Esler, A.E. 2007: Living with hairy-legs groundsel (*Senecio esleri*). *Auckland Botanical Society Journal 62(1)*: 97-99.
Thompson, I.R. 2004: Taxonomic studies of Australian *Senecio* (Asteraceae): 1. The disciform species. *Muelleria 19*: 101–214.
Thompson, I.R. 2006: A taxonomic treatment of the tribe Senecioneae (Asteraceae) in Australia. *Muelleria 24*: 51–110.
Webb, C.J.; Sykes, W.R.; Garnock-Jones, P.J. 1988: *Flora of New Zealand*. Vol. IV. Christchurch, Botany Division, DSIR.
Webb C.J. 1989: *Senecio esleri* (Asteraceae), a new fireweed. *New Zealand Journal of Botany 27*: 565-567.

## *Chionochloa conspicua* subsp. *cunninghamii* (Gramineae) in the Waitakere Ranges

**Rhys Gardner**

Until 2001, when Chris McKain found this native snow-tussock (*Chionochloa conspicua* subsp. *cunninghamii*) on the slopes south of the Karamatura Stream, all of its records in northern New Zealand were from the Bay of Islands-Waipoua-Whangarei region. The plants Chris saw are right beside the track, and would surely have been noticed by others if they had been there long.

One might think that somewhere closer to the stream, on its steep, damp gorge walls and ledges, out of direct sunlight, there might be more *Chionochloa conspicua* subsp. *cunninghamii* colonies. Taking an indirect approach, in Feb 2006 I explored not the Karamatura but the Pararaha, to find a few plants in the damp scrub on the stream's true right bank, not far above the major waterfall (as shown on topo sheet 260 R11). A greater surprise came subsequently when I also found a few plants on the Piha Stream, at the top of the gorge, just below what is now known as "Black Rock Dam".

I also noted it a few years ago on the summit of the Bream Head range, and (in Jan 2007), at the top of the forested part of Mt Manaia (that is, just below the summit pinnacles themselves).

What is going on here? Have these plants newly sprung up from long-overlooked nearby sources, or has there been an especially successful wave of colonisation from the south ? It would be useful to know whether this grass might have increased in abundance along the tops of the Coromandel and Kaimai Ranges, by spreading through animal-damaged forest that in the last decade or so has seen its burden of pests (especially goats?) greatly reduced.

## The distribution and influence of the introduced alga *Colpomenia bullosa* within New Zealand

**Daniel McNaughtan**

The introduced intertidal brown alga *Colpomenia bullosa* was first observed in Leigh Marine Reserve, North of Auckland, over 20 years ago (Parsons 1982).

**Fig. 1. Scale picture, *Colpomenia bullosa* gametophyte, October 2006, Palmer Head, Wellington (Daniel McNaughtan).**

Since this initial discovery the species has undergone a range expansion and can now be found in several North Island port and adjacent areas including Gisborne, Napier, and Wellington (Nelson 1999). Recently, isolated plants have also been discovered in two locations near Nelson in the South Island. Despite this continued range extension very little is known about its localised distribution or the effects it may be having on endemic communities. This study addresses some of these issues by investigating its local intertidal distribution, physiological tolerance towards temperature and light, and how it interacts with other algal species of comparable morphology.

Like several other brown algal species, *C. bullosa* has a heteromorphic life history with two distinctly separate phases. The most recognisable is the upright gametophytic phase that can be identified by its brown finger-like projections 10-12 cm long and numbering 1-8 per holdfast (Adams 1994). The alternate phase is a crustose sporophytic thallus that can be easily identified with practise and can cover significant amounts of available substrate in intertidal pools. While the upright phase shows a pronounced seasonal distribution, present early spring to mid summer, the crustose phase is present throughout the year and is more likely to have long-term ecological impacts. While the exact origin of the species is unclear, recent molecular work has shown that the New Zealand species is identical to the species found in Japan (W. Nelson *pers. comm.*, 2006).

The first stage of this study was to quantify the distribution of this introduced alga within the intertidal zone and establish which endemic or naturalised

species it could potentially interact with. A survey design was used with 5 locations around the Wellington region with multiple sites and tidal heights nested within each location. No significant difference was found between the locations or sites though it appeared that the crustose phase was restricted to pools in the high intertidal and could cover large amounts of space in such pools. It was not found on emergent rock at any tidal level. The upright phase was found in the low- to sublittoral zone and was often within 10 cm of the low water mark. No uprights were ever found above the mid level of the intertidal zone or in areas of high wave energy. Although the observed distribution of the upright phase is similar to that displayed by the species in Japan and Northern California (Parsons 1982) no data was available to compare percentage cover or abundance from these locations.

**Fig. 2. *Colpomenia bullosa* gametophute *in situ* October 2006, Palmer Head, Wellington (Daniel McNaughtan).**

Additional surveys were then carried out at the high and low tidal levels to establish which native species this introduced alga most commonly interacts with and the nature of such interactions. For the crustose phase, a band transect 400 mm wide was surveyed at the high tidal level and the events occurring at the North, East, South, West compass points at the thallus edge was recorded. Statistical analysis showed that the crustose phase of *C. bullosa* significantly overgrew morphologically similar species in more situations than what would be expected. Species overgrown included thin crustose coralline algae and two brown crustose algae *Ralfsia* sp., and *Diplura* sp.. When compared against more upright species, crustose *C. bullosa* was overgrown significantly more times than expected but more work is required for this to be conclusive as there were only two species that provided enough data for the analysis (*Hormosira banksii* and *Corallina officinalis*). A similar survey for the upright phase was inconclusive in terms of overgrowth due to a lack of data and only revealed the most common neighbouring species of *Colpomenia sinuosa* and *Leathesia*.

To help predict where *C. bullosa* could become established, physiological tolerance towards temperature and light was assessed using PAM fluorometry. Samples were collected from the field and placed into a controlled light and temperature environment where stress levels were assessed daily. The experiment revealed a critical threshold temperature of 27$^{o}$C and an ability to tolerate a wide range of light conditions. Temperatures above 27$^{o}$C caused permanent damage to photosystems within 12 hours and samples had become photosynthetically inactive after 24 hours. Temperature data from around Wellington shows that 25$^{o}$C is not uncommon within high intertidal pools and this suggests that *C. bullosa* is living at the edge of its thermal tolerance during certain periods of the year.

In summary this study has found that *C. bullosa* in the Wellington Region has a restricted intertidal distribution with the sporophytic crustose phase only found in pools high in the intertidal while the gametophytic upright is usually found in sheltered areas at the sublittoral fringe. The crustose phase appears to compete well against morphologically similar species and can occupy captured space long-term but does not do as well against more upright algal species. The next step in this study is to test the distribution predictions outside the Wellington region as this may help identify potential areas at risk of introduction. More work is also required to establish the importance of the species at risk of begin displaced by this introduced alga and what role they play within the intertidal community.

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**References**

Adams, N. M. 1994: *Seaweeds of New Zealand: An illustrated Guide.* Canterbury University Press.

Nelson, W.A. 1999: A revised checklist of marine algae naturalised in New Zealand. *New Zealand Journal of Botany 37*: 355–359.

Parsons, M.J. 1982: *Colpomenia* (Endlicher) Derbès et Solier (Phaeophyta) in New Zealand. *New Zealand Journal of Botany 20*: 289–301.