August 1996

# Odontoglossum Alliance\*

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# Vancouver Odontoglossum Alliance Meeting

# **Election Results**

The results of the balloting for the election or directors for the period 1996-1999 is as follows:

Sue Golan John Hainsworth Jerry Rehfield Helmut Rohrl Wally Thomas Wim Velsink Lake Forest II. McKinnleyville, CA Carpenteria, CA La Jolla, CA Vancouver, BC Beaverton, OR

Thanks to all the candidates and congratulations to our newly elected slate. The directors will elect the officers of the Odontoglossum Alliance for a three year term. These results will be announced in the next newsletter.

# 1997 Odontoglossum Alliance Meeting

The 1997 meeting of the Odontoglosssum Alliance will be held in conjunction with the Santa Barbara Orchid Show and the AOS Trustees meeting in Santa Barbara 6-9 March 1997. The plans for our meeting are beginning to come together. The meeting will be on 7 March 1997 starting with a luncheon at noon. This will be followed by a short business meeting. We will then have four lectures starting at 1:30 PM and going until 4:30 PM. At the conclusion of the lectures we will conduct an auction of fine Odontoglossum Alliance material donated by our members. Three of the four speakers have been scheduled and the fourth will be announced in the next newsletter. Also the topics of all speakers talks will be announced in the next newsletter. The three speakers are: Tim Brydon, a superb amateur grower from San Francisco, Tom Perlite, Golden Gate Orchids and John Hainsworth, Strawberry Creek Orchids.

The Odontoglossum Alliance meeting in the past have been interesting and educational. This meeting promises to be equal or exceed those of the past. Also I expect there will be a significant number of sales booths offering plants of our alliance. Mark you calendar and future newsletters will detail this meeting.

# Video Tapes Available

Video tapes of the 1996 Odontoglossum Alliance Lectures given in Vancouver April 1996, are now available. The two tape set can be purchased for \$50.00. Send you request and check to:

Odontoglossum Alliance P.O. Box 38 Westport Point, MA 02791

Make Check Payable to: Odontoglossum Alliance

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# Santa Barbara Orchid Show 1996.

In 1996 at the Santa Barbara Orchid show in March, Sunset Orchids' display received a "JC", Judges Commendation from the American Orchid Society for the grouping of Odontoglossums; reportedly the first time a JC has ever been given to a display. The display also received Trophies for Best Table Display and Outstanding Display. Odm. Durham Picot 'Sunset Gaint' was awarded an AM/AOS and received the trophy for Best Odontoglossum. Other odonts receiving AOS awards included Odm. pescatorei 'Tiffany' HCC/AOS, Wils. Hilda Plumtree 'Orange Sunset' HCC/AOS, and Wils. Hilda Plumtree 'Sunset Skirt' HCC/AOS.

Steve Gettel, owner of Sunset Orchids also provided a picture of the display which is included with this newsletter. I believe we can count on Sunset Orchids to be at the 1997 Santa Barbara Orchid Show and the Odontoglossum Alliance meeting in Santa Barbara in March 1997.

# Trekking - Part III by Robert Hamilton

To get to Guayaquil on time for the national orchid show, our travel companion, Dr. Moises Behar skillfully maneuvered us out of Chillianus in spite of a national strike. National strikes are relatively common in Ecuador. This one was about rate hikes for bus fares. Trying to drive during a strike is a good way to get your front windshield broken.

Slipping out the back door, we headed for Guayaquil, a coastal city. This entailed another long descent. We wanted to make time so there would be little opportunity for stops on the way. As ones descends in altitude there are significant climate changes as well as a change in scenery. The temperate climate of 2500 meters begins to warm. At 1700 meters the climate is cool-intermediate. At 1300 meters the climate is intermediate and by 900 meters things are warm.

Warming is accompanied by a change in flora. I began to notice large red pods drying in neat rows by the side of the road. Walter Teague explained, "those are cocoa fruit, the fruit exported to make chocolate." We stopped to look at some cocoa trees. Cocoa trees are unique because they fruit from the stem rather than the branches. I was struck by the quantities of fruit neatly rowed along the road. Croppers obviously felt perfectly safe with their valuable crop drying along a public road. In the US a similar method of drying would invite vandalism — a crunch of car tires. Ecuadorians, knowing a hard life respect each others livelihood.

At 400 meters things became downright hot. This was the dry season so the scenery also became brown. The houses at 400 meters were built 3-4 meters off the ground because the area was a flood plane. Fortunately, we were visiting during the November, the dry season! We stopped for a refreshment at a local vendors stand, agua de coco (coconut water). Moises and Walter knew how to pick the best coconuts. When coconuts are young and fresh, they contain the maximum amount of sweat "milk". As they age the volume of juice as well as the flavor decreases. A young boy, perhaps 10 chopped the top off the coconuts. At 10 he was already an expert with a machete. He had probably gone to school until he could read and do math, then quit to help the family income. He made quick work of removing the top and cutting a hole. Agua de coco is the Gatorade of Ecuador. I would take it 10 to 1 over the US version.

After significant travel and a much slower descent we approached the outskirts of Guayaquil. Traffic got downright heavy with every kind of vehicle: bicycles, horse drawn carts, the ubiquitous smoking trucks and buses and lots of foot traffic. Carts were heading for the city. Hundreds had crates of crabs stacked shell to shell. The number of peddlers was extraordinary and it seemed the supply of crabs was endless. One of the reasons these crabs were so plentiful is because Guayquil is built on mangrove swamps.

Regrettably, the mangroves are now heavily cut to accommodate aquaculture of shrimp, an important export crop. The loss of the mangroves also harms the ecology of the swamps.

Guayaquil is not a beautiful city. To lean to the generous one could say it has its own "charm". We made our way to the sight of the show, a modern shopping mall. Like most malls in South America, the hallways were decorated with security guards carrying automatic weapons. Once we located the show we found our Quito friends busy assembling their exhibit. This required shoveling and mounding a great deal of mulch for their naturalized exhibit. The backdrop we saw being painted in Quito was now assembled in one piece along the back wall.

