

***Tayloria* - Deceptive Moss Downunder: a field trip report**

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Finding a specific moss on a mountain is a little like finding a needle in a haystack, but our recent trip to Tasmania in January 2011 was surprisingly successful! Our goal was to locate and study three species of moss in the Splachnaceae family for comparison with New Zealand native species. Splachnaceae mosses are unique because they occur only on animal matter, primarily animal dung but also carrion (Marino et al. 2009). Most mosses disperse passively by water, but Splachnaceae mosses must disperse between patchily distributed dung and carrion, and it seems they use insects as couriers (Bequaert 1921, Cameron 1982). In New Zealand, we've been studying the way the Splachnaceae use visual and olfactory signals to deceive flies into carrying their spores between patches of animal matter. The three species of Splachnaceae occurring in New Zealand are *Tayloria purpurascens*, *T. callophylla* and *T. octoblepharum* (Fig. 1), and we'd be very keen to hear if any Bot Soc members find new locations for these species. In New Zealand, Splachnaceae are reported only growing on dung and remains of introduced species such as possums and dogs, and their native hosts are unknown, but Tasmanian Splachnaceae still have many of their native hosts such as herbivorous wallabies, possums and wombats, and carnivores such as Tasmanian devils and quolls. One species, *T. octoblepharum*, occurs in both Tasmania and New Zealand, providing an opportunity to investigate how use of host dung and sensory deception of flies can differ. Tasmania's two endemic Splachnaceae, *T. tasmanica* and *T. gunnii*, were also on our hit-list.

Into the field

Before we could study the Tasmanian Splachnaceae, we first had to find them. This was no easy task because carrion and dung are so ephemeral that old records do not necessarily indicate present distributions. Nonetheless, armed with records from the Tasmanian Herbarium we began our search on Mt Wellington in Hobart. Though there was an impressive view and many interesting mosses and vascular plants at the summit, Splachnaceae were not to be found.



Fig 2. The impressive Organ Pipes, a geological feature halfway up Mt Wellington, Hobart, Tasmania. All photos taken on the field trip by the three authors.



Fig 3. Georgia Cummings, moss whisperer, in the field.

We encountered our first success at a site half way down Mt Wellington, the "Organ pipes", an impressive geologic formation (Fig. 2). One of our group, Georgia, quickly established a reputation of being an



Fig 1. From left to right, *Tayloria octoblepharum* growing on a deer vertebra, *T. purpureascens* on a deer skull, and *T. callophylla* on the ground at the Old University Hut site in Swanson.



Fig. 4. A beautiful, burgundy-coloured *Chiloglottis* orchid (*C. ?grammata*), Mt Wellington, Hobart.



Fig 5. Intrepid moss-hunters Anne Gaskett and Georgia Cummings are not distracted by the poetically named 'Cinnamon bells' (*Gastrodia sesamoides*) - in the foreground.

excellent Splachnaceae spotter, and found our first specimen, *T. octoblepharum* behind a barbeque area built into the side of the slope (Fig. 3). There was no evidence of carrion or dung, but perhaps sufficient material was washed down from further up the slope? Unfortunately, we needed mosses in their reproductive phase with sporophytes, something these specimens lacked! Methodically searching the immediate area and proceeding to the Organ Pipes did not yield any further results, although we enjoyed the stunning alpine *Eucalyptus* growing around rocky scree slopes, some charming orchids, including

burgundy-coloured *Chiloglottis* (probably *C. grammata*, Fig. 4), potato orchids (*Gastrodia sesamoides*, known in Australia by the more poetic name, 'Cinnamon bells', Fig. 5), and several greenhoods. We also had our first encounter with Jack jumper ants (*Myrmecia pilosula*), a native bull ant with a nasty sting and a characteristic pebbly nest (Fig. 6). Over the next two days we searched the parks and rivulets of Hobart and enjoyed a walk to a known *T. octoblepharum* site with Lyn Cave of the Tasmanian Herbarium.



Fig. 6. The fearsome Jack jumper ant (*Myrmecia pilosula*) (10-12mm long), thankfully displayed here at greater than life size.



Fig. 7. The Tessellated pavement, a rather unique rocky shore on The Tasman Peninsula, east of Hobart.

A daytrip to the Tasman Peninsula yielded some small specimens of Splachnaceae along roadsides and carparks (again, largely found by our chief moss spotter, Georgia) and some marvellous coastal views (Fig. 7).



Fig. 8. Wallaby dung with a well established specimen of *Tayloria octoblepharum*.



Fig. 9. Nathan with *Tayloria octoblepharum*.

