ORCHIDS IN NEW ZEALAND

JANUARY/FEBRUARY 1983

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ORCHIDS IN NEW ZEALAND

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Contents

Page:

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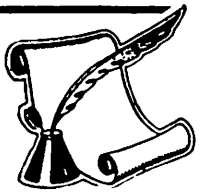
LETTER TO THE EDITOR



Dear Sir,

With reference to the article in "Orchids in New Zealand" Vol. 8. No. 2. September/October, 1982, entitled "Growing Thelymitra Longifolia from Seed" by R.A. Bicknell, and Ella Campbell, I would like to point out what I consider to be discrepancies in the article relating to:

(a) The Nutrient Agar. and,
(b) Sterilisation of the Seed.

The nutrient agar as suggested is a very old one, and as this has been given for any would be grower to follow, and make use of, the person who is attempting to flask seed for the first time would begin to wonder what was happening for the following three reasons.

1. The Chemical Ca3 PO4, is not soluable, and should be replaced by a modern equivalent.
2. The stated amount of Iron. Fe2 (C4H406)3 H20. at 0.28gm is about ten times the required amount, and should read 28mg. Also it is not easily obtainable, and should be replaced with Fe EDTA. at 27/30 mg per litre.
3. The amount of agar used is twice the amount that should be used; i.e. 6/8 gms. and not 16 gms as quoted, for the reason that if, as stated, the germination time is 12/14 weeks, the large amount of agar would harden and prevent root penetration of the agar.

Finally, regarding sterilisation of the seed, I would suggest that five minutes is insufficient, and suggest a time of 20/30 minutes.

What is wrong with the tried and tested system of 20/20. That is 20% Janola, for 20 mins.

Yours faithfully,
F. Ruhl,
Auckland

Massey University, Palmerston North

We are most grateful to your correspondent for his comments and to the Editor for the invitation to reply to them.

1. *In regard to phosphate we followed the formula of Vacin and Went and used a mechanical stirrer and hot plate to get as much as possible into solution, but agree that a modern equivalent would seem preferable.*
2. *(a) The amount of iron used was 0.028gm. The amount printed was a printing error. (Apologies — Ed).*
   (b) Have already substituted Fe EDTA for ferric tartrate in the solution we are using for subculturing some of the plantlets. It was not available to us earlier due to the chemical store being security-locked.
3. *Also, when subculturing we have reduced the proportion of agar for, as surmised by your correspondent, we found that the roots were unable to penetrate the firmer agar except along cracks. The subcultured plants in the softer agar are now growing well.*
4. *In regard to sterilisation of the seed, we did not realise that the minute seeds with their thin seed-coat and undifferentiated embryo are remarkably resistant to penetration by chemicals, but we have since read that this is so. Janola is certainly readily available and we presume that a 20% solution of household Janola is the concentration advised. It is worthy of a trial this summer when fresh seed is available. Seed, as compared with undehisced capsules, has the advantage of the possibility of storage so allowing transport from a distance.*

Several trials will be necessary in order to find the most satisfactory method of growing any one of our native orchids from seed. Mr C.L. Kan has started to do this. Any comments or suggestions would be welcomed.

R.A. Bicknell,
E.O. Campbell
Dept. of Botany and Zoology

Some Thoughts on Virus

by Philip A. Wyatt of Cambridge

There is also a theory that leaves rubbing together of virused and non virused plants can transmit the virus while this has not been proven it is now accepted that something more abrasive than two leaves is required to effect a wound sufficient enough to transmit and accept virus.

Possibly the current most common method of transmitting virus is through tissue culture. Recent examples of this are Snowbird 'Jay Hurst,' Mimi 'Sandlewood,' Sensation 'Melita,' Burgundian 'Bexley' and Valya Craig 'Sutherland.' It is generally accepted that virus is not transmitted through seed, but that discovered in new seedlings is generally attributed to the pod parent being virused, and when the pod is cut open in Green pod culture, some of the seeds are damaged and subsequently infected. Then during replating and deflasking the plants are further damaged and hence spreading the virus throughout the crop. The strains of TMV found in Tobacco have been shown to be ineffective in cymbidiums and infection from this source although widely believed to be important does not have the evidence to back it up. Nematodes have been shown to be the responsible factor in the transmission of TRS in Orchids but fortunately most enlightened growers have their plants growing on benches raised off the ground.

There has been some work done on looking at other plants that may possibly act as natural reservoirs for Orchid viruses, especially in weeds that abound on the richly fertile floor under the benches of Orchid Houses. These plants have been implicated with other crops so why not Orchids. But so far this search has provided limited numbers of other hosts, showing that these virus have a strong specificity to Orchids.

What can we do about viruses? If you have positively infected plants — BURN THEM. Virus' have remarkable powers of survival and by composting the plants you are just creating a natural reservoir for virus.

How do you find out if you have any virused plants? This is simple using indicator plants, away from your collection though; sow a few seeds of Chenopodium quinoa C. amaranticolor as indicator plants (there are several others that can be used too.)

Once the plants have reached leaf stage, they can be then innoculated with sap from leaves of the test plant. Wear plastic disposable gloves when preparing the innoculum for the plants, this is another precaution to prevent spread. Grind up the leaf in a little water with a mortar and pestle, or similar type of grinder, then using a cotton bud on a stick, first lightly damage the uperside of the leaf of the indicator plants, with dry abrasive powder then add a drop of the test sap on the leaf over the wound. Be careful not to destroy the leaf when wounding it because if the leaf dies or it is too damaged it will mask or obliterate the infection pattern. Also do a few plants with water only to act as a comparative negative standard. Watch the plants for lesions of sunken brown patches on the leaves. After use, sterilise all utensils by boiling vigorously for one hour or destroy them. Use a separate or new vessel for each test plant so as not to give false positives from cross contamination. And Laboratories could help by using a brand new scalpel blade for every mother flask that's done in the Lamina flow cabinet.

ORCHID SPECIES EVOLUTION

W. James Harper
To the Wellington Orchid Society, February 1, 1982

Let me first make a disclaimer — I am not a botanist — but a food scientist whose closest professional contact with orchids is the use of vanilla flavouring from the seedpod of the Vanilla orchid (which we will see, in the course of this discussion, is one of the oldest members of the orchid family). Rather I am an amateur orchid grower with a keen interest in the great diversity of orchid species — and their relationships to each other.

My fascination with species began about the time in orchid growing, when I became aware that there were orchids other than hybrid Cattleyas (translate that to Cymbidiums for New Zealand). That fascination has grown with the years and been sharpened by observing orchids in their native habitats. While collecting in Mexico, questions began to arise — why did species that were compatible and growing in the same area not form hybrids? Were species still evolving — did that explain the wide variance in the same species? Why did birds pollinate one orchid and bees another? How could a two inch plant in flower be the same as the 10 inch one with the same flower 400 miles away? What makes a species? — and WHY didn't I pay more attention to botany in school?

