Journal of the Native Orchid Society of South Australia Inc

Caladenia latifolia

PRINT POST APPROVED
PP 54366200018

VOLUME 26 NO. 6
JULY 2002

NATIVE ORCHID SOCIETY OF SOUTH AUSTRALIA

POST OFFICE BOX 565 UNLEY SOUTH AUSTRALIA 5061

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Journal cost $2 per issue. Family or Single Membership with subscription $15.

JOURNAL OF THE
NATIVE ORCHID SOCIETY
OF
SOUTH AUSTRALIA INC.
JULY 2002 Vol. 26 No. 6

2002 - NATIVE ORCHID SOCIETY OF SOUTH AUSTRALIA - 25 YEARS

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NEXT MEETING 23 JULY 2002
Tuesday, 23 July, St Matthew's Hall, Bridge Street, Kensington. Meeting starts at 8:00 p.m. Doors to the hall will be open from 7:15 p.m. to allow Members access to the Library and Trading Table. Bring your orchids to fill the display table and in particular all pots of the helmet orchids, *Corybas*, which has been selected as the plant of the month. Many species are at their flowing peak during July. We hope to see these displayed at the meeting.
Our speaker for July is Geoff Edwards who will take us on a tour of south-west Western Australia.

DIARY DATES
28 July Conservation trip to Mount Bryan
30 Aug.-1 Sept. Southern Flinders Ranges Field Trip
21-22 Sept. N.O.S.S.A. Spring Show
23-28 September Kangaroo Island Field Trip.
1 December Annual BBQ.
18-21 Sept. 2003 16TH Australian Orchid Council Conference Adelaide, hosted by O.C.S.A.

NEXT COMMITTEE MEETING
Wednesday 31st July at the home of David & Rosemary Hirst. Meeting commences at 7:30 p.m.

JUNE SPEAKER: Peter McCauley gave an interesting talk on his trip to Borneo and the 17th World Orchid Conference. The talk was illustrated with slides of orchids and Malaysia and it was not difficult to see why that is a popular holiday destination. Slides included a *Rafflesia* sp., the worlds largest flower, unique to the rainforest in that part of the world.

JUNE MEETING - Plants Benched

Terrestrial Species: *Acianthus pusillus* (2 plants); *Chiloglottis seminuda; Corybas fimbriatus; Pterostylis cocinna; Ptst. cocinna* yellow form; *Ptst. nana* 'big bush'; *Ptst. nutans; Ptst. nutans* 'Wensley Dale'; *Ptst. ophioglossa; Ptst. procera; Ptst. robusta* (two plants); *Ptst. sanguinea*.
Terrestrial Hybrids: *Pterostylis* x *furcillata*; *Ptst*. Ruckman.

Epiphyte Species: *Dendrobium bigibbum*
Epiphyte Hybrids: *Dendrobium* Aussie Child x *speciosum* (now named Avrils Gold); *Den*. Essie Banks; *Den*. Edda x *speciosum*; *Den*. Golden Fleck; *Den*. Hilda Poxon (9 plants); *Den*. Jesmond Treasure x Sunglow (now named Jesmond Charm); *Den*. Jesmond Dazzler (2 plants); *Den*. Ku-Ring-Gai; *Den*. Zepplin (2 plants); *Den.* Unknown

Judging
Terrestrial Species
1st *Pterostylis nana* grown by Malcolm Guy
2nd *Pterostylis sanguinea* grown by Les Nesbitt
3rd *Acianthus pusillus* grown by Malcolm Guy
Terrestrial Hybrids
1st *Pterostylis* Ruckman grown by Les Nesbitt
2nd *Pterostylis* x *furcillata* grown by Les Burgess
No Third

Epiphyte Species
1st *Dendrobium bigibbum* grown by Les Nesbitt
No 2nd or third
Epiphyte Hybrids
1st *Dendrobium* Hilda Poxon grown by J. & G. Burford
2nd *Dendrobium* Jesmond Dazzler grown by Brendan Killen
3rd *Dendrobium* Avrils Gold grown by Brendan Killen
Orchid of the Night
Dendrobium Hilda Poxon grown by J. & G. Burford

Popular Vote Results
Epiphyte Species: *Dendrobium bigibbum* grown by Les Nesbitt
Epiphyte Hybrid: *Dendrobium* Avrils Gold grown by Brendan Killen
Terrestrial Species: *Corybas fimbriatus* grown by Malcolm Guy
Terrestrial Hybrid: *Pterostylis* Ruckman grown by Les Nesbitt

Commentary given on terrestrials by Les Nesbitt
Commentary given on epiphytes by Noel Oliver.

