangium, stramineous, subellipsoidal, monolete, perispore forming broad wings, cristate, to (30–)34.8(–40) x (22–)26.3 (–32) μm. Figure 40 C & D.

**Vernacular names:** Forest mother fern; Woud moedervaring (Afr).

**Ecology:** Terrestrial, usually in leaf-litter in deep shade on moist or seasonally moist evergreen forest floor, generally near streams. Not edaphically bound, but in Swaziland the species is restricted to soils weathered from the greenstone belt. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction primarily by the formation of bulbils along the main axes of the lamina. Seasonal pattern apparently non-existent, no dormant period.

**Distribution:** Sporadic in Swaziland and the species appears to be restricted to forests in ravines of the Sondeza range and Lufafa, occurring at altitudes ranging between 500 and 700 m. *Tectaria gemmifera* is widespread in the eastern parts of west central and east tropical Africa and the eastern parts of south tropical and southern Africa.


megā (Greek) = large; lasi or lasio (Greek) = hairy

Generic description as for the species. A genus of approximately 30 species centred in the neotropics with one species extending to Africa and the western Indian Ocean region.


lanuginosum = woolly or downy

Plants terrestrial. *Rhizome* erect, to 450 mm long, to 30 mm in diameter, set with roots, crowded persistent stipe bases and scales, scales chartaceous, castaneous, sessile, linear to filiform, denticulate, often with a few filiform outgrowths at the base, apex terminates in a small thin-walled cell, to 13 mm long, to 0.5 mm wide. *Fronds* crowded, caespitose, arching, to 1.9 m long; *stipe* firm, basally castaneous to ferrugineous, brown distally, to 780 mm long, to 11 mm in diameter, set with scales and hairs, scales sparsely set, castaneous to ferrugineous, chartaceous, sessile, linear to filiform, denticulate, apex terminates in a small thin-walled cell, to 3.5 mm long, to 0.4 mm wide,
Figure 41 A & B, *Megalastrum lanuginosum*, A, section of basal pinna, B, section of fertile segment; C & D, *Athyrium scandicinum*, C, basal pinna, D, fertile segment.
hairs pluricellular, acicular or filiform, acicular hairs terminating in a gland-like cell, to 560 µm long, filiform hairs to 0.3 mm long; lamina anadromous proximally, catadromous distally, elliptic, to 4-pinnate, to 1.2 m long, to 1 m wide, with up to 15 petiolated pinna pairs, distal pinnae adnate, basiscopically decurrent along the rachis; rachis stramineous, adaxially sulcate, sulcus not open to that of the lower order axes, closely set with scales and hairs similar to those on the stipe; pinnae petiolate, petiole to 22 mm long, alternate, overlapping, basal pinna pair to 2-pinnate, basiscopically developed, inequilaterally ovate-deltate, to 550 mm long, to 430 mm wide, oblong-cuneate higher up, with up to 14 petiolated pinnule pairs, distal pinnules adnate, basiscopically decurrent along the pinna-rachis; pinna-rachis adaxially shallowly sulcate, sparsely set with appressed scales similar to, but smaller than, those on the rachis, closely set with hairs similar to those on the rachis; pinnules petiolate, petiole to 6 mm long, alternate, spaced or slightly overlapping, to 1-pinnate-pinnatifid, acrosopic pinnules lanceolate to oblong-cuneate, to 110 mm long, to 34 mm wide, proximal basiscopical pinnule basiscopically developed, inequilaterally ovate, to 350 mm long, to 130 mm wide; pinnule-rachis adaxially sulcate, set with scales and hairs similar to those on the pinna-rachis; segments petiolate, petiole to 2 mm long, alternate, spaced, pinnatifid, oblong-cuneate, to 82 mm long, to 19 mm wide, with up to 14 ultimate segment pairs; costa adaxially closely set with stramineous, pluricellular, acicular hairs, to 0.8 mm long, and pluricellular, filiform hairs, to 0.3 mm long, abaxially set with scales and hairs, scales chartaceous, ferrugineous, sessile, subulate, bullate, denticulate, often with short filiform outgrowths at the base, to 3 mm long, to 0.8 mm wide, and hairs similar to, but slightly longer than, those on the adaxial surface; ultimate segments sessile, herbaceous, opposite to alternate, adnate and increasingly more basiscopically decurrent along the costa towards the apex, to 11 mm long, to 4 mm wide, lobed, denticulate, costule and lamina regularly set with stramineous, pluricellular, acicular hairs to 1 mm long along the veins, and unicellular gland-like hairs between the veins, abaxially more closely set with hairs similar to those on the adaxial surface, acicular hairs also occur between the veins and along the margin, to 1.2 mm long. Vénation catadromous, evident, pinnately branched, vein branches terminate near the margin in the sinus between the teeth. Sorè circular, to 1 mm in diameter, terminally on the anadromous vein branches, or on unabbreviated vein branches; sporangium long-stalked, simple, 3-seriate below the capsule, capsule globose in lateral view, with 13(–15) indurated annulus cells, epistomium 3(–4)-celled, hypostomium 4-celled; indusium chartaceous, ferrugineous, reniform, to 0.6 mm in diameter, bearing unicellular glands, cylindrical and acicular hairs along the margin and surface. Spores 64 per sporangium, dark brown, ellipsoidal, monolette, echinate, (28–)32.2(–36) x (22–)24.75(–26) µm. Figure 41 A & B.

Vernacular names: Downy forest fern; Fluweel woudvaring (Afr.).

Ecology: Terrestrial, usually in deep shade along perennial streams in evergreen forests. Not edaphically bound, but in Swaziland the species is restricted to soils weathered from the greenstone belt. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction evidently non-existent. Seasonal pattern apparently non-existent, no dormant period.

Distribution: Rare in Swaziland and confined to the northwestern corner of the country only, occurring at an altitude of ± 1 520 m. Widespread in east tropical Africa, the eastern parts of south tropical Africa, and southern Africa, Bioko and the western Indian Ocean region.
WOODSIACEAE

The Woodsiaceae is a family with near-cosmopolitan distribution.

**Key to the genera:**

Rhizome erect to suberect; lamina to 3-pinnate; indusium J-shaped, to 1 mm long ....................

........................................................................................................................................

Athyrium

Rhizome wide-creeping; lamina to 1-pinnate-pinnatifid; indusium linear, to 3 mm long ..........

..................................................................................................................................

Deparia


**athyros** (Greek) = opened

Generic description as for the species. A near-cosmopolitan genus of approximately 180 species mainly concentrated in eastern and south-eastern Asia.


**scandicinum** = obscure, but may have originated from the Latin *scandare* = scandent.

Plants terrestrial or epilithic. *Rhizome* suberect to erect, to 150 mm long, to 10 mm in diameter, set with roots, closely spaced stipe bases and scales, scales herbaceous, brown, adnate, lanceolate, cordate, entire, apex terminates in an oblong thin-walled cell, to 10 mm long, to 2.2 mm wide. *Fronds* closely spaced, caespitose, suberect to arching, to 755 mm long, to 6 per plant; *stipe* firm, proximally castaneous, stramineous distally, adaxially sulcate, to 300 mm long, to 4 mm in diameter, proximally closely set with scales, sparsely scaled higher up, scales chartaceous, castaneous, adnate, lanceolate to lanceolate-cuneate, cordate, entire, apex terminates in an oblong thin-walled cell, to 8 mm long, to 2 mm wide; *lamina* anadromous, thinly herbaceous, to 3-pinnate, ovate to narrowly ovate, to 425 mm long, to 200 mm wide, proximal pinna pair reduced or not, with up to 17 petiolated pinna pairs; *rachis* stramineous to greenish, adaxially sulcate, sparsely scaled to glabrous, scales similar to, but smaller than, those at the stipe base; *pinnae* anadromous, petiolate, petiole to 3 mm long, to 2-pinnate, proximally widely spaced, becoming more closely spaced towards the apex and somewhat overlapping, ovate, lanceolate or oblong-cuneate, to 155 mm long, to 42 mm wide, with up to 12 pinnule pairs; *pinna-rachis* greenish, adaxially sulcate, sparsely
set with ferrugineous filiform scales, to 0.5 mm long, and pluricellular, uniseriate hairs; **pinnules** anadromous, petiolate, petiole to 1.5 mm long, alternate, ovate to inequilaterally lanceolate, to 28 mm long, to 16 mm wide, usually with a single pair of petiolated **segments**; **segments** broadly elliptic to oblong-obtuse, lobed, lobes strongly dentate, to 9 mm long, to 6 mm wide, adaxially glabrous, abaxially with short, pluricellular hairs along the veins. **Venation** evident, pinnately branched, free branches ending in the margin in the teeth. **Sori** linear to J-shaped, to 1 mm long, inframedially on the vein branches, or at a fork; **sporangium** short-stalked, simple, capsule globose, with 13(–14) indurated annulus cells, epistomium (3–)4-celled, hypostomium 4(–5)-celled; **indusium** herbaceous, ferrugineous, linear, attached almost along the entire length, erose to fimbriate, to 1 mm long. **Spores** 64 per sporangium, brown, ellipsoidal, monolet, rugate, (42–)47.15(–52) x (26–)28(–30) µm. Figure 41 C & D.

**Vernacular names:** Shady lady fern; Sagte damesvaring (Afr.).

**Ecology:** Terrestrial or epilithic, always in deep shade on and among rocks in streambeds, or banks of perennial streams in evergreen forests. Not edaphically bound, in Swaziland occurring on soils weathered from the greenstone belt and granitic rock formations. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the rarely branched rhizome. Seasonal pattern apparently non-existent, no dormancy period.

**Distribution:** Rare in Swaziland and known from the Pigg’s Peak and Hlatikhulu areas only, occurring at an altitude ranging between 1 250 and 1 520 m. Widespread in west central tropical Africa, east and south tropical Africa and the eastern parts of southern Africa.

**Deparia** Hook. & Grev., Icon. filic. 2: t. 154 (1830). Type: **Deparia macraei** Hook. & Grev. (now **Deparia prolifera** (Kaulf.) Hook.; **Dicksonia prolifera** Kaulf.).

depas (Greek) = a dish or saucer

Generic description as for the species. A genus of approximately 40 species widespread in the temperate and tropical parts of the Old World.


**japonica** = from Japan

Plants terrestrial or epilithic. **Rhizome** wide-creeping, sparsely branched, to 120 mm long, to 5 mm in diameter, set with roots, widely spaced persistent stipe bases and scales, scales chartaceous,
Figure 42 A & B, Deparia japonica, A, frond, B, section of fertile pinna; C, Oleandra distenta, habit.
castaneous to ferrugineous, adnate, lanceolate to narrowly ovate, entire or with scattered unicellular gland-like cells along the margin, apex terminates in an oblong thin-walled cell, to 5 mm long, to 1 mm wide. Fronds erect to arching, to 15 mm apart, to 6 per plant; stipe firm, atrocastaneous, adaxially shallowly sulcate, to 300 mm long, to 2.2 mm in diameter, closely set with scales and hairs, scales similar to those on the rhizome, hairs pluricellular, uniseriate, acicular, or cylindrical, terminating in a gland-like cell, to 0.8 mm long; lamina anadromous, catadromous towards the apex, 1-pinnatipinnatifid, ovate, to 310 mm long, to 280 mm wide, with up to 6 petiolated pinna pairs, becoming sessile and adnate towards the apex; rachis shallowly sulcate adaxially, densely set with scales and hairs similar to those on the stipe; pinnae opposite to alternate, pinnatifid, basally more widely spaced, basal pinna pair often basiscopically developed, to 168 mm long, to 40 mm wide; costa adaxially shallowly sulcate, closely set with scales and hairs similar to those on the rachis; pinnules firmly herbaceous, oblong-cuneate to oblong-obtuse, to 31 mm long, to 10 mm wide, crenulate, adaxially regularly set with pluricellular acicular hairs along and between the veins, abaxially moderately set with acicular hairs along the veins, to 1 mm long. Venation evident, pinnately branched, free, branches end in the teeth near the margin. Sori linear, often back-to-back, usually on the acrosopic vein branches, to 3 mm long; sporangium long-stalked, simple or with 1 or 2 gland-like cells near the apex, capsule globose in lateral view, with (13–)14(–15) indurated annulus cells, epistomium (3–)4-celled, hypostomium (3–)4-celled; indusium chartaceous, stramineous, linear, fimbriate, often with acicular and cylindrical hairs terminating in an enlarged gland-like cell occurring on the surface, to 3 mm long, to 0.3 mm wide. Spores brown, ellipsoidal to spheroidal, monolete, tuberculate, exospore (30–)35.8(–40) x (24–)26.6(–28) µm. Figure 42 A & B.


Ecology: Terrestrial, usually along perennial streams in deep shade in evergreen forests. Not edaphically bound. Hemicryptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the creeping, branched rhizome resulting in the formation of small clonal stands. Seasonal pattern apparently non-existent in optimal conditions, no dormancy period.

Distribution: Sporadic in Swaziland and currently known from the Pigg’s Peak and Hlatikhulu areas, occurring at altitudes ranging between 1 250 and 1 520 m. This species, a native of the Himalayas, central and south-western China, Korea and Japan, appears to have become naturalised in the country during the last decade. In South Africa the species is now widespread in the wetter central and coastal regions of KwaZulu-Natal.

OLEANDRACEAE (J.Sm.) Ching ex Pic.Serm.

The chromosome number based on 2n = 80 or 82, together with several anatomical and morphological characters suggest that the Oleandraceae have an affinity with the dryopteroid ferns (Nayar et al. 1968). This view is supported by rbcL data which show that the dryopteroid ferns are basal to the Oleandraceae, Nephrolepidaceae and Polypodiaceae (Hasebe et al. 1995).
Key to the genera:
Lamina simple; indusium glabrous ................................................................. Oleandra
Lamina 1-pinnate-pinnatifid; indusium margin and surface closely set with unicellular capitately gland-like hairs ............................................................... Arthropteris


oleandra = perhaps in resemblance to the leaves of Nerium oleander (Apocynaceae)

Generic description as for the species. A genus of approximately 40 species with pantropical distribution, but mainly in Asia.


Oleandra articulata sensu Sim, Ferns S. Afr.: 189, pl. CVII, fig. 1 (1892); Sim, Ferns S. Afr., 2nd edn: 124, pl. 44, fig. 1 (1915).

distenta = expanded or swollen

Plants epilithic. Rhizome scandent, irregularly laterally branched, to 1 m, or longer, to 3.5 mm in diameter, variously set with long, usually unbranched wiry roots, phyllopodia to 12 mm long and up to 50 mm apart, and scales, scales chartaceous, castaneous near the point of attachment, somewhat paler along the margin, appressed, imbricate, peltate, lanceolate, fimbriate, apex terminates in an oblong thin-walled cell, to 5.5 mm long, to 1.2 mm wide. Fronds pendent, to 290 mm long; stipe firm, articulated to the phyllopodia, articulation swollen, stramineous, adaxially sulcate, to 22 mm long, to 1.2 mm in diameter, sparsely set with scales similar to, but smaller than, those on the rhizome; lamina herbaceous, simple, oblong-attenuate to oblong-caudate, cuneate to acute, entire to shallowly repand, to 265 mm long, to 42 mm wide, adaxially and abaxially initially set with scales and hairs, scales membranous, ferrugineous to stramineous, sessile, basally attached, lanceolate to cordate, truncate to cordate, margins variably fimbriate, the apices of which terminate in an oblong thin-walled cell, to 2.5 mm long, occurring along the costa, and simple, multicellular, uniseriate hairs to 0.8 mm long, occurring on the lamina surface and margin, these soon become abraded; costa adaxially shallowly sulcate, pronounced abaxially. Venation anadromous, evident, pinnately forked, free, branches ending in or near the margin. Sori circular, inframedial on the acroscopic vein branch, scattered in a line parallel to, and on both sides of, the costa. Sporangium long-stalked, stalk simple or with one to three glandular cells and/or a filiform outgrowth near the capsule, 3-seriate below the
capsule, capsule globose in lateral view, with (13–)14(–15) indurated annulus cells, epistomium 4(–6)-celled, hypostomium 4(–5)-celled. *Indusium* crustaceous, castaneous, persistent, reniform, entire, to 1 mm in diameter. Spores elliptic, monolete, perispore with wing-like folds, echinate, porate, (34–)37.3(–40) x (22–)27.1(–30) µm. Figure 42 C.

