

# The Red

## *Dendrobium speciosum subsp. curvicaule*

By  
Sid Batchelor

In the December 1990 Australian Orchid Review, David Banks and Steve Clemesha make a brief reference to a red clone of *D. speciosum subsp. curvicaule* in their informative article "Dendrobium speciosum - A Review of the Species." This is the story of that plant.

Late in September 1990 Kevin Hipkins of Royale Orchids flowered a plant of *Dendrobium speciosum* which he had received at his nursery as a legally collected bush seedling from north Queensland three years previously. Kevin rang me to say that he was sending the plant to me to see if I was interested in working with it in my breeding programme. It arrived in due course, in full flower. It was a plant of *Dendrobium speciosum subsp. curvicaule* from the northern part of the range of that orchid.

But this was no ordinary *Dendrobium speciosum*. It carried four upright spikes of flowers, nicely clear of the foliage of the plant, the flowers were of good shape and texture and of reasonable size, but they were RED! Well over half of each flower was red, not the odd streak or blotch of dull red that we have seen in *Dendrobium speciosum* before, these flowers carried a consistent pattern of deep bright red over much of the flower, including the petals. It is the most striking Australian Native *Dendrobium* Species that I have ever seen.

The plant was admired by a large number of native orchid enthusiasts - all agreeing that it was *D. speciosum subsp. curvicaule*. Of course there was the odd vague comment of 'It must be a hybrid' from a couple of people who had only seen the photographs - but with what? The growth habit of the plant is typical of the subspecies.

I contacted Kevin and advised him that I would most certainly be interested in working with the plant, and asked him what he had in mind with regard to a breeding programme. His reply surprised me to say the least, saying: "You are the native man, you do whatever you think is best." How many people would be prepared to let a valuable plant like this out of their collection and into the care of someone else to work with without instructions or restrictions. I felt very privileged and honoured to have the opportunity to work with this plant under these conditions. The programme so far has been quite satisfying. We have had good germination of a selfing, and sibling crosses with *Dendrobium speciosum subsp. speciosum*, *Dendrobium speciosum subsp. curvicaule* and *Dendrobium speciosum subsp. pedunculatum*. I made no hybrids with it this year - maybe next year when I have had a chance to further consider the possibilities.

Kevin has given the plant the clonal name of 'Margaret Healey'.

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# "Red" *Den. speciosum*

by  
Ross Wirth

In completing this article I have revised my first one published in August 1991 (written 19th. February 1991) and the second prepared for the A.N.O.S. Far North Coast Orchid Society monthly bulletin dated 17th July 1991. Developments that occurred later last year have also been included.

My introduction to this fascinating and controversial form of coloured *Dendrobium speciosum* came as quite a shock to me two years ago. Being a *Den. speciosum* freak I have been obtaining all varieties over many years and have them growing around our swimming pool, at ground level and in hanging wire baskets. I couldn't believe my eyes one morning early in August 1989, when I saw a clone opening its early flowers that showed intensive spotting which gave a "Red" appearance. I put the plant in a safe spot, away from visitors' hands, and watched the later flowers as they came out, all coloured. A fortnight later another miracle happened, two more clones opened their flowers, also all spotted - so started our activities. At this stage I had not spoken to Steve Clemesha and learnt of the similar spotted clone he was familiar with, collected in the mid New South Wales coast, so therefore my amazement.

I sent photos to Ted Gregory and Steve Clemesha for their comments.

The history of the clones I had is very interesting. John Mewburn, a well known Australian orchidist from Queensland, gave me, as a gift in 1987, a quantity of *Den. speciosum* varieties which included four that were of the spotted form. The fifth I obtained from another Queensland area.

I decided to give them all clonal names starting with 'Red' and they are as follows, (the names date from 1st. February 1991).

1. *Den. speciosum* var. *curvicaule* 'Red Prince'
2. *Den. speciosum* var. *curvicaule* 'Red Tzar'
3. *Den. speciosum* var. *curvicaule* 'Red Star'
4. *Den. speciosum* var. *curvicaule* 'Red Spot'
5. *Den. speciosum* var. *curvicaule* 'Red Denis'.