The exhibit, with its plants was first class. Of note in the Quito exhibit was an extraordinary Masdevalia cucullatum much bigger than any I had seen before. There were also Bolleas, Cyrtochilum macranthums and other Cyrtochilums, Odontoglossum cirrhosum, pardinum and ramossisimum, Oncidium from the cucullata section, Pleurothallids, Stanhopeas. I am working from memory, there was much, much more.

Another exhibit of note belonged to Father Padre Andreeta, dean of Ecuadorian growers. There I saw my first Odontoglossum edwardii, a striking small purple flower on a tall branched. Since 1991, this plant has become more common. A road near its habitat opened, making its collection practical. Sadly, too practical.

Clearly, Edwardii is a much closer relative to Cyrtochilum than Odontoglossum. Having grown Cattleyas at one time I was knocked over by Father Andreeta's exceptional dark clone of Cattleya maxima. I had grown maxima but I had never seen such a magnificent clone. Walter explained the darker clones came from the lowlands while a lighter phase grew in cool-intermediate areas.

Being at any orchid show during setup is exciting. In Ecuador, there is even more intrigue. For one thing, foreigners are all trying for the coveted CITES. CITES documents are required to bring plants back into the US. There is never any consistency as to who gets CITES, but national orchid shows typically use CITES as a lure for foreigners. At this 1991 show it was rumored that a CITES for 100 plants, purchased from show vendors would be given to each attendee. Our group wondered where, when and if this would happen.

Plant enteree was being handled by Max Konnen, a Guayaquil resident of great orchid fame. I was impressed with his organization. He had setup his laptop and created a spreadsheet for plant entry. All this in Guayaquil, Ecuador in 1991. The AOS had a group of judges who came to scrutinize plants and grant awards to those deserving. The judges were, as usual intense and busy as this was their shot at making offers on the best plants, one of the perks of judging a show. In Ecuador, most plants in the show were freshly collected and almost all could be had. Besides the judging, all sorts of deals were going on between vendors who were trading stock back and forth. Various orchid collectors were about bargaining under the table. Collecting and selling jungle plants is strictly forbidden. This dealing thus was surreptitious. The worst of the "dealers" were the black marketers who lurk and sell plants in the parking lot. These persona non gratis types really know how to throw a hook. "I have a new, red masdevallia with very large which I found near the Colombian border".

We could not legitimately spend more time at the show, as this was setup and we were in the way. Our friends were trying to assemble their exhibit. We also needed to make our way to our hotel, The Oriental. We drove back to the center of Guayaquil, checked in and dropped off our luggage. We then headed to the Parque del Centranario, a historic central square. Having lived in Guayaquil, Walter knew of a great luncheon spot, a hotel with a second floor dinning room overlooking this park. We took window seats where we watched people promenade. Steve Beckendorf and Walter immediately set about identifying the birds in the park trees. Knowing little of birds I listen and learned. We killed some time lounging before going to our hotel to rest and dress for the evening. In the evening we would attend the show's opening night ceremony.

## Odontoglossum Alliance

Guayaquil remains hot at night. Nevertheless, the opening night ceremony for the 1991 show required wearing at least a sport coat and tie. Such attire is a poor compliment in the tropics. When we got to the show we found the entrance area had collected a good sized crowd. We joined in and visited. Time passed while we waited for inaugural guest, the Minister of Agriculture. He was not on schedule and the five of us were irked by the heat and the wait. Eventually, perhaps an hour, perhaps two the Agricultural Minister arrived. No one seemed overly concerned by his lateness. He began his speech. Ecuadorians are polite people and they listened, and listened and listened. Brevity was not this ministers forte.

My Spanish is poor. The word "ecology" droned. The drive between Quito and Guayaquil was not ecologically encouraging. This grandiose speech was well accepted — lots of applause. When a foreigner, cultures are sometimes more transparent. Eventually the ribbon was cut and the show opened.

The next day we spent doing the things all tourists must; changing money, taking care of car problems, phone calls, etc. We had a chance to do a little sight seeing before attending the show. This was the day we were scheduled to get the coveted CITES. When we got to the show there was a great deal of confusion regarding CITES. The number of plants was being reduced from 100 to 25 and the plants had to be present with receipts from the vendors. Some of the AOS judges and a few of the US vendors has gotten their document but there was a pause and some talk of CITES being cut off at the show. I was becoming gloomy. We decided to delay leaving Guayaquil for another day to see if the CITES situation would resolve.

The evening of the opening day featured a private invitation to dinner at Max Konnen's house for guests who paid for Opening Night. Max's hospitality was legendary. We left the show for a rest and to dress for dinner. This time coat and tie.

Max Konnen hired buses to transport his guests. We had instructions to assemble in the lobby of a downtown hotel. This was exciting because there were so many interesting orchid people in the group. All of the principals from J&L Orchids had gone to the 1991 show so we had a chance to visit with some friends. In addition, there were several prominent AOS judges and several growers from Colombia and Peru. What a great crowd for cool growers to be in with. I met several Ecuadorians who were well informed about their native orchids and who had wonderful stories to tell. We left the hotel and proceeded

to the Konnen's. Within a mile one bus had hit a car. This was the middle bus of three and I was stuck in the third bus. It was hot, I was dressed in a suit and my traveling companions were lucky enough to be on the first bus. Eventually we started up again. Delays, like heat are part of the tropics.

The trip from the downtown to Max Konnen's took us through the poorest areas of Guayaquil. I thought of Dickens's Tale of Two Cities. Arriving at our destination did not do much to assuage my fears. Max's house was a walled compound with machine-gun totting guards. The trip through his house showed why. Max had a beautiful art collection. I am told his family has a private chapel in their compound. His backyard was an orchid lovers dream. Thousands of plants ringed the backyard on staged benches. To add to the evening Max provided an open bar, music and a fantastic dinner. Ecuador is full of contrast.

The following day we went back to the show. After a few hours of standing around it was clear no further CITES would be issued. We decided to "pack it in" and leave Guayaquil. As we were just about to we were approached to take a young man. He was in his early twenties and in his final year of college. For his thesis he was profiling a mountain, taking an audit of orchid species. His thesis was being done near the city of Loja. and he had heard we were on our way to Loja. He asked for a ride. With two four-wheel drive Troopers and only five in our group we could oblige. The eight of us left Guayaquil and headed for Loja.

