

This article was first published in Eucryphia No 15, February 1994.

The author, Anders Bofeldt from the Wollongong Botanic Garden, had a wide knowledge of the flora of the Illawarra as a result of his work at the WGB and his frequent field trips. Further articles were published later and will soon be available on [www.reps.org.au](http://www.reps.org.au).

Drawings used (with kind permission) are from Harden, G.J. ed. *Flora of New South Wales* (1990-4), and Jones, D.L. and Clemesha, S.C. *Australian Ferns and Fern Allies* (1981).

## RARE PLANTS IN RAINFORESTS OF THE ROBERTSON PLATEAU

### PART 1 - THE NATIONALLY THREATENED SPECIES.

The last decade has seen an amazing increase in public awareness of the environment, especially in the last few years. This is also true for forests and in particular, rainforests.

The Robertson Plateau's rainforests are no exception. This increased awareness and interest has yielded many "fruits" . Among these has been the formation of the Robertson Environment Protection Society and the book *A Guide to the Yarrawa Brush: Trees, Shrubs and Vines of the Robertson Rainforest Remnants*. We have also seen a substantial increase in knowledge of the floristics, ecology and extent of these rainforest remnants on the Robertson Plateau.

As an example, it was commonly thought that the Robertson rainforests were restricted to the rich volcanic soils derived from Robertson Basalt. It is obvious, however, that these rainforests extend onto the Wianamatta Shales underlying the basalt and in some places even onto the Hawkesbury Sandstone underlying the shales. This is due to the enrichment of the underlying geology by the overlying geology as a result of the natural process of erosion, weathering and soil movement and the very high rainfall of this area. Consequently the typically poor sandy soils derived from the Hawkesbury Sandstone in this area are quite clayey and rich compared to other areas.

Hundreds of hours of field work have been spent in these remnants looking at various aspects of the rainforest but especially their composition, structure and species composition. It is now apparent that there are numerous rare species occurring in these rainforests. The Robertson Plateau referred to in the following text is taken in the broadest sense to refer to the area above the escarpment i.e. the plateau, but including the Budderoo, Barren Grounds and Robertson Plateaus. Obviously these all are part of the same plateau with the place name referring to different parts of it. There are no clear boundaries as to where one ends and the other starts. It is convenient to consider the plateau as a single area with the escarpment cliff as a distinct geographical boundary. This concurs with the State definition of the eastern part of the Central Tablelands Botanical Division (Harden, 1990). The rare rainforest plants of the Robertson Plateau can be divided into a few categories: Nationally Listed Rare or Threatened Plants (Briggs and Leigh, 1988); Regionally Rare plants (in part Mills, 1988); and Locally Rare or Significant Plants.

There are seven species currently listed as nationally rare or threatened:

<i>Blechnum gregsonii</i>	2RC warrants 2VC
<i>Hymenophyllum pumilum</i>	3RC warrants 3VC
<i>Irenepharsus typherus</i>	2RC warrants 2ECi
<i>Leptopteris fraseri</i>	3RC warrants 3VC
<i>Pterostylis pulchella</i>	2VC
<i>Sphaerocionium lyallii</i>	3RC
<i>Typhonium eliosurum</i>	3EC warrants 3VCi

The coding system used above is internationally recognised and explained below, after Briggs and Leigh (1988).

- 1 species known only from the type collection.
  - 2 species with a very limited distribution in Australia and with a maximum geographic range of less than 100 km.
  - 3 species with a range over 100 km. in Australia but occurring only in small populations which are mainly restricted to highly specific habitats.
  - X species presumed extinct. These have either not been found in recent years despite thorough searching, or have not been collected for at least 50 years.
  - E endangered species in serious risk of disappearing from the wild state if present land use and other causal factors continue to operate.
  - V vulnerable species not presently endangered but at risk over the longer period through continued depletion, or which largely occur on sites likely to experience changes in land use which threaten survival of the species in the wild.
  - R species which are rare in Australia but which are not currently considered to be endangered or vulnerable.
  - K poorly known species that are suspected, but not definitely known, to belong to any of the above categories.
  - C species known to be represented within a national park or other proclaimed reserve. The species may or may not be considered adequately conserved within the reserve(s).
- a indicates that the species is known to be adequately conserved.
  - i indicates that the species is known to be inadequately conserved.
  - indicates that its reservation status is unknown.

