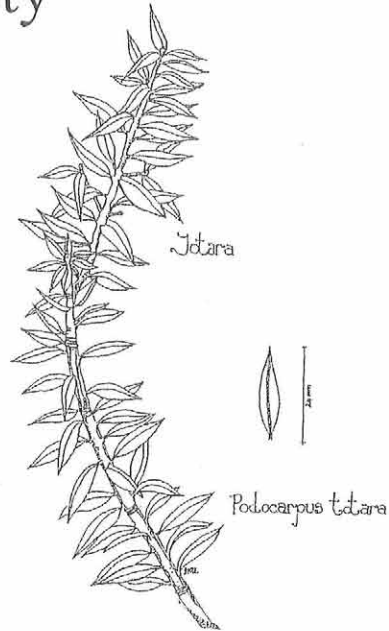


Botanical Society
of Otago
Newsletter.
Number 23,
October 2000.



Botanical Society of Otago Meetings

Thursday October 12th **Talk and supper** Zoology Seminar Room,
7.00pm. With Professor Alan Mark: *The History of New
Zealand's Tussock Grasslands: Evolution and Management.*

29th December – 7th January: **Summer Field Trip** with the Wellington
Botanical Society to Borland Lodge. See details inside.

7th – 9th January: **Lichen Field Trip** CANCELLED

Field trips and workshops are always the **third Sunday** of the month and Talks and
slide shows the Wednesday or Thursday before the field trip.

All activities are advertised in the Wednesday Star preceding the activity.

Cancellations will be broadcast on Radio 4ZB and 4XO cancellation service!

Otherwise assume they are **ON!!**

Notes from Branch Office

Barbara and Bastow are off on a last-minute sampling trip to the far north, before Barbara heads off to South America and Europe for an exciting year of comparative ecology. We wish her well, and look forward to some interesting articles from overseas.

Many thanks, Barbara, for doing so much to kick-start the BSO into action again. This has been a wonderful year full of a wealth of articles, talks, workshops and field trips covering a wide range of botanical topics. It will be a hard act to follow, but we do still have the summer field trip at Borland Lodge with the Wellington Botanical Society to look forward to.

Allison Knight will be editing the newsletter in Barbara's absence. Please send articles for the newsletter to her c/o

OTA Herbarium,
Botany Dept,
Otago University,
Box 56,
Dunedin

Email: curator@botany.otago.ac.nz

Barbara, Bastow & Allison

Cover picture: *Podocarpus totara*

Drawn by Inge Andrew. *Podocarpus totara* or *P. cunninghamii*, (lowland or true totara) is the subject of a popular article by Tetsuya Matsui.

How useful is bark thickness in distinguishing *Podocarpus totara* (lowland or true totara) from *P. hallii* (mountain or Hall's totara)?

By Tetsuya Matsui

In Otago and Southland, there are two canopy tree species of *Podocarpus* (*P. totara* and *P. hallii*). *P. totara* occurs from sea level to c. 600 m, as does *P. hallii*, but *P. hallii* is more common at altitudes above 480 m (Salmon 1980). In the Southland region, the two *Podocarpus* species are often found together at low altitudes (e.g., Norton 1996, Johnson 1988). Various morphological features may be examined to distinguish the two *Podocarpus* species (see the identification hints below).

In the field, bark is probably the easiest feature to examine. It should be easy to distinguish the two species given the typical bark features as shown in the plates. However, when there are trees with intermediate (or hybrid) bark features, identifying the two species from the bark surface features is difficult. Seed length is another feature easily examined in the field, but it is only possible with mature female trees.

As part of my MSc thesis in the Botany Dept at Otago University (Matsui 2000) I made an attempt to identify the two species by examining bark thickness. I studied totara forests on the southern coast of Otago and Southland: Otatara and Sandy Point in Invercargill, Waikawa Harbour and Cannibal Bay in the Catlins coast. These forest remnants have been reported to contain either: (1) only *P. totara*, (2) only *P. hallii*, and (3) a mixture of *P. totara* and *P. hallii* (and possible hybrid).

In these forests, bark thickness and dbh (diameter at breast height) of totara trees were examined to see trends of the two variables (Matsui 2000). It was assumed that given the same dbh, the bark thickness of *P. totara* would generally be thicker than *P. hallii*.

