

## *Durvillaea willana*: an algal icon of southern shores

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Plants typify different parts of the globe: eucalypts are Australian, we associate redwoods with California, sonora cacti with semi-desert states of the USA, proteas and ericas with South Africa, and kauris with New Zealand and New Caledonia.

Here, in the Southern Ocean and South Pacific, many plants have very localised distributions: they are endemic. This is partly because of the way the ancient southern continent of Gondwana spread apart carrying life forms to evolve in relative isolation. On a smaller scale, and in more recent geologic times, endemic species have evolved on even smaller shelf islands such as Three Kings Islands in the far north or Auckland and Campbell Islands in the south.

Many marine plants also have localised distributions, although this not as readily appreciated by humans who generally view things from a terrestrial perspective. But in the USA, the conspicuous giant kelp *Macrocystis pyrifera*, is often regarded as typically Californian because of the huge kelp forests that lie off southern California shores. Exposed shorelines of Oregon, Washington and British Columbia are characterised by a strange brown kelp called the "sea palm" (*Postelsia palmaeformis*) while in the fiords of this region there are huge beds of a strange brown kelp called *Nereocystis*. Symptomatic of southern shores of Cape Province, South Africa, are kelp beds formed by a massive brown kelp, *Ecklonia maxima*, while the inlets and fiords of northern Europe and Scandinavia are dominated by a brown seaweed called *Ascophyllum*.

When Morton and Miller wrote their popular book *The New Zealand Sea Shore* in 1968, they described the southern hard shorelines of New Zealand as "*Durvillaea* coasts". Much as we describe forests as rata-kamahi forest, rimu forest or silver beech by their dominant species, our southern shores are easily identified by the thick beds of *Durvillaea* kelp, especially *D. willana*. These massive plants, thrashing about in the breaking waves on exposed coasts, and forming a continuous kelp zone in many places, are a both a photographers delight and the bane of many a fisherman fishing from the rocks.

The genus *Durvillaea* is typically Australasian since four of the five species<sup>1</sup> in the genus are confined to our part of the world. The fifth species, *Durvillaea antarctica* — the only species with buoyant, honeycombed blades — has a wider circum-subantarctic distribution being found in New Zealand, Chile, Tierra del Fuego, the Falkland Islands, South Georgia, Kerguelen Islands and most other so-called subantarctic islands dotted around the Southern Ocean. In a few places, eg Gough Island on the mid South Atlantic Ridge it grows together with the typically North Atlantic kelp, *Laminaria* which

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<sup>1</sup> The four solid-bladed species have relatively localised distributions being endemic to: Tasmania and southeast Australia (*D. potatorum*), central and southern New Zealand (*D. willana*), the Chatham Islands (*D. chathamensis*) and the Antipodes islands, where there is an undescribed species.

it resembles superficially.

Exposed rocky shores of Otago and Southland are best characterised by *D. willana*. Perhaps 90% of all plants, and most of the biomass comprising this endemic species occurs on these coasts where it forms thick, dense, fringing forest on exposed rocky shores from the low water mark down to depths of about 5 m. At Tautuku, in the Catlins area, the biomass of this kelp was measured at just under 100 kg per square metre of lower shore.

*Durvillaea willana* is one of the world's massive kelps. Unusually large plants may weigh 45 kg. Found only in central and southern New Zealand it is named after the famous French explorer, Dumont d'Urville, and Mrs Eileen Willa, a resident of Stewart Island and keen amateur marine botanist who died in 1998.

Together with its close cousin, *Durvillaea antarctica* — which grows right next to it, but higher on the shore in southern NZ — the undiscerning British settlers lumped the two *Durvillaea* plants as “bull kelp”. More observant Maori probably noticed that while the honeycombed, spongy blades of *rimurapa* (*D. antarctica*) could be used to manufacture bags for holding and preserving tītī (mutton birds), and possibly for carrying water, the solid leathery blades of *D. willana* were quite useless for such purposes.

(Interestingly *D. antarctica* is an important sea-vegetable in Chile where the whip-like thongs of the plant are bound into hanks, dried and sold in fish markets. Called *cochayuyo* or *hUILte*, the pieces of dried blade are soaked, cut into pieces, and boiled for at least two hours to form a meat substitute in stews and casseroles, or it is served cold in salads. There appears to be no record of Maori eating *rimurapa*, perhaps because of the long boiling time needed to tenderise the plant).

Even on neap tides it is usually possible during calm seas to walk out amongst the spongy blades of *D. antarctica* to gather paua or collect mussels. Venturing out further into the zone of *D. willana* is, however, much more precarious. For this species comes no higher on the shore than the extreme low water mark, and it is the front line of defence against the onslaught of the huge waves that typically pound these coasts.