***Blechnum gregsonii*** is a very rare fern which grows on rocks or cliffs near waterfalls in very wet, cool mountain areas typically in association with rainforest. The fern is quite large with fronds 30 - 80 cm long and forms pendant clumps. It has no common name and is only known from the upper part of Minnamurra Falls and three sites in the Blue Mountains. Very little is known about this fern and the number of plants present in the wild. The exact location of the fern at Minnamurra is not known as it has not been seen in recent years, probably not since it was last collected by Howard Judd in 1957. It may be present at other similar sites in the region like Carrington Falls or Belmore Falls. As a result of the rarity and very specialised niche, I believe this species warrants a change from "rare" to "vulnerable". It is hoped that the population(s) of this species can be relocated this summer when the author plans to do a number of field trips in this area.

***Hymenophyllum pumilum*** is a very small epiphytic filmy fern which grows in very wet, sheltered sites in very high rainfall cool mountain areas. The habitat is CTRF/WTRF. The fern has fronds only 3.5cm long and so is very difficult to see as it grows amongst mosses and other filmy ferns. Very little is known about the fern or its exact whereabouts in the area, the only reference being Beadle et al. (1982) "pass above Kiama" (Jamberoo Pass). The only other locations are three sites in the Blue mountains. It is an extremely rare species and certainly warrants "vulnerable" or even "endangered" status rather than "rare". Its exact status in the region needs thorough and extensive investigation in the field. It is hoped that this summer will unravel some of the mystery surrounding the species.

***Irenepharsus trypherus*** is a herb to 1m tall which is restricted to the Illawarra district. It was known from only four collections: two from Minnamurra Falls, Upper Kangaroo Valley (Carrington Falls?) and the Shoalhaven (Mills, 1988). The plant is short lived like most herbs in the Mustard family, and it is not known whether it is a perennial or an annual. It grows on moist rock walls, steep rocky slopes or disturbed

rocky areas, often near cliff tops, and seems to prefer the fertile volcanic rocks like latite.

Weed invasion is a serious threat to the species, especially Mistflower (*Ageratina riparia*), Crofton Weed (*Ageratina adenophora*) and Lantana (*Lantana camara*). These weeds often smother the plants' habitat to a degree where it is impossible for the species to regenerate. Vast areas of the species' niche are covered with these weeds and it is probable that the plant has become extinct in many of its former locations like Minnamurra Falls.

There was some thought that the species was extinct (the last previous collection was made in 1959) but it was recently rediscovered by Mark Robinson on Stockyard Mountain and also at Macquarie Pass National Park where it was only surviving as an individual plant surrounded by Mistflower. Fortunately the author has gathered seeds from this plant and the other population and has brought the species into cultivation at the Wollongong Botanic Gardens.

*Irenepharsus* is associated with rainforest at both these sites but mainly DRF and STRF, especially on their margins and on disturbed sites, seeming to prefer sheltered sites with high light levels to semi-shade. It has leaves 3 - 10 cm long with a serrated margin and masses of small, white flowers with a slight, pleasant perfume, followed by lots of small siliqua (dry fruits) to 2cm long. Cattle grazing is a problem at the Stockyard Mountain site, fencing or ideally reservation of the site should be a priority. The species should be changed from "rare" to "endangered". Surveys to find existing populations should be carried out at Minnamurra and Carrington Falls. Its altitudinal limit and cold tolerance is not known. It may be more widespread and could easily be mistaken for a weed.

***Leptopteris fraseri*** or Crepe Fern is a very attractive, delicate large fern which grows on very moist rocks or cliffs often above watercourses or near waterfalls in very high rainfall, cool, mountain areas. Such sites are invariably surrounded by WTRF/CTRF. It is known from a number of sites in the Illawarra district: Broger's Ck. (Barren Grounds), Upper Minnamurra Falls, Belmore Falls, Wonga Falls (Barren Grounds) and Meryla near Bundanoon (Mills 1988).

This fern resembles a small tree fern and can form a caudex (trunk) up to 1m tall though often it is much less or trunkless with fronds to 1.2m long though usually about 0.5 - 1m long. The fronds have lamina (leaves) which are very thin and filmy and hence have little or no tolerance of dry conditions. Crepe Fern is usually common where it occurs, often with numerous plants of various ages, but very localised and occurring in a very small area at each site e.g. within about 10m of a waterfall.

The fern belongs to an ancient family. It has a curious distribution outside the Illawarra. It is known from one or two sites in the Budawangs in Southern NSW (Mills, 1988), a few sites in the Blue Mountains and Wollemi National Parks (Floyd, 1990), two sites in the upper Hastings R. area 250km to the north (Floyd, 1990), and then about 1500km north in the Wet Tropics (Thomas et al., 1989).

Crepe Fern may warrant upgrading from "rare" to "vulnerable", or even downgrading off the R&E list, depending on the size of the populations in the tropics, Budawangs and Blue Mountains/Wollemi areas.