A linear relationship was found between bark thickness and dbh, i.e., the larger a tree the thicker the bark up to c. 20 mm in bark thickness. The slopes of these linear relations were different between sites. Sites which have previously been considered to be dominated by *P. totara* showed steeper regression slopes, that is thicker bark for similar dbh than sites which have been considered *P. hallii* forests. At the sites where a high proportion of individuals with intermediate bark features have been reported, the slopes of linear regression were between the highest and the lowest slopes. Therefore, even after measuring bark thickness, the identification of the two species was not readily possible (i.e., it was hard to split into two groups using the bark thickness-dbh relation) when the bark surface showed intermediate features. This suggests intermediate-bark individuals are most likely hybrids of *P. totara* and *P. hallii*, as hybridisation between *P. totara* and *P. hallii* has been reported (Poole & Adams 1994, Webby *et al.* 1987).

Molecular study is necessary to confirm this view. Data collection from other sites where only *P. totara* or *P. hallii* occur is also necessary to confirm that the highest and lowest regression slopes at the study sites show the same degree of steepness with regression slopes from other sites.

In conclusion, measuring bark thickness can be the easiest way of collecting quantitative data in identifying *P. totara* and *P. hallii* in the field. However it would be wise to check other characters such as length and shape of seeds or leaf characters.

Acknowledgements

I would like to thank Carol West and David Norton for their useful comments on the identification keys.

I also thank Nancy Adams for the permission to reproduce her drawings.

Some key features for distinguishing *Podocarpus totara* and *P. hallii*.

1. Bark

P. totara

thick, furrowed and stringy bark (Plate A; Poole & Adams 1994, Salmon 1980).

P. hallii

thin papery bark (Plate B; Poole & Adams 1994, Salmon 1980).

2. Seed

P. totara

ovoid and 4-5 mm long (Poole & Adams 1994);
average 5 mm in length (Bergin & Ecroyd 1987);
rounded at the apex (Allan 1961, Dallimore *et al.* 1966, Kirk 1889,
McEwen 1988, Salmon 1980).

P. hallii

6-7 mm long with a short broad beak (Poole & Adams 1994);
average 7.6 mm in length (Bergin & Ecroyd 1987);
obtuse, and abruptly narrowed at the apex (Allan 1961, Dallimore *et al.*
1966, Kirk 1889, McEwen 1988, Salmon 1980).

3. Leaves

P. totara

blunt at the tip and more spirally arranged (West C. J., pers. comm.).

P. hallii

pungent (pointed at the tip), and juvenile leaves of *P. hallii* are arranged
in a plane (West C. J., pers. comm.);
has an obvious, depressed leaf midrib when viewed from the top and the
leaf has slightly rolled margins in contrast to *P. totara* (Norton,
D.A., pers. comm.).

4. Branches of young trees

P. totara

Branches of young *P. totara* are stiff and rigid (Kirk 1889).

P. hallii

Branches of young *P. hallii* are often pendulous (Kirk 1889).

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- Salmon, J. T. 1980. The native trees of New Zealand. Reed, Wellington, New Zealand.
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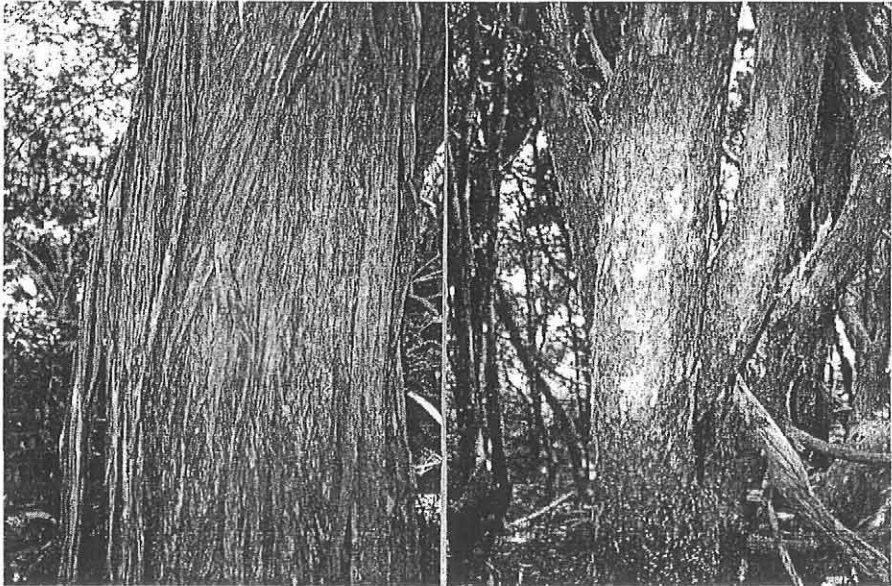


Plate Bark features of *Podocarpus* spp. trees at Otatara and Sandy Point, Invercargill: (A) an example of the thick-barked individuals (presumably *P. totara*) and (B) an example of the thin-barked individuals (presumably *P. hallii*).