To me, one of the most fascinating aspects of the orchid family is its diversity — in form, colour, habitats and development. No one really knows the number of orchid species — they are estimated to make up more than 10% of the flowering plants on earth — with guesses ranging from 12,000 to 35,000 different species. The most common figure heard is that of 25,000. That number doesn't seem unusually large — until we calculate that if you saw one new orchid plant each day, it would take over 68 years to see every species. That doesn't even consider orchid hybrids, estimated at over 70,000. So it is little wonder that one generally sees at least one new orchid at every show.

The evolution of the orchid family is not really known, since orchids do not lend themselves to fossilization. One fossil — "Protorchis monorchis" from the Eocene epoch (of the Tertiary period) may be an orchid. The lack of a fossil history makes determination of the evolution of the orchid species like a jig saw puzzle — it has been put together piece by piece. Many pieces are missing, others fit together poorly. For those especially interested in these aspects of orchids, I would enthusiastically suggest that you read the recent book by Dr Robert Dressler — published in 1981 under the title "The Orchids — Natural History and Classification." Much of this talk is based on Dressler's views — reinforced by observation and discussions with other orchid scientists — especially Dr. Cal Dodson of the Marie Selby Botanical Garden in Florida.

Before further exploring the evolution of the species of orchids, let us first gain an understanding of what orchids have in common with other families of the monocotyledons and with each other.

Orchids belong to the superorder of the Liliiflorae — so they are

distantly related to lilies, amaryllis and iris. The Orchidaceae family is by far the largest family of the Liliiflorae. The orchids are generally placed in their own order — Orchidales, with just one family — the Orchidaceae. This is based on the fact that there is no evidence that any orchid has derived from any recent member of the Liliales.

The major features that make an orchid an orchid are:

1. The stamen are all on one side of the flower, symmetrically arranged. Most orchids have one fertile stamen and only one genus has three. Dressler feels that the feature of developing stamen all on one side was the critical step in the development of the orchid.
2. The stamen and pistil are at least partly united. In most orchids these parts are completely united and we speak of the column as the reproductive unit.
3. The seeds are tiny and numerous. The more primitive the orchid, the larger the seed — but still small compared to other plant seeds.
4. The flower usually has a lip or labellum (the petal opposite the fertile stamen).
5. The flowers are usually resupinate — twist around in the course of development.
6. Part of the stigma (rostellum) is usually involved in transferring the pollen from one flower to another — a major theme in orchid evolution.
7. The pollen is usually bound together in a few large masses — called pollinia. One of the most distinguishing features of the family, this characteristic along with the rostellum, is intimately involved in pollination by insects and birds.

Better understanding of relationship between species requires an understanding of how the species are organized into genera and higher groupings. It is best to start with the family and work down — Thus the major hierarchy of categories is as follows:

Category	Example
Order	Orchidales
Family	Orchidaceae
sub family	Epidendroideae
Tribe	Epidendraea
sub tribe	Denbrobiinae
Genera	Denrobium
species	kinglanum
variety	alba

The classification of the orchid family is traditionally based on the details of the pollinia and associated features. So let us back up a bit and look at the detailed structure of the orchid column — one of the major factors in orchid classification.

AN = ANTHER
PO = POLLEN
STG = STIGMA
CA = CAUDICLE
RO = ROSTELLUM
VI = VISCIDIUM
STP = STIPE

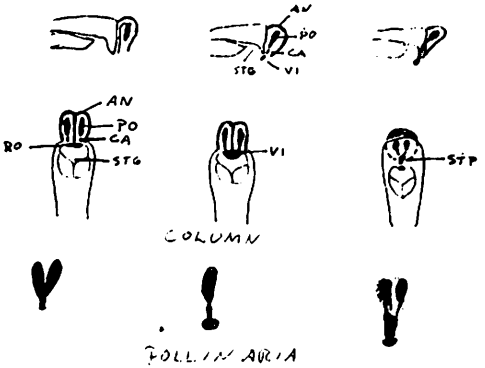
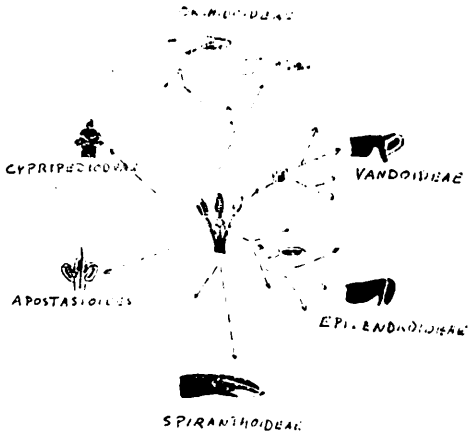


Figure 1

The six sub-families or orchids, listed in order of presumed level of development are:
Aspostasioideae
Cypripedioideae
Spiranthoideae
Orchidoideae
Epidendroideae
Vandoideae

Two of these sub-families are of relatively little importance to orchid hobbyist and will not be covered in any detail in further discussion. These are the Aspostasioideae and the Spiranthoideae. The jewel orchids belong to the latter sub-family, but otherwise none are commonly cultivated. Most of the orchids in collections belong to the Cypripedioideae, Epidendroideae and Vandoideae. You will quickly associate with genera of these sub-families — Cypripedium, Epidendrum and Vanda. Over 50% of all species are in the Epidendroideae. We can't cover all the sub-family relationships, but mention in passing that Dendrobiums, Epidendrums and Bulbophyllums are all in the Epidendroideae; whereas Oncidiums, Vandas and Cymbidiums are in the vandoideae. Of particular interest to New Zealanders would be the fact that most of the native terrestrial orchids are in the Orchidoideae sub-family.

Figure 2 shows the differences in the organization of detailed structure of the pollinia that differentiate these sub-families. Dressler (1981) has indicated that all the major groups have emerged from a common source. The position of the subfamilies in the chart are based on apparent relationships between the sub-families, with those next to each other being most closely related. The degree of evolution within each subfamily differs. Those orchids with two or more fertile anthers are considered the most primitive followed by the Spiranthoideae and



ORCHID SUBFAMILIES

Figure 2

the Orchidoideae although both have members that are far advanced as compared to the more primitive members of the Epidendroideae and Vandoideae. Within the vandoideae, the genus Cymbidium is considered to be the most advanced.

The orchid family appears to be a family in a state of active evolution. "Good" species, semi-species and variable complexes are found as would be expected of a group in active specification. Hyesshyy has stressed that we should not try to derive one group from another but rather observe that the different groups all have features that tie them together. Different groups are considered to be "advanced" in different features and often specialized and unspecialized features are found in one group at the same time. Thus a nice neat hierarchy of family, sub-family, tribal, generic and specific features as previously illustrated does not always follow. Thus taxanomic problems are not all the fault of taxonomists — but in part to orchid evolution.