***Pterostylis pulchella*** is a small terrestrial orchid, to 15cm tall in flower, which forms small colonies in very wet, cool mountain areas. It is restricted to five known sites (Leo Cady, pers. comm.). These are Upper Minnamurra Falls, Carrington Falls, Belmore Falls (Rupp, 1969), Fitzroy Falls and Wonga Falls (a new site where the author found it in May, 1992).

This orchid grows on cliffs amongst mossy rocks in open forest or in sheltered gorges below these cliffs in RF where it typically grows on large, moss-covered sandstone boulders in creek beds in semi-shade to heavy shade, associated with

numerous filmy ferns including some regionally rare species and R&E species like *Sphaerocionium lyallii*.

***Sphaerocionium lyallii*** is a small filmy fern with fronds to 4 cm high. It forms small, dense colonies on mossy rocks or mossy tree trunks. It commonly grows in association with a number of other filmy ferns. Again the habitat is very high rainfall, cool, mountain areas, especially ones that are always moist like creek beds and waterfalls.

It is known from a few sites in the Blue Mountains, Illawarra and one site on the South Coast - Monolith Valley in the Budawangs (Mills, 1988). In the Illawarra it is known from Upper Minnamurra Falls, Wonga Falls, Broger's Creek, Jamberoo Mountain, Caloola Pass (Mills), Crankey Ck., Meryla (Mills), and Mt. Keira (Bofeldt). This species also occurs in New Zealand. It is often locally common but only in very small areas i.e. where the moisture is always high. It is likely to be a little more widespread.

Like all species of fern from very high rainfall areas, especially the filmy ferns, it is very dependant on constant humidity and moisture. Some ferns are very sensitive to drying out which can kill or severely setback populations. Some other ferns, however, have the ability to dry and shrivel up and then resurrect themselves following rain.

***Typhonium eliosurum***, Illawarra Stinking Arum, is now almost entirely restricted to the Illawarra. It was known as far north as Bulahdelah but seems to have disappeared from these northern sites (Leigh, Boden & Briggs, 1984). It is now known from Werong Beach (Royal National Park) to YatteYattah near Milton on the South Coast. Ten years ago it was widely thought to be on the verge of extinction, being only known from a few surviving populations, a number of others having disappeared as a result of clearing and flooding from dam construction.

The last decade, however, has seen a dramatic increase in knowledge on this intriguing species. Illawarra Stinking Arum is a terrestrial herb to 40cm tall but typically less. It forms colonies through spreading, branching, thick rhizomes. Some of these colonies can cover an acre or more but normally they are much smaller, one to a few square metres. The leaves are three lobed to deeply hastate to 20cm long. The inflorescence is about as tall as the leaves (15 – 20 cm) and is a narrow lanceolate spathe, deep purple in colour.

It flowers from October to December and each inflorescence lasts a few days to a week. When it opens in the morning it begins to release a strong, pungent odour akin to rotting meat or faeces lasting most of the day and it invariably attracts numerous flies and beetles which enter the flower which closes in the afternoon/evening trapping insects overnight. During the course of the night the trapped insect(s) crawl about the sexual parts of the inflorescence attempting to escape and thereby pollinating it. In the morning the flower opens again, releasing its captives. Over the next few days the flower withers and, if fertilised (which is rare), will develop a fruit.

Until 1990 it was not really known what the fruit was like. It was assumed that it resembled other species of the genus, which it does. The fruit was first photographed in 1990 from a cultivated specimen grown by the author at the WBG which has had plants growing since 1980. The fruit is an aggregate of yellow berries surrounded by the remnants of the green spathe. This cluster is roughly ovoid, 2 - 3 cm in diameter. Each berry is fleshy, 8 - 10 mm long, elliptical and contains brown seed, 5 - 8 mm long.

*T. eliosurum* is very easy to cultivate and divides readily. It is quite vigorous but needs ample water and fertiliser and repotting every 1 - 3 years. In the wild and in cultivation it has the habit of dying back to the rhizome, especially during cool or dry periods which can explain the difficulty in locating plants again in the wild and making it difficult to locate extant plants in field survey work.

A number of populations of this species have been found in the Illawarra by the author: Broker's Nose, Flying Fox Gully (Terragong), Mt. Keira, Johnson's Ridge, Calderwood and Macquarie Hill (Mt. Murray). This last population is the largest known and is as high as the species has been found anywhere (720 m) which tends to indicate that the species is quite cold and frost tolerant. It usually grows on fertile loams but the parent material and soil type can vary considerably as can the habitat. It grows in a range of RF types: LRF, DRF, STRF, WTRF and Riverine RF.