Borland Lodge Combined Summer Field Trip: 29th December – 7th January 2001.

Wellington Botanical Society and Botanical Society of Otago.

There is a wonderful diversity of plant communities to explore in this area. Plans are to visit as wide a range as possible, including alpine, sub-alpine, forest margin, rainforest, totara forest, lowland forest remnants, scrubland, tussock grassland, limestone, streamside, riverside, lakeside turf, wetland (bring gumboots) and bog pine wilderness communities. **Maps:** NZMS 273-03, Fiordland National Park gives broad coverage. For finer detail see NZMS sheets C44, Hunter Mountains, D45 Ohai, D44 Takitimu, C43 Manapouri.

To ensure a place, please send your registration form and deposit of \$100 **by Nov 7th** to:

Tony Aldridge
PO Box 19 –576
Christchurch

Food and cooking for breakfasts and dinners will be organised on a group basis and fillings will be available for sandwiches. Bring your own scroggin, bread, marg/butter, fruit, biscuits and snacks. There will be an opportunity to buy fresh supplies every few days. Also bring your own sleeping bag and pillowcase, and bring or borrow a pillow. Daypack, lunch box, water bottle and thermos will also be helpful; full gear list later.

The main Botanical Society group will leave Dunedin from the Botany Dept car park, 464 Great King St at midday on Dec 29th, for the 4 hr drive to Borland Lodge, stopping at places of interest on the way. They will return to Dunedin on the morning of January 7th. Please indicate on the form if you can help or need help with transport. We are estimating transport costs/refunds at 7c/km/passenger, depending on current fuel and rental costs.

Lichen Field Trip – Borland Lodge January 7th to 9th January. CANCELLED

Unfortunately David Galloway is no longer available for either of the field trips this summer. There will still be plenty of opportunity to look at Fiordland lichens with other interested people during the Botanical Societies summer field trip.

A follow-up workshop in Dunedin over Jan 7-9 may well be arranged to further identify the lichens collected, with the aim of producing an updated lichen list for the areas visited.

Contact Allison Knight, 03 487 8265, email:
alli_knight@hotmail.com for further details.

Look forward to another lichen identification field trip with the Botanical Society of Otago later in 2001.

Registration Form

Botanical Societies Summer Field Trip.

Name.....

Address.....

Phone: Fax:

Email:.....

Preferred Accommodation:

Inside: I would like to share a cabin @ \$15/night, for nights

Outside: I will bring my own tent/campervan/other.....

@ \$10/night, fornights

(Includes use of Lodge herbarium, common room, showers,
kitchen, laundry, drying room, etc)

Total accommodation costs = \$.....

Transport

Help offered: I will be bringing a vehicle/4WD vehicle:

- a) To Borland from.....
Leaving (time).....(date).....
- b) From Borland to.....
Leaving (time).....(date).....

I will have room for passengers at 7c/km/passenger:

To Borland

During Borland trip.....

From Borland

Names of passengers if known

.....
.....
.....

Help needed: I need transport:

- a) To Borland from..... on.....
- b) During Borland trip
- c) From Borland to.....on

Name of Driver, if known

(Transport costs are estimated at 7c/km, depending on current fuel costs)

I **would/would** not be happy to help with driving a hired or a private vehicle.

(Please bring your drivers licence if you can help with driving)

Special Requirements

Please indicate any special food, medical, or other requirements:

.....

Microscopes (for Lichen identification):

I will **bring/would like to borrow** low power
and /orhigh power microscope(s).

Any queries contact:

Allison Knight
28 Embo St
DUNEDIN
Phone 03 487 8265
email: alli_knight@hotmail.com

or Herabrium, Botany Department,
University of Otago,
P.O. Box 56,
Dunedin.

Remember to send this form by Nov 7th to:

Tony Aldridge
PO Box 19 -576
Christchurch

Carrageenans and seaweed.