**Vernacular names:** Tangled crevice creeper, Oleander fern; Kranstou (Afr.); Gebeleweni (Sis.).

**Ecology:** Chasmophytes or epilithic in seasonally moist, exposed or shaded rock crevices in boulder-forests, or in the shade on moist or seasonally moist cliffs. Not edaphically bound, but in Swaziland the species occurs on granitic rocks and formations forming part of the greenstone belt. Nanophanerophyte, mesoxerophyte; fronds mesoxeromorphic. Vegetative reproduction by the wide-creeping, branched rhizome resulting in the formation of tangled masses. Seasonal pattern apparently pronounced, deciduous during dry periods.

**Distribution:** Sporadic in the western half of Swaziland, occurring at altitudes ranging between 1 200 and 1 370 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.

*Arthropteris* J.Sm. ex Hook.f., Fl. nov.-zeland 2; 43, t. 82 (1854). Type: *Arthropteris tenella* (G.Forst.) J.Sm. ex Hook.f.; *Polypodium tenella* G.Forst.

*arthrós* (Greek) = joint; *pteris* = fern

Generic description as for the species. A genus of approximately 15 species with a palaeotropical distribution.


*Nephrodium albo-punctatum* sensu Sim, Ferns S. Afr.: 173, pl. XCV (1892).

*Dryopteris orientalis* sensu Sim, Ferns S. Afr., 2nd edn: 91, pl. 9 (1915).

*mono* (Greek) = one; *carpa* (Greek) = fruit

Plants terrestrial, epilithic or epiphytic. *Rhizome* wide-creeping, irregularly laterally branched, to 3 mm in diameter, set with roots, widely spaced persistent phylloedia to 20 mm long, and scales, scales chartaceous, castaneous to ferrugineous, peltate, circular to subcircular, margins regularly set with uni- and bicellular capitate hairs, adaxial surface closely set with filiform unior pluricellular hairs, to 2 mm long, to 1.5 mm wide. *Fronds* erect to arching, widely spaced, articulated to phylloedia, to 60 mm apart, to 765 mm long; *stipe* articulated to the phylloedia, firm, proximally castaneous, stramineous higher up, adaxially sulcate, to 235 mm long, to 2.5 mm in diameter, set with hairs and scales, hairs pluricellular, acicular, or 2- or 3-celled and clavate, to 120 µm long, sparsely scaled, scales chartaceous, ferrugineous, adnate to sessile, broadly ovate, cordate, margins regularly set with unicellular, thin-walled cells, to 2 mm long, to 1.8 mm wide; *lamina* catadromous, 1-pinnae-pinnastrifid, narrow-elliptic, to 520 mm long, to 175 mm wide, with up to 22 sessile pinna pairs; *rachis* adaxially sulcate, closely set with hairs similar to those on the stipe; *pinnae* opposite to alternate, more widely spaced and often slightly reduced basally, oblong-cuneate, pinnastrifid, adnate and basiscopically decurrent towards the apex, to 85 mm long, to 27 mm wide; *costa* adaxially convex, densely set with hairs similar to those on the rachis; *pinnules* herba-
Figure 43 A & B, *Arthropteris monocarpa*, A, habit, B, section of fertile pinna; C, *Elaphoglossum acrostichoides*, habit.
ceous, adnate, oblong-acute to oblong-obtuse, basiscopically decurrent, 4 mm long, to 6.5 mm in diameter, dentate, adaxially and abaxially regularly set with acicular hairs to 1 mm long along the veins and margin, and with 3-celled clavate hairs on the lamina between the veins, the 2 apical cells being shorter and gland-like, to 110 mm long. Venation evident, pinnately branched, vein branches terminate in a hydathode in the teeth near the margin, often exuding a white crystalline substance adaxially. Sorá circular, to 1.2 mm in diameter, terminally on an abbreviated anadromous vein branch; sporangium long-stalked, simple, 3-seriate below the capsule, capsule globose in lateral view, with (10–)13(–15) indurated annulus cells, epistomium (3–)4-celled, hypostomium 4-celled. Indusium chartaceous, brown, reniform, margin and surface closely set with unicellular capitate gland-like hairs, to 1 mm in diameter. Spores 64 per sporangium, elliptic to spheroidal, monolete, brown, with narrow reticulate wings, exospore (36–)38.08(–42) x (26–)27.13(–32) μm. Figure 43 A & B.

Vernacular names: Dotted fern; Spikkelvaring (Afr).

Ecology: Chasmophytes or epilithic, on moist or seasonally moist, usually shaded cliffs and on rocks in scree. Not edaphically bound, but in Swaziland the species is confined to rocks from the greenstone belt. Hemicryptophyte, mesophyte; fronds mesomorphic, articulated. Vegetative reproduction by the wide-creeping, many-branched rhizome, resulting in the formation of large clonal stands. Seasonal pattern apparently non-existent. Dormant during prolonged droughts.

Distribution: Rare in Swaziland and only known from a single isolated valley in the north-western corner of the country, at an altitude of ± 600 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.

LOMARIOPSIDACEAE Alston

A family with a pantropical distribution. Phylogenetic studies based on morphological (Stevenson & Loconte 1996) and molecular information (Hasebe et al. 1995) suggest it is closely related to the Dryopteridaceae.

Elaphoglossum Schott ex J.Sm. in J. Bot. (Hooker) 4: 148 (1841), nom. cons. Type: Elaphoglossum conforme (Sw.) J.Sm., type cons.

elaphos (Greek) = a deer; glossa (Greek) = a tongue

Generic description as for the species. A genus of approximately 400 species occurring throughout the temperate and tropical regions of the world, but with the largest species diversity in the neotropics.

**Vittaria acrostichoides** Hook. & Grev., Icon. filic.: t. 186 (1830). *Drymoglossum acrostichoides* (Hook. & Grev.) T.Moore, Index fil.: 31 (1857). Type: Cape of Good Hope, 1822, Carmichael s.n. (K!, holo.).


*acrostichoides* = like *Acrostichum*, with sporiangia covering the abaxial surface of the lamina.

Plants terrestrial or epilithic. *Rhizome* creeping, irregularly branched, to 3.5 mm in diameter, set with roots, spaced phyllopodia 2–7 mm long, and scales, scales often bicolorous, chartaceous towards the base, stramineous to ferrugineous, crustaceous towards the apex, castaneous and nitid, adnate, lanceolate to ovate, truncate to cordate, entire, repand, or with scattered glandular cells and filiform outgrowths terminating in an oblong thin-walled cell, apex terminates in an oblong thin-walled cell, to 2.5 mm long, to 1.5 mm wide, aerophores large. *Fronds* erect to arching, dimorphic, fertile generally overtop the sterile, sterile to 620 mm long, fertile to 510 mm long; *stipe* articulated to the phyllopodia, firm, proximally castaneous to black, green higher up, proximally adaxially flattened, shallowly sulcate higher up, sterile to 265 mm long, to 2.2 mm in diameter, fertile to 280 mm long, to 2.2 mm in diameter, initially sparsely scaled, glabrous later, scales chartaceous, ferrugineous to stramineous, sessile, ovate to broadly ovate, cordate, margins irregularly set with filiform outgrowths, apex terminates in an oblong thin-walled cell, to 2.5 mm long, to 1.5 mm wide; *lamina* firmly herbaceous to coriaceous, simple, entire, sterile oblong, attenuate to cuneate, apex cuneate to acute, to 365 mm long, to 42 mm wide, fertile linear to oblong, cuneate, apex cuneate, to 230 mm long, to 31 mm wide, adaxially with a few fugaceous scales similar to, but smaller than, those on the stipe along the costa, also with scattered glands, abaxially initially with fugaceous scales similar to those on the stipe along the costa, also with appressed, ferrugineous to stramineous, dendroid scales, and glands; *costa* adaxially shallowly sulcate, pronounced abaxially. *Veination* anadromous, obscure, pinnately forked, free, vein branches ending near the margin. *Sori* acrostichoid, often incomplete at the base; *sporangium* stalk simple, 3-seriate below the capsule, capsule globose, annulus with (11–)12 indurated annulus cells, epistomium 4-celled, hypostomium 4-celled. *Spores* elliptic, monolete, perispore with irregular reticulate ridges, porate at base, crests spinulose, scabrous between the ridges, exospore (38–)41.7(–46) x (26–)28.2(–30) µm. Figure 43 C.

**Vernacular names:** Narrow-leaved deer tongue fern; Smalblaar tongvaring (Afr.); Lehorometso, tsebe-tsa-mutla (Ses.); Gebeleweni (Sis.).

**Ecology:** Epilithic, in seasonally moist exposed or shaded rock crevices. Not edaphically bound. Hemicryptophyte, mesoxerophyte; fronds mesoxeromorphic, articulated. Vegetative reproduction by the many-branched, creeping rhizome, often resulting in the formation of large clonal stands. Seasonal pattern pronounced with new growth and the formation of fertile fronds restricted to the rainy season. Fertile fronds collected in May and July.

**Distribution:** Infrequent in the north-western part of Swaziland, occurring at an altitude ranging between 1 300 and 1 520 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.
BLECHNACEAE

A cosmopolitan family of great diversity on the temperate, tropical–montane and oceanic islands in the southern hemisphere. The affinity of the Blechnaceae to any other group of extant ferns remains unresolved. There is, however, evidence that the family is more closely related to the Dryopteridaceae (Hasebe et al. 1995; Stevenson & Loconte 1996), than the Aspleniaceae (Holttum 1947).


*blechnon* (Greek) = a fern

Plants terrestrial, epilithic or epiphytic. *Rhizome* short, decumbent and often stoloniferous or suberect to erect and trunk-like, set with roots, closely spaced stipe bases, and scales, scales chartaceous, castaneous to ferrugineous, adnate, lanceolate, narrowly ovate, triangular, or subulate, cuneate to cordate, margins variously set with unicellular capitate glands, and short or long, pluricellular, uniseriate hairs, terminating in an oblong thin-walled cell, apex terminates in an oblong thin-walled cell. *Fronds* approximate, usually caespitose, erect to arching, strongly dimorphic, fertile generally overtop the sterile, or the sterile overtop the fertile, fertile short-lived; *stipe* firm, proximally castaneous, stramineous higher up, adaxially sulcate, not open to the sulci of the costae, proximally densely scaled, moderately scaled higher up, scales chartaceous, ferrugineous to stramineous, sessile, lanceolate, ovate, linear-flagelliform, cordate to cordate-imbricate, margins irregularly set with unicellular capitate glands, and short or long pluricellular, uniseriate hairs terminating in an oblong thin-walled cell; *lamina* catadromous, firmly herbaceous, to 1-pinnate, sterile elliptic, fertile elliptic, much contracted; *rachis* adaxially shallowly sulcate, sulcus not open to that of the costa, pronounced abaxially, variously set with scales, hairs, and glands, scales chartaceous, ferrugineous to stramineous, filiform, apex terminates in an oblong thin-walled cell, hairs 2-celled, apical cell enlarged and thin-walled, glands cylindrical; *pinnae* sterile firmly herbaceous to subcoriaceous, dark green abaxially, grey-green abaxially, attenuate towards the base and apex, adnate, sessile, or short petiolate, increasingly more widely spaced towards the base, usually touching higher up, linear-attenuate, oblong-acute, oblong-cuneate, or triangular, often falcate, inequilateral, adnate with an abruptly widened base, truncate, or cordate, narrowly to broadly cuneate acroscopically entire, or with minute hyaline teeth, glabrous adaxially and abaxially, or variously set with unicellular cylindrical glands, fertile firmly herbaceous, attenuate towards the base and apex, adnate, more widely spaced towards the base, linear, or linear-attenuate, often falcate, entire or shallowly and irregularly lobed, with an abruptly widened base, glabrous adaxially, or variously set with unicellular cylindrical glands; *costa* adaxially shallowly sulcate, pronounced abaxially. *Vénation* anadromous basally, catadromous towards the apex, evident or obscure, pinnately forked, free, in the sterile fronds the free branches end near the margin in an enlarged apex, free vein branches end near the margin; in the fertile fronds the vein ends anastomose to form a near-marginal vascular commissure, often with short excurrent veins extending from it. *Stomata* usually of the polycytic type, hypostomatic; *aerophores* in continuous dorsilateral lines along the stipe and rachis. *Sori* linear, extending from above the base to near the apex of the fertile pinnae; *indusium* firm, brown, linear, repand or erose; *sporangium* long-stalked, simple, 3-seriate below the capsule, capsule globose to obovate in lateral view, with (12–)13, 15, 18, 19 or 20(–25) indurated annulus cells, epistomium (3–)4, 5 or 7(–10)-celled, hypostomium 4, 5, 6 or 7(–8)-celled, stomium well-defined; indusium continuous or discontinuous, entire, opening towards the costa. *Spores* 64 per sporangium, ellipsoidal, monolete, with low reticulate ridges, rugulose, (52–)56.2(–62) x (32–)34.7(–38) µm.
A genus of approximately 200 species with subcosmopolitan distribution, but with better representation in the southern temperate areas than in the northern temperate regions.

**Key to the species:**

1a Sterile lamina pinnatisect:
   2a Sterile fronds to 1.24 m long; sterile pinnae linear, attenuate to triangular; fertile fronds overtop the sterile ................................................. **B. attenuatum**
   2b Sterile fronds to 440 mm long; sterile pinnae oblong-acute to oblong-obtuse; sterile fronds overtop the fertile ...................................................... **B. inflexum**

1b Sterile lamina 1-pinnate:
   3a Sterile pinna margins serrate ........................................................................ **B. capense**
   3b Sterile pinna margins entire to minutely denticulate:
      4a Sterile pinna margins entire; sterile pinna apex mucronate .................. **B. australe**
      4b Sterile pinna margins denticulate; sterile pinna apex attenuate ................
         .............................................................................................................. **B. punctulatum**


Type: Ex insula Mauritii, Gröndal s.n. (S!, holo.).

**Blechnum giganteum** (Kaulf.) Schltdl., Adumbr. pl.: 36, t. 20, 22, fig. 1 (1827); Jacobsen, Ferns Sthn. Afr.: 460, fig. 346a, b, map 173 (1883); Schelpe & Anthony, Fl. S. Afr., Pterid.: 269, fig. 91, map 233 (1986). **Lomaria gigantea** Kaulf., Enum. filic.: 150, 151 (1824).

Type: Habitat ad C. B. Spei, Sonnerat s.n. (P-JU 1278, holo.).


Type: Habitat in Promontorio bonae spei, sine coll. s.n. (not located).

**Lomaria punctata** Blume, Enum. pl. Javae: 201 (1828). Type: (missing).


attenuatum = gradually tapering

Plants terrestrial, epilithic or epiphytic. **Rhizome** short-decumbent, to 12 mm in diameter, set with roots, closely spaced stipe bases, and scales, scales chartaceous, ferrugineous, adnate, lanceolate to subulate, cuneate to cordate, margins variably set with unicellular capitate glands, and short or long, pluricellular, uniseriate hairs, terminating in an oblong thin-walled cell, apex terminates in an oblong thin-walled cell, to 22 mm long, to 2 mm wide. **Fronds** arching, dimorphic, fertile generally overtop the sterile, sterile to 1.24 m long, fertile short-lived, to 830 mm long; **stipe** firm, proximally castaneous, stramineous higher up, adaxially sulcate, sterile to 175 mm long, to 10 mm in diameter, fertile to 180 mm long, to 6 mm in diameter, proximally densely scaled, moderately scaled higher up, scales chartaceous, ferrugineous, sessile, linear-flagelliform, cor- date to cordate-imbricate, margins irregularly set with unicellular capitate glands, and short or long pluricellular, uniseriate hairs terminating in an oblong thin-walled cell, to 18 mm long, to 1.2 mm wide; **lamina** firmly herbaceous, pinnatisect, sterile elliptic, to 1.2 m long, to 340 mm wide, fertile
Figure 44 A & B, *Blechnum attenuatum*, A, basal part of lamina, B, fertile pinnae; C & D, *B. australe*, C, habit, D, fertile pinnae.
elliptic, to 650 mm long, to 170 mm wide; rachis adaxially shallowly sulcate, sulcus not open to that of the costa, pronounced abaxially, pinnae sterile firmly herbaceous to subcoriaceous, dark green abaxially, grey-green abaxially, attenuate towards the base and apex, adnate to the rachis, touching higher up, widely spaced towards the base, linear-attenuate to triangular, entire, with an abruptly widened base, glabrous adaxially and abaxially, to 195 mm long, to 15 mm wide, fertile firmly herbaceous, attenuate towards the base and apex, adnate to the rachis, more widely spaced towards the base, linear-attenuate, entire or shallowly and irregularly lobed, with an abruptly widened base, glabrous adaxially, to 150 mm long, to 2.5 mm wide; costa adaxially shallowly sulcate, pronounced abaxially. Veination evident, pinnately forked, free, in the sterile fronds, free vein branches end near the margin; in the fertile frond the vein ends anastomose to form a near-marginal vascular commissure. Sori linear, extending from above the base to near the apex of the fertile pinnae; indusium firm, brown, linear, erose; sporangium long-stalked, simple, 3-seriate below the capsule, capsule obovate in lateral view, annulus with (17–)20(–22) indurated annulus cells, epistomium 4(–5)-celled, hypostomium 4(–6)-celled. Spores 64 per sporangium, elliptic, monolete, with low reticulate ridges, rugulose, (52–)56.2(–62) x (32–)34.7(–38) µm. Figure 44 A & B.