Their origin and mystery is so interesting. I'm sure that they will create a lot of discussion (they already have, theories and opinions are in from everywhere) as more information comes to light. My own observations are that three of the clones from John Mewburn, I feel sure, came from northern Queensland and another Queensland area so there could be a considerable spread of their locations. One of the spotted clones is reported as coming from the Bega, N.S.W. area, however, this cannot be confirmed and cannot be considered as an origin factor.

The condition of the clones, as I received them, indicated that they came from a fairly hard-growing area, however, after four years of ownership I feel they have responded to cultivation and improved quite well.

Regarding the colour of the flowers of the above clones, I am quite sure that Steve Clemesha's description that "This desirable clone exhibits deep cream flowers with distinctive deep purple spots" (A.O.R. 55/6 December 1990) is correct. The colour called "Red" is a loose description, it is in fact a grouping of deep purple spots. The more spots there are the more the impression of a solid "Reddish" block of colour, but it is a deep purple. This spotting is similar on all my clones' flowers, it does vary however from flower to flower and clone to clone. Some of the tepals have up to half coloured and some labellums up to three-quarters coloured.

Regarding the culture I use; we are on the Richmond River about 35 metres away from the water's edge, the shade house and pool are bordered by sugar cane on two sides, one is 10 metres and the other is 25 metres away. Using plenty of light, I let them have full or half day direct sun from April through to flower spike and bud form, then get them into a light or dappled shade, with no direct sun during flowering. I fertilise and water well during the flowering period and have to inspect each day or twice a day for the cursed *Dendrobium* beetle; this inspection has to start from August through to March.

The first three of the clones flowered in 1989 and the remaining two in 1990, the last to flower was 'Red Denis' and was given to Mr. D. Lynch, President of A.N.O.S. Far North Coast Orchid Society who is a well respected and qualified authority on *Den. speciosum* and also a judge.

In 1989 Denis, Mike Symmons and I started a hybridizing activity at Mike's nursery, Pacific Orchids. Mike is doing the pollinating and we found the clones were all quite good parents. We get really excellent flasking results, Vic Miscamble and his wife did our flasking at Coolangatta, the success rate was beyond our expectations. The *Den. speciosum* crosses provided good seedlings, unfortunately they were all sold hardly before they hit the bench - sorry we have to wait another year.

In June 1991 the saga of the "Reds" again evidenced itself in my collection, this time a small clone flowered with the multiple massed purple spots on all its flowers.

Luckily, the flowering occurred a fortnight before Steve Clemesha visited and spoke at our monthly society meeting. The history of this clone is quite different from the others reported earlier in this article. This time the plant, as it turned out, was actually one given to me by Steve in August 1986 and tagged showing that date and specifying it was a *Den. speciosum* var. *pedunculatum*. The identifying, original tag still in the pot is in Steve's own handwriting, he recognised this fact, as I had a day or so before he came up, but unfortunately he had no idea of its origin or that it was a "Red" clone he had given me five years ago. It was a remarkable coincidence. He did agree on the night of our meeting to the clone being named 'Red Clemesha' in line with the others, also he confirmed it was the variety *pedunculatum*. It certainly has been a very good example of the value of recording pertinent facts on tags.

This clone is a group of eight pseudobulbs, 4.5cm tall and with one, two and three tough leaves to the bulb. There was only one raceme on each of the two bulbs that flowered. The new bulb that grew is only 5cm tall, this together with the small flowers indicates it is a dwarf variety *pedunculatum*. The cream colour and deep massed purple spots are similar to the variety *curvicaule* ones but of course much smaller.

Steve, at our meeting, again referred to the coloured spotting, he is still at a loss to understand the reason for it, the unpredictability and the vast distances between locations.

The last event in this procession occurred in the spring of last year. I went out to water my collection and to look for beetles, when I noticed another clone opening its first flower. I had another clone that started to show spots!!! After several days all of the flowers were out and similarly spotted. My first reaction was why me, why am I getting all these clones?