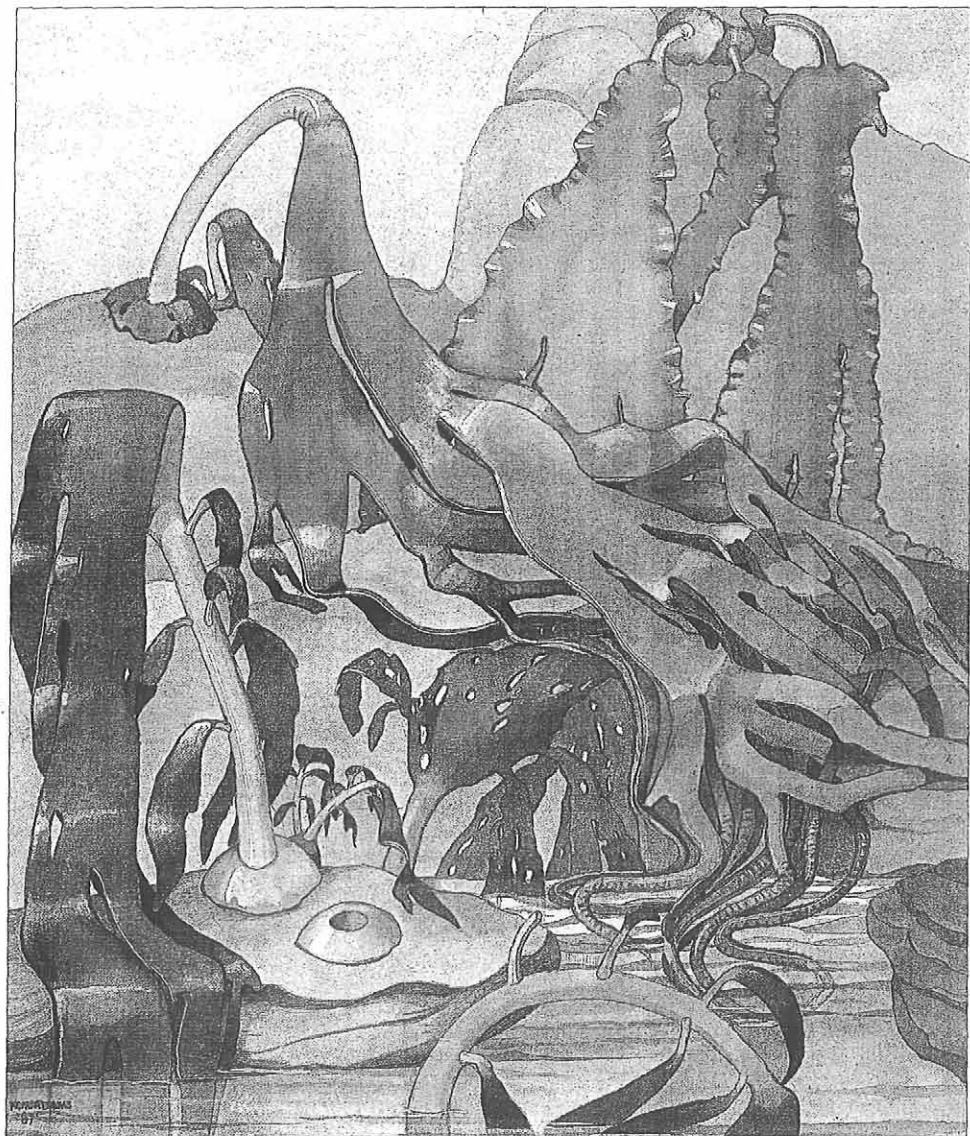
### **How do you tell the *Durvillaea* species apart on Otago and Southland shores?**

#### ***Durvillaea antarctica*:**

*D. antarctica* has smooth stalks (stipes) commonly as thick as a man's arm or thicker in southern New Zealand (northern plants are much more slender), and usually shorter than 0.5 m. Initially each baby *Durvillaea* plant has a simple leafy blade supported by a single stipe arising from a small sucker-like holdfast which adheres strongly to the rock. With time, several plants often merge to produce a dome-like holdfast with an irregular outline and supporting ten or more stipes. So what looks like a single *D. antarctica* plant is often a cluster of plants.

Fig. *Durvillaea* species: *D. willana* (left); *D. sp.* "Antipodes Is." with perforated frond (centre); *D. antarctica* (upper left); *D. chathamensis* (upper right); these do not all occur together in one locality, but their relative positions on the shore are suggested.

Nancy M Adams, *Seaweeds of New Zealand*, 1994.



The flexible stipes supporting dozens of whip-like inflated thongs, thrash about in the surf. However, on very gently sloping shores (eg at Oaro on the southern Kaikoura coast) and in semi sheltered places (eg Paterson Inlet), the blade is almost undivided, and the stipe and holdfast much reduced in size. These broad-bladed plants, that can be sliced open to elongated bags, are best suited for packaging and preserving mutton birds. Fully grown plants have blades commonly 4-5 m long and up to 8 m+ on occasions

#### *D. willana*:

Stipes of *D. willana* are very much longer and thicker. Semi-rigid, they stand upright or in a drooped position at low tide. Some of the largest specimens have stipes up to 2 m long and 100 mm thick at their base. Unlike *D. antarctica* the stalks have leaf-like blades attached along their length and also along the lower margins of the main blade. Often the main blade has snapped off leaving a truncated plant. Although *D. willana* individuals also merge to form composite holdfasts with multiple stipes, this happens less frequently than is the case with *D. antarctica*. Many of the largest *D. willana* specimens are solitary; ie with a single stipe and holdfast. The blades of *D. willana* also commonly exceed 5 m.