Maydena was our next base - a small town 84 km west of Hobart and the gateway to Mt Field National Park and the spectacular Southwest National Park and World Heritage area. These regions proved very rich in Splachnaceae, wildlife (we saw wild platypus, pademelons, wallabies and kangaroos) and Devonshire teas. In Mt Field, the trip up and around Lake Dobson and Eagle Tarn was a highlight and we

found several Splachnaceae growing on the characteristically cube-shaped dung of wombats. Our main field sites were found around the edge of the artificial Lake Pedder. Damming the Gordon River to create Lake Pedder for hydroelectric power within a designated world heritage zone was a controversial move that kick-started the conservation movement in Tasmania in the 1970s and generated the world's first green political party (Kellow 1989). Our brief visit to a logging protest camp in the Florentine forests abutting the World Heritage Area showed us that management and conservation of natural resources is still highly contentious in Tasmania.



Fig 10. An old beer bottle seems to serve just fine as a cosy home for *Tayloria tasmanica*, easily identifiable by the conspicuous white capsules on the sporophytes.

The Wedge River picnic area presented us with a great many specimens of *Tayloria gunnii* and *T. octoblepharum* growing on wallaby dung (Fig. 8, 9). Ted's Beach had large amounts of *T. octoblepharum*, and the endemic *T. tasmanica*, including one clump growing healthily in an old broken beer bottle (Fig. 10)! We also found a diverse array of carnivorous plants, including two distinct types of sundew (probably *Drosera pygmaea* and *D. binata*; Fig. 11) and a bladderwort (*Utricularia* sp.).



Fig. 11. *Drosera ?binata* An almost iridescent red sundew at Ted's Beach on the shore of Lake Pedder.

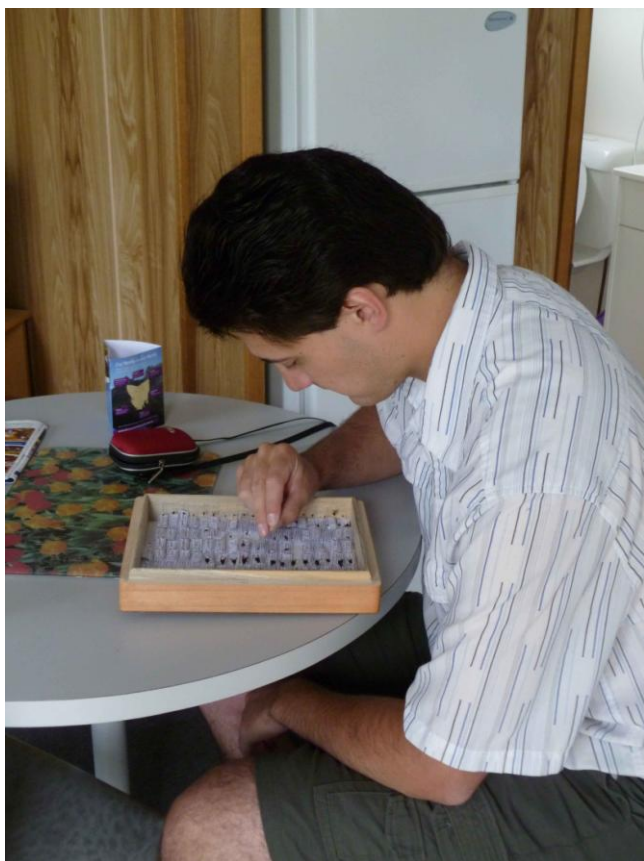


Fig. 12. Nathan Camp performing the enthralling task of categorising Diptera.

To determine whether Splachnaceae do attract insects to act as spore dispersers, we set up traps constructed from 1.5L plastic bottles over moss and dung specimens. Trapping continued for three days and every evening we pinned and tagged all fly specimens – Nathan and Georgia had the unenviable task of identifying all these specimens to the lowest possible taxonomic level before our departure (Fig. 12).

Scent analysis in the lab

After our success in the field, we returned to Hobart with samples of the three *Tayloria* moss species, dung from native herbivores (wallabies, wombats and brushtail possums) and carnivores (Tasmanian devils and quolls), and our collection of flies. We spent two

References

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days in the Central Science Laboratory at the University of Tasmania where we analysed the compounds comprising the scents of the mosses and dung using Gas Chromatography-Mass Spectrometry (GC-MS; Fig. 13). The preliminary results were promising: compounds usually associated only with dung and carrion were produced by all three *Tayloria* species! Due to limited time, we were only able to identify most fly specimens down to the level of Family and Subfamily, however it is apparent that the majority of the flies caught (Calliphoridae and Muscidae) are usually associated with animal waste and remains (Norris 1965, Eberhardt & Elliot 2008). This is another positive result as it indicates that the Splachnaceae are actively attracting flies that will be more likely to transfer their spores to appropriate sites.



Fig. 13. Anne Gaskett in the organic chemistry lab at the University of Tasmania.

Our trip began with only a few small patches of Splachnaceae, but the further we went into the wilderness areas, the more wildlife, dung and moss we found. Overall the trip was successful and very enjoyable, giving us a great overview of Tasmanian botany and wildlife – and a chance to experience some Australian delights including Caramello koalas and Cascade beer.