This plant is probably the best I have, the flowers are larger, just as clearly marked and the clone is more robust. It is a Queensland plant that we have recorded as *Den. speciosum* var. *curvicaule* 'Pacific Red Spots'. I have given it to Mike Symmons, in fact, I have given all the other spotted clones to Mike and Denis between them as I believe at my age (71 years) they have many more years than I to develop and study this segment of our most fascinating of Australian orchids. Our good friend Wal Upton has his own experience with "Red" forms and kindly gave Mike pollen from his "Red" clone, variety *pedunculatum*. This was used on Pacific Red Spots' and to date is doing well in the flask.

I have another complicating matter that is very interesting and worth reporting. At the Annual Spring Show of the A.N.O.S. Far North Coast Orchid Society that was held last spring (August 1991), one of our longtime native growers tabled a *Den. Lemon Glow* (*Den. Jamie Upton* x *Den. speciosum*) that had its flowers identically "Red" spotted to ours. The massed, dark purple spots were quite similar, the flower shapes of course were different. The owner, Neville Kirkland has had the plant for some time, he grows it in Alstonville here in the north coast some 20 odd kilometres away from us. There obviously is some relationship here and we would be pleased to hear from any other growers having hybrids so marked.

Mike and Denis have again made a number of sibling crosses using the "Red" clones' pollens also as mentioned earlier Wal Upton's spotted variety *pedunculatum*. These together with a number of other *Dendrobium* hybrids with the Reds' are developing quite well in flasks.

*From Orchids Australia, October 1992, p41-43*

# Thoughts and Observations on Red Spotted *Dendrobium speciosum*

By  
Neil & Meg Finch

Over the past few years there has been a lot of talk about plants of *Dendrobium speciosum* that have varying amounts of red markings on the floral segments. During this time I have observed many of these plants and spoken at length with many experienced growers about this phenomenon, and feel confident enough now to make public my thoughts on the matter, however, I must stress at this point that they are just that, my thoughts and growers of plants of this type should wait for conclusive evidence before deciding what they should do with these plants.

I strongly suspect that this phenomenon is caused by the presence of an, as yet, unidentified virus which is infecting these plants. My reasons for thinking this are as follows:

1. All the subject plants that I have seen are poor performers, rarely flowering well and usually smaller than normal flowers on small twisted spikes. The flower count is also usually much lower than one would expect. Further, many of these plants have mutated flowers on these spikes. It does appear that this phenomenon moves through the plant relatively slowly and it is possible a plant may only show these symptoms on the spikes of older bulbs whilst the spikes on new sections do not. I would suggest that such plants have not been infected for very long.

2. Most of the subject plants are poor growers and suffer more problems from fungal infections in the roots as well as the leaves, possibly due to a weakened immune system caused by the virus. The new growths on such plants often show chlorophyll deficient sections randomly distributed. This is most observable when these growths are immature. At this young stage the leaves look like they are variegated, however, it is often hard to spot. This type of symptom is common in other virus infected plants.

3. One of the most convincing pieces of evidence is that there are some collections around where these plants are present, within which this phenomenon has spread to other plants of *Dendrobium speciosum*, which have been in cultivation for many years but only recently started flowering with red markings on the flowers. These collections are often neglected and suffer from aphid infestation and I strongly suspect that they may be one of the vectors. It makes me suspicious when only a few years ago red spotted *Dendrobium speciosum* was unheard of; now, however, many growers are saying that they have more and more of them showing up in their collections each year. If this is a virus then it spreads quite quickly under the right conditions.

Although no conclusive evidence that this phenomenon is a virus exists at present, I personally am convinced that it is and I am not alone in this thinking. I therefore hope other lovers of our native orchids will listen and take extreme care when handling these plants until an answer can be given by those currently carrying out tests on some of these plants. In the meantime I would recommend that growers take the following advice.