Colour: While the colour of both *D. antarctica* and *D. willana* changes seasonally and with their level on the shore (palest plants are often highest on the shore) at most locations *D. willana* typically forms a dark chocolate brown zone (almost black in some lights) below a paler tan or yellowish brown intertidal zone of *D. antarctica*.

As mentioned, both kelp species are attached to the rock by massive sucker like holdfasts (rather like a sink plunger). However whereas the holdfasts of *D. antarctica* are often bored and excavated internally by a myriad of small crustaceans (the boring starts with a small fluffy isopod called *Phycolimnoria*), and molluscs, the holdfasts of *D. willana* are typically solid and woody throughout. By being impervious to boring and tunnelling animals the holdfasts of *D. willana* adhere so strongly to the rocks that during storms it is often the bed rock that shatters before the holdfast gives way. Which explains why on beaches quite large rocks are often cast near the high tide mark? They arrived originally with a drifting kelp plant (commonly *D. willana*) which has since rotted away.

#### The discovery of *D. willana*

It was only in relatively recently that scientists noticed that *D. willana* was a different species from *D. antarctica*. In 1923 specimens of *D. willana* that washed up on New Brighton Beach near Christchurch were described in *Proceedings of the NZ Royal Society* as a peculiar form of *D. antarctica*. A factor perhaps contributing to this late discovery was that for many years New Zealand seaweeds were studied by Prof VJ Chapman of the Botany Department, University of Auckland and by one of his keenest seaweed-collecting students, Victor Lindauer (son of the famous portrait painter of Maori). In the north of New Zealand, eg at places like Piha and Bethells, the only species of *Durvillaea*, is *D. antarctica*. Knowledge of a distinctive southern *Durvillaea*

species was slow to reach the north, and because of the huge size of the plants, nobody was able to press an entire mature plant onto a herbarium sheet.

In the south, however, Mrs Eileen Willa, life-time resident of Stewart Island, was busily collecting and pressing seaweeds onto herbarium cards which were kept at Rakiura Museum in Oban. Her favourite collecting place was Ringaringa beach where large quantities of drift seaweed washed ashore after easterly storms. Over the years Mrs Willa communicated with several of the world's most famous marine botanists including Prof F Papenfuss at the University of California and many of her specimens are now scattered throughout plant herbarium collections world-wide. Mrs Willa always knew that there were two types of *Durvillaea* in the south. There is a very accessible bed of *D. willana* at one end of Ringaringa beach where she collected so many specimens after easterly storms. In letters and with drawings and specimens she communicated this information to Victor Lindauer at the University of Auckland who described the new species in 1949, naming it after Mrs Willa.

This discovery of such a large undescribed kelp seaweed in 1949 may seem inconsequential. For many folk, seaweeds are pretty much all the same — an infernal nuisance when they get around the propeller! But for marine botanists, the late discovery of such a distinctive and ecologically dominant kelp, widely distributed on mainland southern New Zealand, was as if terrestrial botanists had suddenly stumbled on an undescribed dominant tree like rimu of kahikatea.

Currently there are 17 marine reserves on the mainland New Zealand coast. Several are in estuaries and just seven are south of Cook Strait. Collectively they amount to far less than 1% of the length of the mainland coast and none in South Island includes any significant area of exposed *Durvillaea* coasts.

Fig. BSO & *Durvillaea*, Shag Point - Allison Knight. See also Chris Hepburn's pictures of named seaweeds on our website: <http://www.botany.otago.ac.nz/bso-ed>.



It is therefore important that we protect a very good example of the type of shoreline on which endemic *D. willana* is the ecologically dominant species. On land we have land reserves for red tussock, for rimu and even ranunculus. Several sites along the Otago and Southland coasts and on Stewart Island would be ideal candidates for protecting this endemic and dominant kelp and the flora and fauna that lives within the forests of Mrs Willa's *Durvillaea* kelp.

## Botanical Art Feature

### *Geranium* 'Von'

Janet Atkinson, 2004 Art competition.

In 1993 Tony Druce found a little white root in with a specimen he was potting up from a botanising trip in Otago. He potted the root separately and up came this little geranium, which he nicknamed *Geranium* 'Von', as it was from a kettle hole or from boggy habitat surrounding a tarn in the Von valley. Plants grown from that specimen have flourished and spread in the gardens of several botanists since then, but no one has yet, despite intense searching (especially this summer), found a wild specimen of this particular new native geranium.



"Geranium Von"  
(nickname - not yet described  
by taxonomists) Feb 2004.

Sketch of *Geranium* "Von" by Janet Atkinson. Her colour painting of the same specimen can be seen on the BSO website, along with the other entries in the inaugural Audrey Eagle Botanical Drawing competition. See: <http://www.botany.otago.ac.nz/bsa>