Orchids appear to have evolved in what was West Gonwandaland, which is the continent that later split to form South America and Africa. The exact location of the first development is unknown, but probably was tropical in nature. At present the most primitive genera are either pan tropical or well scattered. Most experts in this area believe that the orchids developed after the development of flower visiting Hymenoptera (bees and wasps), and the orchids probably evolved in the Cretaceous period or a little earlier. The distribution of primitive orchids, such as Vanilla, Tropidia and Corymborkis — and the distribution of major groups of orchids point to differentiation of major lines of orchid evolution in the later Cretaceous or very early Tertiary period, when South America and Africa were much closer together. A major evolution of orchids took place after the Paleocene epoch (55 milion years ago), when all three major tropical areas were well isolated. By this time Dressler proposes that all six sub-families were present in recognizable form — with primitive representatives of most tribes already established or to become established shortly thereafter.

There appears to be general agreement that orchids have evolved to their pollinators, and that the origination of orchids from the related lillies occured at about the time of appearance of bees about 80 to 100 million years ago. At present still about 60% of the orchid species are bee pollinated. (Figure 3).

It is always fascinating to see two distinct species, that are interfertile, retaining their speciation even though they are growing on the same tree. In order for this maintenance of identity to occur, there must be a reproductive barrier or isolating mechanism. Dressler again emphasizes that

ESTIMATED POLLINATOR SPECTRUM

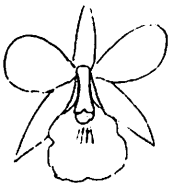
HYMENOPTERA

Lower Bees	16%
Carpenter Bees	11%
Euglossini	10%
Mixed Bees	10%
Social Bees	8%
Wasps	5%
	60%

OTHER AGENTS

Flies	15%
Moths	8%
Butterflies	3%
Birds	3%
Mixed Agens	8%
Autogamous	3%
	40%

SYNDROME — In pollination ecology. The complex feature which suggests the adaptation to a particular class of pollinators



GULLET FLOWERS — Any flower that forms a chamber into which the pollinator must enter.

Figure 3

reproductive isolation is a critical step in speciation. Generally no single feature is operative, but several different features operate in combination to achieve the isolation. The factors most commonly listed as contributing to isolation are:

1. Prepollination systems
   a. temporal—such as season
   b. floral—such as ethological, structural, chromatic and olfactory.
   c. reproduction mode.
2. Post pollination systems
   a. incompatability
   b. hybrid unfitness—such as hybrid not viable in nature hybrid is

sterile, or hybrid breaks down in later generations.

Of these the floral barriers are perhaps the most fascinating. The interrelationships between behaviour and structure (chemistry) of plant and pollinator can — and have — filled many chapters. Pollinator behaviour is always related to some response to features of the flowers being pollinated. Size differences in flower (Figure 5), difference in spur length, colour and perfume are some examples.

and birds. About 3% of the orchids species are self pollinating — which is the ultimate in isolation. Table 2 illustrates some features of flowers adapted to different polliators.

Unlike many other flower families, evolution has not gone towards the adaptation (to any great extent) to social bees. Dressler attributes this to the fact that social bees are not well adapted to dispersed populations — such as the orchids. On the other hand orchids have become specialized to

Figure 5 ***SYNDROME ASSOCIATE WITH FOLLOWING POLLINATORS***

	BEE	MOTH	BUTTERFLY	BIRD	FLIES
Anthesis	Diurnal	Night	Diurnal	Diurnal	Varied
Landing Platform	Prominant	Curved or Turned up	Horizontal, Lobes weakly Dissecte	Absent or Curved Back	Landing by Steps
Color	Blue, Violet, Purple, Yellow, White	White, Cream Green	Vivid Red	Vivid Scarlet Contrasting	Dull and Spotting
Odor	Fresh, Sweet	Heavy, Sweet	Agreeable Fresh	Absent	Often unpleasant
Nectar	More or less hidden	Abundant, hidden	Bee Moth in long narrow tubes	Very abundant	Absent
Nectar Guides	Present, Complex	Absent	Present, Simple	Absent	Absent
Flower Position	Horizontal	Rarely erect, Hanging	Erect	Tubular Flowers Horizontal or Hanging Freely	Varied
Other	Trap Devices Mimicry	Sexual Organs Protruding	Sexual Organs Usually enclosed	Hard flower Wall, protected organs Alpine growth Habit	Slits, Holes, Transparent Window Guides, Brown Furry Hair Trap Devices

Generally evolutionary trends in flowers have been from non specific — even promiscuous — pollination systems to highly specialized relationships. Even the most primitive types of orchids are reasonably well advanced. The estimated distribution of pollinators (in %) are in Table 1. bees and wasps make up the majority of pollinators, followed by flies, Lepidoptera (butterflies and moths)

groups of non social Hymenoptera.

Orchids have evolved a number of systems in which the orchid offers no rewards (relying on mimicry or deceit) or offers a reward other than food (perfume or wax). This "stinginess" appears to have several advantages to the orchid — these include: (a) a better system of isolation; such as in pseudocopulation, (b) greater attraction of the pollinator, (c)

pollination over greater distances, (d) greater outcrossing and (e) longer visits by the pollinators.

I would like to digress at this point to tell about a story of a friend who was working on the pollination of three Epidendrum species that grew in the same area, but remained speciated. No natural hybrid populations were observed, but man made hybrids do exist. These orchids were heavily scented — and were pollinated by small euglossa bees. He collected the perfume of these flowers and isolated and identified the compounds. One compound was common to all three flowers. When put on a blotter in the area where these orchids grew, about 50 of the known 65 species of bees were attracted to the blotter. As he slowly added other compounds found, fewer bees were attracted. When he chemically reproduced the perfume of one of the flowers, only two bees came to the blotter — one was the real pollinator. Each flower had a different chemical make-up to its perfume and each was pollinated by a different bee. In addition, the position of the pollinia on the bees body was also different in each case. By the way — only the male bees were active in pollination. Dodson has suggested that they use the nector from the flower to attract females — with the supposition that it acts like a pheromone. Another point of interest in euglossa bee pollinated orchids is that the most common species of bee is also generally the pollinator of the most common species of orchid in the area.

It is interesting to note that different pollination systems often follow generic boundaries. Cattleyas and laelias are pollinated by large bees; whereas Brassavolas are moth pollinated. Where members of these genera occur in the same habitat, natural hybrids exist between Laelia and Cattleya species, but not between these genera and Brassavola. Of course most here are familiar with Brassavolalaeliacattleya (BLC) hybrids.

