A.N.P.S.A. Fern Study Group

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SPORE BANK: Barry White,

Program for South-east Queensland Region

Peter Bostock

Sunday, 3rd February, 2013: Meet at 9:30am at Peter Bostock's home at
. Slide viewing.

Sunday, 3rd March, 2013: Meet at **8:30am** (note early time) at Binna Burra for excursion to Dave's Creek track, Lamington National Park.

Sunday 7th April, 2013: Meet 9:30am at Shirley and Nev Deeth's place
Backup: Maiala section of D'Aguilar National Park at Mt Glorious (lower carpark). *Please advise Peter or Dan if you are coming (preferably by email) so we can transfer the meeting at short notice if necessary.*

Program for the Sydney Region

Dot Camp

December 2012 and January 2013 – No Meetings, - MERRY CHRISTMAS.

Saturday 9th February, 2013. Meet from about 11am at the home of Peter & Margaret Hind,
Study of Australian *Pteris* species. Enquiries to Peter 96258705

PLEASE NOTE: THIS DATE HAS BEEN CHANGED SINCE THE LAST NEWSLETTER TO ALLOW MEMBERS TO ATTEND THE FEBRUARY REGIONAL MEETING AT MENAI

Saturday 16th March, 2013. Meet from 11am at the home of Ron & Paula Wilkins,

Saturday 20th & Sunday 21st April, 2013. Meet at the home of Kylie & Dwayne Stocks at Verdigris Nursery.

Enquiries Kylie & Dwayne 02 44781311

PLEASE NOTE: THE MONTH FOR THIS MEETING HAS BEEN CHANGED SINCE THE LAST NEWSLETTER

Saturday 18th May, 2013. Meet at the home of Natalie & John

Sydney Area Meeting Reports

Strickland Falls Walk *Dot Camp*

On Saturday the 15th September, 2012, the group met at Dot Camp's home in Narara. After lots of chat, lunch & chocolate cake we took the short trip up to Strickland Reserve. We did find additional ferns to add to the list of 31 ferns we found in 2008 & these were- *Adiantum hispidulum* var. *hypoglaucum*, *Christella dentata, Cyathea cooperi, Hymenophyllum cupressiforme, Lycopodium laterale, Pellaea nana, Selaginella uliginosa, Tmesipteris truncata*. Peter feels that the *C. cooperi* is a 'blow in' as it is not a local fern. Many of the ferns were very stressed with the extremely dry weather.

Get well Peter *Dot Camp*

We wish Peter Hind a speedy recovery after recent hip surgery.

South East Queensland Meeting Reports

Excursion to Manorina Picnic Area *Claire Shackel*

For our November meeting, the fern study group meet at the Manorina Picnic Area in the D'Aguilar National Park. After a stand up morning tea, the group started the slow climb up the Morelia track. This leads to a lookout on top of the range but our objective was to find *Doodia maxima* (?*Blechnum cartilagineum* × *Doodia aspera*) about 3km up the track.

It was a very gentle climb on a good track and passed through open eucalypt forest on the ridges and moist rainforest in the gullies. *Doodia aspera*, *Adiantum hispidulum* var. *hispidulum* and a robust form of *Pellaea paradoxa* were common in the open drier area and *Blechnum cartilagineum* in moister places. As we climbed higher, *Microsorum scandens* and *Arthropteris tenella* were seen climbing the trees. There was a good number of *Lastreopsis* starting with *L. decomposita* at the beginning of the track, changing to *L. microsora* as we ascended. *L. marginans* was also present at higher altitude.

After walking for about two hours (fernies pace) a big patch of a very robust *Doodia* was seen. It appeared to have some of the features of *Doodia aspera* and some that were more like *Blechnum cartilagineum.* After walking a little further and establishing it was more wide spread than originally thought, we turned around and headed down hill. As there were no facilities at Manorina, not even a table, the party retreated to Jolly's Lookout for lunch.

Ferns seen: *Adiantum atroviride, Adiantum formosum, Adiantum hispidulum* var. *hispidulum, Adiantum hispidulum* var. *hypoglaucum, Adiantum hispidulum* var. *whitei, Arachniodes aristata, Asplenium australasicum, Blechnum cartilagineum* (Figs. 5 & 6)*, Christella dentata, Cyathea cooperi, Cyathea leichhardtiana, Davallia pyxidata, Doodia aspera* (Figs. 3 & 4)*, Doodia caudata, Doodia maxima* (Figs. 1 & 2)*, Drynaria rigidula, Hypolepis muelleri, Lastreopsis decomposita, Lastreopsis marginans, Lastreopsis microsora* subsp. *microsora, Microsorum scandens, Nephrolepis cordifolia, Pellaea paradoxa, Platycerium bifurcatum, Pteris tremula, Pyrrosia confluens* var. *confluens, Pyrrosia rupestris.*

Figure 1 Rod Pattison with plants of *Doodia maxima*, trackside in Manorina, nr Mt Nebo.

