

A Gardening Q and A Session at Punkalla

Report on last meeting by Jenny John, with Pete John and Paul Hattersley

While some members, living more distantly from Punkalla, were defeated by the weather and rang to convey their apologies for not making it to the planned meeting, Shane Doherty and Paul Hattersley braved torrential rain and muddy roads and the four of us enjoyed an agreeable and informative few hours.

It turned out that Shane and Paul are near neighbours at Dalmeny and they told us about the progress of work done on the headland between the Yabbarra and Duesbury beaches. Eurobodalla Shire Council's environment officers have over the last few years organised firing of two small surviving areas of *Themeda australis* grassland communities, which once characterised South Coast seacliffs and headlands.

The communities are recognised as threatened subclimax ecosystems and the aim is to restore the fire management practised before European settlement and thus prevent trees, shrubs and weeds destroying the ecosystems. The areas are discrete patches of land on the headland sandwiched between the coastal bike path and Dalmeny Drive. After regular fire the Kangaroo grass is now dominating and outgrowing the kikuyu and Shane and Paul have observed small orchids and native lilies making a comeback.

This led to a discussion on native grasses about which Paul is enthusiastic and knowledgeable and he used as an example, a plant of *Neurachne queenslandia* (which is restricted to the Great Divide, just east of Tambo, Central Qld), which he had brought in a pot.

He explained that grasses can be categorised as C3, C4 or intermediate depending on the precise pathway by which they photosynthesise. Designation as C3, or C4 refers to the number of carbon atoms in the immediate product of photosynthesis. C4 photosynthesis is a complicated anatomical, biochemical and physiological elaboration of C3 photosynthesis, in which a high local concentration of CO₂ is created near the vascular bundles of the leaf which enhances the efficiency of **rubisco**, the enzyme that fixes CO₂ to form 3-phosphoglyceric acid (3PGA) in all higher plants. 3PGA is the primary carbon product of light photosynthesis and is the precursor of the proteins, lipids and carbohydrates that all cells need to grow.



Neurachne queenslandia

Paul told us that the evolution of C3 to a more efficient C4 metabolism in the grass family, some 25million years ago, was in response to the decreasing levels of atmospheric CO₂, over geological time. CO₂ levels were then at their lowest in our planet's history.

Later, when the grass savannahs of the world were developing in some areas in response to increased aridity following the break up of Gondwanaland, C4 grasses really took off and dominated those ecosystems. C4 grasses outcompete C3 grasses in high light, and higher temperature situations and are also more water-use efficient .

Now, of course, CO₂ levels and global temperatures are rising due to fossil fuel use and this raises the question of how competition between C3 and C4 grasses will play out.

Themeda australis is a C4 grass and it and other C4 grasses dominate in the Dalmeny area. Meanwhile in the adjacent forest areas C3 grasses like *Oplismenus* and *Entolasia* species occur.

Paul's interest in the *Neurachne* species that he brought along, is that this genus, endemic to Australia, is very unusual among grass genera. Of the seven species of *Neurachne*, many lines of analysis have shown that four are C3, one is C4, one is a C3-C4 intermediate (the only intermediate so far known from the Australian flora) and one is now suspected of becoming intermediate. Paul thinks there must be a C3 *Neurachne* species somewhere on the Great Divide but so far none has been found.

Research at UWA on photosynthetic pathway variation in this genus is providing clues as to how C4 photosynthesis evolved. This is important in the context of current anthropogenic climate change and our food security. Most major cereal food crops such as wheat, barley, oats, rye and rice are C3. Maize and sorghum and other millets are C4. The now rising CO₂ and temperature will affect the growth of food crops world-wide and there is also currently research into the prospect of modifying rice from C3 to C4 to increase its water use efficiency. (It's a shame that such an interesting and absorbing topic didn't reach a wider audience.)

Paul asked Shane as a landscape designer for suggestions for additional planting at the Lions Park near Kianga Bridge; plants that would provide shade and decoration to the area surrounding the barbecues. Narooma and District Lions Club already intend to plant *Eucalyptus botryoides*, *Melaleuca sp*, and *Banksia integrifolia* for shade with *Myoporum boninense* and *Lomandra longifolia* for the lower plantings. Shane suggested using the dwarf and prostrate forms of *Banksia integrifolia*, one of which we could see from the window, but it was not a day for strolling round the garden.

Paul also brought to show us *Grevillea* 'Bulli Princess', a medium sized shrub to 3m or so, the parents of which are *Grevillea venusta* and *G. johnsonii*. This and a number of other *Grevillea* hybrids were selected by Ray Brown of the Illawarra *Grevillea* Park, and after extensive trialling, were released for general sale, the funds being used to assist in funding the operations of *Grevillea* Park. Another unidentified fragrant, pink flowered sprig we thought might be a *Hakea* because of its similarity to *H. decurrens* and *H. verrucosus* that are currently flowering in the garden at 1044.



Grevillea "Bulli Princess"



However subsequent research indicates it is more likely *Grevillea zygoloba* or a hybrid between *G. zygoloba* and *G. crithmifolia*, known as *Grevillea* 'Pink Ice'. This is an attractive small shrub to about 1.5m with a spreading habit. *G. zygoloba* is found in the low rainfall area west of Kalgoorlie W.A., and *G. crithmifolia* grows in coastal scrubland around Perth. Plants of *G. "Pink Ice"* are usually available as grafted plants in the eastern states.

None of us were able to identify the previous occupant(s) of a mud nest attached to a branch of *Hakea decurrens*.

Grevillea "Pink Ice"

Pete and Paul delve into the mystery of the mud nest



We opened it up but whatever had been inside had obviously departed through the small holes on the surface.

Shane left before lunch as the rain increased in volume. Paul, Pete and I continued our discussion over lunch. **It was still raining!**