Special visitors at the June meeting were Justin Scott-Rodgers (great-grandson of Dr R.S. Rogers) from NSW and Birgitte Sorensen who, some members will remember, gave us a talk on conservation of *Pterostylis arenicola* in February 1996.

Judging Classes: Date for next Judges Meeting: Saturday 3rd August at 9:30am

FOR YOUR INFORMATION - NOSSA NEWS

TREASURER

We are still in need of a Treasurer. We are proposing that the role be split. 1. The duties required would be receiving and receipting of monies (at meetings and from other incoming avenues), payment of accounts, and banking. We are making a heartfelt plea for someone to come forward to take on this role. 2. The books can be kept by another member. It doesn't seem fair to me that our President Bill Dear, who already has a full workload, is now handling all the accounts and banking etc. and Thelma Bridle (Committee member, Field trip organiser and Conservation Officer) is managing the receiving and receipting of monies. Come on members, let's have someone who is prepared to stand up and be counted! The job is not hard and there are people who will support you.

"ORCHADIAN"

We are making one last plea for replacement "Orchadian" issues. If we do not receive any some the Committee has decided that they will have to purchase replacements. The cost to N.O.S.S.A. (which is really to all of us) will be in the vicinity of $72. Add to this the cost of the Second A.N.O.S. Conference Proceedings and there won't be much change from $100-.
The issues we are looking for are:-
Vol. 10 numbers 2, 4, 9 Vol. 11 numbers 2, 3, 4, 7, 9, 10
Vol. 12 numbers 4, 6, 7, 8, 10, 11, 12 Vol. 13 number 6

FIELD TRIPS FOR JULY

Sunday 28th July CONSERVATION TRIP TO MOUNT BRYAN
Marking of Pterostylis despectans rosettes at several sites in the area.
Please meet at Mount Bryan township out of Burra at 10.30am. Remember to bring lunch:

FIELD TRIPS FOR AUGUST

1 Aug. *Caladenia behrii* weeding
4 Aug. *Corybas despectans* at Hardys Scrub
9 Aug. Hindmarsh Reservoir weeding
11 Aug. *P*. 'Halbury' populations monitoring, Halbury
16-18 Aug. Yorke Peninsula weekend-weeding Mona Reserve, caging *C. macroclavia*
22 Aug. Roachdale weeding
The above were on the agenda but at the time of printing further details were unavailable. For information contact Thelma Bridle 8384 4174.

WINE GLASSES with the NOSSA logo are now available at $7.50 each.

HOW ITS DONE Reg Shooter

The June meeting could be referred to as the Hilda Poxon Night. There were no less than nine plants of this lovely hybrid benched. They varied from the tall form to the shorter form, the colours were as equally varied ranging from pure yellow through some that were speckled and spotted with red or brown to one which had more reddish brown than yellow. *Dendrobium* Hilda Poxon is a primary hybrid (that is a crossing of two species) *Den. speciosum* x *tetragonum*, two species that themselves are quite variable. The variation in the hybrid occurs depending upon which variety of the two species are used.
The judges had quite a job judging all the epiphytes on the night but had no trouble in awarding first place and Orchid of the Night to Jan & Graham Burford's beautifully