# Lewis Knudson: His life and Times Part V

by Dr. Joseph Arditti

#### McAlpine: Anticontaminants

In my last year at the University of Southern California I wrote an article on orchids for Scientific American. It generated some mail, and one of the most interesting letters was by K. L. McAlpine, B.A., M. A., F.C.J.C. from Toronto: Ontario, Canada. He covered several topics, including the use of anticontaninants and his article on the subject in the Orchid review. "About this time [1947] I published in England a method of germinating orchids on a medium which was self-sterilizing and a few weeks later Dr. Knudson wrote me a letter that he had been working on the some idea but was too busy to get it into print....Then he did publish his work... [and] ...gave me credit.

McAlpine screened several fungistatic agents including ethyl, propyl, butyl, and isobutyl vanillate and found that higher concentrations inhibited germination, whereas lower ones failed to prevent contamination. Knudson obtained the same results and in his article fully credited McAlpine and cited his paper. It would have been easy for Knudson to report on his findings and ignore McAlpine, but he did not. He gave him full credit and by doing so drew attention to his work. This is a clear indication that Knudson was not only a good scientist but also a fair and honorable one. On the other hand, it seems that Knudson published his results only because McAlpine had done so with similar findings.

#### Vacin and Went: pH Fluctuations

Frits W. Went was born in Holland in 1903 and discovered the first plant hormone, auxin, as a graduate student in his father's laboratory. After that he worked at the famed Bogor Botanical Gardens near Jakarta, Indonesia (then the Netherland Indies), and came to the California Institute of Technology shortly before World War II. From CalTech he went to St Louis to become director of the Missouri Botanical Garden. He left St Louis to assume the directorship of the Desert Research Institute at the University of Nevada in Reno and remained there until his retirement. As this in being written, he is more than 80 years old and lives in Oregon. Orchids were never his main interest, but he carried out research on their ecology, physiology, and seed germination in Indonesia and at CalTech.

Emil Vacin "made a fortune with the gas mask during the war..." germinated orchid seeds for commercial establishments and carried out research on the subject with Prof. Went at CalTech. In the course of these studies they noted the pH of the Knudson C solution which supported growth of orchid seedlings dropped from 5.46 to 3.78 after 190 days. Following an additional 87 days the pH dropped to 3.12 for a total drop of 2.34 units. The pH of a medium which did not support seedlings dropped from 5.46 to 5.23 (0.23 units) during the same period.

The drop in pH of medium supporting orchid seedlings is well known at present and not a subject for concern. Hans Burgeff tried to maintain a stable pH in orchid seed germination media with a buffer as replacement for the monobasic potassium phosphate () in the Knudson C medium. My long-time colleague, Dr. Robert Ernest, observed it several times during the last 20 years. Vacin and Went were among the first to pay attention to this drop in pH after the war and were concerned by it, because in their view the critical pH range for good growth was 4.5-5.5. They investigated the buffering capacity of the Knudson C medium and the effects of individual salts on the pH. As a result of these studies Vacin and Went formulated their solution 5, which is now known as the Vacin and Went medium. They also suggested that tomato juice can be beneficial.

Knudson must not have been very pleased because in his view "solution 5 is proposed as a replacement for Knudson's solution C...". He also questioned the suggestion by Vacin and Went that the best pH range for growth on his solution C was 4.5-5.5. To answer some of these questions Knudson carried out careful comparisons between his solution C and Vacin and Went medium. His conclusions, based on experimental finding, were that:

1. "The Vacin and Went solution 5 is unsuited for the purposes suggested." The purpose" in this case was to maintain a stable pH. As a seed germination and tissue culture medium the Vacin and Went solution is suitable for orchids.

2. "The tricalcium phosphate .. [in the Vacin and Went medium] ... at the pH values recommended removed minor elements by adsorption, the result of which is chlorsis." This is possible. This salt is also hard to dissolve.

3. "Knudson solution C is entirely adequate for germination... and growth of seedlings." This is entirely accurate. The Vacin and Went medium is also adequate.

Knudson also added that "If...the initial pH value is close to 5, an increase in hydrogen-ion concentration with time is without any deleterious effect on the seedlings. It is probable that the seedlings adapt themselves to the higher hydrogen-ion concentration...". He was right about this. Recently it has been shown tissue-culture derived plantlets of *Aranda, Brassocattleva, Dendrobium*, and *Vanda* cause the pH of a modified Schenk and Hildebrand medium (Table 1) to change from pH 4,5,6,7, or 8 to about 4 after two weeks of culture. The pH remains at this level until the end of the culture period, and this has no deleterious effect on

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#### plantlet growth.

An interesting and little-known aspect relating to the question of pH in orchid seed germination media is the fact that at Knudson's suggestion one of his graduate students studied the problem, but his dissertation does not seem to have been published as a paper in a journal. The experiments were carried out mostly in 1922 and involved the germination of seeds and the culture of seedlings on the Knudson B medium at pH ranging from 3 to 8.8. In most experiments the pH of the culture media dropped when seedlings were maintained on them. However as long as the initial pH was suitable the drops appear to have been without much of an effect. This has been confirmed since then by Dr. R. Ernst and other workers. It is not clear at present why Knudson did not use data from this dissertation in discussing the Vacin and Went medium.

Even more than 65 years ago when not much was known about cell physiology, Knudson was concerned about the effects of the pH of the medium on the cells. Lacking sophisticated equipment of the kind available at present, Nanz (with Knudson's help no doubt) was able to make good use of what was at hand and measured the pH of the cell sap of orchid seedlings grown on media ranging in initial pH range from 3.6 to 6.0. He found that when *Laeliocattleva* seedlings were grown on fructose containing media with a starting pH of 3.6 -6.0, the pH of each medium dropped after 317 and 215 days (except when the starting pH was 3.6). However the cell sap remained at a relatively constant pH of 5.8-6.2 (there are no statistics, and the significance of the difference is unclear) regardless of the final pH of the medium. When grown on glucose-containing media at pH 4.6-5.0 for 48 and 149 days the seedlings also brought about a reduction of the pH of the medium. As on the fructose-containing media, the pH of the sap was 5.8-6.0 and appears not to have been affected by the external pH. The sap of *Dendrobium* seedlings (starting pH 3.5-5.5, final pH 3.5-4.8) was 5.8-5.9.