One of the most accepted factors involved in speciation is geographical isolation, where gradual speciation is usually considered as the major pattern of speciation. While geographical isolation is essential to speciation, other factors must also be involved. The major one is prepollination isolation. Flowering time is a simple example. Adaptation to another pollinator is probably much more significant, in which case two different pollinators must be effective for a period of time. In Guatemala we have seen C skinneri (bee pollinated) and C. aurantiaca (bird pollinated) form C X guatemalensis — which can form hybrid swarms. In fact some forms have been given species status — C.deckeri is an example. In addition to gradual speciation, the combination of isolation mechanisms in orchids can give rise to fairly abrupt speciation. A change in structure that attracts a new pollinator is a good example. (Figure 4). Similarly the invasion of an orchid into a new area can evolve a new species if the original pollinator is not present and another pollinator is minimally effective. This would be expected to give rise to selective pressure for reorganization of the flower to better accommodate the new pollinator.

Hybridization also has other roles in speciation. The most subtle effect is the integration of gene material from one species into another, causing variation in one or both species. Its importance lies in the introduction of a new adaptive system and can permit individuals to accommodate to new environments.

(To be continued)

Rotorua Seminar — 21st August 1982

Roger Cooper, Wellington Orchid Society

The orchid seminar has become a regular part of the annual calendar of orchid events in New Zealand. This year there are no fewer than three seminars — at Rotorua, Masterton and Christchurch. Judging by the interest and attendance and by the standard of speakers at the few seminars that I have attended, seminars are likely to remain a permanent and popular part of the orchid scene — and a welcome one too! It is a healthy sign of a rapidly expanding interest in orchid growing that is affecting (infecting?) all regions of the country.

The Hamilton seminar, held last year, was specifically aimed at the more experienced grower with excellent talks on biological aspects of orchids (by J. Arditti) and culture, breeding and marketing. In contrast the Rotorua seminar was specifically aimed at the less experienced hobby grower with most speakers concentrating on aspects of basic culture.

Tom French concentrated on a few fundamental 'growing tricks' to make growing Cattleyas easier for the 'lazy grower,' possibly the most useful of which was to use a very open potting mix. This removes the worry of over-watering — you can't. Jim James gave an interesting account of the impact on Western growers of the hybridising achievements of J. Yamamoto in Japan with nobile-type dendrobiums. To induce flowering in this group which have a tendency to throw keikeis instead of flowers, one needs only to withhold nitrogen feed from January (or at latest, March) onwards. The traditional method of withholding watering altogether is not necessary. George Fuller, who threatened open conflict with the microphone at the start of his talk, pointed out the orchid world in our own back-yard, claiming that New Zealand native orchids are as beautiful and intricate as any, though smaller than most horticultural varieties. George ended on quite friendly terms with the microphone. Ron Maunder then revealed his love affair with the Greek beauty, Lycaste, and presented a fine set of colour slides of the important species used in breeding.

Using a Thunia marshalliana pseudobulb as a baton George Fuller next conducted an interesting outline of the basic design of an orchid plant, ending his talk with his choice of 10 species for beginners. They are: Thunia marshalliana, Pleione, Dendrobium kingianum, Paphiopedilum insigne, Sobralia macrantha, Laelia anceps, Oncidium flexuosum, Epidendrum ibaguense, Maxillaria variabilis, and Sarcochilus hartmannii. Ross-Taylor covered the growing of Odontgolossums and Colombian Miltonias (Miltoniopsis) stressing the need for humid fresh air, air movement and thorough leaching of the mix after feeding. The importance of distinguishing the warm-growing (20°C min.) Asian slipper species from the cool-tolerant ones was the message from Alan Jones if you want to succeed with the culture of this group. He recommended crocks in the bottom

of the pot and passed around an excellent demonstration pot cut vertically to show the mix inside. Don't try and grow Phalaenopsis if you can't keep them warm (18—20°C min.) advised Tom Trench in the final talk. "It is the conditions that grow the plant — get the conditions right and your plants will grow." This concluding remark applies to all orchids and suitably summed up the main message of the whole seminar.

The weather was beautiful, the food excellent and the organisation of the conference smooth and unobtrusive. Congratulations to the Rotorua Orchid Society.

WATERING

Reproduced from O.C.S.A. Bulletin

Despite the fact that there has been much written about it, and a great deal of discussion, the matter of how often you should water your orchids still causes problems. The following comments may help you to evolve a system which satisfies your conditions.

1. You cannot expect to fix a strict timetable for watering orchids. The frequency of watering is governed by many factors — the type of pot and the potting medium used; whether the plant is in active growth; the average temperature and humidity; the amount of light available to the plant; the degree of air movement around the plant.
2. Many orchids are watered far too often. It is suggested that most growers could halve their normal watering schedule by substituting a fine mist spray for about five minutes for every second occasion on which they would normally be watered.
3. When an orchid plant starts to look dry and wrinkled do not immediately think that it needs water. It can show these symptoms if the roots have rotted and there is no way for water to get to the plant.
4. Plants use water as a medium to carry dissolved materials from the place where they are available to the place where they are needed. This is a two-way flow — upwards from the roots and downwards from the leaves.
5. In those orchids which have pseudobulbs or canes, water can only be stored for short periods as a reserve in times of drought.
6. Water in the internal cells of a plant helps to keep the pseudobulbs, canes, leaves and flowers plump and fresh.
7. Water enters a plant through the roots and excess water can only be disposed of through the leaves by transpiration and evaporation to the atmosphere. When the atmosphere is damp and humid, and there is no air movement, transpiration cannot take place.
8. The process of respiration helps to keep the plant cool and prevent burning of leaves.
9. The roots of an orchid are made up of a fine central tube surrounded by a layer of fleshy absorbent material known as velamen. The tube on its own cannot take in water, it must first be absorbed by the velamen and then filtered through into the central tube.
10. To remain healthy this velamen must be allowed to dry out after it has soaked up sufficient moisture for the needs of the plant. If the velamen remains wet for long periods it is attacked by moulds and fungi and can be destroyed. Once the velamen has been destroyed that particular root is useless.