Figure 2 Pattern of sori in *Doodia maxima*, generally in a single row near the midrib.

Figure 1 Pattern of sori on *Doodia aspera*, also from Manorina track.

Figure 4 Frond of *Doodia aspera* from Manorina track side.

Figure 5 *Blechnum cartilagineum* from the Manorina area.

Figure 6 Small fronded *Blechnum cartilagineum,* from Mt Mee north of Brisbane.

Spore List - November 2012

Barry White

Acrostichum speciosum 4/09
Adiantum formosum 1/12
Adiantum hispidulum 6/12
Amphineuron opulentum 7/11
Angiopteris evecta 11/09
Anogramma leptophylla 10/12
Arachniodes aristata 4/12
Asplenium aethiopicum 4/12
Asplenium milnei 10/10
Asplenium nidus 5/08
Asplenium nidus cv.5/08
Asplenium pellucidum 3/11
Blechnum ambiguum 1/08
Blechnum chambersii 4/12
Blechnum fluviatile 9/11
Blechnum minus 3/12
Blechnum patersonii 4/11
Blechnum wattsii 9/11
Chingia australis 8/11
Christella dentata 3/12
Christella hispidula /09
Christella parasitica 5/11
Christella subpubescens12/08
Cyathea australis 1/12
Cyathea baileyana 3/11
Cyathea cooperi 1/09
Cyathea cooperi (*Blue Stipe*) *1/11*
Cyathea cooperi 'Brentwood' 3/08
Cyathea cooperi 'Cinnamon' 4/11
Cyathea exilis 7/11
Cyathea leichhardtiana 8/12
Cyathea macarthuri 10/10
Cyathea robusta 9/10
Dicksonia antarctica 8/12
Diplazium australe 1/12
Diplazium assimile 7/12
Diplazium dilatatum 12/10
Diplazium dilatatum × Deparia petersenii subsp. congrua 3/11
Doodia australis 2/12
Dryopteris sparsa 5/11
Histiopteris incisa 12/11
Hypolepis glandulifera 1/12
Hypolepis muelleri 3/12
Lastreopsis acuminata 4/11
Lastreopsis decomposita 1/12
Lastreopsis marginans 3/12
Lastreopsis microsora 6/10
Lastreopsis nephrodioides 4/12
Lastreopsis rufescens 3/11
Lastreopsis tenera 3/11
Macrothelypteris torresiana 6/10
Microsorum punctatum 1/09
Oenotrichia pinnata 7/11
Ophioglossum pendulum 7/08
Pellaea falcata 1/11
Pityrogramma calomelanos 8/11
Platycerium bifurcatum 4/11
Platycerium bifurcatum 'Venosum' Mt Lewis 10/07
Platycerium superbum 4/08
Plesioneuron tuberculatus 1/11
Pneumatopteris sogerensis 7/11
Pneumatopteris costata 6/11
Polystichum australiense 10/12
Polystichum formosum 8/12
Polystichum proliferum 12/10
Polystichum whiteleggei 10/10
Pronephrium asperum 1/11
Pteris tremula 11/10
Pteris umbrosa 8/12
Dryopteris wattsii (formerly *Revwattsia fragilis*) *3/11*
Rumohra adiantiformis (native) *4/12*
Sphaerostephanos heterocarpus 7/11
Teratophyllum brightiae 8/11

Thank you to the following spore donors: Nada Sankowsky, Sheila Tiffin, Kylie Stocks, Neville Crawford, Wendy Johnston, Claire Shackel, Dot Camp, and Crosby Chase.

Stem dichotomy in *Cyathea australis*, an arborescent Australian tree fern

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Laurence Knight, University of Tasmania.

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Cyathea australis is a distinctive robust tree fern widely distributed in eastern Australia from central Queensland south to southern Tasmania and west to the South Australian-Victorian border (Fig. 1). The species is cold tolerant, living as long as 3 to 4 centuries (Mueck et al. 1996) and growing to 12–15 metres in height and 40 centimetres in diameter (Duncan & Isaac 1986, Bostock 1998). In Queensland, the species is predominantly found at altitudes above 500 metres ('Herbrecs', Queensland Herbarium specimen database, 2011).