- a. Isolate these plants from all your other plants.
- b. Insure that these plants don't become pest infected as they may spread it to your other plants.
- c. Don't cut any part of these plants unless all your implements and your working area is thoroughly sterilised after being in contact with them. Don't forget to wash your hands.
- d. Don't reuse anything that has been in contact with these plants, such as pots, tags, compost etc. as they can also spread virus to the next plant they contact.
- c. Don't trade or sell these plants as you may be the cause of the further spread of this problem. It is not fair to sell these plants to unsuspecting beginners.
- f. If you have purchased seedlings from plants exhibiting these symptoms they may not be infected if the breeder used dry seed and not a green pod. There is strong evidence that most of the seedlings from a normal dry seed pod will normally not carry a virus, even if the parents were infected, however, this is not a 100% guarantee, so these should also be isolated. If ultimately the seedling flowers normal colour then it is probably clean. If it flowers with the

red spots then I would be vary careful with it until final results are published.

If this proves to be a virus then we will all need to work together to halt its spread so that this most significant species can be saved. Remember to be fore warned is to be fore armed!

Neil & Meg Finch, Kilaben Bay, N.S.W.

*From Orchids Australia, December 1994, p21*

ARTICLE No: 4

# From Letters to the Editor, Orchids Australia

Dear Sir,

## **Red spotted *Den. speciosum***

I was surprised to read the article (Dec.94) on spotted *Den. speciosum* by Neil and Meg Finch as published in your magazine. A magazines editor has the right to exercise editorial decisions and I am disappointed that you chose to print such a controversial article.

My plant *Den. speciosum* 'Pacific Red Spot' in no way fits the description as published, ie. it has never been subject to fungus attack; has a normal flower habit; and fine flowers. It would be a desirable clone even if it were not spotted. Likewise the clones used by Dennis Lynch and I in breeding - not one exhibit the characteristics he mentions. In fact I have yet to hear of one that does.

Don Gowanlock of the University of Queensland, who is currently researching virus in orchids, has inspected my nursery and several samples were taken for analysis. *Den. speciosum* 'Pacific Red Spot' tested free of any abnormality. I understand that Sid Batchelor (Yondi Orchids) has some *Den. speciosum* 'Margaret Healy' and some seedlings tested, with the same result; similar results were recorded for samples from John Woolf (Florafest).

Some 12 years ago Phil Spence (Orchid Productions) discussed with me his theory that at some time in the distant past, all, or some, *Den. speciosum* (particularly var. *pedunculatum*) were red, or at least coloured, and have evolved over time to the white or yellow form we know today - a theory I consider more plausible than that of Finch.

At the Gosford Orchid Spectacular this year I met a fellow who grew up in the Bega area. He said all the many *Den. speciosum* he saw on their large (800 acre?) property were heavily marked - some almost solid red - and it was not until he went outside the area that he discovered *Den. speciosum* were not all of similar colouring. That they were all virused seems unlikely.

Several years ago I (and others) marketed seedlings bred by Phil Spence ('Red Spot' x Red Factor') and a percentage of these are now flowering with much colour. All I have seen are fine plants, one in particular with red/brown peduncle, peach colour to the back of the flowers, and heavily marked - a plant anyone would be proud to own and one I would suggest shows the result of breeding for colour.

Ironically, some time ago Neil Finch telephoned my colleague Ross Wirth, with an inquiry for divisions of plants we had used in breeding!

M.J. Symmons, Ormeau, Qld

*From Orchids Australia, February 1995, p16-17*

ARTICLE No: 5

# From Letters to the Editor, Orchids Australia

Dear Sir,

## Red spotted *Den. speciosum*

After reading the letter by Mike Symmons in your February issue which refers to my article of December 1994, I feel compelled to respond to several of the matters raised in his letter.

If you refer to my article you will see that from the first paragraph I stressed that what I wrote was only my thoughts on this matter. I deliberately did not mention any names even though I could have said a great deal more on this subject. In Spring 1991 during a visit to Ballina I personally inspected several of the plants referred to by Mike at his nursery, Pacific Orchids, in flower. I have also, some years ago, personally viewed *Den. speciosum* 'Margaret Healey' in flower at Yondi Orchids. The comments made by me in my article were, based on many observations over several years and I stand by my published comments 100%.