presented *Den*. Hilda Poxon. This plant was one of the taller type carrying racemes of large yellow spotted red flowers approximately 4 to 5 inches in length on 20 inch tall pseudobulbs. The flowers were arranged on the raceme in such a way that they 'looked at you', which always attracts the judges eye. The Burford's grow this orchid (which was obtained from a friend when that friend gave away growing orchids about 2 or 3 years ago) along with all the other epiphytes under 50% shade cloth however Graham thinks they get too much shade as the area faces west and there is further shading from the nearby house. All the plants in this area are hanging about head high on vertical mesh as a space saving measure. They are potted in straight bark with no additions. Fertiliser is given during the growing period September to May, no special fertiliser is used. Graham feels lucky to have obtained such a lovely orchid that flowers so well in spite of the fact that he thinks it gets too much shade. Well done, thank you for sharing its beauty with us on a cold winter night.
There was an equally interesting number of terrestrials benched; the *Corybas fimbriatus* benched by Malcolm Guy attracted the majority of popular votes and the judges gave it first in the species section. Malcolm grows his terrestrials exceptionally well and is to be congratulated. However the judges had to decide between this and a lovely pot of a hybrid *Pterostylis* Ruckman grown by Les Nesbitt. Les made and registered this hybrid in 1996 using *Ptst. procera*, and the natural hybrid, x *ingens*. Both these orchids have large flowers carried on tall 40cm stems, are colony forming and considered easy to grow in cultivation. The hybrid Ruckman has inherited all these traits and the pot that Les exhibited was no exception. There were approximately 20 plants in a 175mm plastic squat pot, 6 were in full flower and there were 11 buds in various stages of development. Les grows this orchid in sphagnum moss as he does several other species. The leaves are large and carried well clear of the potting mix which adds to the overall attraction of the specimen.
Considering the cold wintry conditions of the evening it was pleasing to see so many plants benched. Thank you to everyone who brought plants in for us to enjoy.

PTEROSTYLIS PROCERA Les Nesbitt

Until 13 years ago this orchid was known as the early flowering form of *Ptst. baptistii*. David Jones in his book 'Native Orchids of Australia', published in 1988, mentions 2 races of baptistii, an early form flowering from March to May and a late form flowering from August to October.
Ptst. procera was first named in 1989 in Volume 1 of 'Australian Orchid Research'. The type specimen came from Moomin in Queensland and was collected by Len Lawler on 2 May 1988. *Ptst. procera* occurs in Queensland and Northern NSW.
My original plants were purchased as *Ptst. baptistii* from the Rev. Collins in Atherton, Qld some 25 years ago. They are vigorous growers but their growth cycle is three months ahead of local greenhoods. The tubers begin to shoot by Xmas and, if watered over summer, they will come up in February and flower from March onwards although the flowers will abort in hot weather. If the tubers are kept almost dry, the shoots develop more slowly and leaves do not appear until March-April. The plants do not all flower at the same time like the spring flowering *Ptst. baptistii*. Rather they follow in succession over a period of 2-3 months. You have to be lucky to get a potful to all flower together. Although they will grow in a shadecloth shadehouse in Adelaide, they do better under cover. My best plants are growing in sphagnum moss in my heated glasshouse where they flower from May to July. The plants have large leafy rosettes on the pot surface. The large green and white flower is held upright on a straight stem up to 250mm tall. They have a brown tinge on the top of the hood.

As the largest autumn flowering rosette type greenhood it has attracted my hybridiser instincts but only two hybrids have been registered so far;

• *Ptst*. Iron Baron = *procera* x *rogersii* (as *baptistii*)

• *Ptst*. Ruckman = *procera* x X *ingens*

A potful of Ruckman was displayed at the June NOSSA meeting. My plants of Iron Baron have gone to that great orchid house in the sky. One day when my time on Earth is done, I may get a job there helping to look after them.

THE BURREN: WILD ORCHID GARDEN OF IRELAND

Bob Bates in England June 2002

I flew to Dublin from Luton in June of this year, ostensibly for a holiday but with the added intention of tracing my Irish (McGough and Kennedy) roots. Orchids were not on the agenda especially since I thought they would be as rare as hens teeth in the cleared and overgrazed Emerald Isle. In my fire-truck red Opel hire-car I skirted Dublin's fair city (where the girls are not so pretty) and headed to the land of my ancestors west of Ennis, County Clare on the west coast. Ireland being a rather small place, I was there in 3 hours thanks to their super highway system - You can't get lost in Ireland.

I made one stop on the way; at a limestone pavement in the centre of the island, to admire the patches of purple flowered shamrock; which turned out to be shamrocks and *Orchis*! A lucky fluke I thought.

I noted the name McGough in the phonebook near Ennis and rang on the off chance that we might be related. The sweet 82 year old said that as her husband Patrick's great great grandpa had the same name as mine it would be a good idea if I visited for lunch the next day. I took up the offer and was amazed as I walked down the hallway to see a portrait of my great grandpa who they knew only as the great uncle who went to Australia in the 1860's. After some great reminiscing over an Irish whisky or two, lunch and watching (with 84 year old Patrick) Ireland live from Japan in the World Cup football I went my way with much improved knowledge of my Irish ancestors.

The McGough cousins also told me the best tourist spots in the area, namely the Cliffs of Mohr and the Burren and as dusk would be at 10pm I had plenty of time to see both.