Vernacular names: Giant hard-fern; Waterval varing (Afr).

Ecology: Terrestrial, epilithic or low-level epiphytes, occurring in moist to wet conditions at waterfalls and along streams, usually in deep shade. Not edaphically bound, occurring on various rock types within Swaziland. Hemicyryptophyte or nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the branched rhizome, resulting in the formation of small clonal stands. Seasonal pattern apparently non-existent.

Distribution: Frequent in the western half of Swaziland, occurring at altitudes ranging between 1 200 and 1 520 m. The species is widespread in west central tropical and east tropical Africa, and the eastern parts of south tropical and southern Africa.


Lomaria pumila Kaulf., Enum. filic.: 151, 152 (1824). Type: Prom. bon. spei, 03/07/1829–38, Ecklon et Zeyher s.n. (HAL 76913, ?holo.).

australe = south or southern
Plants terrestrial or epilithic. Rhizome short-decumbent, to 4 mm in diameter, set with roots, crowded stipe bases, and scales, stoloniferous, stolons to 90 mm long, to 2 mm in diameter, thickening towards the apex, proximally with few roots and widely spaced fronds, fronds crowded towards the apex, scales chartaceous to crustaceous, castaneous, adnate, lanceolate to narrowly ovate, cordate, margins irregularly set with outgrowths terminating in an oblong thin-walled cell, apex terminates in an oblong thin-walled cell, to 7 mm long, to 1.5 mm wide. Fronds erect to arching, dimorphic, fertile generally overtop the sterile, sterile to 540 mm long, fertile to 560 mm long; stipe firm, proximally castaneous, stramineous higher up, adaxially sulcate, sterile to 140 mm long, to 1.2 mm in diameter, fertile to 150 mm long, to 1.2 mm in diameter, initially sparsely scaled, glabrous with age, scales chartaceous, ferrugineous to stramineous, sessile, lanceolate to ovate, cordate to cordate-imbricate, margins irregularly set with outgrowths terminating in an oblong thin-walled cell, apex terminates in an oblong thin-walled cell, to 3 mm long, to 0.2 mm wide, hairs 2-celled, apical cell enlarged and thin-walled, glands cylindrical, to 0.3 mm long; pinnae firmly herbaceous, attenuate towards the apex, basal pinnae gradually reduced, sessile, adaxially glabrous or variously set with unicellular cylindrical glands similar to those on the rachis, abaxially sparsely set with filiform scales along the costa, often also closely set with cylindrical glands, sterile oblong-acute, often falcate, truncate to cordate, often acroscopically auricled, mucronate, margins with minute transparent teeth, to 43 mm long, to 9.5 mm wide, fertile linear, auriculate, mucronate, often falcate, to 37 mm long, to 2.5 mm wide; costa adaxially shallowly sulcate, pronounced abaxially. Venation evident or obscure, forked, in the sterile frond the free branches end near the margin in an enlarged apex; in the fertile frond the veins form a near-marginal vascular commissure with short excurrent veins extending from it. Sori linear, extending most of the pinna length; indusium firm, brown, linear, repand; sporangium long-stalked, simple, 3-seriate below capsule, capsule broadly elliptic in lateral view, with (12–)13(–14) indurated annulus cells, epistomium 4(–5)-celled, hypostomium 4(–5)-celled. Spores elliptic, monolet, with low, irregular verrucae, (36–)39.3(–42) x (26–)28(–32) µm. Figure 44 C & D.

Vernacular names: Southern hard-fern; Bostapyt (Afr); Metsi-a-oang (Ses.).

Ecology: Terrestrial or epilithic, occurring on the seasonally moist, shaded forest floor in leaf-litter. Not edaphically bound, but in Swaziland the species is restricted to granitic soils. Hemicryptophyte, mesoxerophyte; fronds mesomorphic. Vegetative reproduction by the stoloniferous rhizome and rootbud formation, generally resulting in the formation of small clonal stands. Seasonal pattern appears to be pronounced with new growth restricted to the wetter summer months. No dormant period.

Distribution: Rare in Swaziland, occurring at ± 1 370 m in the Mbabane region only. The species occurs in east tropical Africa, the eastern part of south tropical Africa and the moister parts of southern Africa.
Figure 45 A–C, *Blechnum capense*, A, section of sterile lamina, B, venation of sterile pinna, C, section of fertile lamina; D & E, *B. inflexum*, D, sterile frond, E, fertile frond.


Lomaria procera sensu Sim, Ferns S. Afr.: 122, pl. LVII (1892).

*capense* = from the Cape

Plants terrestrial. *Rhizome* short-decumbent, irregularly branched, to 12 mm in diameter, set with roots, crowded stipe bases and scales, scales chartaceous, ferrugineous to stramineous, adnate, triangular to lanceolate, entire, apex terminates in a much enlarged thin-walled cell, to 10 mm long, to 4 mm wide. *Fronds* crowded, erect, dimorphic, fertile generally overtop the sterile, sterile to 1.04 m long, fertile to 1.28 m long; *stipe* firm, castaneous to ferrugineous, adaxially sulcate, sterile to 400 mm long, to 7 mm in diameter, fertile to 655 mm long, to 8 mm in diameter, initially closely set with scales, glabrous later, scales thinly chartaceous, stramineous, sessile, linear-flagelliform to filiform, cordate, entire, apex terminates in an oblong thin-walled cell, to 22 mm long, to 1.5 mm wide; *lamina* catadromous, 1-pinnate, sterile elliptic, with up to 21 free pinna pairs, to 645 mm long, to 210 mm wide, fertile elliptic, to 630 mm long, to 170 mm wide, with up to 20 free pinna pairs; *rachis* adaxially shallowly sulcate, initially closely set with scales similar to those on the stipe, glabrous or near-glabrous later; *pinnae* herbaceous, petiolate, petiole to 1 mm long, sterile oblong-cuneate, inequilateral, narrowly to broadly cuneate acroscopically, obtuse basiscopically becoming decurrent towards the apex, serrate, to 116 mm long, to 19 mm wide, spaced or imbricate, fertile linear, to 142 mm long, to 3 mm wide, spaced, adaxially initially set with ferrugineous to stramineous, filiform scales, becoming glabrous later, abaxially variously set with scales along the costa, scales chartaceous, ferrugineous, sessile, lanceolate-flagellate to ovate-flagellate, cordate to cordate-imbricate, entire or with a few marginal outgrowths, apex terminates in an oblong, thin-walled cell, to 4 mm long, to 1.2 mm wide; *costa* adaxially sulcate, sulcus confluent with that of the rachis, pronounced abaxially. *Véonation* catadromous, evident, forked, the free vein branches terminate in an enlarged apex in the sinus between the teeth near the margin, in the fertile the veins form a near-marginal vascular commissure. *Sori* linear, extending the entire length of the pinnae; *indusium* chartaceous, brown, linear, repand to lacerate; *sporangium* long-stalked, simple, 3-seriate below the capsule, capsule broadly elliptic in lateral view, with 18–22 indurated annulus cells, epistomium (4–)5–(8)-celled, hypostomium (4–)5–(8)-celled. *Spores* elliptic, monolete, with narrow reticulate ridges, (48–)56.8–(60) x (34–)38.2–(44) µm.

Figure 45 A–C.

**Vernacular names:** Palm leaf fern; Kaapse vleivaring (Afr.).
Ecology: Helophytes, terrestrial, along continuously wet stream banks, and in seepage areas along perennial streams in open grassveld, or along forest margins, in exposed conditions or light shade. Not edaphically bound, but in Swaziland the species is confined to granitic and weathered gneiss soils. Hemicryptophyte to nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the closely branched rhizome results in the formation of small clonal stands. Seasonal patter pronounced with fertile fronds and new growth restricted to the warmer and wetter summer months. No dormant period, pyrophytic.

Distribution: Frequent in the western half of Swaziland, occurring at altitudes ranging between 900 and 1 270 m. The species is restricted to the eastern parts of south tropical and southern Africa.


*inflexum* = bent inwards

Plants terrestrial. *Rhizome* suberect to erect, to 140 mm long, to 6 mm in diameter, closely set with roots, crowded stipe bases and scales, scales chartaceous, ferrugineous, sessile, subulate, irregularly set with short, retrorse, marginal outgrowths terminating in an enlarged thin-walled cell, apex terminates in an oblong thin-walled cell, to 15 mm long, to 1 mm wide. *Frons* crowded, erect to suberect, dimorphic, sterile overtop the fertile, sterile to 440 mm long, fertile to 335 mm long; *stipe* firm, proximally castaneous, stramineous higher up, adaxially sulcate, sterile to 175 mm long, to 2.5 mm in diameter, sterile to 130 mm long, to 2.5 mm in diameter, proximally densely scaled, sparsely scaled higher up, scales chartaceous, ferrugineous, sessile, subulate, cordate, entire or with a few retrorse outgrowths terminating in an enlarged thin-walled cell, apex terminates in an oblong thin-walled cell, to 23 mm long, to 3 mm wide; *lamina* pinnatisect, sterile narrowly elliptic to oblong-acute, basal pinnae gradually reduced, to 340 mm long, to 87 mm wide, fertile narrowly obovate to oblong-acute, to 340 mm long, to 35 mm wide, with up to 30 petiolated pinna pairs; *rachis* adaxially shallowly sulcate, sulcus not open to that of the costae, pronounced adaxially and abaxially, sparsely scaled abaxially, scales sessile, filiform, cuneate to cordate, entire, apex terminates in an oblong thin-walled cell, to 6 mm long, to 0.4 mm wide; *pinnae* firmly herbaceous, adnate to the rachis, sterile oblong-acute to oblong-obtuse, with an abruptly enlarged base, touching, becoming widely spaced basally, to 46 mm long, to 10 mm wide, fertile linear, closely spaced, to 37 mm long, to 1 mm wide, adaxially and abaxially initially closely set with scales similar to, but shorter than, those on the rachis, glabrous to subglabrous later; *costa* adaxially convex, pronounced adaxially and abaxially. *Vénation* basally
anadromous, catadromous towards the apex, evident, forked, free vein branches terminate near
the margin, in the fertile the veins form a near-marginal vascular commissure. *Sori* linear, ex-
tending the entire pinna length; *indusium* chartaceous, brown, linear, repand, with pluricellular
projections, to 1 mm wide; *sporangium* long-stalked, simple, 3-seriate below the capsule, capsule
broadly elliptic in lateral view, with (18–)19(–25) indurated annulus cells, epistomium (5–)7(–10)-
celled, hypostomium (5–)7(–8)-celled. *Spores* elliptic, monolete, with narrow reticulate ridges,
(50–)54.7(–62) x (32–)36.2(–46) µm. Figure 45 D & E.

**Vernacular names:** Folded hard-fern; Klein stamvaring (Afr.).

**Ecology:** Terrestrial, generally in moist conditions along streams in open grassveld, but rarely
also in seasonally moist conditions in the shade of low scrub away from water, or at boulder bases.
Not edaphically bound, but in Swaziland the species is confined to granitic soils. Nanophanerophyte,
mesoxerophyte; fronds mesoxeromorphic, fertile fronds short-lived. Vegetative reproduction by
the closely branched rhizome and rootbud formation. Seasonal pattern apparently pronounced
with new growth and fertile frond formation restricted to the wetter and warmer summer months.
No dormant period, pyrophytic.

**Distribution:** Rare in Swaziland and known from a single collection made on the Ntondozi moun-
tains only, occurring at an altitude of 1 270 m. The species is confined to eastern Zimbabwe and
the eastern and southern parts of southern Africa.

**Blechnum punctulatum** Sw. in J. Bot. (Schrader) 1800(2): 74, 75 (1801). Type: ex Cap. b. Spei,
Thunberg s.n., Herb. Swartz (S!, holo.).

**Key to the varieties:**
Sori an uninterrupted near marginal line .................................................. var. **punctulatum**
Sori on the lower pinnae breaking up towards the rachis into small separate oval sori ........
........................................................................................................................ var. **atherstonei**

var. **punctulatum**
Sim, Ferns S. Afr., 2nd edn: 181, pl. 77 (1915); Jacobsen, Ferns Sthn. Afr.: 466, pl. 351a, map 177
(1983); Schelpe & Anthony, Fl. S. Afr., Pterid.: 273, 275, fig. 95, map 237 (1986); Burrows, Sthn.
_Lomaria punctulata_ (Sw.) Kunze in Linnacea 10: 507 (1836); Sim, Ferns S. Afr.: 118, pl. LII (1892).
_Mesotheum punctulatum_ (Sw.) C.Presl, Epimel. bot.: 113 (1851). _Blechnopsis punctulata_ (Sw.) Trevis.
in Atti Reale Ist. Veneto Sci. Lett. Arti 2, 2: 166 (1851). _Struthiopteris punctulata_ (Sw.) Trevis. in
gen. pl. 2: 822 (1891).

_Blechnum rigidum_ Sw. in J. Bot. (Schrader) 1800(2): 75 (1801). _Mesotheum rigidum_ (Sw.)
C.Presl, Epimel. bot.: 113 (1851). _Lomaria rigidida_ (Sw.) Fée, Mém. foug. 5: 68 (1852). _Struthiopteris
rigida_ (Sw.) Trevis. in Atti Reale Ist. Veneto Sci. Lett. Arti 3, 14: 572 (1869). Type: ex Cap, b. Spei,
Thunberg s.n. Herb. Swartz (S!, holo.).

Gesammtten Naturk. 5: 30 (1811). Type: Habitat ad C. B. Spei, Descrez s.n. (P-JU 1370, holo.).
_Lomaria densa_ Kaulf., Enum. filic.: 151 (1824). Type: Habitat in Promentorio bonae spei,
Sieber s.n. (HBG, holo.).

_Lomaria dregeana_ Fée, Mém. foug. 10: 9 (1865). _Struthiopteris dregeana_ (Fée) Trevis. in

punctulatum = minutely dotted
Figure 46 A & B, Blechnum punctulatum var. punctulatum, A, sterile frond, B, fertile pinnae; C, B. punctulatum var. atherstonei, fertile pinnae; D & E, B. tabulare, D, sterile pinnae, E, fertile pinnae.
Plants terrestrial or epilithic. *Rhizome* short-decumbent, to 10 mm in diameter, set with roots, crowded stipe bases and scales, stoloniferous, stolons to 90 mm long, to 2.5 mm in diameter, thickening towards the apex, with few roots, sparsely scaled, fronds widely spaced, crowded towards the apex, scales concolorous or bicolourous, concolorous scales stramineous to ferrugineous, bicolour ferrugineous to stramineous, with a chartaceous, narrow castaneous stripe centrally, sessile, linear-flagelliform, truncate, adnate, margins irregularly set with long, retrorse, multicellular outgrowths terminating in an enlarged oblong cell, and unicellular cylindrical glands, apex terminates in an enlarged oblong thin-walled cell, to 20 mm long, to 2 mm wide. *Fronds* crowded, caespitose, erect to arching, dimorphic, fertile generally overtop the sterile, sterile to 850 mm long, fertile to 1.09 m long; *stipe* proximally castaneous, stramineous higher up, adaxially sulcate, sterile to 180 mm long, to 4.5 mm in diameter; fertile to 145 mm long, to 5 mm in diameter; initially densely scaled proximally, moderately to sparsely scaled higher up, scales similar to those on the rhizome, to 9 mm long, to 1 mm wide; *lamina* 1-pinnate, sterile narrow elliptic, basal pinnae widely spaced, imbricate towards the apex, to 800 mm long, to 175 mm wide, with up to 36 pinna pairs, fertile narrow elliptic, widely spaced, to 950 mm long, to 187 mm wide, with up to 45 free pinna pairs; *rachis* adaxially shallowly sulcate, sulcus not open to that of the costa, pronounced abaxially, variously scaled, scales chartaceous, ferrugineous to stramineous, filiform, to 10 mm long, to 0.5 mm wide; *pinnae* firmly herbaceous, sessile, attenuate towards the base and apex, sterile narrow triangular to oblong-obtuse, entire, auriculate, acroscopic auricle generally slightly larger, gradually basiscopically decurrent along the rachis towards the apex, apical pinnae adnate, adaxially glabrous, abaxially sparsely set with filiform scales terminating in an oblong thin-walled cell, to 1.3 mm long, fertile linear, entire, basally often with a sterile part proximally, to 96 mm long, to 3 mm wide; *costa* adaxially shallowly sulcate. *Vénation* obscure, forked, in the sterile the free branches end near the margin in an enlarged apex, in the fertile the veins anastomose to form a near-marginal vascular commissure with short excurrent veins extending from it. *Sori* linear, extending most of the length of the pinna; *indusium* firmly chartaceous, near-marginal, brown, linear, repand; *sporangium* long-stalked, simple, 3-seriate below the capsule, capsule broadly elliptic in lateral view, with (14–)15(–17) indurated annulus cells, epistomium (3–)4(–5)-celled, hypostomium (4–)5(–6)-celled. *Spores* 64 per sporangium, pale brown, elliptic, monolete, (40–)43.1(–46) x (30–)32.2(–36) µm. Figure 46 A & B.