11. On its upwards movement from the roots to the leaves the water carries minute amounts of dissolved plant nutrients to the leaves. These nutrients, plus sunshine and carbon dioxide from the air, and some of the dissolved oxygen in the water are used by the leaves in the process of photosynthesis to make a sugar-like material known as sucrose. This sucrose is then diluted by the water and carried back down to the plant to the new leafy growths, or the green growing tips at the end of the new roots.
12. Excess sucrose cannot be stored. If too much is manufactured it is exuded in the form of small drops of nectar at the tips of new shoots or the sepals of the flowers.
13. When flower buds have just left their sheath they require the pressure of rising water in their cells to expand the petals and sepals. In chemical terms this is known as osmotic pressure.
14. The most efficient use of water can only take place when both the roots and the leaf surfaces are clean and healthy. The best means of ensuring this is to allow some time for the compost and the roots to dry out; and by regular spraying of the leaves to remove accumulations of dust and dirt.
15. There are three sets of circumstances when a plant may safely be given water —
    (a) When the days are warm and sunny and the process of photosynthesis in the leaves can proceed without interruption. Any excess water is passed out by transpiration.
    (b) When the new vegetative growth has started and the new green root tips can be seen at the base of these growths.
    (c) When flower buds are just emerging from the sheath.
16. Conversely, there are circumstances when water should not be given to a plant —
    (a) When days are cool and cloudy and photosynthesis has slowed up or stopped.
    (b) Whenever there is high humidity and little air movement. At such times respiration and evaporation cannot take place.
    (c) When the plant is not showing signs of active growth or flowering.
17. On this question of when to water there is only one hard and fast rule to adopt. WHEN IN DOUBT — DON'T.

One final word. These notes refer mainly to orchids which have pseudobulbs or canes. The watering requirements of paphiopedilums, phalaenopsis and members of the vanda alliance are slightly different because they cannot store excess water.

WHANGAREI ORCHID SOCIETY STRIKES GOLD

During the recent 7th Australian Orchid conference held in Brisbane, September 1982, the Whangarei Orchid Society gained 1st place in the Best Display by an Interstate or Overseas Society's section. This was in competition with Japan, Papua New Guinea, Thailand, Australian States and fellow New Zealand Societies. Third prize in the Novelty Cymbidium, Red/Pink, section was won by D. Spehr of Whangarei with Bulbarrow var 'Northland.'

The Grand Champion of the show was Phal. Abendrot tabled by K. McFarlane of Queensland.

The show was held in the Greek Community Centre in South Brisbane which boasted excellent facilities, Conference room, bar and

restaurant. Dominant in most displays were the hard and soft caned Dendrobiums complemented by the variety of native species present.

Our group of 25 members left Whangarei on Sunday 19th, following our own successful show, swelling to 33 in Auckland. On arrival in Brisbane we were met by John Maynard from the Queensland Orchid Society, who kept a fatherly eye on us for the duration of our stay.

The Whangarei Orchid Society Group owed its success to their host Society for the help they gave in supplying foliage plants and staging. We were also treated to an enjoyable days outing around Redcliffe members own collections interupted by a gourmet buffet lunch, more orchid collections concluding with a Mayoral Reception at afternoon tea in the Council Chambers.

The success of this trip makes us recommend to fellow Societies in New Zealand to think ahead to Townsville 28th August to 4th September 1983 where registration needs to be confirmed. All correspondence to: The Secretary, Box 129, Townsville, North Queensland, 4810.

NEW ZEALAND NATIVE ORCHID GROUP

Dorothy Cooper

The group is thriving, we have over 100 members and already we are beginning to learn something about native orchids in areas of the country other than our own.

One article contributed by E.D. Hatch in the last newsletter is worth thinking about, several of our native species occur in water, I have recently come across a colony of **Corybas orbiculatus** — in a swamp with water running over the flowers!

Prasophyllum suttonii (P.patens)

How do the seeds germinate?

E.D. Hatch

I only ever found **Prasophyllum suttonii** once, in January 1945, in a pond or tarn in the State Forest plantations above Tangiwai, on the south-western slopes of Ruapehu.

The water was shallow — 100—150mm deep — and studded with little hummocks of **Calorophus minor.** The hummocks themselves, about 600mm in diameter, supported numerous plants of the washed-out looking **Pterostylis micromega** and the **Prasophyllum** grew in the open water between the clumps.

It occurred to me at the time to wonder how the **Prasophyllum** seed germinated and got to the bottom of the pond. They would obviously come down on the surface of the water — but what happened next? Then there is the anaerobic problem. Orchid development in my experience is notoriously dependent on a free flow of air, and how do they get on under water? We have a great deal to learn about many of these plants before they disappear forever with the draining of the swamps.

It is interesting to note that Cheeseman in the 1906 **Manual,** records both **Pterostylis micromega** and **Prasophyllum patens,** as he called it, from the Ngaire (Ngaere?) Swamp near Mt. Egmont. I found the **Pterostylis** to be fairly frequent in bogs round the central mountains during 1942—45, and it occurs occasionally in the lower Waikato, but I only once found the **Prasophyllum** growing with it.

PUKEKURA CORNER

By George Fuller, N.D.H. [N.Z.],
Curator Pukekura Park, New Plymouth.

The Pride of Table Mountain

Few orchid species have aroused the level of world-wide interest that has centered around the ground — dwelling Disa uniflora. Once common enough to be picked wantonly as a cut flower, its great beauty and practical qualities contributed to its demise with the result that it is now a heavily protected species in its native habitat.

One of the great thrills in recent years is the increase in stock and range of forms and we have now come to a stage where a seed bank can be formed.

In view of the fact that many areas of New Zealand have climatic conditions roughly comparable to those in the Cape Town region, habitat of Disa uniflora, the cultivation of one of the worlds most striking and sought-after orchids comes within the capabilities of a great many plant lovers here.

An erratic supply of plants has limited distribution and will continue to do so for some time yet but because the seed of this orchid can be raised without the need for flasking and the plants come to maturity within about three years, there are good prospects of this situation changing.

Several enthusiasts in Taranaki have been exchanging plants and seeds with the park and each other over the past few years and having become proficient at raising seed and growing and flowering these handsome orchids, feel that they should share their experiences more widely by distributing seed.

Germination of the seed is possible without the aid of a glasshouse or elaborate facilities, though winter protection would be necessary in the more southerly areas of New Zealand. The procedure is similar to that used for begonia seed or fern spores. In this region the plants can be grown with a minimum of protection such as in a shade house with benefit from a move into the shelter of a cool glasshouse or porch in the winter.

The stock of plants now mature enough to produce seed covers a wide colour range from orange — yellows to dark reds and only plants of good form and flowering habit are pollinated.

The seed will be distributed through the Taranaki Orchid Society as a means of encouraging the cultivation of orchid species and details of availability may be found advertised elsewhere in this journal.

FERTILIZERS

Half strength application during periods of active growth should be the rule when applying liquid fertilizers. Hardy plants like cymbidiums need applications more often rather than stronger doses.

CHRISTCHURCH SEMINAR

Dorothy Cooper

A brief report on a very successful Christchurch seminar. I think these funtions are marvellous. Invigorating, stimulating, and rejuvenating, I only wish there was one every weekend! If you haven't been to one, try and make it to the next, as you don't know what you're missing.