One of the conclusions drawn from these and other experiments was that the range for "optimal growth...was pH 4.5 to pH 5.5". There are no comments in the discussion or summary regarding the drop in pH in media which had supported seed germination or seedling growth. It is difficult, if not impossible, at this time to determine the reasons why the dissertation by Nanz was never published as a paper in a scientific journal. The problem was, and still is, interesting. Nanz carried out a large number of good experiments and obtained worthwhile results. His data appear to be good despite the lack of statistics and are worthy of publication. They must have satisfied Knudson because he seems to have paid relatively limited attention to pH of media from 1922 until Vacin and Went raised the question. On several occasions he mentioned that Nanz was studying the effects of pH and that a paper would be forthcoming, but if one was published I have not been able to find it. Had Nanz published his findings, Burgeff and later Vacin and Went may have had a different perspective.

The interaction between Knudson and Vacin and Went was direct, clear, and professional. It reflected the high standing of Knudson and Went in the plant science community as well as competence, professionalism, and strong characters. It is possible to suggest that this interaction is indicative of a certain amount of sensitivity and even vanity on Knudson's part. And, indeed, it has been suggested that Knudson was very proud of his work with orchids and perhaps even somewhat sensitive about it. In this case Vacin and Went were justified in raising the question even if they, unlike Nanz and Knudson, failed to note that the drop in pH of the medium had no deleterious effect as long as the pH was appropriate. They may not have raised it had Nanz published his findings. In any case, Went, who was open and outspoken when he and I discussed the episode; had no negative comments to make about Knudson.

#### **Dorothy Downie: Scottish Orchids**

Dr. Dorothy Downie worked on the germination and mycorrhiza of terrestrial orchids and seems not to have interacted with Knudson. The orchids she studied, like other North and South Temperate species, appear to have a much stronger dependence on their fungi than the tropical epiphytic and terrestrial species.

#### Mária Galambos and Mária Domokos: A Very late Claim

In 1976 a bizarre attempt was made in Hungary to claim that asymbiotic seed germination was first achieved there in 1914 (seven years before Knudson's first paper) by a hitherto unknown biologist. Dr. Mária Galambos. The attempt was in the form of a question-and-answer interview published in *Die Orchidee*, journal of the German Orchid Society. In this interview, conducted by the author of a Hungarian book for orchid amateurs, called *Orchideák*, the 83 -year-old Dr. Galambos recollected that in 1913 (i.e., as a 23-year-old student) she had already had behind her a high school study (*"Hochschulstudium")* on orchids. At that time she had seedlings in vitro and pure cultures of endophytes. Despite the fact that asymbiotic germination of seeds had not been mentioned previously in their conversation the interviewer, Mária Domokos1 suddenly asked about it in a manner which suggested an answer:

"After the experiments with symbionts, how did you get the idea to try seed germination without symbionts?"

Answer: "Bernard showed as early as 1903 that seed germination occurs only after the fungus enters the seed. What remained was the question of which components were involved."

The gist of the answer ("compounds involved") but not the error in dates (Bernard first pointed to the role of fungus in 1899) could have been taken from Knudson's early papers.

In a television or movie version of a court of law the subsequent questions could be subject to objections called "leading the witness."

Question: "When did you succeed?"

Answer: "In 1914 I added to the medium being used (Table I) 25 g sugar ("Zucker") and 17 g agar. Seeds [of Cattleva and Pha-

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laenopsis hybrids]" germinated on this medium..."

**Comment and question:** "You germinated orchid sees asymbiotically before Knudson. Why didn't you publicize this fact?" **Answer:** "This is hard to answer..."

**Question:** "Where did you obtain the seeds?

Answer: "I collected seeds of native orchids and obtained others in the botanical garden."

**Question:** "Were your findings used by others?"

Answer: "At that time orchids were cultivated only in City and State institutions, and the plants I produced were sufficient." Question: "Where did you carry out your orchid work?"

Answer: "After 1918 the botanical garden sent me native ("einheimischen") and foreign ("austandischen") seeds and I carried out my experiments in my free time at home until 1939."

Question: "Do you have any records of your work?"

Answer: "I kept records, but they were lost during World War II."

I translated (in free style) the gist of parts of the interview to provide background for a discussion. My own view is that it is perhaps possible but certainly not very likely for a young and inexperienced student, like Dr. Galambos at the time, to decide that sugar was the key to asymbiotic germination. When Prof. Knudson reached this conclusion he was an experienced scientist who had worked on plants, fungi, and sugar utilization for many years. He could reason from experience. Dr. Galambos did not have such an advantage being at that time a young, inexperienced student.

The solution used by Dr. Galambos (Table I) is very similar to Knudson B (Table I) and to several experimental modifications of this medium used and published by Burgeff in some of his early (well before 1913) and later experiments and described in his major work. One difference is in the ion salts [ in Knudson B vs in the Galambos medium]. This could be due to the unavailability of the salt used by Knudson (see section on the Knudson B medium). Ferric phosphate is very similar to it, easily available, and a good substitute. The difference between 200 mg and 500 mg is small (Table I) and probably irrelevant. Asparagine is not known to enhance orchid seed germination but is a better nitrogen source for seedlings than leucine or cystine and was used in culture media for endophytes. KCl is present at 100 mg in the Pfeffer medium (Table I) and was also used by Burgeff in some media. It is not impossible, but very unlikely that a young and inexperienced student (who was apparently not working with an orchid expert as a mentor) could 1) formulate a medium similar to media developed by three experienced scientists like Pfeffer, Knudson, and Burgeff and 2) unravel the intricate problem in a manner similar to Knudson's.

In 1913 and 1914 a method for the asymbiotic germination of orchid seeds would have been a major discovery, and it is hard to believe that Dr. Galambos would not have published her findings. Even if not allowed or encouraged to so in 1914 (as she claims), she (Dr. Galambos) could have published her findings on leaving the University in 1918 which was before Knudson's first paper. And, if not then, Dr. Galambos could have published in 1935 after she received a gold medal from the state for her work with orchids. Asymbiotic germination of orchid seeds was still new enough at that time to justify such a publication. She could have also published a paper between 1922 and 1930 (or so) during the debates between Knudson and Costantin. That is what Ballion, Butell, and Clement did. Altogether the lack of publications raises serious questions about Dr. Galambos' claims or those made on her behalf.

