New insights into the growth cycle of *Cephalotus follicularis*

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Introduction

Much of the literature on *Cephalotus follicularis*, particularly that focused on cultivation, is short on detail of the plant's true growth cycle. This is probably a result of observations in the field being limited to a single visit or observations being made of cultivated plants. Having made numerous visits to many *C. follicularis* swamps over the past 10 years, I began to notice some interesting trends starting to appear. In fact the *C. follicularis* true growth cycle may be much longer than first thought, and the state of the plants in full growth with carnivorous pitchers, may be not the norm in most habitats.

The Current Accepted Understanding

A recurring annual growth cycle, where *C. follicularis* puts out flat non-carnivorous leaves in spring, as the weather improves and daylight hours increase, are followed by carnivorous pitchers that last for as long as 12 months. Flowering occurs in late summer, and then as winter approaches and daylight hours and temperatures decrease, growth slows to the point where the plants are dormant.

A New Hypothesis Based on Observations in the Field

Bushfires are a natural part of the Australian bush and most *C. follicularis* swamps go through a cycle of growth that sees a major bush fire every 10-15 years, in some cases longer. Some swamps are also subject to controlled burns at shorter intervals. After the fire, the low-lying vegetation and grasses are completely burnt back and this exposes large areas of peat that receive constant moisture from underground seeps/springs. At this time *C. follicularis* recovers quickly from the fire and puts out many flat non-carnivorous leaves followed by pitchers. It is usually a year or two after the fire that most observations of *C. follicularis* occur. The interesting thing is that over a 3-5-year period the swamp completely regrows and the *C. follicularis* are completely crowded out. One particular swamp at Walpole in the D'entrecatsreaux National Park has now been observed since 2003. The swamp had been burnt out during 2002, visits in October 2003 and March 2005 (Fig. 1 left) yielded some excellent *C. follicularis*, *Drosera binata*, *Drosera hamiltonii*, and *Utricularia paulineae*. A further visit in November 2007, and the swamp had completely overgrown to the point where it was nearly impossible to see one's feet and in some places the tea trees were over 2 meters tall (Fig. 1 right). Extensive searches yielded no *C. follicularis*, yet there is no doubt they were there.

This process also occurred at a swamp in Denbarker that had been burnt out in 2004. The author and Phill Mann made visits in December 2005 (Figs. 2-3), March (Fig. 3) and October 2006, November 2007, and October 2008, by which time the swamp had regenerated and was now completely overgrown. Where there were once carpets of *C. follicularis,* there were now only a few patches of green non-carnivorous leaves growing in full shade. This swamp was then subject to a controlled burn in 2011, and a few months later in the burnt open patches the *C. follicularis* shoots were numerous and rapidly taking hold.

Figure 1: Left: The author photographing *Cephalotus follicularis* at a swamp in the D'entrecatsreaux National Park. This swamp had been burnt a few seasons before and the vegetation had not fully recovered.
Right: The same swamp 5 years after the burn. Phill Mann can just be seen through the dense regrowth.

Figure 2: A swamp at Denbarker 12 months after a burn. The vegetation is still relatively open. *Cephalotus follicularis* forming large clumps in the exposed areas after the fire.

Figure 3: Left: In the lower parts of the swamp, high levels of light and pools of water being fed from below provide ideal conditions for this impressive clump of *Cephalotus follicularis*.
Right: Eighteen months after the burn at Denbarker the surrounding plants are regenerating and growing amongst the *Cephalotus follicularis*.

Figure 4: Left: *Cephalotus follicularis* growing at Coalmine Beach attain very attractive coloration due to the constant exposure to bright light and open growing conditions; Right: plants growing in almost pure sand at Northcliffe.

A very recent visit (March 2014) to a site on the Pemberton – Northcliffe Rd., with Phill Mann and Allen Lowrie, seemed to confirm similar behavior. This swamp was very overgrown and in need of a controlled burn, a fire track had been cleared right through the middle of the swamp, and along the edges of the track, plants of *C. follicularis* with many traps were beginning to form. Attempts to find more plants by pushing through the dense bush just a meter off the cleared track, yielded nothing.

The question is what happens to *C. follicularis*, after a few years of growing in open areas, and then eventually becoming completely crowded out? They must still be there, as the new growth and size of the plants after a fire are not from seed. So here is an hypothesis, based on extensive observation, as to what might happen:

- After a fire *C. follicularis* grows quickly from its fleshy rhizome.
- Non-carnivorous leaves are produced and followed by carnivorous traps that capture as much prey as possible to store food in the rhizome, which grows quickly and produces new growth points.
- Profuse flowering occurs late in summer and seedlings develop that attain a reasonable size within a few seasons.
- As the plants get crowded out they start to produce only non-carnivorous leaves to capture the small amounts of light that get through the canopy of surrounding plants, and live off the stores of nutrients in their rhizomes.
- The plants exist in this semi-dormant state for up to 10 years or more until the next fire.

Having visited approximately 20 *C. follicularis* sites, it is safe to say that this is the most typical growth habit for this species.

Some colonies are not subjected to this dense bush regrowth and grow in open areas at all times. Two sites that exhibit these growing conditions are Coalmine Beach (Fig. 4 left), and a very unusual site at Northcliffe (Fig. 4 right), where the plants grow in a substrate that is almost pure course silica sand. Plants growing in these conditions attain very attractive coloration due to year round exposure to strong sunlight. In the case of the plants at Northcliffe, the pitchers are stunted due to the very harsh conditions. Tests in cultivation show that these plants attain normal dimensions in good conditions and with less light don't color up.

This article may well raise more questions than it answers, but it is hoped that it will add to the store of knowledge on this enigmatic species.

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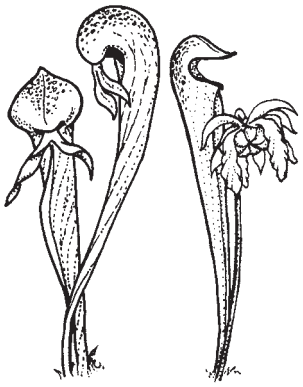

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Front Cover: *Cephalotus follicularis* growing near the Donnelly River, Western Australia. Photo by Richard Nunn. Article on page 96.

Back Cover: *Pinguicula primuliflora* 'Rose'. Photo by Barry Rice. Article on page 103.

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