Kevin Mills has found this species at Wandandian and Mark Richardson, from the Australian National Botanic Garden, Canberra, has located a few large colonies along the banks of the Shoalhaven (pers. comm.). The species is quite widespread but most of the populations are small and vulnerable, being mostly in sites near roads or tracks or areas where grazing, quarrying or other activities are likely to threaten them. The species is inadequately conserved and reservation of known populations should be a priority, some being adjacent to existing reserves or National Parks e.g. Macquarie Hill which is only a few hundred metres from the boundary of Macquarie Pass National Park. The species should be downgraded from "Endangered" to "Vulnerable".

#### **ABBREVIATIONS USED:**

RF - rainforest, STRF - subtropical rainforest, WTRF - warm temperate rainforest, DRF - dry rainforest, CTRF - cool temperate rainforest, LRF - littoral rainforest, R&E - rare and endangered.

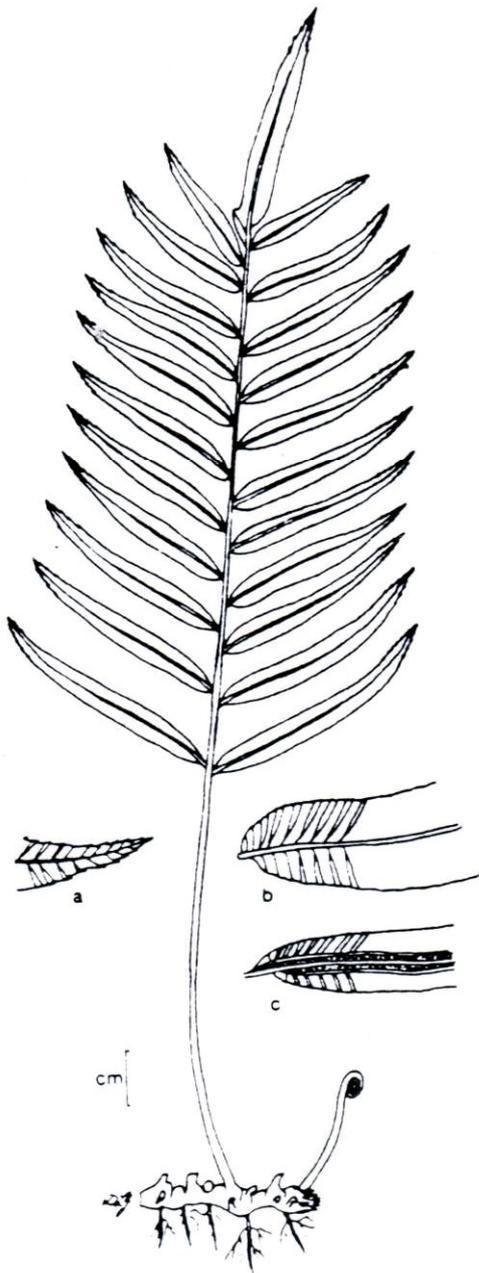
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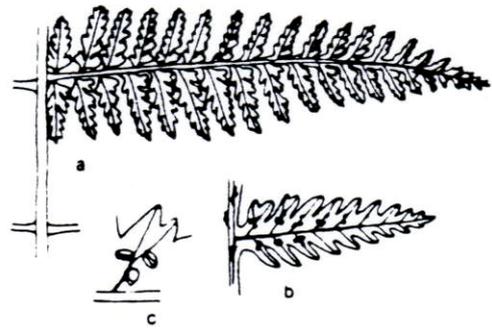
*Typhonium eliosurum*

From *Flora of New South Wales*  
G J Harden

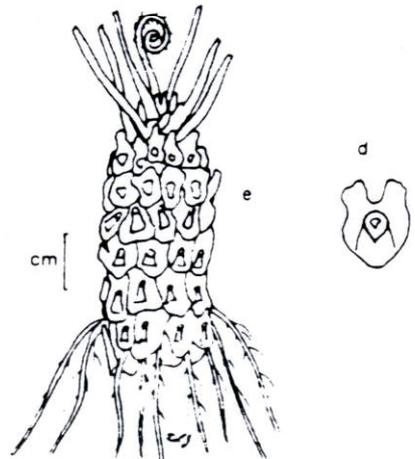




**BLECHNUM GREGSONII** x $\frac{1}{2}$   
 a) Tip of sterile pinna x1  
 b) Base of sterile pinna x1  
 c) Base of fertile pinna x1



**LEPTOPTERIS FRASERI**  
 a) Section of frond x1  
 b) Pinnule x3  
 c) Sori x5  
 d) Base of stipe x1  
 e) Rhizome x $\frac{1}{2}$



**Sphaerocionium lyallii** x1, sorus x3

From *Australian Ferns and Fern Allies*