Knudson was alive for many years after his first paper and even allowing for wars, distance, and slow mails, it is reasonable to assume that Dr. Galambos could have and should have contacted Knudsoin either to inform him of her work or to compare findings2. The fact that neither Galambos nor Knudson mention such a contact is an indication that it did not occur. I cannot help but think that if Dr. Galambos discovered asymbiotic seed germination before Knudson she would have contacted him at some point.

A medium like the one described by Dr. Galambos could most likely be used for the asymbiotic germination of seeds of tropical epiphytic orchids. Seeds of North Temperate terrestrial species (like those found in Europe and the "einheimischen" orchids in Hungry) would probably germinate poorly or not at all on this medium (or Knudson B and C for that matter). Therefore, claims that this medium was used for such orchids add to my doubts about the Galambos claim.

Finally, even if Dr. Galambos did germinate orchid seeds asymbiotically before Knudson, she did not publish her findings before (or even after) his papers were published. The tradition in science is to consider only results and findings which have been published. For this reason, if no other, the claims by or on her behalf of Dr. Galambos cannot and should not be accepted. **Concluding Comments** 

Professor Knudson was a pioneer American plant scientist in a number of areas, not the least of which was an attempt to culture cells, despite the fact that he is currently remembered primarily for his contribution to orchids. He was the first person to develop a reproducible and reliable method for practical in vitro axenic plant culture and propagation. This was an entirely new concept at the time, opening the door to all research which depends on the axenic culture of plants in vitro and to current micropropagation methods. With orchids the impact was direct. Investigators either employed Knudson's method itself or used it as an impetus or a starting point for further research.

An example of the latter is the research which led to the first method of clonal propagation in vitro [known at present as tissue culture propagation, mass rapid clonal propagation, mericloning (an abominable noun) or micropropagation] by Dr. Gavino Rotor, who was then a graduate student at Cornell University3. Dr. Rotor, who at present owns an orchid nursery, recalls that he

got the idea when...listening to one of Dr. Knudson's regular lectures in plant physiology. That day he was discussing the role of sugars...his face brightened up when I showed him a flask of the first successful propagation...and told him how I got the idea from his lecture...." Dr. George Morel, who is erroneously given the credit for developing the first method for the clonal propagation of orchids, despite the fact that his procedure was published 11 Years after Rotor's, also used the Knudson C medium (which he mistakenly called "Knudson III in one paper).

An indirect effect of Knudson's discovery was production of many new hybrids and outstanding plants which generated a need for a method of mass rapid clonal propagation. Further, Knudson's seed germination method reduced the cost of producing orchids and converted them from a plaything of the rich to a plant anyone could afford and grow. These facts would have pleased Knudson because he was described as a highly capable person who used his brain to solve practical problems for the benefit of mankind and also as a scientist who liked the idea of applying basic (pure) research to applied problems.

Good examples of the applied aspects of his work are the investigations of banana diseases (his work for the United Fruit Co. spanned the 1930's and 1940's). *Vanilla* breeding, and his consulting in the area of inhibiting fungal growth.

Knudson's greatest and most direct scientific and commercial impact was the development of a reliable and reproducible method for the asymbiotic germination of orchid seeds. Earlier methods by Bernard and Burgeff were not 1) axenic, because they utilized fungi, 2) always reliable, and 3) generally reproducible.

Once seeds could be germinated easily, amateur and commercial growers in the U.S., U.K., Europe, and Asia made thousands of crosses and produced a large number of hybrids. The more adventurous breeders (or perhaps those lucky enough not to know any better) attempted to make crosses between different genera and succeeded. As a result bigeneric hybrids such as *Laeliocattleya* or *Doritaenopsis* are common, and the same is true for trigenerics, e.g., *Mokara (Arachnis x Ascocentrum x Vanda)*. Quadragenerics such as *Lindlevara (Euanthe x Renanthera x Vanda x Vandopsis)* and pentagenerics of which *Knudsonara; (Rhynchosltyis x Ascocentrum x Neofinetia x Vanda x Renanthera)* is an example are not uncommon. Hybrids involving even larger number of genera also exist or are just around the corner.

Many, perhaps most, hybrids did not last and disappeared quickly, leaving behind only a line or two in Sander's List of Orchid Hybrids. Others became famous in their own right and/or as useful parents in further breeding. An example is Dendrobium Pompadour4, produced in 1934 by the French firm, Vacherot-LeCoufle (La Tuilerie, Boissy Saint Léger, France). Over the years it was used as a parent by its breeder, but its major impact and fame as "founding orchid" and for many years the mainstay of the multimillion-dollar orchid industry in Thailand.

Another example is John Laycock's primary hybrid *Arachnis* Maggie Oei in Singapore which was germinated on Knudson's medium by R.E. Holtum at the Singapore Botanical Garden. Ironically, *Vanda* Miss Joaquim, the best-known Singapore orchid and the national flower of the remarkable City-State, was discovered by Miss Agnes Joaquim5 in 1893 as a chance seedling in her garden. Another difference between these orchids are the ladies whose names they bear, Agnes Joaquim was a gentle churchgoing lady who never married, whereas Maggie Oei, John Laycock's friend is reported to have worked as a bar hostess and/or taxi dancer6. When efforts were made to find Maggie Oei, they were unsuccessful. A search for information about Miss Joaquim was more successful, but a photograph of her could not be found7.

Arachnis Maggie Oei, Vanda Miss Joaquim, and subsequently other orchids germinated on Knudson's media B and C (several Aranda hybrids, *Mokara* Mak Chin On8) became the mainstays of the Singapore orchid industry. The examples set by the Thai and Singapore orchid industries led to similar developments in Malaysia, Indonesia, and other countries. None of this could have happened without Knudson's method. Had he lived to see these developments Knudson would have been pleased, because, according to one of his contemporaries, "he acted more like a business man than a Professor-more like a man of the world-and so did his few intimates on the faculty." and was a businessman very interested in money.

The remarks about Knudson being "a businessman" and "interested in money" require a comment. Knudson was a successful player on the stock market and made money as a consultant, but he separated these activities (the former may have been a hobby and/or a challenge) from his role as a scholar and scientist (though there are reports that he used to read the financial pages in his office). There is no evidence that they had a negative effect on him as a teacher and a scientist.