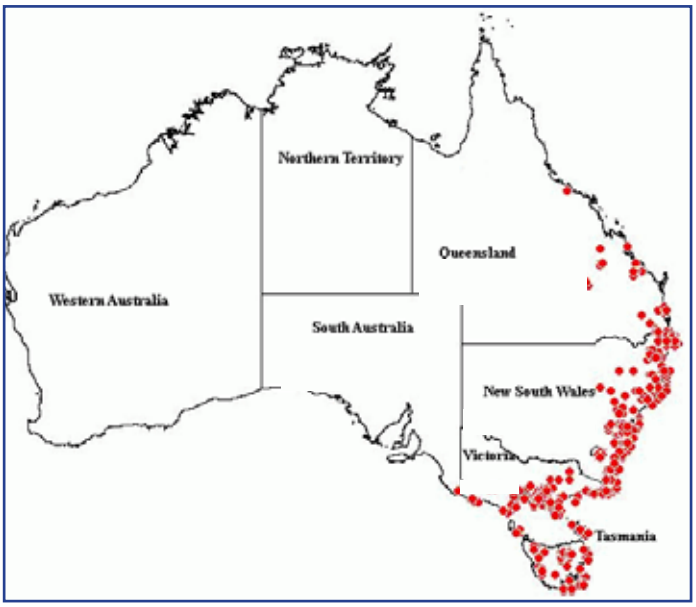

Fig. 1. Distribution of Cyathea australis (excluding Norfolk Island). ©Australia's Virtual Herbarium.

Generally this species forms single, erect, straight trunks topped with gradually abrading skirts of dead fronds. As described by Holttum (1963), the "vascular system ... [is] a hollow cylinder [filled with pith] with gaps corresponding with leaf bases, in some cases small medullary bundles also present; a cylinder of very hard sclerenchyma, with gaps at leaf-bases, present both inside and outside the vascular cylinder...". This rigid core is surrounded by a densely packed layer of adventitious roots and persistent stipe bases up to 10 cm or more thick (Figs. 2, 3 and 5). Individuals in areas where fire is rarely experienced are often much larger in diameter than those whose protective layer has been thinned or removed by one or more fire events. Plants that succumb to bush fires or other causes can remain standing for more than 10 years (based on direct observation of a dead plant in PB's garden in Brisbane).

Fig. 2. Persistent roots and stipe bases surround the rigid vascular core.

Fig. 3. LK investigating a multi-stemmed *C. australis*

Fig. 4. Paired vascular cylinders surrounded by burned root mass on section cut from dead treefern

Stem dichotomy in *Cyathea australis*, an arborescent Australian tree fern

A population of multi-stemmed *C. australis* was observed by LK while bushwalking on the Great Dividing Range in southeast Queensland during the year 2000. Realising this was unusual, he discussed the phenomenon with PB and placed a photo in State of the Environment Queensland 2003 (DERM undated). Since then, the authors have visited the site near Mt Cordeaux in the Main Range National Park on a number of occasions, making detailed observations in 2006 and 2008.

While we are aware of the existence of small numbers of multi-stemmed *C. australis* at a few other locations in southeast Queensland, our investigation is limited to the Mt Cordeaux population of approximately 90 branched individuals. These plants are distributed within an area measuring about 350 by 110 metres on a gradually descending, westerly trending ridge at an altitude of 1100 metres. They are situated in a tall open eucalypt forest, subject to moderately frequent bush fires (Fig. 9), adjacent to a microphyll (closed canopy) fern forest.

The ferns in question exhibit dichotomous branching of their stems. In all other respects, the plants in this population do not appear to differ significantly from their unbranched neighbours (based on observations by PB of living and dried specimens).

We examined 46 plants in 2006, counting the number of stems, and measuring their height, the heights at which they branched, and their "circumference" at chest height. We also collected a sample from a dead individual to examine the branching process (Figs. 4 and 6). We subsequently systematically photographed 90 plants (78 living and 12 dead) in 2008, counting the number of stems, estimating their height and noting their location with a GPS.

There was a large degree of variation in the variables we measured. The number of stems ranged from 2 to more than 12, overall height ranged from 50 centimetres to 10 metres, circumference ranged from 57 centimetres to 221 centimetres (considerably more than the norm), and the first branching point ranged in height from 10 centimetres to 3 metres above ground level.