I also have personally flowered and seen quite a few of the Phil Spence cross referred to. Amongst those flowered by me and others, I have seen two with red spotting and both these plants comply with my published description and I would NOT have them in my yard. The others of this cross that have flowered the normal colour were beautiful and well worth owning. These "normal colour clones" do not comply with my published description and I believe them to be free of this phenomenon. This observation is completely consistent with part 'f' of my article, and I quote:

"If you have purchased seedlings from plants exhibiting these symptoms they may not be infected if the breeder used dry seed and not a green pod. There is strong evidence that most of the seedlings a normal dry seed pod will not carry a virus, even if the parents were infected. However, this is not a 100% guarantee, -so these should also be isolated. If ultimately the seedling flowers normal colour then it is probably clean. If it flowers with red spots then I would be very careful with it until final results are published."

In relation to the story by John Donnelly of Bega, he personally told me the same story several years ago and promised to show me some of these plants, but alas they never materialised here. It is always possible that such plants will be found in the wild as clearly red genes do exist in *Den. speciosum* as a look at the labellum shows. However, all my inquiries over many years have failed to uncover a single confirmed red spotted plant being found IN THE WILD, and the plants currently under discussion, which are not from the Bega area, I believe are NOT the result of a random genetic mistake but infected with a pathogen of some type.

The next matter I wish to address is the test results quoted. It is my experience that most testing labs will tell you that a positive result for virus is guaranteed, but a negative result is NOT guaranteed! It simply means that in the sample tested a virus was not detected, but that does not mean that one is not present.

Finally I wish to say to those interested in this matter, I wrote my article with honourable intentions in the firm belief that if my suspicions are ultimately proven correct, (which I believe WILL be the case), and I had not come forward and warned my fellow growers when I did, that would have been negligent. I, like many others, was initially excited when the first reports of these red spotted speciosums filtered through the grape vine and I did make an inquiry to Ross Wirth back then. I have since, however, changed my view of them, as have many other reputable growers, which is no secret.

Best wishes and good growing.

Neil & Meg Finch, Kilaben Bay, NSW.

The Editor,  
Dear Sir,

With the amount of correspondence appearing in various orchid publications as to whether red spotted *Dendrobium*

*speciosum* is virused or not, I feel I must write this letter to clarify the whole subject from a scientific viewpoint.

It is true I have tested by electron microscope some samples of red spotted *Den. speciosum* without detecting virus. This itself is not very conclusive. A much broader sampling would have to be undertaken to be entirely satisfied whether virus is widespread or not throughout this particular species. That sort of project would involve a lot of time and at the moment cannot be fitted into my programme. I hope, as the year progresses, to be able to commence a project that will clarify this whole question.

D.H. Gowanlock, Research Officer,  
University of Queensland, Brisbane, Qld.

*From Orchids Australia, April 1995, p5*

# VIRUSES OF NATIVE ORCHIDS

By  
Don Gowanlock

## Introduction

The aim of this project was to investigate the incidence of rhabdo-like virus and any other viruses that may be infecting native orchids growing in their natural environment.

The disease survey area was initially to include South-East Queensland and Northern New South Wales but this was extended to North Queensland and the coast of New South Wales to Newcastle. This was made possible by an additional grant from Australian Conservation Agency.

Written approaches were made to the various orchid societies along the eastern seaboard for their co-operation in collecting diseased specimens. This method proved a little disappointing, however, I am grateful to several members of native societies who were able to devote time to accompany me to sites or to collect suspect plants.

During the course of the previous project, a number of societies were addressed on the subject of orchid diseases. This education programme has continued but at a much slower rate mainly because of the publication of various pamphlets and the availability of our previous report to growers.

Societies addressed included: Newcastle Native Orchid Society, Orchid Club of South Australia, Bellingen Orchid Society, Toowoomba Native Orchid Society, and Bribie Island Orchid Society.

A virus diagnostic service to growers is still being offered through the University of Queensland, Centre of Microscopy and Microanalysis.