It is also clear that he completely separated science from business and did not use his discovery to make money. The asymbiotic method of orchid seed germination was of great importance, and he could have sold it to an orchid establishment for a large sum of money. Or, he could have delayed publication (for a price) while an orchid firm established itself in the market and made a profit [there are intimations that this may have been done with the shoot-tip-culture method for mass rapid clonal propagation of orchids]. He did neither and in the best tradition of scientists published full details in two scientific journals (and two languages) where they were available to all. Following publication of his papers and after a number of commercial establishments adopted his methods. Knudson is reported to have consulted for Armacost and Royston in Los Angles and J&A McBean, Cooksbridge, Sussex, England (this report was made in a popular article without any documentation). Such consulting by experts is not unusual, and Knudson would have probably been available to other firms. His consulting was probably valuable, but other firms who did not secure his advice also managed to establish successful laboratories.

One of Knudson's colleagues, Prof. F.C. Stewart (now Emeritus), visited me some years ago, and we talked about Knudson. He pointed out that media B and C gave Knudson an excellent tool for studies of mineral nutrition and deficiencies in plants, but he never used it. Professor Stewart, who was interested in mineral nutrition, felt that Knudson made a mistake by not using this

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opportunity. This view is debatable, Knudson had other interests, and to him studies of mineral nutrition may have been uninteresting. However, this conversation pointed to the tremendous research potential presented by Knudson's method.

As efforts are being made to save endangered orchids from extinction, Knudson's method will gain added importance as a means of propagating rare species. Seedlings produced in this manner can be returned to their natural habitat and/or distributed to growers throughout the world. Mark Clements at the National Botanic Gardens in Canberra, and Maureen Weatherhead, Department of Botany, University of Hong Kong, are doing the former, whereas Norbert Haas-von Schmude, who operates a commercial laboratory in Germany, is engaged in the later.

Altogether "there is no question that Dr. Knudson did more to advance the cultivation of orchids than any other individual..." This statement by a colleague was true in 1922 (Knudson B medium), 1946 (Knudson C medium), 1949 (first invitro prorogation of an orchid, or any plant for that matter, by Dr. G. Rotor), 1960 (first shoot-tip culture of orchids), and at present. And, it is safe to predict that it will remain true in the future even if technology will change. The name Knudson will forever be tied with orchids just like the names of John Lindley, H.G. Reichenbach, and H.G. Reichenbach *fil*, G.C.K. Dunsterville, G. Seidenfaden, A. Millar, R.E. Holtum, and others.

Knudson was aware of the magnitude of his contribution. A former student recalled that he "carried his test tube of medium and growing seedlings all the time" and "even after he retired in the mid-1950s, when 1 met him on a train trip he had his demonstration test tube of growing orchid seedlings with him."

Professor Lewis Knudson, son of an immigrant in the best American tradition, rose to a position of prominence and made major contributions to science and his country because "his mind was open and widely ranging." His mind was also sharp and agile, his imagination was fertile, his intellect was broad, his choice of scientific problems was astute, and he was a brilliant scientist and "very precise researcher..." His success is also a tribute to the U.S.A., the country his father chose as his own, which gives individuals the freedom, opportunity, and chance to be all they can be9. Lewis Knudson became what he could be, and the orchid world is better for it.

1 I asked Dr. Geofrey Hadley, Dr. Downie's succesor at the University of Aberdeen, to locate a photograph of her. He tried repeatedly without success. In 1981 I visited him, and we again asked if anyone had a picture of Downie. A technician who had been at the Department for many years recalled a group photograph. I photographed and enlarged Dr. Downie's image from it. Dr. Downie is reported to have died of cancer.

2 Knudson visited Europe several times after Dr. Galambros' purported discovery, and she could have made an effort to meet him. Even in those days it would not have been difficult for her to travel to Spain or France.

3 Dr. Rotor earned his degree with a dissertation on the control of flowering in orchids under the tutelage of Dr. Lawrence H. Mac-Daniels, who died recently.

4 Not Madam Pompadour or Madame Poumpadour as sometimes seen in the literature.

5 Prof. Abrham D. Krikorian of the State University of New York, Stony Brook, has suggested that her last name at one point must have been a proper Armenian Hovagimian.

6 According to a book on the fall of Singapore it was not unusual in those days for mothers to take their daughters to work at the dance halls and pick them up at the end of the their shift thereby ensuring no after-hours involvement. When the hybrid became famous an unsuccessful effort was made to locate Maggie Oei. Old timers in Singapore suggest that she could not be found, having 1) perished during the war on subsequent Japanese occupation which was very cruel, 2) died after the war, 3) married and settled down and preferred not to be found, 4) left Singapore for China or another country.

7 A wedding-day photgraph of her sister was found and is used because the two sisters are said to have looked very much the same, almost like twins.

8 Mr. Mak Chin On, the owner of Maryland Orchid Nursery in Singapore, also produced *Dendrobium* Mary Mak, another mainstay of the Singapore orchid industry and other outstanding hybrids. He is my good friend.

9 As an immigrant myself I know this better than most how true this really is. I came to this country with \$50 and no high school diploma. The U.S., my adopted and now only country, gave me the opportunity to be all I could be and more. That is why the best gift I gave and will ever give to my son, Jonathan (4 1/2-years-old as I write this), was the chance to be born in California as an American citizen.

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# An Odontoglossum Hunt in California

by John Miller

Hunting for Odontoglossums in the United States is fun, challenging and educational. After a Seattle Odontoglossum Alliance meeting in March 1989, Dr. Howard Liebman and I embarked on an air and auto trip down the West Coast, visiting every known (to us) commercial odontoglossum nursery and a number of great amateur collections. The trip produced a prolific number of plants for our respective greenhouses. So this year (1996) while at the Vancouver meeting of the Odontoglossum Alliance when Howard suggested a similar trip I jumped at the opportunity. Since the previous trip Howard had married llene and they have two small children. Ilene was generous enough to take on all the home chores while Howard took off five days for orchid hunting.