**Vernacular names:** Glossy hard-fern; Blinkblaar bosvaring (Afr).

**Ecology:** Terrestrial or epilithic, in seasonally moist shaded or exposed rock crevices and at boulder bases in submontane grassveld. Not edaphically bound, occurring usually on granite in Swaziland. Hemicryptophyte, mesoxerophyte; fronds mesoxeromorphic, fertile fronds short-lived. Vegetative reproduction by the stoloniferous rhizome. Seasonal pattern apparently pronounced with new growth and fertile frond formation restricted to the summer months. No dormant period, pyrophytic.

**Distribution:** Sporadic in the north-western part of Swaziland, occurring at an altitude ranging between 1 370 and 1 670 m. The species also occurs in east tropical Africa, the eastern parts of south tropical Africa and southern Africa, and the western Indian Ocean region.
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**atherstonei** = in honour of William Guybon Atherstone (1814–1898), British medical practitioner, geologist, naturalist, and member of the Cape parliament.

Similar to *B. punctulatum* var. *punctulatum*, but in var. **atherstonei** the sori on the lower pinnae break up towards the rachis into small separate oval sori. Figure 46 C.

**Vernacular names:** Atherstone’s hard-fern; Atherstone-se-blinkblaarbosvaring (Afr.).

**Ecology:** Terrestrial, in light shade or in exposed conditions among grass and low scrub in moist conditions along streams. Not edaphically bound, but in Swaziland the species occurs in soils weathered from granite, gneiss and quartzitic sandstone. Hemicyrptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the stoloniferous rhizome. Seasonal pattern pronounced with new growth restricted to the summer months. No dormant period, pyrophytic.

**Distribution:** Rare in the western half of Swaziland, occurring at altitudes ranging between 1 370 and 1 520 m. The species also occurs in Malawi and the eastern parts of southern Africa.


**Lomaria coriacea** Schrad. in Gött. Gel. Anz. 1818: 916 (1818). Type: Cape, *Hesse* s.n. (?LE, holo.).


**Lomaria boryana** sensu Sim, Ferns S. Afr.: 123, pl. LVIII (1892).

tabulare = flattened horizontally, growing on Table Mountain, South Africa.
Plants terrestrial. *Rhizome* erect or decumbent, to 900 mm long, to 100 mm in diameter, closely set with roots, crowded persistent stipe bases and scales, scales chartaceous, concolorous and/or bicolorous, bicolorous scales ferrugineous to stramineous with a castaneous, narrow central stripe, sessile, lanceolate-flagelliform to linear-attenuate, cordate to cordate-imbricate, entire or with a few short marginal outgrowths near the base, apex terminates in an oblong thin-walled cell, to 23 mm long, to 3 mm wide. *Fronds* crowded, caespitose, erect, dimorphic, fertile usually overtop the sterile, sterile to 1.2 m long, fertile to 1.25 m long; *stipe* rigid, proximally castaneous, stramineous higher up, adaxially sulcate, sterile to 60 mm long, to 6 mm in diameter, fertile to 110 mm long, to 8 mm in diameter, set with unicellular cylindrical glands to 112 µm long, and scales, smaller scales filiform, larger scales similar to those on the rhizome; *lamina* 1-pinnate, sterile oblong-obtuse to oblong-acute, gradually reduced towards the base, basal pinnae widely spaced, more closely spaced and often imbricate towards the apex, to 1.1 m long, to 300 mm wide, with up to 14 free pinna pairs, fertile oblong-obtuse, gradually reduced towards the base, basal pinnae widely spaced, more closely spaced to crowded higher up, to 1.14 m long, to 230 mm wide, with up to 42 pinna pairs; *rachis* firm, stramineous, adaxially sulcate, sulcus not open to that of the costa, pronounced abaxially, variously set with glands and scales similar to those on the stipe; *pinnae* coriaceous, pale green, sterile sessile, oblong-cuneate, entire, base inequilateral, acroscopically narrowly cuneate, basiscopically cuneate to obtuse, gradually basiscopically decurrent along the rachis towards the apex, to 190 mm long, to 17 mm wide, fertile sessile, linear, to 215 mm long, to 4 mm wide, adaxially with scattered unicellular cylindrical glands to 112 µm long, abaxially with glands and scales, scales initially closely set along the costa, chartaceous, ferrugineous to stramineous, sessile, lanceolate-flagelliform to filiform, cor- date to narrowly cuneate, entire, or irregularly set with scattered marginal outgrowths, apex terminates in an oblong thin-walled cell, to 11 mm long, to 0.5 mm wide; *costa* adaxially shallowly sulcate. *Venation* adaxially obscure, evident abaxially, forked, in the sterile, free branches end near the margin, in the fertile the veins anastomose to form a continuous near-marginal vascular commissure. *Sori* linear, extending most of the pinna length; *indusium* firmly chartaceous, brown, near-marginal, linear, lacerate; *sporangium* long-stalked, simple, 3-seriate below capsule, capsule broadly elliptic in lateral view, with (16–)19(–20) indurated annulus cells, epistomium (6–)7(–9)-celled, hypostomium (4–)6(–8)-celled. *Spores* 64 per sporangium, brown, elliptic, monolete, with low reticulate ridges, granulate, (58–)63.29(–72) x (46–)49.52(–54) µm. Figure 46 D & E.

**Vernacular names:** Mountain hard-fern; Vals boomvaring (Afr.).

**Ecology:** Terrestrial or epilithic, at boulder bases, along streams, in ditches and in seepage areas in submontane grassveld, exposed or partially shaded. Not edaphically bound, occurring in soils weathered from an array of different rock types. Nanophanerophyte, mesoxeromorphic; fronds mesoxeromorphic, fertile fronds short-lived. Vegetative reproduction by the rarely branched rhizome. Seasonal pattern pronounced with fertile fronds produced during the summer only. No dormant period, pyrophytic.

**Distribution:** Frequent in the western half of the country, occurring at altitudes ranging between 920 and 1 520 m. The species is widespread in the mountainous regions of sub-Saharan Africa and the western Indian Ocean region.
A cosmopolitan family of ± 700 species either all included in a single genus, or with one large genus and several small segregate genera. The affinity of the Aspleniaceae with any of the other families is not clear.


a = without; splen (Greek) = spleen

Plants terrestrial, epilithic or epiphytic. Rhizome short to wide-creeping, or erect to suberect, simple or branched, closely set with roots, persistent stipe bases and scales, scales thinly chartaceous, chartaceous or crustaceous, clathrate, sessile or adnate, entire or variously set with outgrowths, apex terminates in a thin-walled cell. Fronds monomorphic, crowded and caespitose or closely to widely spaced, erect, suberect, or arching; stipe generally with two distinct vascular bundles uniting upwards into a single X-shaped bundle, firm, terete, adaxially sulcate, or the sulcus centrally raised, often narrowly green-winged for most of the length, or in the upper half, variously set with glands, hairs and scales, hairs 3- or 4-celled, scales chartaceous, clathrate, sessile, cordate to cordate-imbricate, entire or variously set with outgrowths, apex terminates in a thin-walled cell; lamina anadromous, herbaceous to firmly herbaceous, or coriaceous, 1–3-pinnate, with up to 36 petiolated pinna pairs, often with a proliferous bud adaxially on the rachis near the apex, or at the apex of a rachis extension; rachis and lower order axes firm, terete, sulcate, or sulcus centrally ridged, adaxially, often narrowly green-winged, variously set with glands and scales similar to, but smaller than, those on the stipe. Stomata usually of the anomocytic and copolocytic types, hypostomatic. Venation anadromous, free, obscure or evident, often raised adaxially, flabellately forked, or pinnately branched, ending near the margin. Sori linear, extending along a vein, inframedial, medial, or supramedial, at, below, or above a vein fork, or cupuliform and then borne terminally on each lobe, acentric; receptacle nude or with simple, pluricellular, hair-like paraphyses, apical cell acicular; indusium membranous, herbaceous, or chartaceous, linear or semicircular, entire or lacerate, attached along the entire length; sporangium long-stalked, simple, uniseriate, 3-seriate below the capsule, capsule globose in lateral view, with (16–)18, 19, 21, 23(–27) indurated annulus cells, epistomium (1–)2, 3-celled, hypostomium (3–)4, 6(–7)-celled. Spores 32 or 64 per sporangium, elliptic to broadly elliptic, monolete, with low, narrow or broad reticulate ridges and prominent wings, often laciniate or erose, the areas between the wings often irregularly echinulate, or with a fine reticulate meshwork, exospore 28–60 x 16–56 µm. Chromosome number 2n = 72, 144 or 288, sexual or apogamous.

Asplenium is often subdivided into several smaller genera and subgenera. Morton & Lellinger (1966) recognize Loxoscope T.Moore and placed the species with veins and sori occurring at an acute angle to the costa, and with rachises more or less scaly and sometimes hairy in Asplenium section Sphenopteris Mett. The occurrence of intermediate forms between these genera and sections render most of these classifications unsatisfactory. The classification followed here is conservative in that only two subgenera, Asplenium and Ceterach Willd. are recognized. Asplenium section Hymenasplenium (Hayata) K.Iwats. is widely accepted as a well-defined group (Mitui et al. 1989; Murakami & Moran 1993). The section is defined by creeping rhizomes, dorsiventrally symmetrical steles, swollen stipe bases or trophopods, and chromosome numbers based on n = 38 or 39. Asplenium unilaterale Lam. belongs to this section.
Key to the species:
1a Lamina 1-pinnate:
   2a Lamina proliferous:
      3a Lamina bearing a proliferous bud adaxially on the rachis near or at the base of the terminal pinna .............................................................................................................. A. boltonii
      3b Lamina bearing a proliferous bud at the apex of an extended rachis .................... A. sandersonii
   2b Lamina never proliferous:
      4a Pinnae dimidiate:
         5a Rhizome erect to suberect, short; stipe narrowly green-winged near the base........ A. inequilaterale
         5b Rhizome wide-creeping, long; stipe not winged ................................................ A. unilaterale
      4b Pinnae not dimidiate:
         6a Fronds to 510 mm long; pinnae to 30 mm long, to 14 mm wide ...................... A. erectum
         6b Fronds to 740 mm long; pinnae to 150 mm long, to 25 mm wide ..................... A. anisophyllum
1b Lamina 2 or more pinnate:
   7a Stipe sulcus at least in the upper half centrally raised:
      8a Sori near-apical on the ultimate segments .......... A. theciferum var. concinnum
      8b Sori lateral on the ultimate segments .............................................................. A. rutifolium
   7b Stipe sulcus not centrally raised:
      9a Stipe green-winged for most of the length; veins pinnately branched .................. A. lobatum
      9b Stipe never green-winged; venation flabellate:
         10a Pinnae to 30 mm long ................................................................. A. multiforme
         10b Pinnae usually more than 30 mm long:
            11a Stipe scales irregularly set with short outgrowths along the margin and not restricted to the scale base ........................ A. splendens var. splendens
            11b Stipe scales entire or irregularly denticulate, outgrowths confined to the scale base .......... A. aethiopicum


Key to the subspecies:
1a Reproduction apogamous (32 spores per sporangium); spores globose, (48–)53.7(–60) x (42–)47.6(–56) µm ............................... subsp. filare apomict pseudofilare
1b Reproduction sexual (64 spores per sporangium); spores elliptic, smaller:
   2a Fronds to 1.23 m long, 3-pinnate; stomata (32–)34.03(–40) µm long; spores (30–)34.03 (–40) x (18–)20.91(–24) µm ............................... subsp. tripinнатum
   2b Fronds to 660 mm long, to 2-pinnate; stomata (36–)47.07(–64) µm long; spores (44–)43.73(–54) x (22–)26.72(–34) µm .................................. subsp. aethiopicum


Asplenium adiantoides Lam., Encycl. 2: 309 (1786), non (L.) C.Chr. (1905). Type: Loco incerto, sine coll. s.n. (P, syn.).

Asplenium falsum Retz., Observ. bot. 6: 38 (1791). Type: Habitat in Africa, ad Bay Falso, sine coll. s.n. (not located).
Asplenium furcatum Thunb., Prodr. pl. cap.: 172 (1800); Sim, Ferns S. Afr.: 152, pl. LXXIX (1892). Type: e Cap b. Spei, C.P. Thunberg s.n. (UPS-THUNB 24806B!, lecto.).

Asplenium praemorsum sensu Sim, Ferns S. Afr., 2nd edn: 163, pl. 65 (1915).

*aethiopicum* = from Africa

Plants terrestrial, epilithic or epiphytic. *Rhizome* short-creeping, sparsely branched, to 120 mm long, to 5 mm in diameter, closely set with roots, persistent stipe bases and scales, scales chartaceous, atrocastaneous to ferrugineous, clathrate, sessile, subulate, cordate-imbricate, entire, apex terminates in an oblong thin-walled cell, to 9 mm long, to 0.6 mm wide. *Fronds* closely spaced, arching, to 660 mm long; *stipe* firm, atrocastaneous to black, adaxially sulcate, to 245 mm long, to 2.5 mm in diameter, densely scaled, scales chartaceous, atrocastaneous to ferrugineous, clathrate, sessile, subulate, cordate-imbricate, entire, apex terminates in an oblong thin-walled cell, to 8 mm long, to 0.6 mm wide; *lamina* anadromous, to 2-pinnate, narrowly elliptic to lanceolate, to 420 mm long, to 105 mm wide, with up to 18 stalked pinna pairs; *rachis* firm, atrocastaneous to black, sulcate adaxially, initially closely set with scales similar to those on the stipe; *pinnae* petiolate, petiole to 5 mm long, opposite to alternate, basally slightly more widely spaced, firmly herbaceous, lanceolate, to 70 mm long, to 37 mm wide, with up to 2 pinnule pairs; *pinna-rachis* sulcate adaxially, sulcus confluent with that of the rachis, initially densely scaled, scales similar to, but smaller than, those on the rachis; *pinnules* cuneate, trullate or obtrullate, narrowly to broadly cuneate, basiscopically decurrent towards the apex, divided into oblong segments, irregularly dentate, to 25 mm long, to 11 mm wide, adaxially sparsely scaled, scales chartaceous, castaneous, clathrate, sessile, filiform, cordate, entire, often with 2 or more oblong gland-like cells near the base, apex terminates in an oblong thin-walled cell, to 0.3 mm long, abaxially initially moderately scaled, scales chartaceous, ferrugineous, clathrate, sessile, subulate, cordate to cordate-imbricate, usually with several short filiform outgrowths at the base, these generally terminate in an oblong thin-walled cell, apex terminates in an oblong thin-walled cell, to 0.7 mm long, to 0.5 mm wide. *Venation* obscure, flabellate, terminating in the teeth near the margin. *Stomata* (36–)47.07(–64) µm long. *Sori* linear, extending along a vein, to 8.5 mm long; *indusium* firmly herbaceous, stramineous, linear, entire, attached along the entire length, to 8.5 mm long, to 0.3 mm wide; *sporangium* long-stalked, simple, uniseriate, 3-seriate below the capsule, capsule globose in lateral view, with (18–)19(–24) indurated annulus cells, epistomium 2(–3)-celled, hypostomium 4(–5)-celled. *Spores* 64 per sporangium, brown, elliptic, monolete, with low reticulate ridges and prominent wings, 43.73(–54) x (22–)26.72(–34) µm. *Chromosome number* 2n = 288, octoploid. Figure 47 A & B.