By Kate Neill

Carrageen or Irish moss has been collected on the North Atlantic coasts of Scotland and Ireland since around 1810. Carrag(h)een (or carrageen) is the common name for a red seaweed, *Chondrus crispus*. An extract of this seaweed was used to make soups and jellies. These delicacies were considered beneficial to those with delicate stomachs, invalids, and as a general cure for respiratory diseases.

The name carrageenan is derived from the colloquial term carrageen, and is now a general name for polysaccharides derived from red algae. Carrageenans are now extracted from a wide range of seaweed species including members of the genera *Gymnogongrus*, *Eucheuma*, *Iridaea* and *Gigartina*.

Many people are unaware that they consume or use carrageenans on a daily basis. Carrageenans are commonly used in food, cosmetic, pharmaceutical and biomedical products. Carrageenan extracts are currently responsible for over 4% (US\$200 million) of all annual trade in seaweed products. The proliferation of applications for carrageenans has resulted in increasing demand for this group of polysaccharides. Many countries are beginning to investigate the possibility of farming the algae that produce carrageenans.

As yet no commercial carrageenan extraction business exists in New Zealand. However a number of species have been tested for types and quality of carrageenans. One of these is *Gigartina lanceata*, a red seaweed, which is incidentally the subject of my Masters thesis in the Marine Science and Botany Depts at the University of Otago. *G. lanceata* is found in the low intertidal zone of rocky shores of the South Island, Stewart Island, the Chathams and a number of the sub-Antarctic islands. I am investigating seasonal variation in growth, reproductive

behaviour, nutrient content and polysaccharide chemistry of *G. lanceata* at Purakanui and Murdering Beach. The aim is to determine whether *G. lanceata* is a valid candidate for mariculture.

For those of you brave enough to try it, here is a recipe for a carrageen pudding. Dried carrageen may be found in health food stores, or for the more adventurous a collecting trip to the beach may be called for!

Honey and Lemon Carrageen Pudding

For 4 servings:

½ cup Dried carrageen

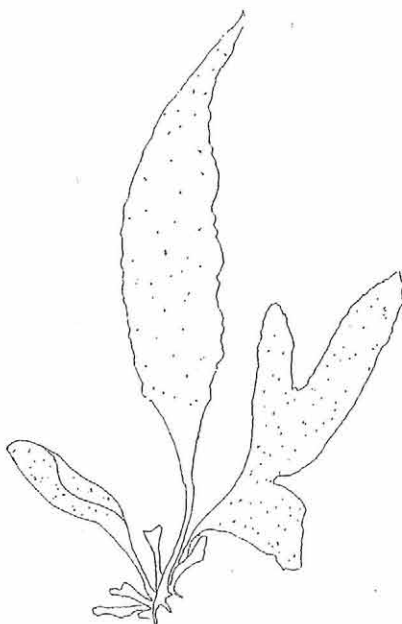
2 Tb Honey

Lemon juice and grated rind

Egg white, beaten stiff

150 ml Cream, whipped

Soak the carrageen in enough hot water to cover for about 15 minutes (or reconstitute according to packet instructions), then drain and discard the soaking liquid. Put into 600 ml of fresh water along with the honey, lemon juice and rind. Bring to the boil and simmer for 25-30 minutes. Strain and discard the carrageen, and let the liquid cool slightly. Meanwhile, combine the beaten egg white and the whipped cream, then gently fold the mixture into the carrageen liquid. Pour into a greased mould and chill before serving. **Enjoy!**



Carageenans and seaweed ctd

Acknowledgments. Thanks to Matt Scott for providing the drawing and to Norm Mason for his help with the manuscript.

Botany Department Colloquium

13th October, Friday. The Botany Colloquium is held every year by the students and staff of the Botany Department, University of Otago. It is a wonderful chance for young botanists to present their work and proposals in an informal and friendly atmosphere. This year it will be held at Cargill's Hotel, 678 George Street from 1pm till 6pm. The programme will be posted on the Departmental website closer to the time, and abstracts will be reprinted in the Botanical Society of Otago Newsletter following the colloquium. The Botanical Society of Otago Award for the best student presentation will be presented at the end of the colloquium along with the prize for the best poster. Contact Alison Stringer or David Burnett at 479 9065 or email: Alison.stringer@botany.otago.ac.nz.

California to Canada, and Home Again.

By Sheryl Miller and Lisa Russell

Late last year, three Otago University Botany students decided they would attend a phycological (seaweed) conference in the USA. They got together and started to scheme and plan about how they could afford it. 'Lets apply for funding' said one. 'How about the Regional Council or the Natural History Unit' added another. 'I know' said the third, 'lets bake muffins and sell them for morning and afternoon tea.' And so they did. Lisa, Julia and Sheryl would like to take this opportunity to thank everyone who made themselves buy and eat our home-made muffins, biscuits and slices of cake.