The Cliffs of Mohr, with a 200m drop into the Atlantic and obligatory castle I shared with 3 busloads of American tourists, a family from Adelaide and more orchids!

The Burren was a different story altogether, amazing limestone domes, no trees, shallow soil pockets and no people..._ but the greatest surprise was the orchids. For three hours I was never out of sight of them as I circled lakes and climbed the white domes. And to think my own great grandpa had walked these hills as a young man 150 years before. I counted a dozen different orchids, mostly in full flower. The most common were the *Orchis* species like lollipops on sticks.... I apologise if the names I got from a brochure are out of date but the species seemed to be *O. morio* and *O. mascula* with massed purple or pink flowers, the twayblades *Listera ovata* with green flowers, the fragrant pink Dac*tylorhiza kerryensis* in two forms and the very dense headed *Neotinna intacta* which had also been at the Cliffs of Mohr. Less common was the bee orchid *Ophrys* and the miniature fly orchid *O.* aff *insectifera*, a small white *Gymnadenia*, an unidentified *Orchis* and in peaty bogs grazed low, the leaves and buds of a *Spiranthes*, probably *S. romanzoffiana*.

According to the brochure at the park headquarters there are also 3 endemic wildflowers. At 9am on the way back to Ennis I actually found orchids in a paddock where peat was being cut.

For the next two days I explored the adjacent County Kerry which has some of the best scenery in the British Isles.... At Killarney it has island filled lakes to rival the Lake district of England, mountains to rival Ben Nevis in Scotland (and if you want an exciting ride go on the one lane, cliff hanging roads thru the mountain passes).

I recommend the coast hugging tourist route the 'Ring of Kerry' and do take the car ferry to the island of Valentia and the boat ride to the Arran Isles. All this scenery with castles, wonderful guesthouses, horse-rides and the museums of Tralee all within 25km of Killarney. And yes you will spot orchids on the roadside in many places.
Western Ireland is a magical place! There seems to be a rule that adjacent houses must be different colours... so if you build between a pink house and a blue house you will need to paint yours yellow. Needless to say wherever you drive these fairytale 2 storey houses with attics can be seen clinging to mountainsides where they are very visible indeed. House prices in Ireland are about a quarter the cost of a similar house in England so the standard of living is higher and everything costs much less especially since the exchange rate of A$ to Euros is better than to pounds.

CONTROL FOR BRIDAL CREEPER ON KANGAROO ISLAND

Beverley Overton
Volunteer coordinator of rust fungus bio-control for Kangaroo Island Animal and Plant Control Board.
From Australian Plants Society Journal Vol. 17 (1), February 2002.

On Kangaroo Island there currently are field trials of two biological control vectors that are specific to bridal creeper: a leaf hopper and rust fungus. These field trials are secondary to the use of appropriate herbicides that continue to be the primary control method. This report focuses on the effects of rust.

A single bare-rooted bridal creeper, infected with rust, was donated to the Kangaroo Island Animal and Plant Control Board in August 2000. This had been placed in a pot of moist potting mix for ease of transport by plane and has been used with much success.
Rust pustules change the bridal creeper leaf colour from green to yellow and, over time, defoliate the plant thus reducing its ability to take up nutrient to 'feed' its underground tubers. Depending on the weather conditions it can take from 24 to 36 days before the first sign of yellow flecking is visible, and a further 5 to 7 days for the rust (pustules) to mature sufficiently (become active) to spread by the breezes or direct contact to nearby leaves. Rust fungus has an over-summering stage. This means that it is only active in winter at the same time bridal creeper is growing. So, they both 'rest' in summer, as does the leaf-hopper.
Initially it was hoped to have between 65 to 100 pots of bridal creeper inoculated with rust fungus by May 2001 for community members to use amongst their patches of dense bridal creeper. Vandalism caused some set back, with some 50 pots being damaged. Pots were up-ended, and soil, plants and pots were removed and the signs and recycled plastic stakes destroyed. Luckily not all of the pots of young bridal creeper had been put into the field because, at that time, their leaves had not expanded sufficiently for inoculation. By mid September 2001, the Animal and Plant Control Board was still able to involve 35 of the community members who had registered their interest in participating in this particular bio-control on their properties, as well as continuing inoculation at selected sites.
Each pot of infected bridal creeper was accompanied by verbal and written instructions so that recipients learnt how to maximise the use of their pot of rust fungus. These community persons have been asked to record their success or failures on a form so that the information can be used towards future releases of bridal creeper rust on Kangaroo Island and other affected Australian states.
None of this year's program could occur until rust reappeared on the 'wild' bridal creeper. The heavy June rainfall was sufficient to reactivate rust fungus in the Kangaroo Island Council and privately owned bushland near Little Brownlow, and rust first became evident on leaves on 3