**Vernacular names:** African spleenwort; Afrika tralievaring (Afr).

**Ecology:** Terrestrial, epilithic or epiphytic, in leaf litter on moist or seasonally moist forest floor, in rock crevices and in shallow humus pockets on boulders in forests, and as epiphytes in deep shade in evergreen forests and forest patches. Not edaphically bound, but in Swaziland the species primarily grows on granite. Hemicyryptophyte, mesoxeromorphic; fronds mesoxeromorphic, poikilohydrous. Vegetative reproduction by rhizome branching resulting in the formation of small clonal stands. Seasonal pattern pronounced with new growth more or less restricted to the wetter summer months. Often wilted and dormant during prolonged droughts.
Figure 47 A & B, Asplenium aethiopicum subsp. aethiopicum, A, frond, B, fertile segment; C, A. aethiopicum subsp. tripinnatum, pinna, D. A. aethiopicum subsp. filare, frond.
**Distribution:** Frequent in the western half of Swaziland occurring at altitudes ranging between 1,060 and 1,520 m. The species is widespread in sub-Saharan Africa.


*tri* = three; *pinna* = primary division of a compound leaf

Plants terrestrial or epilithic. *Rhizome* short-creeping, sparsely branched, to 150 mm long, to 5 mm in diameter, closely set with roots, persistent stipe bases and scales, scales chartaceous, atrocastaneous to ferrugineous, clathrate, sessile, subulate, cordate-imbricate, entire or shallowly dentate, smaller scales often with a few gland-like cells at the base, apex terminates in an oblong thin-walled cell, to 7 mm long, to 0.5 mm wide. *Fronds* closely spaced, arching, to 1.23 m long; *stipe* atrocastaneous, adaxially sulcate, to 625 mm long, to 3 mm in diameter, densely scaled initially, scales chartaceous, atrocastaneous to ferrugineous, clathrate, sessile, subulate to filiform, cordate-imbricate, entire or shallowly dentate, smaller scales often with a few gland-like cells at the base, apex terminates in an oblong thin-walled cell, to 6 mm long, to 0.5 mm wide; *lamina* anadromous, to 3-pinnate, narrowly elliptic to lanceolate, to 605 mm long, to 150 mm wide, with up to 22 petiolated pinna pairs; *rachis* firm, atrocastaneous, sulcate adaxially, initially closely set with scales similar to those on the stipe; *pinnae* petiolate, petiole to 6 mm long, opposite to alternate, basally more widely spaced, often slightly overlapping apically, firmly herbaceous, ovate to lanceolate, to 130 mm long, to 60 mm wide, with up to 6 petiolated pinnule pairs; *pinna-rachis* sulcate adaxially, sulcus confluent with that of the rachis, initially densely scaled, scales similar to, but smaller than, those on the rachis; *pinnules* petiolate, petiole to 2 mm long, alternate, spaced, 1-pinnate, trullate to narrowly trullate, to 33 mm long, to 22 mm wide, often with a single pair of petiolated segments; *segments* narrowly to broadly cuneate, trullate or obturllate, divided into oblong segments, irregularly dentate, to 10 mm long, to 8 mm wide, adaxially sparsely scaled, scales chartaceous, ferrugineous, clathrate, sessile, filiform, cordate, entire, often with one or more gland-like cells near the base, apex terminates in an oblong thin-walled cell, to 0.3 mm long, abaxially initially moderately scaled, scales chartaceous, ferrugineous, clathrate, sessile, ovate, lanceolate, or filiform, usually with pluricellular filiform outgrowths and gland-like cells at the base, apex terminates in an oblong thin-walled cell, to 2 mm long, to 0.4 mm wide. *Venation* adaxially obscure, evident abaxially, flabellate, terminating in the teeth near the margin. *Stomata* (32–)40.04(–48) µm long. *Sori* linear, extending along a vein, to 5 mm long; *indusium* firmly herbaceous, stramineous, linear, entire, attached along the entire length, to 5 mm long, to 0.3 mm wide; *sporangium* long-stalked, simple, uniseriate, 3-seriate below the capsule, capsule globose in lateral view, with (18–)19(–20) indurated annulus cells, epistomium 2-celled, hypostomium 4(–5)-celled. *Spores* 64 per sporangium, brown, elliptic, monolete, with low reticulate ridges and prominent wings, (30–)34.03(–40) x (18–)20.91(–24) µm. *Chromosome number* 2n = 144, tetraploid. Figure 47 C.

**Vernacular names:** Tall African spleenwort; Drie-veer tralievaring (Afr.).
Ecology: Terrestrial or epilithic, in leaf litter on forest floor, in rock crevices and in shallow humus-filled pockets on boulders in forests and boulder-forests, lightly or deeply shaded. Not edaphically bound, but in Swaziland the species appears to be restricted to granite. Hemicyryptophyte, mesoxerophytic; fronds mesoxeromorphic, somewhat poikilohydrous. Vegetative reproduction by rhizome branching, resulting in the formation of small clonal stands. Seasonal pattern pronounced with new growth restricted to the wetter summer months. Fronds often wilted and the plants dormant during prolonged periods of drought.

Distribution: Sporadic in the western half of Swaziland, occurring at altitudes ranging between 1 270 and 1 520 m. The species is restricted to the eastern parts of south tropical and southern Africa.


apomict pseudofilare, Braithwaite

filum = filament; pseudo (Greek) = false

Vernacular names: Tough spleenwort; Noordelike berg-tralievaring.

Plants terrestrial or epilithic. Rhizome short-creeping, sparsely branched, to 60 mm long, to 4 mm in diameter, closely set with roots, persistent stipe bases and scales, scales chartaceous, atrocastaneous to ferrugineous, clathrate, sessile, subulate, cordate-imbricate, usually with a few short, multicellular outgrowths near the base, entire towards the apex, apex terminates in an oblong thin-walled cell, to 5 mm long, to 0.7 mm wide. Fronds closely spaced, suberect to arching, to 250 mm long; stipe atrocastaneous, adaxially sulcate, to 100 mm long, to 2 mm in diameter, densely scaled initially, scales chartaceous, castaneous to ferrugineous, clathrate, sessile, subulate to filiform, cordate to cordate-imbricate, usually with short or long filiform outgrowths terminating in a gland-like cell at the base, entire towards the apex, apex terminates in an oblong thin-walled cell, to 5 mm long, to 0.5 mm wide; lamina anadromous, to 2-pinnate, narrow elliptic, to 170 mm long, to 70 m wide, with up to 10 petiolated pinna pairs; rachis firm, castaneous, sulcate adaxially, initially closely set with scales similar to, but smaller than, those on the stipe; pinnae petiolate, petiole to 2 mm long, opposite to alternate, basally slightly more widely spaced, often overlapping apically, basal two to three pairs gradually reduced, firmly herbaceous, narrowly to broadly trullate, to 45 mm long, to 26 mm wide, generally with a single petiolated pinnule pair; pinna-rachis sulcate adaxially, sulcus confluent with that of the rachis, initially densely scaled, scales similar to those on the rachis; pinnules alternate, sessile, narrowly to broadly cuneate, rhomboid or oblong, 14 mm long, to 7 mm wide, divided into oblong segments, irregularly dentate, adaxially initially sparsely scaled, scales chartaceous, ferrugineous, sessile, filiform, cordate, mostly with one or more gland-like cells at the base, entire towards the apex, apex terminates in an oblong thin-walled cell, to 2 mm long, to 0.3 mm wide, abaxially sparsely scaled, scales chartaceous, castaneous to ferrugineous, clathrate, sessile, subulate to filiform, cordate, usually with short and/or long outgrowths at the base, terminating in an
oblong thin-walled cell, apex entire, terminating in an oblong thin-walled cell, to 3 mm long, to 0.4 mm wide. Venation obscure, flabellate, cordate to cordate-imbricate, margins regularly set with short and long filiform outgrowths terminating in an enlarged obvate thin-walled cell, usually with a few glandular cells near the point of attachment, apex terminates in an enlarged obvate thin-walled cell, to 13 mm long, to 1.5 mm wide. Fronds crowded, caespitose, suberect to arching, to 740 mm long; stipe firm, castaneous, adaxially sulcate, to 200 mm long, to 4 mm in diameter, initially closely scaled, scales chartaceous, dark brown, clathrate, sessile, linear to filiform, cordate to cordate-imbricate, margins regularly set with short and long filiform outgrowths terminating in an enlarged obvate thin-walled cell, to 5 mm long, to 0.2 mm wide; lamina anadromous, 1-pinnate, elliptic, to 530 mm long, to 280 mm wide, with up to 14 petiolated pinna pairs; rachis firm, adaxially sulcate, green, brown abaxially, sparsely set with scales similar to those on the stipe; pinnae petiolate, petiole to 2 mm long, opposite to alternate, basally more widely spaced than apically, the 2–3 basal pairs generally gradually reduced, firmly herbaceous, inquilaterally oblong-cuneate to narrowly lanceolate, acroscopically truncate to broadly cuneate, basiscopically narrowly cuneate, dentate, to 150 mm long, to 25 mm wide, adaxially glabrous, abaxially with scattered scales along the costa and veins, scales chartaceous, castaneous, sessile, filiform, with short filiform outgrowths and enlarged thin-walled cells at the point of attachment, apex terminates in an enlarged obvate thin-walled cell, to 1.5 mm long, to 0.4 mm wide; costa adaxially raised, convex. Venation evident, pinnately branched, branches forked, ending in the teeth near the margin. Sori linear, extending along the vein, to 5.5 mm long; indusium firmly herbaceous, stramineous, linear, entire, attached along the entire length, to 5.5 mm long, to 0.3 mm wide; sporangium long-stalked, simple, uniseriate, 3-seriate below the capsule, capsule globose in lateral view, with (20–)21(–24) indurated annulus cells, epistomium 2(–3)-celled, hypostomium (4–)6(–7)-celled. Spores 32 per sporangium, brown, broadly elliptic to subcircular, monolete, with low reticulate ridges and wings, (48–)53.7(–60) x (42–)47.6(–56) µm. Chromosome number: 2n = 288, octoploid. Figure 47 D.

Vernacular names: Giant spleenwort; Groot tralievaring (Afr).

Ecology: Terrestrial or epilithic, at boulder bases in submontane grassveld and in rock crevices in boulder forests. Not edaphically bound, but in Swaziland the species is confined to granite. Hemicryptophyte, mesoxerophyte; fronds mesoxeromorphic, somewhat poikilohydrous. Vegetative reproduction by rhizome branching resulting in the formation of small clonal stands. Seasonal pattern apparently pronounced with new growth restricted to the wetter summer months. Fronds often wilted and the plants may become dormant during prolonged periods of drought, pyrophytic.

Distribution: Rare in Swaziland and currently known from the Sibebe and Mdzimba mountains only, occurring at altitudes ranging between 1 270 and 1 520 m. The species is restricted to Lesotho, the eastern parts of South Africa and Swaziland.


aniso (Greek) = unequal or uneven; phylhum = leaf

Plants terrestrial or epilithic. Rhizome short, erect, to 30 mm long, to 10 mm in diameter, set with roots, crowded persistent stipe bases and scales, scales chartaceous, dull brown, clathrate, sessile,
Figure 48 A & B, *Asplenium anisophyllum*, A, lamina apex, B, fertile pinna section; C & D, *A. boltonii*, C, lamina apex, D, fertile pinna section.
oblong-cuneate, cordate to cordate-imbricate, margins regularly set with short and long filiform outgrowths terminating in an enlarged obovate thin-walled cell, usually with a few glandular cells near the point of attachment, apex terminates in an enlarged obovate thin-walled cell, to 13 mm long, to 1.5 mm wide. Fronds crowded, caespitose, suberect to arching, to 740 mm long; stipe firm, castaneous, adaxially sulcate, to 200 mm long, to 4 mm in diameter, initially closely scaled, scales chartaceous, dark brown, clathrate, sessile, linear to filiform, cordate to cordate-imbricate, margins regularly set with short and long filiform outgrowths terminating in an enlarged obovate thin-walled cell, to 5 mm long, to 0.2 mm wide; lamina anadromous, 1-pinnate, elliptic, to 530 mm long, to 280 mm wide, with up to 14 petiolated pinna pairs; rachis firm, adaxially sulcate, green, brown abaxially, sparsely set with scales similar to those on the stipe; pinnae petiolate, petiole to 2 mm long, opposite to alternate, basally more widely spaced than apically, the 2 or 3 basal pairs generally gradually reduced, firmly herbaceous, inequilaterally oblong-cuneate to narrowly lanceolate, acroscopically truncate to broadly cuneate, basiscopically narrowly cuneate, dentate, to 150 mm long, to 25 mm wide, adaxially glabrous, abaxially with scattered scales along the costa and veins, scales chartaceous, castaneous, sessile, filiform, with short filiform outgrowths and enlarged thin-walled cells at the point of attachment, apex terminates in an enlarged oblong thin-walled cell, to 1.5 mm long, to 0.4 mm wide; costa adaxially raised, convex. Venation evident, pinnately branched, branches forked, ending in the teeth near the margin. Sori linear, inframedial, extending along a vein, to 4 mm long; indusium firmly herbaceous, stramineous, linear, entire, attached along the entire length, to 4 mm long, to 0.3 mm wide; sporangium long-stalked, uniseriate, 3-seriate below the capsule, capsule globose to broadly elliptic in lateral view, annulus with (16–)18(–19) indurated annulus cells, epistomium (2–)3-celled, hypostomium (3–)4-celled. Spores 64 per sporangium, brown, broadly elliptic, monolete, perispore forms broad reticulate wings, exospore (34–)35.5(–38) x (24–)26.8(–30) µm. Figure 48 A & B.

Vernacular names: Giant spleenwort; Groot tralievaring (Afr).

Ecology: Terrestrial or epilithic, in moist evergreen forests, usually on rocks in or near perennial streams. Not edaphically bound, but in Swaziland the species is confined to the greenstone belt. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction sporadic and then through the closely branched rhizome. Seasonal pattern apparently non-existent, no dormant period.

Distribution: Rare in Swaziland and currently known from the north-western corner of Swaziland only, occurring at an altitude ranging between 1 260 and 1 520 m. Widespread in east and south tropical Africa, the eastern parts of southern Africa, and the western Indian Ocean region.


boltonii = in honour of Daniel Bolton (?–1860), British soldier and naturalist.
Plants terrestrial, epilithic or epiphytic. **Rhizome** short, erect to suberect, to 20 mm long, to 5 mm in diameter, set with roots, crowded persistent stipe bases and scales, scales chartaceous to thinly chartaceous, ferruginous to castaneous, clathrate, adnate, lanceolate, cordate, margins regularly set with short and long filiform outgrowths terminating in an enlarged obvate thin-walled cell, apex terminates in an enlarged thin-walled cell, to 16 mm long, to 3 mm wide. **Fronds** crowded, caespitose, arching, to 820 mm long; **stipe** atrocastaneous, matt, adaxially sulcate, to 170 mm long, to 3 mm in diameter, initially densely scaled, scales chartaceous, castaneous, sessile, linear to filiform, cordate to cordate-imbricate, larger scale margins regularly set with short and long filiform outgrowths terminating in an enlarged thin-walled cell, filiform scales with gland-like cells and short outgrowths terminating in an enlarged thin-walled cell at the base, apex terminates in an enlarged thin-walled cell, to 10 mm long, to 1 mm wide; **lamina** anadromous, 1-pinnate, lanceolate, to 650 mm long, to 190 mm wide, with up to 21 petiolated pinna pairs, with a proliferous bud adaxially on the rachis near the apex; **rachis** firm, atrocastaneous, adaxially sulcate, moderately set with filiform scales similar to those on the stipe; **pinnae** petiolate, petiole to 2 mm long, opposite to alternate, basally more widely spaced than apically, the 2–3 basal pairs generally gradually reduced, firmly herbaceous, inequilaterally lanceolate, often somewhat falcate, acroscopically truncate to broadly cuneate, basiscopically narrowly to broadly cuneate, dentate, usually with alternating shallower and deeper incisions, to 120 mm long, to 20 mm wide, adaxially sparsely set with filiform scales along the costa similar to those on the stipe, abaxially sparsely set with filiform scales along the costa and veins similar to those on the stipe, to 2.5 mm long; **costa** adaxially raised, convex. **Vénation** anadromous, evident, pinnately branched, branches forked, ending in the teeth near the margin. **Sori** linear, inframedial, at or above a vein fork, to 8 mm long; **indusium** chartaceous, stramineous, linear, entire, to 8 mm long, 1.4 mm wide; **sporangium** long-stalked, uniseriate, 3-seriate below the capsule, capsule globose in lateral view, annulus (17–)19(–20)-celled, epistomium 2-celled, hypostomium 4-celled. **Spores** 64 per sporangium, brown, elliptic, monolete, perispore forms broad reticulate wings, exospore (40–46.3(–50) x (30–)31.8(–34) µm. Figure 48 C & D.

**Vernacular names:** Bolton’s mother fern; Bolton-se-tralievaring (Afr).

**Ecology:** Epilithic, on rocks in or near perennial streams in moist evergreen forests, deeply shaded. Not edaphically bound, but in Swaziland the species is restricted to the greenstone belt. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction primarily by the formation of plantlets on the rachis near the lamina apex. Seasonal pattern apparently non-existent, no dormant period.