Lectures at the seminar were well worth attending. Good culture advice was given by Norm Porter — Cymbidiums, Ross-Taylor — Miltonias, Ron Roy — Paphs and Dan Collins — mini Cymbids and Cattleyas.

A helpful insight into virus was given by John Fletcher from Plant Diseases DSIR Lincoln, including the use of slides to show what the various viruses look like.

Stafford Brooks gave an interesting video display on photographing orchids covering the four fundamentals of camera, film, background and lighting.

Dr Brian Molloy from Botany Division lectured on native orchids showing some of John Johns's slides and John Campbell (of piano playing fame) gave an interesting talk on growing species with some helpful hints on propagation.

All in all an interesting programme catering for a wide range of interests. Congratulations to the organisers.

Displays of orchids were good, the range of genera was very broad and created much interest. Stands were well provided with staging and cloth by the hosts and my vote still goes to Marlborough Orchid Society for the imagination and work they put into their display — a map of the South Island with the provinces done in different colour cymbidiums. Well done.

Social activities and meals were great and John Campbell's piano playing provided just the right touch to finish off Saturday's evening's excellent dinner.

Accommodation arrangements by Atlantic and Pacific Travel seemed to be well organised too, even for dumb Wellingtonians who although only 2—3 minutes drive from the Horticultural Hall got lost on every trip!

The only adverse comment I heard was that it was an odd time to close — 1.30 pm on Sunday, people were arriving to see the show while we were packing up at 3.

Well worth the trip, lovely to meet people from afar and put faces to names, making new friends is what it's all about.

Awards won were:

Class 1: Best Cymbidium: Cym. Tapestry No. 3, C. Scott, Nelson.
Class 2: Best miniature or novelty (polymin) Cymbidium: 75mm max: Cym. Illiberale 'Stoneleigh.' T. Connelly, Canterbury.
Class 3: Best of Cattleya alliance: Slc Paprika 'Black Magic,' Mrs E. Manson, Canterbury.
Class 4: Best Paphiopedilum: Paph. haynaldianum, Ross-Taylor, Golden Coast.
Class 5: Best other species: Eriopsis biloba, J. Anderson, Wellington.
Class 6: Best Society display — judging points included number of genera, quality of blooms, general colour, layout: Nelson.

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ZYGOPETALUM, Hooker

This genus gains its name from the fact that the petals and sepals are joined at the foot of the column; zygos, in Greek, means "a bond yoke," and petalon, "a petal." These plants have quite attractive flowers which last well even when cut.

An interesting feature with these zygopetalums is, that when they are crossed with another unrelated genus e.g. Cymbidium, the resulting plant and flower still remains on unchanged zygopetalum, identical with the zygopetalum parent.

Zygopetalums are indigenous to Central America, and the Northern part of South America. These plants like an airy, sunny position among your cymbidiums. Any cymbidium compost, as long as it is "open," will suit, rest for a few weeks, at maturation, but at other times, give plenty of water and allow to almost dry out before rewatering. Fertilize regularly.

A Familiar Lament

"O, say, blithe Puck,
Was it not you that through my little bud did chew,
In guise of fat and ugly snail that left its long and slimy trail
Throughout my houses, and causing ravage
Unlike a fairy, but more a savage;
And many other flowers spoil, and breathless make this anxious grower toil
To overcome such pests as you, who care not for the damage they do.
Are you indeed that loathsome sinner who took my Cymbidium for his dinner?"

The above was written in what was no doubt a moment of undivine inspiration, by Leona Harvey, of the South Coast Orchid Club, South Australia.

BOOK REVIEWS

Laeliinae Intergenerics

by W.W. Goodale Moir and May Moir

Here is a little book full of fascinating informaion by the Moirs of Hawaii who are well known for their very many years of delving into the mysteries of orchid breeding. Keen observing, accurate recording and an enquiring mind are some of the keys towards success. This observing, particularly as to the effects of environment and natural hybridization among plants, is regarded as most important by Mr Moir. At their home in Hawaii the Moirs have tried 36,000 crosses of which a number belong to the Laeliinae intergenerics.

The appendix headed 'One Man's Views' gives the reader a brief history of Mr Moir and his life long interest in the study of plant life. This volume covers the 27 related genera and in sections, deals with two, three, four and five-genera crosses. An excellent companion to 'Breeding Variegata Oncidiums' and 'Creating Oncidiinae Intergenerics' by the same authors.

Published for Harold L. Lyon Arboretum by the University of Hawaii Press, Honolulu. Price $US12.00. Soft cover with eight pages in full colour.

P.B.

Slipper Orchids or the Art of Digby Graham

by Robin Graham with Ronald Roy

This is an art book with a difference. Produced on full gloss paper 38 x 27cm with coloured pictures and working drawings, it covers 37 Paphiopedilum species of the 60 known. Each of the plates has a full description and includes the place of origin and flowering season. A short section covers classifying and cultivating.

This is the art work of Digby Graham who died in Whangarei in 1979 before the last of his paintings was completed. His wife Robin has brought the collection together for publication with the help of Ronald Roy who wrote the text which accompanies the plates.

Those who purchased the 1980 National Conference Calendar will be familiar with the art of Digby Graham. He also provided an original drawing of Corybas orbiculatus for publication on the cover of the November/December 1976 issue of this journal. This is a beautiful book for art lovers and orchidists alike — an excellent reference for both municipal and orchid society libraries. Hard cover, published by A.H., & A.W. Reed 1983, 68—74 Kinsford-Smith Street, Wellington 3. and retailing at $45.00.

P.B.

The Cymbidium List Volumn II

by Arthur R. Koester

Companion book to Volume 1 of the same name. This publication covers the period 1977—80 and in concise form lists a new species, more than 420 new grex names, 400 cultivars with more than 510 awards by awarding societies/councils, since 1976. All miniatures and parents are keyed for easy reference — lists are in alphabetical order and where applicable all awards are shown from the awarding body with year, a basic colour description and name of exhibitor.

The booklet is well set out on full gloss paper 15 x 23cm, with soft cover format. A very handy little

volume for all Cymbidium lovers published by Arthur R. Koester Books, Burbank, California.

For those wishing to obtain direct from USA send a bank draft for $US6.95 surface or $US9.95 airmail to PO Box 344, Burbank, California 91503—0344, USA. New Zealand agents are the New Zealand Orchid Society, Auckland.

P.B.

O.C.N.Z. Awards — 1981

Award No. 1/81: **Colmanara Moon Gold 'Taylors'** — CCC — Mr L.E. Taylor. Natural spread 67mm; Petals and sepals cream, overlaid with heavy dun markings. Labellum off-white with purple/dun markings. Short linear yellowish markings basally. Two spikes; 76 blooms and 97 buds.

