

The Pteridophytes of the 'Petite Suisse' area in Luxembourg. Diversity, Surveys and Conservation.

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INTRODUCTION

The 'Petite Suisse' area in the eastern part of the Grand-Duchy of Luxembourg is known for its sandstone outcrops, deep and often narrow crevices, extended forests and a special microclimate which offer ideal conditions for a great diversity of pteridophytes. It is therefore not surprising that the majority of ferns and fern allies known for Luxembourg occur in this area.

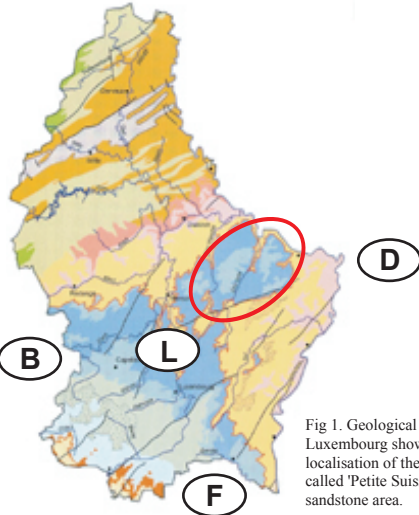


Fig 1. Geological map of Luxembourg showing the localisation of the so-called 'Petite Suisse' sandstone area.

The area is internationally known for the relictual populations of Tunbridge filmy-fern (*Hymenophyllum tunbrigense*). This fern was first discovered in this continental island in 1821 but the location of the major colonies remained uncertain until the early 20th century following its re-discovery in 1873. In 1993 the gametophytes of another filmy fern, the Killarney fern (*Trichomanes speciosum*) were first discovered for continental Europe in the same region. In total 30 fern species (not counting subspecies and/or varieties) are known from this area; more than 90 percent of the species known for Luxembourg. Beside *Hymenophyllum tunbrigense* and *Trichomanes speciosum* (for the second species, only gametophytes), rare or interesting species and/or subspecies are *Blechnum spicant*, *Dryopteris affinis*, *Asplenium csikii* (= *A. trichomanes* subsp. *pachyrachis*), *Polystichum setiferum*, *Polystichum x bicknelii*, ... Unfortunately a certain number of species (for example *Osmunda regalis*, *Asplenium viride*, *Asplenium billotii* and *Polystichum lonchitis*) are considered to be extinct in the 'Petite Suisse' area. The area offers good conditions for horsetails, especially for *Equisetum hyemale* and *Equisetum telmateia*. Considering the clubmosses, from the 5 known species for the area, 4 are considered to be extinct, and the status of *Huperzia selago* is rather unknown.



Fig 2. Narrow crevices like this one contain the last sites of *Hymenophyllum tunbrigense* in Luxembourg.

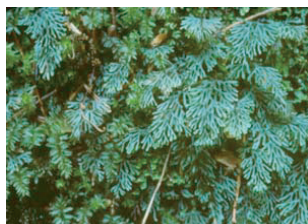


Fig 3. Patch of *Hymenophyllum tunbrigense* (Tunbridge Filmy-fern) with leaves in good condition.