**Distribution:** Rare in Swaziland and currently known from the north-western corner of the country only, occurring at an altitude of ± 1 670 m. Widespread in east tropical Africa and the eastern parts of south tropical and southern Africa, as well as the western Indian Ocean region.

vetustarum insulae Borboniae, *Bory de St. Vincent s.n.* (B-W 19906, lecto., designated by Schelpe & Anthony (1986)).


*erectum* = erect or upright

Plants terrestrial or epilithic. **Rhizome** erect to suberect, to 35 mm long, to 3 mm in diameter, set with roots, crowded persistent stipe bases and scales, scales chartaceous to crustaceous, castaneous, clathrate, sessile, lanceolate, cordon to cordon-imbricate, with scattered filiform outgrowths along the margin of which the apex terminates in an elliptic thin-walled cell, apex terminates in an oblong thin-walled cell, to 8 mm long, to 1 mm wide. **Fronds** crowded, caespitose, erect to arching, to 510 mm long; **stipe** firm, castaneous, matt, terete, to 120 mm long, to 1.8 mm in diameter, narrowly green-winged in the upper half, initially moderately set with ferrugineous glandular cells and filiform clathrate scales of which the apex terminates in an enlarged gland-like cell, to 3 mm long, glabrous later; **lamina** 1-pinnate, narrowly elliptic to oblong-cuneate, to 390 mm long, to 60 mm wide, with up to 36 stalked pinna pairs; **rachis** firm, castaneous, terete, narrowly green-winged, initially moderately set with scales similar to those on the stipe, glabrous later; **pinnae** sessile, herbaceous, opposite to alternate, basally more widely spaced than apically, pinnae in the lower half to one third of the lamina gradually reduced, inequilaterally lanceolate to ovate, often slightly auricled acroscopically, acroscopically truncate to broadly cuneate, basiscopically narrowly to broadly cuneate, dentate, to 30 mm long, to 14 mm wide, glabrous adaxially and abaxially; **costa** adaxially raised, convex. **Venation** anadromous, evident, pinnately branched, branches forked, ending in the teeth near the margin. **Sori** linear, inframedial, usually below or at a vein fork, to 3.5 mm long; **indusium** chartaceous, stramineous, linear, entire, to 3.5 mm long, to 0.3 mm wide; **sporangium** long-stalked, uniseriate, 3-seriate below the capsule, capsule globose in lateral view, annulus with (17–)19(–21) indurated annulus cells, epistomium 2-celled, hypostomium 3–4-celled. **Spores** 64 per sporangium, brown, elliptic, monolete, perispore forms broad reticulate wings, exospore (26–)28.8(–38) x (16–)18.5(–24) μm. Figure 49 A & B.

**Vernacular names:** Erect spleenwort; Regop tralievaring (Afr.).

**Ecology:** Terrestrial or epilithic, usually in leaf-litter on seasonally moist forest floor and on stream banks, deeply shaded. Not edaphically bound, but in Swaziland the species is restricted to
granitic and weathered gneiss soils. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the rarely branched rhizome. Seasonal pattern apparently pronounced with new growth restricted to the wetter summer months, no dormant period.

**Distribution:** Rare in Swaziland and currently only known from the Mdzimba and Malandzela hills, occurring at an altitude ranging between 1 150 and 1 220 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.


*Asplenium laetum* sensu Sim, *Ferns S. Afr.*, 2nd edn: 150, pl. 50. t. 1 (1915), non Sw. (1806).

inequilateralis = with unequal sides

Plants epilithic. *Rhizome* short, erect to suberect, to 20 mm long, to 4 mm in diameter, set with roots, crowded persistent stipe bases and scales, scales crustaceous, atrocastaneous to black, clathrate, sessile, subulate to lanceolate, cordate to cordate-imbricate, entire or with scattered, pluricellular recurved outgrowths along the margin, apex terminates in a thin-walled cell, to 5 mm long, to 0.7 mm wide. *Froinds* crowded, caespitose, erect, to 430 mm long; *stipe* firm, castaneous, matt, terete, to 210 mm long, to 1.6 mm in diameter, narrowly green-winged to the base, base sparsely set with scales similar to those on the rhizome, higher up with filiform clathrate scales terminating in an elliptic thin-walled cell, to 1 mm long, and 3 or 4-celled hairs terminating in an enlarged obovate thin-walled cell, to 0.3 mm long; *lamina* 1-pinnate, narrowly elliptic, to 230 mm long, to 68 mm wide, with up to 17 petiolated pinna pairs; *rachis* firm, castaneous to greenish higher up, shallowly sulcate adaxially, narrowly green-winged, set with filiform scales and hairs similar to those on the stipe, glabrous later; *pinnae* basal pinnae petiolate, petiole to 1.5 mm long, sessile towards the apex, herbaceous, dark to mid-green, opposite to alternate, basally more widely spaced than apically, often slightly overlapping, basal 2–4 pairs often gradually reduced, inequilaterally lanceolate to trapezoid, acroscopically truncate, basiscopically excavate, usually alternately shallowly and deeply dentate, to 38 mm long, to 10 mm wide, glabrous adaxially and abaxially; *costa* adaxially raised, convex. *Vénation* anadromous, evident, pinnately branched, branches forked, ending in the teeth near the margin. *Sori* linear, usually at or above a vein fork, to 4 mm long; *indusium* chartaceous, stramineous, transversely narrowly elliptic, entire, to 4 mm long, to 1.2 mm wide; *sporangium* long-stalked, uniseriate, 3-seriate below the capsule, capsule globose in lateral view, annulus with 19(–22) indurated annulus cells, epistomium 2(–3)-celled, hypostomium 4(–5)-celled. *Spores* 64 per sporangium, brown, elliptic, monolete, perispore forms broad reticulate wings, erose, the areas between the wings irregularly echinulate, exospore (30–)32.2(–36) x (20–)22.3(–24) μm. Figure 49 C & D.
Vernacular names: Lolly spleenwort; Wortelknop tralievaring (Afr).

Ecology: Epilithic and restricted to moist, deeply shaded forests where the plants generally grow on wet or seasonally wet moss-covered rocks in or near perennial streams. Not edaphically bound, but in Swaziland the species is only known from the greenstone belt. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the closely branched rhizome and rootbud formation. Seasonal pattern apparently non-existent, no dormant period.

Distribution: Frequent in the north-western corner of Swaziland, occurring at altitudes ranging between 500 and 1 250 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.


lobatum = lobed

Plants terrestrial or epilithic. Rhizome erect to suberect, to 20 mm long, to 4 mm in diameter, set with roots, crowded stipe bases and scales, scales chartaceous, atrocastaneous, clathrate, sessile, subulate to narrowly lanceolate, cordate, margins irregularly set with short filiform outgrowths, apex terminates in an oblong thin-walled cell, to 5 mm long, to 0.7 mm wide. Fronds crowded, caespitose, erect to arching, to 475 mm long; stipe firm, castaneous, terete, to 120 mm long, to 1.2 mm in diameter, narrowly green-winged for most of the length, initially moderately set with hairs and scales, subglabrous later, hairs 3–5-celled, clavate, to 0.25 mm long, scales chartaceous, atrocastaneous, clathrate, stalked, subulate to filiform, the larger often with short filiform outgrowths along the margin, apex terminates in an oblong thin-walled cell, to 5 mm long, to 0.7 mm wide; lamina anadromous, 2-pinnate, narrowly elliptic, to 360 mm long, to 85 mm wide, with up to 23 petiolated pinna pairs; rachis firm, castaneous, green towards the apex, terete, narrowly green-winged, sparsely set with hairs and scales similar to those on the stipe, glabrous later; pinnae petiolate, petiole to 1 mm long, opposite to alternate, basally more widely spaced than apically, pinnae in the lower half gradually reduced, ovate to narrowly ovate, to 45 mm long, to 16 mm wide, with up to 5 pinnaule pairs; pinna-rachis terete, narrowly winged, glabrous; pinnules herbaceous, sessile, rhombic to flabellate, coarsely serrate or
divided into 2-fid or 3-fid lobes, lobe apices entire or shallowly repand to erose, to 12 mm long, to 10 mm wide, glabrous adaxially and abaxially. **Venation** anadromous, evident, flabellately forked, ending in the teeth near the margin. **Sori** linear, usually on the terminal vein branches, but often also at a fork, to 3.5 mm long; **indusium** chartaceous, stramineous, linear, entire, to 3.5 mm long, to 0.3 mm wide; **sporangium** long-stalked, uniseriate, 3-seriate below the capsule, capsule globose to broadly elliptic in lateral view, annulus with (17–)19 indurated annulus cells, epistomium 2-celled, hypostomium 4-celled. **Spores** 64 per sporangium, brown, elliptic, monolette, perispore forms broad reticulate wings, exospore (28–)31.3(–34) x (18–)20.1(–22) µm. Figure 49 E & F.

**Vernacular names:** Lobed spleenwort; Kant tralievaring (Afr).

**Ecology:** Terrestrial or epilithic, in leaf-litter on seasonally moist forest floor, deeply shaded. Not edaphically bound, but in Swaziland the species appears to be restricted to granite and granitic soils. Nanophanerophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the closely branched rhizome. Seasonal pattern apparently pronounced with new growth restricted to the rainy season.

**Distribution:** Rare in Swaziland and currently known from the Malandzela hills only, occurring at an altitude of ± 1 220 m. The species appears to be restricted to the eastern parts of south tropical and southern Africa and the western Indian Ocean region.


*multi* = many; *forma* = form or shape

Plants terrestrial or epilithic. **Rhizome** short-creeping, sparsely branched, to 35 mm long, to 4 mm in diameter, set with roots, closely spaced persistent stipe bases and scales, scales chartaceous, atrocastaneous, clathrate, sessile, subulate, cordate-imbricate, entire, apex terminates in an oblong thin-walled cell, to 7 mm long, to 1 mm wide. **Fronds** crowded, caespitose, erect to suberect, to 340 mm long; **stipe** firm, atrocastaneous, adaxially sulcate, to 146 mm long, to 1.5 mm in diameter, initially moderately scaled, scales chartaceous, atrocastaneous to ferrugineous, clathrate, sessile, subulate to filiform, cordate to cordate-imbricate, with short and long filiform outgrowths at the base, apex entire, terminating in an oblong thin-walled cell, to 9 mm long, to 0.6 mm wide; **lamina** anadromous, to 2-pinnate, oblong-acute, to 195 mm long, to 50 mm wide, with up to 15 pinna pairs; **rachis** firm, proximally castaneous, greenish towards the apex, adaxially sulcate, moderately scaled, scales similar to those on the stipe; **pinnae** petiolate, petiole to 2.5 mm long, opposite to alternate, basally widely spaced, more closely spaced towards the apex and slightly overlapping, firmly herbaceous, rhomboid to trullate, to 30 mm long, to 21 mm wide, usually with a single pinnule pair; **pinna-rachis** sulcate adaxially, sulcus confluent with that of the rachis, moderately set with scales similar to, but smaller than, those on the rachis; **pinnules** narrowly flabellate, rhomboid, or oblong, the larger divided into oblong lobes,
irregularly dentate, to 13 mm long, to 6 mm wide, adaxially sparsely set with filiform clathrate scales, sessile, filiform, with short and long filiform outgrowths at the base, apex entire, to 2.5 mm long. *Venation* obscure, flabellate, terminating in the teeth near the margin. *Sor* linear, to 6 mm long; *indusium* firmly herbaceous, stramineous, linear, entire, to 6 mm long, to 0.3 mm wide; *sporangium* long-stalked, uniseriate, 3-seriate below capsule, capsule broadly elliptic in lateral view, with (17–19(–20) indurated annulus cells, epistomium 2(–3)-celled, hypostomium 4-celled. *Spores* 64 per sporangium, brown, elliptic, monolete, perispore with low, closely spaced, reticulate ridges, (38–)41.5(–44) x (24–)25.1(–28) µm. *Chromosome number* 2n = 288, octoploid. Figure 50 A & B.

**Vernacular names:** Drakensberg spleenwort; Drakensberg tralievaring (Afr.).

**Ecology:** Terrestrial or epilithic, at boulder bases and in rock crevices in seasonally moist submontane grassveld, exposed or partially shaded, often with *Cheilanthes* and *Pellaea* species. Not edaphically bound, but in Swaziland the species is only known from granitic soils. Hemicryptophyte, mesoxerophyte; fronds mesoxeromorphic, poikilohydrous. Vegetative reproduction by rhizome branching resulting in the formation of small clonal stands. Seasonal pattern pronounced with new growth restricted to the rainy season. Pyrophytic.

**Distribution:** Rare in Swaziland and currently only known from the Nhlangano region, occurring at an altitude of ± 1 300 m. The species is restricted to the eastern parts of South Africa, Lesotho and Swaziland.


**Adiantum achilleifolium** Lam., Encycl. 1: 43 (1783), as ‘*achilleaefolium*’. *Asplenium achilleifolium* (Lam.) C.Chr., Index filic.: 99 (1905), non Liebm. (1849). Type: Cap de Bonne-Espérance, sine coll. s.n. (not located).

**ruta** = *Ruta* (Rutaceae), a genus of Mediterranean plants; **folium** = leaved

Plants terrestrial, epilithic or epiphytic. *Rhizome* erect to suberect, to 40 mm long, to 5 mm in diameter, set with roots, crowded persistent stipe bases and scales, scales thinly crustaceous, atrocastaneous, matt, clathrate, sessile, lanceolate to subulate, cordate to cordate-imbricate, margins regularly set with short filiform outgrowths, pluricellular, uniseriate, apex terminates in an oblong thin-walled cell, to 19 mm long, to 4.5 mm wide. *Fronds* crowded, caespitose, suberect to arching, to 570 mm long; *stipe* firm, proximally castaneous to black, green higher up, firm, sulcate, centrally raised, to 200 mm long, to 2.5 mm in diameter, initially sparsely scaled, glabrous later, scales thinly crustaceous, atrocastaneous to black, clathrate, sessile, subulate, cordate to cordate-imbricate, basally with several filiform outgrowths terminating in an enlarged broadly elliptic thin-walled cell, entire towards the apex, apex terminates in an enlarged broadly elliptic thin-walled cell, to 7 mm long, to 1 mm wide; *lamina* anadromous, to 3-pinnate, narrow elliptic, to 400 mm long, to 120 mm wide, with up to 23 pinna pairs; *rachis* firm, green, sulcate, centrally ridged, sparsely scaled, scales similar to, but smaller than, those on the stipe; *pinnae* petiolate,
petiole to 3 mm long, opposite to alternate, basally widely spaced, more closely spaced towards the apex and often slightly overlapping, firmly herbaceous to coriaceous, lanceolate to ovate, to 80 mm long, to 40 mm wide, with up to 10 pinnule pairs; pinna-rachis sulcate, centrally ridged, ridge not confluent with that of the rachis, sparsely scaled, scales similar to, but smaller than, those on the rachis, to 1.5 mm long; pinnales opposite to alternate, flabellate, rhomboid, elliptic or linear, the larger divided into oblong lobes, lobes entire, to 7 mm long, to 2 mm wide, glabrous adaxially, abaxially sparsely set with scales similar to those on the pinna-rachis. Venation anadromous, evident, raised adaxially, pinnately branched, ending in the lobes near the margin. Sori linear, 1 per lobe, medial to supramedial, to 2 mm long; indusium membranous, linear, entire, extending from the vein almost to the margin, to 2 mm long, to 0.6 mm wide; sporangium long-stalked, uniseriate, 3-seriate below capsule, capsule broadly elliptic in lateral view, with (17–)19 indurated annulus cells, epistomium 2(–3)-celled, hypostomium 4-celled. Spores 64 per sporangium, brown, elliptic, monolete, perispore folded to form narrow reticulate ridges, erose, areolae between the ridges with a fine reticulate meshwork, (38–)42.6(–48) x (24–)26.9(–30) µm.

Figure 50 C & D.

Vernacular names: Carrot fern; Wortelblaar varing (Afr).

Ecology: Epilithic or epiphytic, rarely terrestrial, in deep shade in moist or seasonally moist evergreen forests. Not edaphically bound, occurring on various rock types within Swaziland. Nanophanerophyte, mesoxerophyte; fronds mesoxeromorphic, poikilohydrous. Vegetative reproduction by the closely branched rhizome. Seasonal pattern pronounced with new growth restricted to the rainy season.

Distribution: Frequent in the western half of Swaziland, occurring at an altitude ranging between 500 and 1 520 m. Widespread in east tropical Africa, the eastern parts of south tropical and southern Africa, and the western Indian Ocean region.