With some schedule searching we settled on the week of 13 May 1996. Howard left home in Los Angles on Monday, driving to Santa Barbara where he picked up some 40 odd bottles of replated Odonts, Miltonias and Cyrtochilums to be delivered to Strawberry Creek Orchids. Then he was on to San Francisco to overnight with Bob Hamilton and John Leathers. I in the meantime took the Tuesday 7:00 am (EST) United Airlines flight to San Francisco, arriving at 10:20 am (PST). By sheer luck and coincidence plus, of course, excellent planning and timing I walked out of the baggage claim area just in time to see Howard driving by looking for me. The trip started.

We headed north crossing the Golden Gate bridge, up the coast on Route 101 through Camarillo, on to Eureka, then north to McKinnleyville the home of Strawberry Creek Orchids and Pat Hill. John Hainsworth had joined Strawberry Creek Orchids and the two of them greeted us warmly where we spent the next two nights. Mckinnleyville has the most ideal climate in the US for growing Odontoglossums and the plants showed it.. The nights are always cool, year around and the days seldom reach the 80's. Being close to the coast the humidity is high. Pat had prepared a great dinner for us after which, being on eastern time, I cruised off to sleep. From then on Howard kept the dogs and cats company the rest of the night and slept on the couch in the living room. He said it was preferable to my snoring, which could be heard through two doors. I believe this may be true, but Howard never-the-less, respected my senior age.

Wednesday morning we left for Eureka, home of Roy and Frae Wittwer, the owners and operators of Sequoia Orchids. Sequoia is a major producer of cymbidium flowers for the wholesale market. It was near the end of the flowering season, but still there were huge numbers of blooms showing. Boxes of flowers were being packed for shipment. The quality of the blooms were superb. Howard admired a beautiful green cymbidium and Roy insisted on Howard taking it with us. (It filled half the back seat of the station wagon.) Roy had become interested in Miltonias, Odontidodas and Odontoglossums as pot plants. He had two large houses filled with seedlings and first bloom plants. In particular a remake of Miltonia Jolene Carlson was blooming on the bench. His crosses were interesting with many beautiful flowers. It was the miltonia season and the numbers of them in bloom startled the eye. Roy also had some of Bob Hamilton's Odontoglossum and Odontioda crosses that he was blooming. Howard collected several of the red Odontiodas. An excellent cross of Bob Hamilton's was of Oda. Petit Port x (Richard Gaskel x Aviemore). I was taken by some of the boldly marked Odontoglossums. I left with a plant of Odm. cirroshum x Odm. nobile = Odm. Venilia (Charlesworth 1909), a remake of this old cross and Odm. maculatum x Odm. Halli-crispum.. In the spotted line were Odm. Wells Fargo x Odm. Gorey Castle and Odm. Nicky Straus x (Torpesca x Stropheon). Roy was most generous with his time and plants. We left with a large box filled with our new treasures.

We stopped in Eureka on our return to Strawberry Creek Orchids for a delicious lunch at Lazio's Bar and Grill. Back at Strawberry Creek Orchids with Pat and John, orchid hunting continued. John Hainsworth had called my wife, Janice to obtain her permission to name a cross after her, which she willingly gave. So I had to have a division of the finest of the cross, Oda. Janice Miller 'Powder Puff'. In addition I studied the seedling list and with the advice of Pat and John, selected a number of seedlings of blooming size. Included in the selection was Odm. Moselle x Charade, Oda. Conliana, and Wils. Anaway x Oda. Lillian Dugger. Howard in the meantime, with his wonderful recall and remembrance, combed the plant benches and came up with a box of plants about the same size as mine. We completed our hunting trip through the greenhouse in the late afternoon and retired to Pat's house to give Pat and John a chance to catch up on their work. Strawberry Creek had two large houses filled with Odontoglossum Alliance plants. The benches contained mature plants with huge bulbs, potted in fiber pots in a mixture that contained peat. Many benches had blocks of seedlings in various sizes from community pot to blooming size. It is no wonder that they can stage a unique and first class exhibit each year at the San Francisco Orchid Show. They also have two greenhouses that are not yet completely outfitted with benches and controls to provide future expansion room. There were numerous bottles of interesting looking crosses to be potted out in the coming days. I would guess they will , in the near future, need the expansion room. They have many plants coming on and we can expect that each year, for at least the next several, there will be new and exciting flowers from Strawberry Creek Orchids. There recent displays at the San Francisco show and the Vancouver show certainly showed many lovely flowers.

When evening came we all went to the Eureka Hotel. This is an old hotel that had been restored and maintained as a classic landmark. We enjoyed a glass of wine in the lounge room with its dark wood and glowing fireplace. Then we were off to the Hotel Carter for an excellent dinner. I enjoyed sea bass, locally caught, and deliciously prepared accompanied by a bottle of California chardonnay. The following morning after a quick cup of coffee we were off to San Francisco. This left Pat Hill and John

Hainsworth the entire day to pack orders, plant out flasks and repot Odonts. Our car was starting to fill up. Howard's large cymbidium received from Roy Wittweur helped to fill the back seat of the station wagon. The rear of the car was filled with plants, but Howard could still see out the side view mirror to the rear. We stopped for gas and breakfast at the edge of the redwood forest, then on to San Francisco. Howard had made arrangements to visit Sunset Orchids with owner, Steve Gettel. He also had to head back to Los Angles on the next day, Friday morning, so we were hurrying along. Around 1:00 PM we were in San Francisco and drove to the former home of Unicorn Orchids in Daly City, which has since been acquired by Sunset Orchids. After a short stay there with locked doors, Tim Brydon showed up and let us in to a part of the greenhouse where he has some of his collection. Shortly after that Steve Gettel showed up and we walked around admiring the work that had been done to have the houses in such beautiful shape. Steve then led us to his other greenhouse in Burlington which was solidly packed with Odontoglossums and lycastes. Plants while neatly arranged were everywhere. Howard scoured the place and found some Miltonias which he had given to Bruce Cobbledick and was happy to see them in good health. Before leaving Steve assembled a dozen of his latest crosses for me to return to Westport and the Miller greenhouse. Included in the collection are Oda. St. Clement x Danilo, Oda. St. Clement x Mont l' Ube, and Oda. Michael Newman. Steve's large inventory of seedlings and mature plants, promise some interesting displays for the coming shows and sales tables.