PTERIDOPHYTES OF THE 'PETITE SUISSE AREA'		STATUS (Petite Suisse)	Last mentioned
LYCOPODIOSIDA CLUBMOSSSES			
Lycopodiaceae	Clubmoss family		
<i>Huperzia selago</i>	Fir Clubmoss	RRR	/
<i>Lycopodium annotinum</i>	Interrupted Clubmoss	E	1951
<i>Lycopodium clavatum</i>	Stag's-horn Clubmoss	E	1953
<i>Lycopodiella inundata</i>	Marsh Clubmoss	E	1951
<i>Diphasiastrum complanatum</i>	Isler's Clubmoss	E	1951
EQUISETOPSIDA HORSETAILS			
Equisetaceae	Horsetail family		
<i>Equisetum hyemale</i>	Rough Horsetail	CC	/
<i>Equisetum fluviatile</i>	Water Horsetail	RRR	/
<i>Equisetum palustre</i>	Marsh Horsetail	CCC	/
<i>Equisetum sylvaticum</i>	Wood Horsetail	R	/
<i>Equisetum pratense</i>	Shady Horsetail	E (prob. error)	1934
<i>Equisetum arvense</i>	Field Horsetail	CCC	/
<i>Equisetum telmateia</i>	Great Horsetail	C (1)	/
PTEROPSIDA FERNS			
Ophioglossaceae	Adder's-tongue family		
<i>Ophioglossum vulgatum</i>	Adder's-tongue	R	/
<i>Botrychium lunaria</i>	Moonwort	E	1951
Osmundaceae	Royal Fern family		
<i>Osmunda regalis</i>	Royal Fern	E	1951
Donnstadiaceae	Bracken family		
<i>Pteridium aquilinum</i>	Bracken	CCC	/
Hymenophyllaceae	Filmy-fern family		
<i>Hymenophyllum tunbrigense</i>	Tunbridge Filmy-fern	RRR	/
<i>Trichomanes speciosum</i>	Killarney Fern (gametophyte)	R	/
Thelypteridaceae	Marsh-fern family		
<i>Oreopteris limbosperma</i>	Lemon-scented Fern	RR	/
<i>Phegopteris contorta</i>	Beech Fern	C	/
Aspleniaceae	Spleenwort family		
<i>Ceterach officinarum</i>	Rustyback	E	1883
<i>Asplenium scolopendrium</i>	Hart's tongue	C (1)	/
<i>Asplenium septentrionale</i>	Forked Spleenwort	RRR	1997
<i>Asplenium ruta-muraria</i>	Wall-rue	R	/
<i>Asplenium adnigrum-nigrum</i>	Black Spleenwort	R	/
<i>Asplenium onopteris</i>	Irish Spleenwort	E (prob. error)	1952
<i>Asplenium trichomanes</i>	Maidenhair Spleenwort	CCC	/
subsp. <i>quadrivalens</i>	Common M. Spleenwort	CCC	/
subsp. <i>pachyrachis</i>	Lobed M. Spleenwort	C	/
nothosubsp. <i>staufferi</i>	L. subsp. <i>quadrivalens</i> x subsp. <i>pachyrachis</i>	R	/
<i>Asplenium viride</i>	Green Spleenwort	E (?)	1957
<i>Asplenium billotii</i>	Lancisoletta Spleenwort	E (?)	1952
Woodsiaceae	Lady-fern family		
<i>Athyrium filix-femina</i>	Lady-fern	CCC	/
<i>Cystopteris fragilis</i>	Brittle Bladder-fern	C	/
<i>Gymnocarpium droopteris</i>	Oak Fern	C	/
<i>Gymnocarpium robertianum</i>	Limestone Fern	R	/
Dryopteridaceae	Buckler-fern family		
<i>Polystichum lonchitis</i>	Holly-fern	E (?)	1952
<i>Polystichum aculeatum</i>	Hard Shield-fern	C	/
<i>Polystichum setiferum</i>	Soft Shield-fern	RR	1994
<i>Polystichum x bicknelii</i>	Lowland Hybrid Shield-fern	RR	/
<i>Dryopteris filix-mas</i>	Male-fern	CCC	/
<i>Dryopteris affinis</i>	Scaly Male-fern	RR	/
subsp. <i>borrieri</i>	Common Scaly Male-fern	RR	/
subsp. <i>affinis</i>	Yellow Scaly Male-fern	RRR	1953
subsp. <i>cambrensis</i>	Narrow Scaly Male-fern	RRR	1992
<i>Dryopteris carthusiana</i>	Narrow Buckler-fern	CCC	/
<i>Dryopteris dilatata</i>	Broad Buckler-fern	CC	/
<i>Dryopteris cristata</i>	Crested Buckler-fern	E	1883
Blechnaceae	Hard-fern family		
<i>Blechnum spicant</i>	Hard-fern	RR	/
Polyodiaceae	Polyod family		
<i>Polyodium vulgare</i>	Common Polyod	CCC	/

(1) locally abundant
Status: CCC abundant CC very common C common R scarce RR rare RRR endangered E extinct

Tab 1. List of species and status of the pteridophytes known from the 'Petite Suisse' sandstone area in Luxembourg.

RARE OR INTERESTING SPECIES

The 'Petite Suisse' area hosts some rare or interesting species and subspecies, as for example *Hymenophyllum tunbrigense*, *Trichomanes speciosum* and *A. trichomanes* subsp. *pachyrachis*.