Use: The Zulu use the whole plant as a love charm (Hutchings et al. 1996).


sandersonii = in honour of John Sanderson (1820–1881), Scottish journalist, tradesman and draughtsman who worked in KwaZulu-Natal.

Plants epilithic or epiphytic. Rhizome erect to suberect, to 15 mm long, to 2 mm in diameter, set with roots, crowded persistent stipe bases and scales, scales chartaceous, castaneous to ferruginous, clathrate, sessile, lanceolate, cordate-imbricate, margins basally with a few scattered filiform outgrowths terminating in an enlarged obovate gland-like cell, entire towards the apex, apex terminates in an oblong thin-walled cell, to 5 mm long, to 1.2 mm wide. Fronds crowded, to 9 per plant, caespitose, arching, to 300 mm long; stipe firm, green, basally sulcate, centrally raised

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apically, to 80 mm long, to 1 mm in diameter, sparsely scaled, scales chartaceous, castaneous to ferrugineous, clathrate, sessile, lanceolate to subulate, cordate to cor- date-imbricate, with scattered filiform outgrowths ter- minating in an enlarged obovate gland-like cell along the margin, apex terminates in an oblong thin-walled cell, to 3 mm long, to 0.3 mm wide; lamina anadromous, 1-pinnate, linear-cuneate, to 230 mm long, to 27 mm wide, with up to 24 pinna pairs, proliferous, bud borne at the apex of a rachis extension; rachis green, firm, sulcate, centrally ridged, sparsely scaled, scales similar to, but smaller than, those on the stipe; pinnae petiolate, petiole to 1.5 mm long, opposite to alternate, basally widely spaced, pinnae in the lower third of the lamina gradually reduced, coriaceous, rhombic-dimidiate to cuneate, lobed, in the larger pinnae the proximal acroscopic lobe shallowly 2- to 3-lobed, to 13 mm long, to 9 mm wide, glabrous adaxially and abaxially; costa adaxially slightly raised. Vénation anadromous, adaxially obscure, evident abaxially, ending in the teeth near the margin. Sori linear, lunate, medial on the simple vein branches, to 3 mm long; indusium membranous, semicircular, lacerate, to 3 mm long, to 1.5 mm wide; sporangium long-stalked, uniseriate, 3-seriate below capsule, capsule broadly elliptic in lateral view, with (18–)19(–19) indurated annulus cells, epistomium 2-celled, hypostomium 4-celled. Spores 64 per sporangium, brown, elliptic, monolete, echinate, fenestrates, (38–)41.27(–44) x (26–)28.17(–30) µm. Figure 50 E & F.

Vernacular names: Sanderson’s spleenwort; Sanderson-se-tralievaring (Afr).

Ecology: Epilithic or epiphytic, on moist rocks in streambeds or as low-level epiphytes, in deep shade in moist evergreen forests. Not edaphically bound. Nanophanerophyte, mesophyte, fronds mesomorphic. Vegetative reproduction by the closely branched rhizome and plantlets forming at the apex of the rachis extension. Seasonal pattern apparently non-existent.

Distribution: Rare in the north-western corner of Swaziland, occurring at an altitude of ± 1 300 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.


splendens = shining or gleaming

Plants terrestrial, epilithic or epiphytic. Rhizome creeping, regularly branched, to 100 mm long, to 5 mm in diameter, set with roots, spaced stipe bases and scales, scales chartaceous, centrally castaneous, margins slightly paler, sessile, subulate, cordate-imbricate, denticulate, apex terminates in an oblong thin-walled cell, to 6 mm long, to 1 mm wide. Fronds spaced, to 12 mm apart, erect to arching, to 740 mm long; stipe firm, atrocastaneous, adaxially sulcate, to 320 mm long, to 1.6 mm in diameter, moderately to densely scaled, scales chartaceous, castaneous to ferrugineous,
clathrate, sessile, lanceolate-caudate to ovate-caudate, cordate-imbricate, usually with short outgrowths at the base, denticulate towards the apex, apex terminates in an oblong thin-walled cell, to 5 mm long, to 1 mm wide; lamina anadromous, to 3-pinnate, elliptic to ovate, to 425 mm long, to 30 mm wide, with up to 16 pinna pairs; rachis firm, castaneous, green towards the apex, adaxially sulcate, moderately to sparsely scaled, scales similar to, but smaller than, those on the stipe; pinnae petiolate, petiole to 4 mm long, opposite to alternate, basally widely spaced, more closely spaced towards the apex and overlapping, lanceolate, ovate, to inequilaterally narrowly trullate to rhomboid, to 186 mm long, to 85 mm wide, with up to 12 pinnule pairs; pinna-rachis sulcate, sparsely scaled, but the scales smaller than those on the rachis, to 1.5 mm long; pinnules alternate, lanceolate to inequilaterally narrowly trullate, to 60 mm long, to 23 mm wide, with up to 3 segment pairs; costa adaxially sulcate, sulcus confluent with that of the pinna-rachis, sparsely scaled, scales similar to, but smaller than, those on the rachis; segments firmly herbaceous, sessile, flabellate, trullate to rhomboid, variously lobed, lobes linear, irregularly dentate, to 15 mm long, to 7 mm wide, glabrous adaxially, sparsely scaled abaxially, scales castaneous, thinly crustaceous, clathrate, sessile, filiform, with short filiform outgrowths at the base, terminating in an enlarged thin-walled cell, to 2.5 mm long. Venation evident, flabellate, terminating in the teeth near the margin. Sorì linear, to 9 mm long; indusium herbaceous, stramineous, linear, entire, to 9 mm long, to 0.2 mm wide; sporangium long-stalked, uniseriate, 3-seriate below the capsule, capsule broadly elliptic in lateral view, with (18–)19 indurated annulus cells, epistomium 2-celled, hypostomium 4(–5)-celled. Spores 64 per sporangium, brown, elliptic, monolete, perispore folded to form short and long reticulate ridges, erose, (32–)34.3(–38) x (20–)22.1(–24) µm. Figure 51 A & B.

**Vernacular names:** Splendid spleenwort; Blinkblaar tralievaring (Afr).

**Ecology:** Terrestrial, epilithic or low-level epiphytes in light or deep shade in moist or seasonally moist evergreen forests. Often forms small clonal stands in leaf-litter on the forest floor. Not edaphically bound. Hemicyryptophyte, mesoxerophyte; fronds mesoxeromorphic, poikilohydrous. Vegetative reproduction by the branched rhizome. Seasonal pattern appears to be pronounced with new growth restricted to the rainy season. Plants may go dormant during the dry winter months or during prolonged periods of drought.

**Distribution:** Frequent on the western highveld and middleveld of Swaziland, occurring at altitudes ranging between 500 and 1 520 m. The species is restricted to Swaziland and the eastern parts of South Africa.


Asplenium concinnum (Schrad.) T.Moore in J. Bot. 5: 227 (1853). 

Asplenium theciferum (Humb., Bonpl. et Kunth) T.Moore var. concinnum (Schrad.) C.Chr. in Dansk Bot. Ark. 7: 104 (1932). Type: Capplant, M. Hesse s.n. (GOET!, holo.).

Davallia campyloptera Kunze in Linnaea 10: 544 (1836). Type: In sylva ad Plettenbergsbai sec. fl. Klein Boschrivier, Drège s.n. (LZ†, holo.).

Asplenium theciferum sensu Sim, Ferns S. Afr., 2nd edn: 171, pl. 72 (1915).

concinnus = neat or elegant

Plants epilithic to epiphytic. **Rhizome** erect, to 25 mm long, to 5 mm wide, set with roots, crowded persistent stipe bases and scales, scales chartaceous, concolorous or bicolorous, if bicolorous then centrally atrocastaneous, margins ferrugineous, clathrate, sessile, lanceolate to ovate, cordate-imbricate, margins set with uniseriate, pluricellular outgrowths, apex terminates in an oblong thin-walled cell, to 4 mm long, to 1.4 mm wide. **Fronds** crowded, caespitose, suberect to arching, to 280 mm long; **stipe** firm, green, basally sulcate, sulcus centrally ridged higher up, to 125 mm long, to 1.3 mm in diameter, initially moderately scaled, scales chartaceous, sessile, ferrugineous, clathrate, ovate to lanceolate, margins regularly set with long pluricellular outgrowths terminating in an enlarged, obovate gland-like cell, apex terminates in an enlarged gland-like cell, to 4 mm long, to 1.2 mm wide; **lamina** anadromous, to 2-pinnate, lanceolate to narrowly ovate, to 170 mm long, to 55 mm wide, with up to 13 pinna pairs; **rachis** firm, green, sulcate, centrally ridged, initially moderately scaled, scales similar to those on the stipe; **pinnae** petiolate, petiole to 4 mm long, opposite to alternate, basally often more widely spaced, the basal 2 or 3 pairs gradually reduced or not, coriaceous, lanceolate, ovate, narrowly elliptic to linear, to 38 mm long, to 15 mm wide, with up to 4 pinnule pairs; **pinna-rachis** sulcate, centrally ridged, the ridge not confluent with that of the rachis, sparsely set with scales similar to, but smaller than those on the rachis; **pinnules** alternate, spaced, obliquely spatulate or forked into lobes, to 10 mm long, to 1.2 mm wide, glabrous adaxially, abaxially sparsely set with scales similar to, but smaller than those on the rachis. **Venation** anadromous, obscure, ending near the margin. **Sori** cupuliform, borne terminally on each lobe, acentric, to 1.5 mm long; **receptacle** with simple, pluricellular, hair-like paraphyses, apical cell acicular, to 1.4 mm long; **indusium** membranous, entire, to 1 mm wide; **sporangium** long-stalked, uniseriate, 3-seriate below the capsule, capsule broadly elliptic in lateral view, with (17–)19(–22) indurated annulus cells, epistomium 2-celled, hypostomium (3–)4-celled. **Spores** 64 per sporangium, brown, elliptic, monolete, perispore folded into narrow reticulate ridges, erose, the areolae fenestrate, exospore (44–)49.52(–54) x (28–)31.7(–36) µm. Figure 51 C & D.

**Vernacular names**: Frog’s foot fern; Geitjettoon varing (Afr.).

**Ecology**: Epilithic or epiphytic, in light or deep shade in moist or seasonally moist evergreen forests and boulder forests. Not edaphically bound, in Swaziland occurring on soils weathered from the greenstone belt. Nanophanerophyte, meso-xerophyte; fronds mesoxeromorphic, poikilohydrous. Vegetative reproduction by the closely branched rhizome. Seasonal pattern appears to be pronounced with new growth restricted to the rainy season. Plants may go dormant during prolonged periods of drought.
**Distribution:** Sporadic on the western highveld of Swaziland, occurring at altitudes ranging between 1 200 and 1 300 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.


*unilaterale* = one-sided

Plants epilithic. *Rhizome* wide-creeping, irregularly branched, to 2 mm in diameter, set with roots and scales, scales chartaceous, ferrugineous, clathrate, adnate, narrowly to broadly triangular, repand, apex terminates in an oblong thin-walled cell, to 2 mm long, to 1 mm wide. *Fronds* widely spaced, to 50 mm apart, erect, to 280 mm long; *stipe* firm, atrocastaneous, shallowly sulcate adaxially, to 140 mm long, to 1.2 mm in diameter, proximally sparsely set with 2- or 3-celled hairs and scales, scales chartaceous, ferrugineous, sessile, subulate, apex terminates in an oblong thin-walled cell, to 1.8 mm long, glabrous towards the apex; *lamina* anadromous, 1-pinnate, oblong-cuneate to oblong-ovate, to 180 mm long, to 70 mm wide, with up to 16 pinna pairs; *rachis* firm, atrocastaneous, adaxially sulcate, narrowly green-winged, glabrous, nitid; *pinnae* sessile, opposite to alternate, basally more widely spaced than apically and often slightly overlapping, basal one or two pairs often slightly reduced, herbaceous, inequilaterally rhombic to oblong-paralellogram-shaped, obtiangular towards the apex, dimidiate for half or more the length, acute-serrate, often doubly serrate towards the base, glabrous adaxially and abaxially, to 35 mm long, to 11 mm wide. *Vénation* anadromous, evident, forked, ending in the teeth near the margin. *Sori* linear, at a vein fork or along the ultimate vein branches, to 3.5 mm long; *indusium* membranous, linear, entire, to 3.5 mm long, to 0.3 mm wide; *sporangium* long-stalked, uniseriate, 3-seriate below the capsule, capsule globose to obovate in lateral view, with (20–)23–27) indurated annulus cells, epistomium (1–)2-celled, hypostomium 4-celled. *Spores* 64 per sporangium, brown, broadly elliptic, monolete, perispore folded to form broad reticulate wings, wings narrow, lacinate, areolae echinulate, exospore (32–)34.8–38) x (22–)25.15–28) µm. Figure 51 E & F.

**Vernacular names:** Halved-spleenwort; Eenkant tralievaring (Afr.).

**Ecology:** Epilithic, in shallow soil in seepage areas along perennial streams in forests, partially shaded. Not edaphically bound, but in Swaziland the species is confined to fine-grained quartzite. Hemicryptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the wide-creeping, branched rhizome resulting in the plants forming small clonal stands. Seasonal pattern apparently non-existent.

**Distribution:** Rare in the north-eastern corner of Swaziland, occurring at an altitude of ± 600 m. Widespread in sub-Saharan Africa and the western Indian Ocean region.
Modern *Marsilea* L. dates from the mid-Cretaceous (Skog & Dilcher 1992). The Marsileaceae have traditionally been placed near the schizaeoid ferns, because of several similar anatomical and morphological features. The affinity with this group of ferns is remote, but they may well have descended from a common ancestor. Phylogenetic analyses based on *rbcL* (Hasebe *et al*. 1995), and morphological information (Rothwell & Stokey 1994; Pryer 1999), suggest the heterosporous leptosporangiate ferns to be monophyletic yielding the same intergeneric relationship, (*Marsilea* (Regnellidium Lindm., Pilularia L.).)


Plants seasonally aquatic or subterrestrial. *Rhizome* wide-creeping, firmly herbaceous, terete or obtusely angular, branched, rooting at the nodes, initially sparsely appressed pilose, hairs ventrally attached, fusiform, or filiform, subulate, or acicular. *Stipe* slender to stout, terete, glabrous or sparsely set with hairs similar to those on the rhizome; *lamina* paripinnate, 1-pinnate, with two pinna pairs; *pinnae* pulvinate, opposite, variable in size and shape, narrowly cuneate-obtriangular, obdeltate, or broadly obdeltate, flanks straight, or concave, outer margins rounded, entire to deeply crenate, often with long pellucid streaks between the veins, adaxially sparsely appressed pilose, hairs ventrally attached, acicular, abaxially moderately appressed pilose, hairs ventrally attached, acicular or fusiform. *Venation* obscure, free or anastomosing, terminal vein branches anastomose to form a near-marginal commissure. *Sporocarps* in dense clusters at the nodes, or solitary, or 2 or 3, ascending in a single row at the stipe base, or peduncle simple or branched, appressed pilose or strigose when young, glabrous later, saddle-shaped, subrectangular, or broadly oblong in lateral view, dorsally almost always deeply concave, ventrally rounded or curved, oblong, elliptic or narrowly-elliptic in dorsiventral cross-section, without a dorsal or frontal furrow, with 4–10 lateral ribs visible or invisible in mature sporocarps, not anastomosing, raphe distinct, attached along the entire base of the sporocarp, or one third to two thirds the length of the sporocarp base, inferior tooth absent, or obtuse and not very prominent, superior tooth conspicuous, slender from a broadly conical base, narrowly conical, acute or rarely subobtuse, straight or slightly curved, initially densely appressed pilose, hairs ventrally attached, subulate. *Sori* borne in parallel rows inserted on a long hygroscopic ‘rachis’, heterosporangiate, without a dehiscing mechanism, *microsporangium* with numerous microspores; *megasporangium* with a single megaspore. *Chromosome number* based on 2*n* = 40.

A near-cosmopolitan genus of approximately 65 species.