On July 12th 2000, the three of us left Dunedin bound for San Diego, California. We caught our first flight but missed all connections after Christchurch. Many standby flights and airplane meals later we finally stood on American soil. The 54th annual meeting of the *Phycological Society of America (PSA)* was held 15 to 19th July, 2000 at the Town & Country Resort & Convention Center in San Diego, California, USA. *PSA* met 'side-by-side' with the *American Society of Plant Physiologists (ASPP)*.

The conference began with the student session, which to our delight was dominated by female students. The variety of presentations was amazing as was the way in which they were presented – overheads, power point, slides or a mix of all three. Talks ranged from phylogeny and taxonomy, for example 'Systematics and Phylogeography of the invasive Red Alga, *Polysiphonia harveyi*', to ecological studies including 'Life on the Edge: Stress Survival Adaptations in Southern Limit *Macrocystis pyrifera* Populations' with the question asked – 'Is stress stressful?' In another student talk, 'The Secret Life of Kelps: Planktonic Processes and Population Dynamics', we heard that 25% of *Macrocystis pyrifera* spores travelled further than 5000

meters! This was attributed to triglyceride, a high-energy lipid which helps contain in large amounts.

There were several plenary lectures ranging from the role of light harvesting antennae systems and kelp ecology to evolution, biogeography and systematics of marine algae. We had the opportunity to speak with several well-known phycologists including Max Hommers and Paul Dayton, while Lisa had the chance to collect several alga specimens to boost her phylogenetic results.

A take home message is that one must be prepared and begin applying for funding at least six months beforehand. The conference provided insight into other research being undertaken and methodology used, and also provided the opportunity to make contacts at other research institutes.

After the conference, we travelled to Vancouver, Canada, where we met with and presented our research to Dr. Paul Harrison and his students at the University of British Columbia. We spent two days touring around UBC, and swapping research ideas with students and lecturers alike. A week was then spent at the Bamfield Marine Station on Vancouver Island, courtesy of Dr. Rob DeWreede. During this time we were field assistants for several UBC students working there which allowed us the opportunity to learn and identify some of the British Columbian algae we often read about. A great opportunity to make contacts, look for post-doc positions, pick brains of eminent researchers and generally enjoy a new environment (summer during our winter – superb).

My favourite seaweed: the bull kelp *Durvillaea*

by Catriona Hurd

To most phycologists, *Durvillaea* species typify the Australasian and Chilean marine flora. For those of us trained in the Northern Hemisphere, the first sight of *Durvillaea* is a mystical experience -

it is a magnificent sight but one many South Island New Zealanders might take for granted! Their huge size, leathery texture, sucker-like holdfast and trunk-like stipe makes them distinct from Northern Hemisphere seaweeds. *Durvillaea* grow only in highly wave-exposed sites and are considerably larger than any other seaweed occupying a similar habitat in the mid-intertidal zone. In the Northern Hemisphere you will find the small seaweeds *Fucus* (rockweed, North Atlantic) and the sea palm *Postelsia* (North Pacific) in the same shore position.

There are 3 or 4 species of *Durvillaea* globally, all Southern Hemisphere, cold water species. *D. antarctica* grows in New Zealand and Chile. The 'honeycomb' internal structure that allows *D. antarctica* to float on the sea surface is a unique property of this seaweed. *D. willana* grows only in New Zealand, and occupies a position on the shoreline beneath *D. antarctica*. It is only exposed to the air on very low tides and is distinguished from *D. antarctica* by side-branches arising from the stipe.

D. potatorum grows in Southern Australia and is morphologically similar to *D. willana*; these two species are considered ancestral. A 4th species *D. chathamensis* grows in the Chatham Islands although there is debate as to whether or not this is an ecotype of *D. antarctica* (Cheshire et al 1995).

Individuals of *Durvillaea* are either male or female. Reproduction occurs over several months during winter at which time reproductive conceptacles form over the entire blade surface – these appear as small raised dots. Each individual releases millions (up to 120 million overnight!) of eggs or sperm into the seawater. Despite extreme wave action, the sperm and eggs fuse and form a zygote, which then attaches to the rock surface and grows into a new adult. At the end of winter, you will see hundreds of small juvenile *Durvillaea* growing nearby established adults. Most of these juveniles will die in spring, when a combination of high air temperatures and low tides results in

dehydration stress that causes irreparable damage to the algal cells.