Tim Brydon, a local amateur grower took us to see his plants at a greenhouse in Pacifica, the former home of Valemar Gardens. After a short stop we retired to Tim's town house with his two small immaculate greenhouses attached. Tim, in my opinion, is one of the best growers of seedlings. His plants seem to grow faster and bigger as well as flower more quickly. He is a disciplined collector and grower, and less than first class flowers don't make another growing season in his house. We enjoyed a glassof

California wine and then off to Berkeley, the home of Bob Hamilton and John Leathers. The five of us gathered and went out to a great seafood dinner at Spenger's Fish Grotto. By this time Howard's car was filled with plants, even though I had taken my plants out to store in Bob Hamilton's garage. On Friday morning Howard departed for Los Angles and home, using the side view mirror to see to the rear. The same morning Tim Brydon and I drove south to Monterey the home of the Orchid Zone, owned by Terry Root. Terry was away at the time so Valerie Henderson showed us around. Valerie is manager of the cool growing plants at the Zone. The entire operation is huge and beautifully managed. They have many different kinds of orchids. Starting with specializing in paphiopedilums and then branching out to cymbidiums, both in enormous houses. Each genera was in a separate house or houses. Construction was underway for more very large houses for further expansion. There were two large houses that held the Miltonias and odontoglossum alliance plants. Growth was excellent. I attempted to buy one of the Onc. spacelatum 4N crosses, which were enormous, but Valerie declined saying they wanted to look at all the plants in flower before making any decision on sales. They had expansion room in both houses which I estimate will fill rapidly. The ride back to San Francisco was interesting to an Easterner. We returned to Golden Gate Orchids to visit with Tom Perlite, the owner. Tom raises a large number of the odontoglossum alliance plants, specializing in Wilsonara crosses. He consistently wins AOS awards for his flowers. It was near the end of the day and also the end of the blooming season. But Tom agreed to send out a collection of his new seedlings. Dinner that evening with Tim Brydon, Bob Hamilton, and John's Leathers was at Panos' a great Greek restaurant, in San Francisco. Bob Hamilton had eaten there enough to know one of the waitresses who gave us special treatment.

Saturday morning offered a trip to the Pacifica greenhouses, the old Valemar Gardens. One of the houses had been taken over by Bob Hamilton and Tim Brydon who shared growing areas. Bob had a good number of plants in bloom even though this was at the end of the season. The greenhouses were old but impeccable, plants and benches were clean and neat. Plants were spaced out well to give lots of room for air and growth. Bob Hamilton picked out a few of his seedlings for me including Odm. Wilskeanum x (crispum x luteo-purpureum) and Odm. nobile x Augres as well as two lemboglossum crosses, while Tim Brydon graciously parted with a beautiful Odm Moselle x Odm.. Stonehurst Yellow. John Leathers had some space in this greenhouse as well, but also had a separate small greenhouse. In both he kept his collection of masdevallias and draculas. He probably has the best collection of these genera in the US. John picked out a few draculas for me to try, insisting that they would do well in my cool house.

Tom Perlite has another of the greenhouses in Pacifica. His was quite large, actually two houses. These were about half filled with plants. I poured over the odont seedling house and commented to Tom on a number of plants that looked very interesting. About three weeks later I received a box of these seedlings from Tom containing, among others: Odm. Wearside Sunshine x Odcdm. Crowborough, Odcdm. Solana x Oda. Florence Stirling, and (Odm. Gold Moselle x Golden Rialto) x Odcdm Tiger Hambuhren.

On the way back to Berkeley we went by the greenhouses in Daly City. These are the houses home to a number of growers including Steve Gettel (formerly Unicorn Orchids), Tim Brydon, Fred Shull, and Pui Chin. Pui Chin was at home in his section of the greenhouses. Pui had a long greenhouse divided in two sections, one cool and one warm. I don't believe I have ever seen such a beautiful variety of orchids in one greenhouse. It was a marvelous and completely varied collection. His Masdevallias were in bloom and spectacular. This was a very interesting visit.

It was back to Bob Hamilton's house before supper and packing of the plants for the return to Boston. Howard could leave all his in pots and drive them back in his car, which he did. If I had tried I would have had to have at least six big boxes. So each

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## Odontoglossum Alliance

all his in pots and drive them back in his car, which he did. If I had tried I would have had to have at least six big boxes. So each plant was removed from the pot, wrapped and all were packed in two good sized boxes for checking on the airplane. Completing this task we all four went to dinner, again at a Greek restaurant, Stoyanof's, not as good as the previous night, but interesting. I left the group after dinner for an overnight stay near the airport. This so I could catch an early morning flight to Boston where I was met by Janice, my wife. Before retiring that evening all the plants were unpacked, repotted and were quietly trying to resume growth at the Westport Point greenhouse.

The hunt was successful.

#### John Miller

#### Editors Note:

I apologize for the lateness of this newsletter. Several factors combined to make this mailing at the end of the month and somewhat shorter newsletter. In July Philip Altmann mailed to me his written talk delivered in Vancouver along with the slides. As of this mailing I have not received the material. This was to be a major section of the August newsletter. I have therefor decided to go ahead and publish the August letter without waiting longer. I have been out of the country until the 25th of August which has also delayed publication. I am hopeful that we will recover the slides, which are crucial to the article, and bring to you in November the full Philip Altmann article.

# Dues are Due

Many of you have paid your dues for the year 1996 -1997. I do have a significant number of members who have yet to pay these dues. To you I have enclosed a reminder. I am sending out the newsletter counting on you to pay up. If I have not received your payment before the mailing of the November newsletter, you will not be on the mailing list. The Alliance can not afford to do otherwise.

# John E. Miller Editor and Dues Collector







Legend Top Row: Frae and Roy Wittwer - Roy Wittwer in his Odont house

Second Row: Tim Brydon

Third Row: John Hainsworth, Pat Hill and Howard Liebman -Strawberry Creek Orchids Odonts in bloom

Fourth Row: Pui Chin - Masdevallias in Piu Chin's









Legend Top Row: Valerie Henderson - Orchid Loft seedlings

Second Row: Steve Gettel in Sunset Orchids house -Tom Perlite in Golden Gate Orchids house

Third Row: Bob Hamilton - Odm. Venilia

Bottom Row: John Leathers in his Dracula house