Hymenophyllum tunbrigense (Hymenophyllaceae)

The 'Petite Suisse' area in Luxembourg is one of the few continental areas ever known that hosts *Hymenophyllum tunbrigense*, a species that generally occurs in a more Atlantic range. Due to environmental changes and external pressures (tourism and outdoor activities, ...) a certain amount of sites have disappeared in the last decades. Recent surveys have now shown a certain population increase. However this remarkable recovery is due largely to the contribution of two sites from which the public has been excluded since 1993; elsewhere the number of sites is continuing to dwindle.

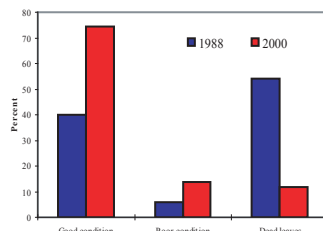


Fig 4. Health status of *Hymenophyllum tunbrigense* leaves in percent (1988 + 2000).

Trichomanes speciosum Willd. (Hymenophyllaceae)

Although primarily a species of the UK, Ireland, Brittany and the Atlantic Islands, the filmy fern *Trichomanes speciosum* Willd. (Killarney fern) is also found in Europe at scattered locations in other parts of France, Spain, Portugal and Italy. The gametophytic generation of *Trichomanes speciosum* can be found independently of the sporophyte and seems to be rather widespread in Europe. In Luxembourg the independent gametophyte of *Trichomanes speciosum* was first discovered in 1993. Recent investigations revealed many new locations and at present date, more than 100 sites of the gametophyte are known in a 70 square kilometres large area. Most of the sites occur in the 'Petite Suisse' area, but the independent gametophyte of *Trichomanes speciosum* is largely spread in the whole sandstone area. Recent discoveries of the gametophyte on Devonian schist seem to indicate that the species is also quite widespread in the Luxembourg's Ardennes.



Fig 5. Gametophytes of *Trichomanes speciosum* (Killarney fern).

Asplenium trichomanes L. subsp. *pachyrachis* (Christ) Lovis & Reichstein

(Syn.: *Asplenium csikii* Kümmerle & Andras.) (Aspleniaceae)
The Maidenhair Spleenwort (*Asplenium trichomanes* L.) is present throughout Luxembourg and quite frequent in natural rock habitats, as well as on walls of all types. Generally two subspecies of *Asplenium trichomanes* are distinguished: the rare subsp. *trichomanes*, growing on silicious rocks, and the common, rather calcicole subsp. *quadrivalens*. A third subspecies, *Asplenium trichomanes* subsp. *pachyrachis* (Lobed Maidenhair Spleenwort) - found in Europe at scattered locations - is known for Luxembourg since the early 1990-ties. Until 2001 only a few sites where known in Luxembourg, almost exclusively in the 'Petite Suisse' area. A rapid investigation of natural sandstone outcrops, buildings, walls, ... showed, that *A. trichomanes* subsp. *pachyrachis* is rather common in the sandstone area. Here it occurs on natural, often vertical rock surfaces, in crevices on steep rocks, as well as on sandstone walls. At present date, more than 40 sites in 25 square kilometres are known. Most of the sites occur in the 'Petite Suisse' area, but the Lobed Maidenhair Spleenwort is present in the whole sandstone area as far as Luxembourg-City.



Fig 6. *Asplenium trichomanes* subsp. *pachyrachis* (Lobed Maidenhair Spleenwort).

Asplenium trichomanes subsp. *pachyrachis* can hybridise with subsp. *quadrivalens*, forming a vigorous plant known as *Asplenium trichomanes* L. nothossp. *staufferi* Lovis & Reichstein. This hybrid is easily found in areas where the two parents are present and grows on natural rocks as well as on man-made walls.

CONSERVATION

Special conservation measures are taken so far only for *Hymenophyllum tunbrigense*. Following field surveys, a series of conservation measures were introduced to secure the survival of the species. In 1993 the Ministry of the Environment finally decided to withdraw public access to the main site by setting up gates and diverting the existing path. Further measures included setting up ramps in strategic places along public footpaths to avoid people straying off the signed paths. These direct measures in the field were supported by a new set of local bylaws governing the legal conditions under which rock climbing is permitted. Due to lack of support, a further attempt to enhance the legal protection of rare species sites and boost conservation initiatives in the area by officially designating the entire forest as a national nature reserve failed so far. Recent loss of some species is regrettable, but the discoveries of new species and subspecies in the last years prove nevertheless that the 'Petite Suisse' area is still offering excellent life conditions for an outstanding pteridological diversity.