The taxonomic classification of *Durvillaea* has eluded phycologists. Its life cycle is similar to that of the Order Fucales (e.g. *Hormosira*, Neptune's necklace) and between 1826 and 1965 it was placed in this Order. In 1965, the Order Durvillaeales was established to accommodate differences in the growth pattern (*Durvillaea* = diffuse, Fucales = apical) and morphology between *Durvillaea* and the Fucales. However, recent molecular phylogenetic studies indicate the original classification was correct and *Durvillaea* are very closely related to the Order Fucales; its taxonomic status is currently undergoing revision.

In a collaborative project between the Botany Dept., University of Otago and NIWA (Wellington), we are examining the eco-biomechanical properties that allow *Durvillaea* to reach its massive size in an extremely wave-exposed environment. Over the past 3 years, myself and NIWA colleagues Drs. Craig Stevens (hydrodynamics) and Murray Smith (physics) have measured the wave-forces experienced by *D. antarctica* and *D. willana* directly, by attaching small accelerometers onto the kelp. This Marsden-funded project is the first internationally to measure wave-forces on seaweed directly and our results indicate kelps experience instantaneous accelerations of 40 m s^{-2} . PhD student Deane Harder, in collaboration with biomechanics expert Dr. Thomas Speck (University of Freiburg, Germany), has examined the biomechanical properties of *Durvillaea*. Deane found that *Durvillaea* is more extensible than Northern Hemisphere seaweeds that occupy a similar niche (*Laminaria* sp.) and hopes to determine if this biomechanical difference is related to the composition of the cell wall matrix, alginates.

Further reading on *Durvillaea*:

Hay, C.H. (1994). *Durvillaea* (Bory). Biology of Economic Algae. Ed. I. Akatsuka, SPB Academic Publishing, Netherlands

Cheshire, A.C., Conran, J.G. and Hallam, N.D. (1995) A cladistic analysis of the evolution and biogeography of *Durvillaea* (Phaeophyta). Journal of Phycology 31: 644-655.

Diary of upcoming events:

12th October, Thursday: BSO Talk and supper. Zoology Seminar Room, 7.00pm. With Professor Alan Mark: *The History of New Zealand's Tussock Grasslands: Evolution and Management.*

13th October, 1-6 pm Botany Department Colloquium, Cargills Hotel and Botany Department

18th October, Wednesday: Botany Department Seminar, Botany School Annexe Seminar Room. MSc research proposals:
12.00pm Alison Stringer: *Molecular identification of the edible ectomycorrhizal fungus Boletus edulis (Porcini)*
and: Gudrun Wells. *Spatial genetic structure in a self incompatible herb Rutidosia leptorhynchoidea.*

29th Dec – 7th Jan, Summer Field Trip at Borland Lodge with the Wellington Botanical Society.

Zoology Department seminars contact Ronda Peacock ph: 479 7976

Entomological Society of NZ Otago Branch contact:

Brent Sinclair email: brent.sinclair@stonebow.otago.ac.nz ph. 479 5618

or Brian Patrick email brian.patrick@otagomuseum.govt.nz

Membership form: Botanical Society of Otago

Title: _____

Name: _____

Address: _____

E-mail: _____

Phone: () _____

Family (2 adults + children) / **Waged** (salary)

/ **Student** (unwaged)

Please **e-mail** / **mail** my newsletter to the address above.

Donations are welcome. Subscriptions are set at the General Meeting in February and are current for the following year. A red spot on your newsletter indicates your subscription is due for renewal:

\$15 Family (2 adults + children) / \$10 waged (salary)

/ \$5 Student (unwaged).

Cheques to "Botanical Society of Otago".

Botanical Society of Otago: whom to contact

Submissions for the diary and new members, subscriptions or donations to:

Trish Fleming

‰ Botany Dept., University of Otago, P. O. Box. 56, Dunedin

Phone (03) 479 7579

email trish@planta.otago.ac.nz

Submissions for the newsletter or

Ideas for activities to:

Bastow Wilson,

‰ Botany Dept., University of Otago, P. O. Box. 56, Dunedin

e-mail bastow@otago.ac.nz

For information on activities:

the trip leader

or Trish (contact above),

or Bastow,

or see our webpage: <http://www.botany.otago.ac.nz/bsa>

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