July 2001. Infection by rust has been very slow to show on the leaves and distribution has been patchy, but outcomes have been positive. The bushland sites have been monitored for natural spread of rust fungus by wind and rain - by 27 September 2001 rust had spread 14 metres by 5 metres from site 1. From site 2 its spread is 5.5 metres by 5.5 metres. From sites 3 and 4 spread has been almost 3 metres by 1 metre but at site 5 it has only moved 25 centimetres. Children playing and making cubby houses out of bridal creeper have heavily disturbed this last site. In two sites the rust fungus did not naturally reactivate.

Herbicide will continue to be the primary control until the huge masses of bridal creeper are reduced significantly. In 1996 the Animal and Plant Control Commission (SA) provided funds to begin using herbicide on bridal creeper in and near Kingscote. The success of this small Project started the ball rolling and now we are getting some great results, both in reduction of infestations, and funding. Biological control with rust fungus and leaf hopper will in time reduce the bridal creeper. But, these vectors can only be effective if we (community, business, rural and city members) continue to work together towards a common goal.

The Kangaroo Island Bridal Creeper Control Committee will release a report on their entire program in due course. The Native Vegetation Council and the Animal and Plant Control Commission provided funds for the initial project. This work would not have been possible without the support and assistance of the local people, assistance for which I and the KI Animal and Plant Control Board are truly grateful.

DENDROBIUM HILDA POXON Graham Zerbe.

This orchid is a crossing between *Den. speciosum* & *Den. tetragonum*, (i.e. a Primary Hybrid meaning that both parents are species). The hybridiser was Ira Butler. The annual trophy presented each year for the most outstanding hybrid is given in his honour. The hybrid was registered by Dr Noel Grundon in 1977, who had purchased the seedlings after Ira's death. Ira never lived to see the beautiful orchid he had created. Grundon named the orchid after a lady in Queensland who had worked for many years growing orchids and serving on committees.

On studying most hybrids that have *Den. tetragonum* in their makeup you find they influence the shape of the pseudobulbs. They tend to be square rather than the normal round shape of others such as *Den. speciosum*. This is apparent in *Den.* Hilda Poxon.

Even the shape of the flowers is more spidery than *speciosum* and more like *tetragonum*. Obviously the size and colour varies depending on the parents used. *Den*. Hilda Poxon can be quite small and flower every month of the year. The segments can range in colour from pure lemon to golden yellow with colourful lips; then again the segments can be overlaid with reddish spots and blotches to the extent of almost blotting out the yellow tonings.

Then if *Den. tetragonum* var *giganteum* is used as a parent the flowers can be quite large up to 100mm and flowering only once a year, namely in spring.

Some of the earlier crossings were slow growers and flowerers however the remakes using different, often line bred parents, are more vigorous and free flowering. Some tend to 'hang their heads' due to the large flowers which tends to detract from the show, but the better clones carry their flowers erect on strong racemes and are very floriferous. When the plant is mature, 10 to 15 flowers on each raceme can be expected.

Hilda Poxon is a plant that should be in everyone's collection, it is very rewarding with its floriferousness and for its results on the showbench.