## Background

During the course of a previous survey, it was noted that some of the native species growing in cultivation seemed to be infected with either a virus or fungus. Dr. Helen Ogle unsuccessfully cultured these lesions for fungus. On electron microscope examination a small bullet-shaped rhabdovirus was detected. The question then arose, were these plants infected before they were introduced into cultivation or were they already infected when collected from their natural environment.

Published material on the incidence of virus in native orchids is very scant. A search of the literature has found that published papers refer only to the incidence of *Odontoglossum* Ringspot virus and *Cymbidium* mosaic virus having not been found in wild species. No record can be found in the literature search of the incidence of rhabdo-like virus affecting native orchids.

## Material and Methods

### Source of Material:

Sites visited during this project included: Mackay region (Cape Hillsborough, Eungulla ranges, Crediton State Forest, Cathu State Forest), Blackbutt Ranges, Lamington National Park, Sundowner National Park (incomplete), Bellingen region (Mt. Picket), Border National Park, Barrington Tops, Watagan State Forest, Kangaroo Valley, Brisbane Forest Park, Jimmna State Forest (Galengowan), Krombit Tops (Clutha Creek), Killarney district (Queen Mary Falls and Emu Creek) and Maroota (NSW).

At each site only a small amount of material was collected and only from plants showing symptoms. There was no random sampling of material growing in the natural environment. Limited sampling was also undertaken from orchid houses in Toowoomba, Bellingen, Ballina and Brisbane.

Sap from each sample collected was examined by electron microscopy using the negative stain technique (see previous report for details of technique).

Thin section microscopy was also necessary to gain an understanding of intracellular interactions between virus and the host plant.

Where it was thought another virus other than a rhabdovirus was present further testing was carried out using Reverse Transcriptase Polymerase Chain Reaction technique (RT-PCR). My thanks to Dr. A. Gibbs, Research School of Biological Science, Australian National University (ANU), Canberra, for his co-operation in these techniques. The technique is very sensitive and can detect virus at much lower concentrations than by electron microscopy. The DNA was then sequenced to determine as to its position in the potyvirus family tree.

### **Results Rhabdovirus incidence:**

A number of *Dendrobium speciosum* growing in cultivation seemed to have had their origins at Mt. Binga (Blackbutt Ranges). This was the first area visited to test the theory as to the origins of this virus. The area visited was deep in the range and nowhere near cultivated orchids. Between 60 - 80 plants were inspected, 20% of these showed some sign of infection. While a number of the plants were heavily infected, some however, showed only a few of the leads with symptoms. A few *Dendrobium kingianum* plants growing in the area also showed signs of infection with virus. The symptoms were, however, different from those of *Den. speciosum*.

Electron microscope examination of samples taken in the area revealed the presence of a bulletshaped rhabdovirus in some of the specimens, while in others with obvious symptoms no virus particles were detected. These negative samples were then further examined using thin section electron microscopy. A few virus particles were detected in the cytoplasm attached to membranes. The most conspicuous aspect of these samples was the large nuclear inclusions. During the infection process, the virus appears in the cell nucleus as viroplasm. Electron micrographs of recent infections show large numbers of virions in the nucleus of a phloem companion cell. A few virions can be seen passing through the nuclear membrane while others are membrane in the cytoplasm.

From the data obtained by thin section electron microscopy, it appears that after the initial infection takes place, all the susceptible cells are probably infected fairly quickly (this is possible the acute phase and particles can be detected by electron microscopy negative stain technique). The plant by some mechanism undergoes a period of "recovery" and the virus concentration declines until the plant enters a chronic phase at which stage virus cannot be found by the negative stain technique electron microscopy. One must presume that the virus antigen remains and so the plant still remains infectious to the insect vector. This series of events has been published for other viruses including Sonchus Yellow net virus which is a rhabdovirus possibly belonging to the same family of virus namely nucleorhabdovirus. We have observed that infected plants, especially those in cultivation, quite often only a few leads may show signs of infection. It may be possible to divide the plant, discarding the infected leads and keeping the remainder. Further work would have to be carried out to prove this point before this could be put into practice.