Overall, 36% of the ferns had 2 stems, 27% had 3 stems, 27% had 4 to 6 stems, 6% had 7 to 9 stems, and 6% had 10 or more stems. There was a positive relationship between the

Fig. 5. Crown and fronds of typical *Cyathea australis* in the Mt Cordeaux population

Fig. 6. Longitudinal section of trunk section in Fig. 4. Scale bar = 10 cm.

number of stems and circumference (r = 0.7), and a negative relationship between the number of stems and overall height (r = -0.3). While 50% of the ferns with 2 stems, 46% of ferns with 3 stems and 33% of ferns with 4

Fig. 7. Treefern no. 2008-29, with Dan Johnston (ANPSA Fern Study Group treasurer & editor) holding the tag. This fern was 4 m tall, with 7 living crowns.

stems were over 4 metres high, only 5% of the ferns with more than 4 stems were over 4 metres high. This may be a consequence of the process of division interrupting normal vertical growth or perhaps some other factor is at play which limits the maximum height these plants can achieve.

Although the developmental process has not been investigated, it seems reasonable to assume that the apical initial cell divides (abnormally) into two separate initial cells. Each cell subsequently resumes normal function, cutting off cells which produce the various tissues, forming paired vascular trunks which take the shape of a rounded Y (Figs. 4, 6 and 7). These pairs of trunks then tend to grow in unison (they are, after all, clones!), until such time as one trunk branches again. Some plants show multiple branches seemingly from a single point—we think these might have occurred when a number of dichotomous branching events took place over a very small time scale thus vertically compressing the branching pattern.

Now for some speculation. The wide range of plant heights indicates that the phenomenon is ongoing and not the result of a single event. We believe that the branching characteristic is a consequence of a degree of genetic variation from the norm, given that the phenomenon is localised—the vast majority of *C. australis* are single-stemmed regardless of environmental influence. The question that follows is whether an environmental stimulus is required to trigger stem division.

We suspect that fire may trigger the branching in this population. There were obvious signs of fire on most of the eucalypt trees in the vicinity and virtually all branched plants showed some signs of being burnt at some stage. One advantage of the branching might be to provide a much greater degree of insulation for some of the trunks and hence enhance the survival of such individuals. In plants with a large number of trunks, the body of the plant generally consisted of a tightly packed mass of trunks (Fig. 8) with a +/- inverted cone or perhaps a wine goblet-like shape. Trunks in the centre of the bunch would be well protected from fire, assuming outer trunks could withstand the blaze.

Alternatively, could there be an advantage also in the huge increase in frond number and area, and consequent increase in chlorophyll activity? This would have to be balanced against the increased water loss from the vastly greater number of fronds. Whether water is a limiting factor is uncertain. *Cyathea australis* probably sources most of its water and perhaps much of

Fig. 8. PDB and Queensland National Parks ranger Kirsten O'Meley at fern 2006-03, which was 5 m tall with 9 tightly packed trunks totalling 2.1 m diameter.

its nutrient from the adventitious roots that surround the vascular core; each additional trunk, although ultimately supported at the very base on a single trunk, would generate, and then be supplied by, its own local set of roots.

We would appreciate hearing from readers who have knowledge of other species of *Cyathea* (in the broad sense) which habitually or occasionally form dichotomously branching trunks. Our literature searches did not reveal many at all. A few papers by J.C. Schoute, dating from the early 20th century (written in German) reveal his discoveries and analyses of branching and arboreally budding *Cyathea* plants particularly from Java.

Schoute was more interested in the production and arrangement of leaves, but he dissected many branched trunks during his investigations. Some of his illustrated branching patterns seem to be non-dichotomous but others are very similar in appearance to the branched forms of *C. australis*. In one paper, he details a robust stem base held in "Museum No. 2", RBG Kew (Schoute 1906), which was labelled as *Alsophila australis* (the earlier name for *Cyathea australis*), and which contained a branched stem that may have been of the sort we have been studying. Unfortunately Schoute did not indicate the origin of that stem section, and we have not yet attempted to determine if it is still present at Kew. Schoute was also probably the first to speculate that dichotomous branching might be caused by injury (Schoute 1914).

Michael Garrett (1996) mentions that multiple crowns have been recorded for *Cyathea marcescens* and *Dicksonia antarctica* in Tasmania. He reports that the occurrence in Dicksonia seems to be mostly from multiple plants growing together, except in one peculiar population where "top growth" consists of hundreds of individual crowns. Such plants were sterile.

We did hear from a Victorian fern enthusiast who sent a photograph of a plant from "a valley of branched *Dicksonia antarctica* plants" near Mt Buller in Victoria. We have also located a few branched examples of *Cyathea australis* on the Springbrook Plateau to the west of the Gold Coast in southern Queensland, and a couple in Gibraltar Range National Park, east of Glen Innes in northern New South Wales.

Future developments: watch this space.

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Fig. 9. Heading home through the open eucalypt forest near Mt Cordeaux.