A SOLAR HOUSE DOWN UNDER

by Russell Job

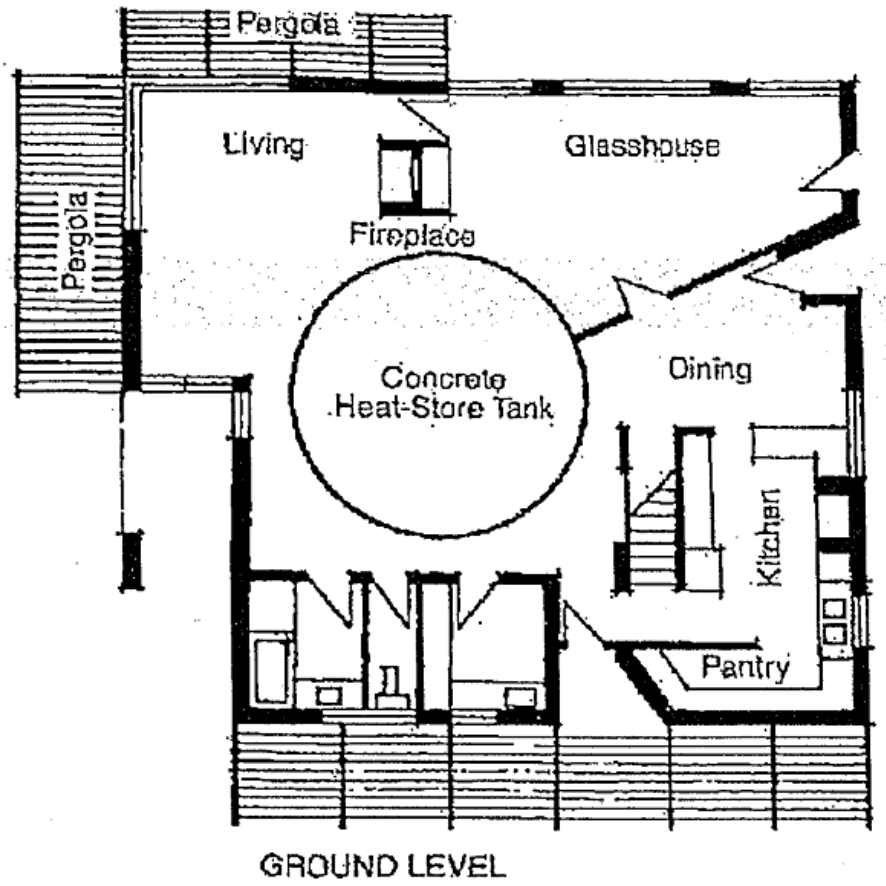
Russell Job and Edda Viskic have been growing orchids for 25 years and have been members of the Orchid Club of South Australia and NOSSA since 1979. They describe their dwelling as a living, tropical house. It is situated on the eastern summit of the Mt Lofty Ranges at Forest Range, South Australia. They live in the house with their orchids and other plants. A glass wall separates the kitchen from a conservatory that houses over 1,000 different taxa of many Phyla. The house and plants have been featured on, This Day Tonight, Towards 2000, Gardening Australia and this article was first published in the American Orchid Society Bulletin February 1986. Following the talk given to Nossa by Russell in April it was considered worthwhile providing an updated version of that article - Ed.

Located at 35°,S 139°,E, we enjoy a temperate, Mediterranean-type climate, with snow only once or twice a year. This affords us hot, dry summers and cool, cloudy winters with an annual rainfall of 1.2 metres. Central to our survival on an exposed, unserviced mountain ridge at 620 metres above sea level are the 50-kilolitre concrete rainwater tank and a sensible heat store to moderate the temperature swings.

In 1973, we read of Steve Baer's "Skylids" in Shelter (Mountain Books, Box 4811, Santa Barbara, Cal). The fundamental relationship dawned on us: controlled aperture + thermal mass = epiphytes. Fortunately, we were able to hire an understanding and enthusiastic architect, Leon Byass, who was able to integrate our ideas in an affordable design. On the northern side of the house, a conservatory traps solar energy. Reflectors boost solar input through geometrically oriented windows. At night, these apertures are closed and insulated to reduce heat loss. The rest of the house is insulated, and insulation inserts are placed in window frames.

The large reflector doors are balanced on springs and can be lower than the horizontal This allows the summer sun to be reflected away on the hottest days. A locking pin can be inserted into the elbows to stop gales from blowing the reflectors closed. Reflectors on the roof above the skylids are fixed. They are at slightly different angles so that their reflected light paths do not overlap (and double-dose some orchids with radiation.). The temperature difference between the glazing over the skylids and the conservatory drives a refrigerant liquid between two connected cylinders fixed on either side of the main skylid louvre. There is enough liquid to fill the cooler of the two cylinders. This shift in weight operates the other louvres by means of a linking rod. The louvres are shaped like an airfoil in cross section to spread the reflected light to a larger area in the house. Insulation in the louvres helps to reduce the condensation that occurs on sloping glass when the outside temperature goes below 4°C. (40°F).