**Key to the species:**

1a Pinnae with pellucid streaks ................................................................. *M. fenestrata*
1b Pinnae without pellucid streaks:
   2a Sporocarps usually in a single row along the stipe base, pedicels unbranched ............
      ........................................................................................................... *M. minuta var. minuta*
   2b Sporocarps in a branched clustered at the stipe base ......................... *M. ephippiocarpa*


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Figure 52 A & B, Marsilea ephippiocarpa, A, habit, B, sporocarp; C–E, M. fenestrata, C, habit, D, sporocarp, E, pinna showing venation and pellucid streaks; F & G, M. minuta var. minuta, F, habit, G, sporocarp.
ephippios (Greek) = saddle; carpus (Greek) = fruit

Plants seasonally aquatic. Rhizome wide-creeping, initially green, brownish later, firmly herbaceous, terete or obtusely angular, to 1.5 mm in diameter, branched, rooting at the nodes, internodes to 38 mm long, initially sparsely appressed pilose, glabrous later, hairs ventrally attached, fusiform, subulate, or acicular, to 2 mm long. Stipe slender to stout, green initially, brown and glossy later, terete, to 90 mm long, to 1 mm in diameter, glabrous or sparsely set with hairs similar to those on the rhizome; pinnae herbaceous, pulvinate, variable in size and shape, narrowly cuneate-obtriangular, to broadly obdeltate, flanks straight or concave, outer margins rounded, entire to deeply crenate, to 16 mm long, to 12 mm wide, adaxially sparsely appressed pilose, hairs hyaline, ventrally attached, acicular, to 0.5 mm long, abaxially moderately appressed pilose, hairs hyaline to stramineous, ventrally attached, acicular, to 1 mm long. Sporocarps in dense clusters at the nodes, peduncle branched, pedicels to 2.5 mm long, appressed pilose when young, glabrous later, dark brown to blackish when fully mature, to 3 mm long, to 2.8 mm high, to 1.4 mm thick, typically saddle-shaped, dorsally almost always deeply concave, ventrally rounded, oblong to elliptic in dorsiventral cross-section, lateral ribs visible in mature specimens, 7-10, not anastomosing, raphe distinct, attached a half to a third the length of the sporocarp base, inferior tooth absent, superior tooth conspicuous, slender from a broadly conical base, acute or rarely subobtuse, initially densely appressed pilose, hairs hyaline to pale stramineous, ventrally attached, 5–7-celled, subulate, to 1.2 mm long. Figure 52 A & B.

Vernacular names: Water clover; Saalrug waterklawer (Afr).

Ecology: Tenagophytic, in shallow seasonal pools and in the backwaters of slow-flowing streams, exposed or partially shaded. Not edaphically bound, but in Swaziland the species is restricted to basaltic derived soils. Hemicryptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the wide-creeping, many-branched rhizome resulting in the plants forming large stands. Seasonal pattern apparently pronounced, immature sporocarps found during May.

Distribution: Sporadic in the north-western corner of Swaziland where the species appears to be restricted to the Mbuluzi River drainage system, occurring at an altitude ranging between 160 and 300 m. Widespread in southern tropical Africa and eastern parts of southern Africa.


fenestra = window

Plants seasonally aquatic. Rhizome wide-creeping, initially green, brown later, firm, herbaceous, terete, to 1 mm in diameter, branched, rooting at the nodes, internodes to 35 mm long, initially sparsely pilose, glabrous later, hairs ventrally attached, filiform, to 1 mm long. Stipe slender to stout, green initially, brown later, terete, to 120 mm long, initially moderately appressed pilose, glabrous later, hairs hyaline to pale brown, laterally attached, filiform, to 1.5 mm long; pinnae herbaceous, pulvinate, obdeltate to broadly obdeltate, flanks straight or slightly convex, outer
margin convex, entire, with long pellucid streaks between the veins, glabrous adaxially, abaxially with scattered hairs, hairs hyaline, ventrally attached, fusiform, to 0.3 mm long. Venation obscure, free or anastomosing, terminal vein branches anastomose to form a near-marginal commissure. Sporocarps in dense groups of 7 to 8, at the very base of the stipes, pedicels simple, to 3 mm long, subrectangular in lateral view, narrowly-elliptic in dorsiventral cross-section, dorsally slightly inwardly curved, ventrally curved, to 3.5 mm long, to 2.6 mm high, strigose initially, glabrous later, 4–7 lateral ribs almost invisible in mature sporocarps, not anastomosing, raphe distinct, attached along the entire base of the sporocarp, inferior tooth obtuse, not very prominent, superior tooth conspicuous, slender, tapering from a cone-shaped base, acute, straight or slightly curved. Figure 52 C–E.

Vernacular names: Windowed water clover; Gestreepte waterklawer (Afr.).


Distribution: Rare in Swaziland and known from a single collection made at Hlane, an area now under intense sugarcane farming. The species appears to be localised, occurring in Mozambique, Swaziland and the northern parts of KwaZulu-Natal in South Africa.


minuta = fine or minute

Plants aquatic or subterrestrial. Rhizome wide-creeping, green to pale brown, firmly herbaceous, terete, to 1.5 mm in diameter, repeatedly branched, appressed pilose, hairs ferrugineous, ventrally attached, to 4 mm long, rooting at the nodes, internodes to 160 mm long, villose at the nodes, hairs stramineous to ferrugineous, ventrally attached, to 6 mm long. Stipe slender to stout, green initially, later proximally brown, green distally, terete, to 200 mm long, sparsely hairy, hairs similar to those at the rhizome internodes; pinnae herbaceous, pulvinate, variable in size and shape, obdeltate to broadly obdeltate, to 20 mm long, to 19 mm wide, flanks straight, outer margin of floating fronds entire or repand, irregularly lobed in aerial ones, adaxially sparsely hairy, hairs stramineous, appressed, ventrally attached, to 0.3 mm long, abaxially sparsely, but more closely set with hairs similar to those on the adaxial surface. Sporocarps dark brown at maturity, solitary or 2 to 3 in a single row at the stipe base, pedicel stout, terete, erect, to 3.5 mm long, dark brown, to 4 mm long, to 2.6 mm high, to 1.5 mm thick, broadly oblong in lateral view, distally rounded, elliptic in
dorsiventral cross-section, without a dorsal or frontal furrow, densely appressed pilose when young, subglabrous later, hairs, ferrugineous, ventrally attached, filiform, to 1.3 mm long, lateral ribs invisible, raphe distinct, attached two thirds of the full length of the sporocarp base, teeth prominent, the inferior shorter than the superior, obtuse to subacute, erect, superior narrowly conical, acute, erect or recurved. Figure 52 F & G.

**Vernacular names:** Waterclover; Gelede waterklawer (Afr.).

**Ecology:** Teganophytic, in seasonal pools in riverbeds and in shallow backwaters of slow-flowing rivers, exposed or partially shaded. Not edaphically bound, but in Swaziland the species appears to be restricted to basaltic soil. Hemicryptophyte, mesophyte; fronds mesomorphic. Vegetative reproduction by the wide-creeping, many-branched rhizome. Seasonal pattern apparently pronounced with sporocarps forming during the drier winter months.

**Distribution:** Rare in Swaziland and only known from a single collection made in the northeastern corner of the country at an altitude of ± 120 m. The species is widespread in sub-Saharan Africa and the western Indian Ocean region.
Abbreviations and Glossary

Abbreviations

Afr. – Afrikaans
auct. – auctorum : of authors
c. – circa : about
coll. – collegit : he gathered
et al. – et alii : and others
fig. – figura : figure
ill. – illustration
m.y. – million years
nom. cons. – nomen conservandum : conserved name
nom. illeg. – nomen illegitimum : illegitimate name
nom. nov. – nomen novum : new name
nom. superfl. – nomen superflus : name superfluous or unnecessary
pl. – plate
p.p. – pro parte : partly, in part
quaod spec. – quoad specimen : with respect to the specimen
Ses. – Sesotho
Sis. – siSwati
s.n. – sine numero : without a number
sp. – species : as a species (singular)
spp. – species : as in several species (plural)
t. – tabula : plate

Glossary

abaxial: the side facing away from the axes, the underside of the lamina.

acicular: slender or needle-shaped.

acinaciform: like a curved sword or scimitar.

acroscopic: facing or directed towards the apex.

acrostichoid: having sporangia scattered over the entire abaxial surface of the fertile lamina.

adaxial: the side facing towards the axes; the upper side of the lamina.

adhesive hairs: hairs of the rhizome and stipe (occasionally also the rachis) that develop by cell division of epidermal cells and consist of one or more stiff hair cells. They occur in the Hymenophyllaceae and anchor the plant to the substrate.

aerophore: aerating structures, usually found along the axes.

aleté: spores without a conspicuous laesura.

anadromous: the basal segment or vein originating from the anterior side, the one on the posterior side originating from a distinctly more distal part.

anastomosing: joining together, veins forming a network.

anisophyllous: distinct leaf types are borne at the same point on the stem.

anisotomous: dichotomies result in branches that have different orientations and functions.

anisovalvate: the two halves of the sporangia are not of equal size.

annulus: the sporangium cells that cause the discharge of the spores.

anomocytic: stomata in which the guard cells are surrounded only by neighbouring cells (without subsidiary cells).

antrorse: directed upwards, opposite to retrorse.
aphlebia: modified basal pinnae as in *Cyathea capensis*.

apiculus: a small sharp point.

apogamous: having the condition of apogamy.

apogamy: the formation of a sporophyte from a gametophyte by asexual means rather than fertilisation.

appressed: lying flat against.

articulate: jointed, separating freely with a clean scar.

atrocastaneous: dark chestnut-coloured.

basiscopic: facing or directed towards the base.

bicolorous: 2-coloured.

bipinnate, 2-pinnate: divided into pinnae bearing pinnules.

carinate: keeled.

carnose: fleshy, or soft but firm.

catatadromous: the basal segment or vein originating from the posterior side; the one on the anterior side originating from a distinctly more distal point.

chamaephyte: usually low-growing plants having renewal buds at or just above ground level.

clathrate: with thick lateral cell walls and thin superficial walls.

colliculate: covered with little rounded altitudes.

concolorous: uniform in colour.

confluent: blending into one.

coriaceous: leathery.

corneous: horny, hard but never brittle.

costa: major axis of a pinna or pinnule.

costule: an axis that is a branch of a costa.

cultrate: shaped like a knife-blade, the sides parallel to each other.

cupulate: cup-shaped.

diacytic: stomata in which the guard cells are surrounded by 2 subsidiary cells. The common wall of the 2 subsidiaries is at a right angle to the long axis of the guard cells.

dichotomous: equally forked.

dimidiate: halved diagonally, with usually one half rudimentary or absent.

dimorphic: having two shapes, the fertile fronds differing from the sterile.

dorsal: upper side.

echinate: bearing spines or prickles.

eglandular: without glands.

elaters: strap-shaped appendages of *Equisetum* spores.

eligulate: without a ligule.

ephemeral: short-lived.

epilithic: growing on rocks.

epiphytic: growing on the trunk or branches of shrubs or trees.

estipitate: without a stipe.

estomate: without stomata

euphyllophytes: all vascular plants excluding the Lycophytes (clubmosses and relatives).

eusporangia: thick-walled sporangia originating from several epidermal cells.

eusporangiate: plants bearing eusporangia.
Figure 53. A diagramatic fern frond and rhizome illustrating some terms in the Glossary.
exindusiate: sori lacking an indusium.

farina: a white or yellow exudate of glands.

foveo-reticulate: the pits form a reticulum or meshwork.

frond: the leaf of a fern.

geophytes: plants whose perennating buds are buried below the substrate surface, and situated on a rhizome.

helophytes: marsh plants.

hemicryptophytes: plants whose buds are formed at the substrate surface.

heterophyllous: having leaves of different forms; the difference may be gradual or abrupt.

heterosporangiate: male and female gametes are produced by different sporangia.

heterosporous: bearing spores of two sizes and sexes.

homophyllous: all leaves are uniform.

homosporous: the spores are all of the same size.

hygromorphic: plants which are structurally adapted for life in moist habitats.

imbricate: overlapping.

indusiate: sori bearing an indusium.

indusium: usually a thin membrane or structure covering the developing sporangia in a sorus.

inframedial: below the middle; sori a little closer to the costa or costule than the margin.

innervated: extending into.

isodromous: where the basal divisions or veins spring essentially from the same point.

isophyllous: leaves similar in size and shape are borne at the same point on the stem.

isotomous: all dichotomies result in equally thick branches, as in Huperzia.

isovalvate: the two halves of the sporangia are of equal size, as in Huperzia.

lacinate: slashed into narrow divisions with taper-pointed incisions.

laesura: the exospore structure on the proximal face through which the gametophyte passes.

lamina: the expanded portion of the leaf blade of a fern frond.

ligule: a small flap of leaf tissue adaxially near the leaf base in Selaginella.

lumina: cavities or spaces.

megaphanerophytes: tree-like plants more than 7.5 m tall.

megasporangium: a female sporangium producing megaspores.

megasporangium: a female sporangium producing megaspores.

megasporangium: a male sporangium producing microspores.

megasporangium: a male sporangium producing microspores.

megaspore: a female spore.

mesic: pertaining to conditions of moderate moisture or water supply.

mesomorph: plants requiring moderate moisture conditions, or only partly protected against desiccation.

mesophanerophytes: tree-like plants between 1.8 and 7.5 m tall.

mesoxeromorphic: plants that prefer conditions intermediate between mesic and xeric.

microphanerophytes: plants 0.3 to 1.8 m tall.

microsporangium: a male sporangium producing microspores.

microspore: a male spore.
**monolete**: a spore having a single unbranched scar or laesura.

**monomorphic**: having a single shape.

**monophyletic**: derived from the same ancestral taxon.

**muri**: walls.

**muricate**: rough, with short hard points.

**nanophanerophytes**: plants with their perennating buds <0.3 m above the substrate surface.

**obtriangular**: inversely triangular, with the sharp point facing downwards.

**octoploid**: plants with eight chromosome sets in the nuclei.

**ossiform-celled**: cells shaped like a bone.

**pan-tropical**: occurring throughout the tropical parts of the world.

**paracytic**: stomata with guard cells accompanied on either side by one or more subsidiaries parallel to the long axis of the pore.

**paraphyses**: unicellular or multicellular structures borne on the soral receptacle.

**paripinnate**: even pinnately compound, without a terminal leaflet.

**patent**: diverging from the axis at almost 90°.

**pectinate**: with narrow linear segments, comb-like.

**pedate**: palmate, but with the lateral lobes divided.

**phyllodendron**: in species with articulate stipes: the portion of the stipe that remains attached to the rhizome.

**pinna**: a sessile or stalked primary division of a compound lamina.

**pinnate, 1-pinnate**: divided into pinnae.

**pinnatifid**: pinnately cleft but not to the axes.

**pinnule**: a sessile or stalked division of a pinna that is narrowed at the base.

**pleustophytes**: plants free-floating on the water surface, not attached to or penetrating a substrate.

**poikilohydrous**: photosynthetic organs that have the ability to become dormant but remain alive during the dry season, and regain their turgidity and become green after being wetted.

**polycytic**: stomata where 1 or more subsidiaries curve horseshoe-like around one of the long-axis guard cell poles.

**porate**: pierced with small holes.

**proliferous**: bearing bulblets or plantlets on the stipe or lamina axes.

**pseudodichotomous**: dichotomously branched, but with an arrested bud in the fork.

**pulvinus**: the swollen base of a petiole.

**punctulate**: minutely dotted.

**pyrophytic**: plants that can withstand periodic burns.

**rachis**: the main axis of a compound lamina.

**raphe**: the suture at the rear of the sporocarp to which the pedicel is attached.

**receptacle**: the lamina tissue to which the sporangia are attached.

**reflexed**: bent abruptly downwards.

**reticulate**: joined together to form a network.

**retrorse**: curved backwards.

**rugulose**: somewhat wrinkled.
secondary rachis: the main axis of a pinna.

sinus: the space between two lobes.

spatulate: spatula-shaped, i.e. from a broad rounded upper part tapering gradually downwards into a stalk.

sporangioophore: a sporophyll bearing a ring of sporangia facing the axis of the strobilus, as in *Equisetum*.

sporocarp: a structure containing the sporangia, as in *Marsilea*.

sporophyll: a fertile leaf, bearing sporangia or subtending the sporangium.

stipe: the stalk of a frond.

strobilus: the imbricate sporophylls arranged around a central axis to form a cone, as in *Equisetum*, *Selaginella* and *Lycopodium*.

subhorizontal: at an acute angle to the horizontal.

subpeltate: almost peltate or shield-shaped.

subtriangular: nearly triangular or equal-sided.

subulate: awl-shaped.

superficial: on the surface of the lamina.

synangium: a number of fused sporangia, as in *Psilotum* and *Marattia*.

taeniform: strap-shaped.

teganophytes: amphibious plants, the juvenile submerged or floating on water and the adult (reproductive) phase terrestrial.

therophytes: annuals.

trilete: a spore having a triradiate scar or laesura.

trullate: angular ovate or shaped like a brick-layer’s trowel.

uncinate: hooked.

verruculose: with small warts.

xeromorphic: plants with structural and functional adaptations to prevent water loss by evaporation, but not necessarily confined to dry habitats.
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