Award No. 2/81: **Oncidium ornithorhynchum 'Clonburn'** — CCC — Mrs J. Frear. Dimensions: Natural spread 17mm; Colour pale lilac; Four flowering bulbs, one with three spikes and three with two spikes each. Whole plant covered with blooms.

Award No. 3/81: **Lycaste virginalis 'Rochelle'** — CCC — H. and P. Lines. Natural spread 123mm; Colour pale lilac; Four flowering bulbs, ten flowers, five buds; Two new growths. Good quality flowers.

Award No. 4/81: **Cymbidium Bulbarrow 'Northland'** — AD — Mrs D. Spehr. Natural spread, 65mm; Colour, pink with predominant red lip and distinctive spike habit.

Award No. 5/81: **Sarcochilus hartmannii 'Chenery'** — HCC — Mr R.S. Woodhouse. Dimensions: Natural spread 24mm. Dorsal sepal length 11mm, width 10mm; Lateral sepals length 11mm, width 9mm; Petals length 10mm, width 8mm. Lip length 6mm, width 4mm; Colour clear white, sparkling with crystalline texture; base of petals and sepals heavily marked with concentric bars of rust-red. Lip white with buttercup yellow base, calli and pollen cap; column cream. Flower flat and well displayed.

Award No. 1/82: **Stanhopea graveolens 'Evets'** — CCC — Mrs I. Collyns. Natural spread 112mm; Six stems with 27 blooms and one stem with five buds. Colour, pale yellow with brownish to purple spots. Erect concave petals and sepals. Lip fleshy, three parts, with curved horns and reflexed margins.

Beautiful British Columbia and Orchids

The Vancouver Orchid Society extends a warm invitation to all orchid enthusiasts to attend the seminars and Orchid Show to be held in conjunction with the A.O.S. Board of Trustees Meeting from March 9 to 13, 1983. This will be quite a special occasion, as it will be the very first Trustees Meeting ever held outside the U.S.A.

All meetings and functions, as well as an A.O.S. sanction show, will be held at the Hotel Vancouver in the heart of the city downtown, just a short walk to a variety of shops and points of interest.

Vancouver has some of the most magnificent scenery to be encountered anywhere — with the Pacific waters lapping at the miles of beaches and a backdrop of majestic mountains close by, this evergreen playground offers a great variety of recreation and sight seeing opportunities for visitors!

It is suggested that your visit be extended to a spring holiday. Vancouver is the gateway to recreation and travel — a trip to Vancouver Island to tour Victoria with its old-country charm, antiques and fine china; to Campbell River, also on the island, for some of the best fishing anywhere; a cruise up the coast to Alaska; east to Banff National Park and its spectacular scenery and ski on the slopes of the Canadian Rockies. All this and orchids too!

The Vancouver Orchid Society plans to make this a memorable occasion for their visitors.

Further information and registration forms may be obtained by writing to Vancouver Orchid Society, 1983 Show Committee, PO Box 23482, Vancouver AMF, B.C., V7B, 1Ws, Canada.

Photographing Native Orchids

by R.J. Markwick — Native Orchid Society of South Australia

(continued)

Bellows.

Last month we discovered how the magnifying power of a lens could be increased by inserting devices of fixed length between the lens and the camera body, i.e. extension rings. We now turn our attention to a device which provides for adjustable lengths, i.e. bellows.

Bellows can be used with most lenses to give a wide range of magnifications, far greater than close-up lenses or extension rings. However, lenses used for general photography yield images which are sharper in the centre than at the edges,and the best results come from using macro-lenses specially designed to focus up close. Further, ordinary camera lenses are designed on the principle that the lens to subject distances will always be far greater than the lens to film distance. In macro work where the magnification exceeds 1:1 this principle breaks down because of the lens extension, but the problem can be solved by reversing the lens. Adapters are available for this purpose.

Some bellows have the degree of magnification (for a specific lens) marked on the rails. Others are marked with a set of figures which must be referenced against a table carrying details for all of the lenses likely to be used. These markings, are an aid to exposure calculation, for unfortunately, when bellows are used, exposure calculations cannot be directly related to the f number engraved on the lens. Much has been written elsewhere concerning this problem, and I will not be discussing it, I merely wish to inform the uninitiated that the problem exists.

Most bellows do not have provision for automic diaphragm (aperture) control. The ones that do are usually operated by a double cable release designed so that one cable closes the diaphragm just before the other operates the shutter release.

Some are equipped with a double rail track, which allows the entire camera/bellows/lens assembly to be shifted along the lower track for fine focusing, without needing to change the magnification setting on the upper track. A very desirable feature.

Serious close-up photographers consider bellows to be a vital piece of equipment providing the ultimate in quality and versatility. They are capable of producing photographs suited to the study of very small morphological detail, helpful if one has an interest in taxonomy or simply appreciates the form and beauty of the smaller parts of the flower.

Macro-lenses.

So far we discussed close-up lenses, extension rings, and bellows as aids to the close-up photography of our native orchids. Of the optical equipment only macro-lenses remain to be considered.

Since they have been specially designed to work at close focusing distances, macro-lenses undoubtedly provide the best optics for close-up work, some even automatically compensating for extensions.

Macro-lenses capable of focusing from infinity to close-up are

available to suit many of the popular SLR cameras, but they are generally quite expensive to purchase.

Two superb brand-name lenses are the 55mm and 105mm Micro-Nikkor (Nikon) close-up lenses. Without any special attachments, both of these lenses will focus up to ½ life size with excellent resolution. This magnification is suitable for photographing the larger of our generally quite tiny South Australian orchids. Used with special auto-extension rings which preserve the full aperture exposure measurement and automatic diaphragm functions, their close-up capability extends to life size, generally suitable for detailed photographs of all but the smallest species, e.g. Microtis and the miniature Prasophyllums. Both offer a minimum aperture of f32 permitting good depth of field, while the longer focal length of the 105mm lens permits a greater working distance which allows for easier illumination of the subject.

I use a 90mm vivitar Automatic fixed mount Macro lens with a Nikkormat FTN. It functions very well as a medium telephoto lens, focusing to life size without any attachments at a lens to subject distance of 17cm. Using certain techniques basic to good close-up photography (to be discussed in a future article), this lens has produced very acceptable results in the field.

These lenses are examples of normal macro-lenses. The other type is the special short-mount macro-lens designed for use with bellows. These lenses don't have a focusing ring of their own. Many of the popular camera manufacturers produce such lenses, commonly with a focal length of 135mm. Like ordinary general purpose lenses, they will focus from infinity down to their closest focusing distance, but of course, they are not as convenient to use for general applications.

Cymbidium Culture Notes

by Gordon Maney of Palmerston North

By now you should have done the bulk of your repotting and breaking up of large plants, (if necessary) and of course cleared away the weeds and washed down the glasshouse ready for the new flowering season.