This virus is particularly hard to detect by electron microscopy for several reasons; (1) the virus is very fragile and is normally in very low concentration, (2) the plant may be in the chronic phase of infection. I believe these two factors have led to the virus not being detected in the past and other diagnoses being given, e.g. citrus fungus.

There remains a great deal of work to be carried, out on this virus especially to document the DNA or RNA sequences which hopefully will give an insight into the origin and evolution of rhabdovirus in Australian native orchids.

There was evidence of *Dendrobium* beetle feeding on infected plants. However, electron microscope examination of beetles collected from the Mt. Binga area failed to show rhabdovirus particles to be present. There is an experiment in hand as this report is being written of scale insects feeding on an infected plant. Some of these insects will be processed for electron microscopy in the very near future while attempts will also be made to transfer the remainder to another plant to see if transmission does occur.

### **Other viruses detected**

While no other viruses were detected in the wild, mention must be made of the incidence of potyvirus in cultivated plants as well as in the so called 'Red speciosums' which were the centre of some debate amongst some growers.

In 1994, an outbreak of what appeared to be virus infection was reported in Victorian *Den. kingianum* hybrids. Electron microscope examination revealed the presence of a flexuous rod-shaped virus. In the previous report this virus was reported to be a possible Carlavirus. Further work has been carried out on these specimens to find that the rods measured 680-750nm in length and were most probably a potyvirus. In thin-section electron microscopy what appears to be a pinwheel type structure was also detected. Pinwheels are a diagnostic marker for potyvirus infection. Similar rod-shaped virus particles have been detected in terrestrial orchids from a variety of locations but all have been grown in cultivation. As yet no virus has been detected in terrestrials growing in the wild.

Since that first detection of potyvirus several positives have been recorded. Again all these have been in collections. It is of interest to note that each of the outbreaks of this virus in Victoria, A.C.T., and Queensland has coincided with an aphid infestation.

Of the 'Red speciosum' plants that have been examined most have proved to be positive for potyvirus.

The electron microscope is just one of the tools available for the classification of viruses. It can image a virus particle and from that image one can usually place a virus in its respective family. Within that family there are various subgroups and potyviruses are no exception. Potyviruses previously isolated from orchids include Dendrobium mosaic, Habenaria mosaic, Pecteilis mosaic, vanilla mosaic and vanilla necrosis potyvirus.

Over the last six months, any orchid found by electron microscopy to be infected with what appeared to be a potyvirus was forwarded to Prof. Adrian Gibbs for RT-PCR and subsequent sequence analysis. An analysis of the information gained from these tests has shown that in Australia there exists another potyvirus infecting orchids. This virus has been called Ceratobium mosaic virus (CerMV). The results are to be published in an international journal.

The symptoms are varied and some are shown photographically in this report. The potyvirus detected in Victoria did also exhibit flower colour break. To my knowledge the isolates of this virus found in ACT and Queensland showed no sign of flower colour break.

All the specimens sent to ANU by the author were grown in cultivation but some had been bush collected but not of recent times.

Included in the list of positive (CerMV) were three of the so called 'Red speciosums'. It is hoped some of the hybrids made from these speciosums can be traced and checked for the same virus.

Virus of the family Potyviridae are usually transmitted by aphids in a non-persistent manner or through seed and can also be transmitted experimentally by sap inoculation.

Prof. Gibbs and his team have produced a sensitive diagnostic technique for the identification of orchid potyviruses and it is hoped this test will be used to test out plants without symptoms randomly collected from cultivation and those growing in their natural environment.

### **Acknowledgments**

I am grateful to the Australian Orchid Foundation for providing the funding that has enabled me to undertake this research and I am specially grateful to my colleague Helen Ogle for her encouragement and help during the course of this study.

My sincere thanks must go to those growers who gave a considerable amount of their time to travel to sites where a great number of native orchids were to be found. Their efforts are greatly appreciated. A very special thankyou to Prof Adrian Gibbs of ANU and his team for the identification of the potyviruses found during this project.

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