Flat-plate solar collectors provide our hot water. A slow-combustion wood stove in the kitchen also can heat the water. There are 25 square metres of swimming pool-grade strip collectors on the roof, made from EPDM plastic. A one-half horse-power pump circulates 10 gallons of the main tank water per minute through this collector when the return temperature is 1°C hotter than the water from the tank. A test of this solar gain is initiated by a blackened temperature sensor on a tiny dummy collector mounted on the roof. We call this system "The Blubber" because it gurgles when it is being heated and circulated.



Above: Plan for ground floor.

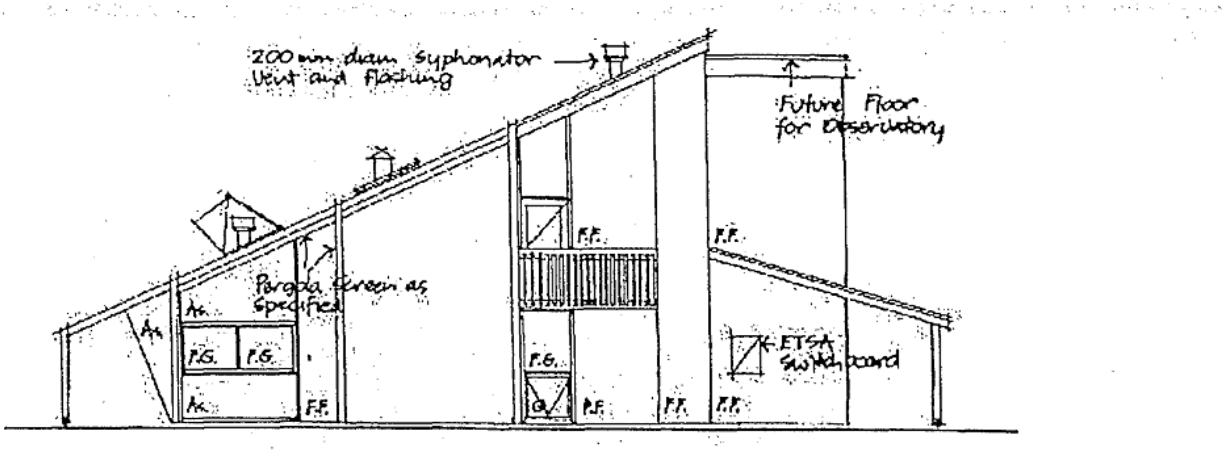
The architectural plan for the house shows that the conservatory sun space has a back wall consisting of kitchen/dining room glass and the main storage tank. The flowering table is adjacent to the tank. Annual minimum tank temperature has been 15°C and minimum rock temperature under the house has been 12°C. This prevents the temperature in the greenhouse from going below 10°C without heating. In other parts of the house we use electricity at point of use or wood stove and fireplace. These have water-heating pipes as well, and the lounge fireplace has a warm air jacket and a clothes drying cabinet built into the back. This also doubles as a heat exchanger and pump house for the conservatory.

A system of fans, humidifiers, ducts and heat exchangers has been built in to give us greater flexibility and alternative strategies to deal with varying conditions.

However, by the nature of the massive, passive control design, there is an element of temperature stability even if a power failure during a blizzard or heat wave should occur. The daily temperature fluctuations in the planthouse are less than 11°C. In the domestic areas of the house, the daily temperature fluctuation is only 3°C maximum.

We have about 70 genera of orchids growing in one house, and it is survival of the fittest. The main limitation seems to be the number of winter days that are cloudy between 10 a.m. and 2 p.m. Descendants of *Dendrobium taurinum, Den. nindii*, or *Vanda sanderiana* seem to suffer more due to lack of sunshine that to low temperature. *Phalaenopsis* do not like the cool winter temperature, but their survival is more probable than the ones I've just mentioned. Some Vandas and Ascocendas do well, hanging or low down near the north-sloping glass at the front of the conservatory. They appear to respond to the extra angle of lighting. Vandaceous hybrids have been bred mainly for tropical climates. The stop-go seasonal climate that we have in South Australia selects the plants that can adapt.

V. roeblingiana, tesselata and *coerulea*, all can perform well with good genes, culture and luck. Most epiphytic tribes have complex hybrids that will do well here. In an external ambient shade house, 6 varieties of *Den. speciosum* refuse to flower. Some are very large specimens, once tricked into initial elongation with enough heat from early May through June they can flower in the bright part of the living room of our temperature-stabilized house in an extreme environment.



west elevation 1:100