However, the feeding of plants is extremely important from now on if you are to have good strong spikes and plenty of flowers.

At this time of the year, nitrogen is cut down otherwise you will get all growths and few spikes.

A top dressing of 2 parts blood, 6 parts super and 2 parts potash, spread round the top of the plant at the rate of a tablespoon to a 9 litre bucket. Be careful not to get it into the leaf axils, otherwise you'll burn them. You should do this once during January and again in February. With the hot weather and watering more frequently, the fertilizer soon gets washed through.

If your plants are outside under shade cloth, make sure you water thoroughly as the plants dry out much quicker.

With overhead sprinklers they will need to be on for two hours. For liquid feed, use Phostragen each week but always remember water today feed tomorrow.

Never feed a dry plant.

It's wise at this time of the year to keep up a regular spraying program for red spider.

If you have a problem with scale, make sure you get rid of it as quickly as possible. Insects such as these will make your plants sick and naturally they will not thrive.

If you see a plant with scale stand it on a bench and spray thoroughly with all-seasons oil and wettable powder Malathion. These two ingredients are compatible and readily mix together.

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Cross157: **MALONES 'JUPITER' x (CONSOLE x ORION) 'NERO'**
'Jupiter' has a large wine flower while 'Nero' has an intense purple flower of excellent size.

158: **HOSHIMUSUME 'HAMING' x (ORIENTAL PARADISE x USUKI) 'GIANT'**
'Haming' has a flat round cream flower with a lemon throat. 'Giant' is a robust squat plant with flowers similar in colouring to 'Haming'.

159: **RED FAIRY 'MARI' x (CONSOLE x ORION) 'NERO'**
'Mari' has a bright red flower on a relatively short cane. 'Nero' has a large purple flower.

160: **HOSHIMUSUME 'CANARY' x (ORIENTAL PARADISE x YUZUKI) 'GIANT'**
'Canary' has a round cream flower with an intense orange lip — yellow flowers are possible from this cross.

161: **(YUMEJI x REIMEI) 'H.H.' x HOSHIMUSUME 'HAMING'**
'H.H.' has a large white flower tipped with mauve and a dark brown lip. Colours range from cream to white with interesting lip colours.

(Lynda & Brian Pryor)

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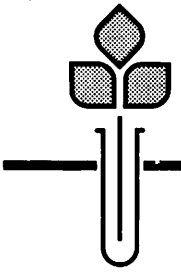

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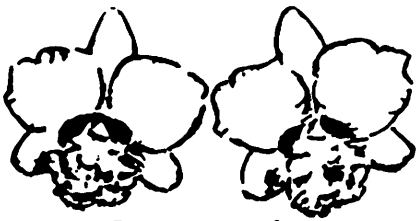

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Phone: Otaua 753

SEED OF DISA UNIFLORA

Availability is subject to the following conditions:

(a) Application to include a clearly self-addressed (not stamped) envelope and an imbursement of $2 to cover costs.

(b) Applications fulfilled in order of receipt, distribution commencing with the harvest in March, April and May, 1983.

(c) Should the demand exceed the 1983 seed supply, orders will be held and supplied in March, April and May 1984.

(d) Any orders not supplied by **May 1984** will be cleared by return of imbursement less postage.

(e) No correspondence will be entered into but instructions giving guidance to germination and cultivation will be supplied with the seed.

Application for seed together with self-addressed envelope and imbursement for $2 should be sent to the:

Secretary, Taranaki Orchid Society,
Mrs R. Scheliin,
47a Endeavour Street,
NEW PLYMOUTH

Please note that no seed will be available until March 1983 because the seed must be freshly harvested.

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From the Beall Company Vashon Island USA

* **Crispum type Odontoglossums**
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* **Paphiopedilums**

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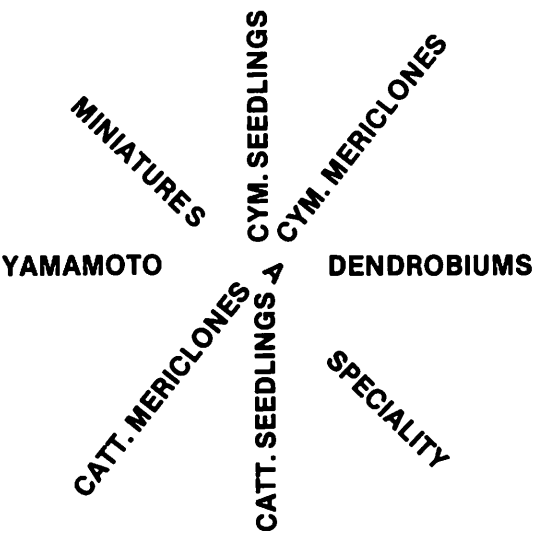

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1.	Amesbury 'St Patrick' HCC	—Ex green
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3.	Dag 'Dandy'	—Yellow/green pure colour
4.	Dagonet 'Pink Beauty'	—Pink
5.	Ensikhan 'Alpha Orient'	—Early pink
7.	King Arthur 'Merlin'	—Bronze/yellow
9.	Mary Pinchess 'Limelight'	—Yellow green
10.	Oriental Legend 'Cinnamon'	—Light tan
11.	Oriental Legend 'Enchantress'	—Soft pink
12.	Oriental Legend 'Golden Harvest'	—Light yellow
13.	Oriental Legend 'Wild Rose'	—Deep pink
14.	Pelleas 'Zuma'	—Light brown
16.	Sharon 'Kermit' (Showgirl x Amesbury)	—Green
17.	Swan Lake 'Snowcap'	—White
18.	(Sweetheart x Ann Green) 'Pink Gin'	—Pink (soft)
19.	Sylvia Miller 'Serendipity'	—Bright yellow

$10.00 each plus $3.00 freight and packing per shipment in New Zealand. New customers $5.00 deposit with each order please.

Contract seed sowing and replating service. Write to the Manager, Tony Minett for details.

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We have received a small supply of the following Yamamoto Dendrobium seedlings: 1180, purples — 1181, mauves — 1182, red/purples — 1183, whites — 1185, yellows. We hope these will be released from quarantine before Christmas. All are size B and are priced at $7.50 each or one of each (5) for $32.50.

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We are most desirous of having those plants referred back to us with the view of purchasing or sharing for mericloning purposes.

The first of our own hybrids have this year shown their blooms. Much more will be heard of them.

Our present offered seedling lists surpasses any other listing offered in New Zealand.

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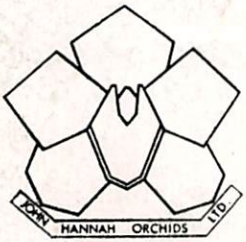

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