❖Odontoglossum Alliance❖

February 1996

Vancouver Odontoglossum Alliance Meeting

The Odontoglossum Alliance meeting will be held Saturday, 13 April 1996 at the Vancouver Hotel in Vancouver, British Columbia, Canada. This meeting will be held in conjunction with the Western Orchid Congress and the AOS Trustees meeting 10-14 April 1996. The Odontoglossum Alliance meeting is scheduled for a Saturday morning and does not conflict with any of the lectures at the Congress nor any of the other specialty meetings.

Program

0830 Opening Remarks
Robert Hamilton, President Odontoglossum Alliance

Program Chairman
Mario Ferrusi, Toronto, Canada

0830 - 0915
Mr. Alan Moon
"The Odontoglossums of Charlesworth"

The Eric Young Orchid Foundation retains the slides of the odontoglossums of Charlesworth, Inc., the premier odontoglossum breeder for many years. These slides have been converted from the two and one quarter square to 35 mm. Alan has made a selection of these slides to show what history has brought us today. The heritage of Charlesworth's Odonts is well known. To see them today in the light of years of development will be exciting.

Alan Moon has been involved with orchids all his life. He started work at McBean's Orchids in Cooksbridge and moved to Jersey in the early 1960's to look after Eric Young's Cymbidiums. Now the curator of the Eric Young Orchid Foundation, he lectures all around the world. He is a member of the Orchid Committee of the Royal Horticultural Society. Alan is well known for the magnificent exhibits seen at orchid shows. The Eric Young Foundation will have a display at the Vancouver show. Great progress has been made in Odontoglossum ploidy at the Foundation. Many awarded hybrids are the result of the programs at the Foundation. The parentage of these hybrids was derived in great measure from the products of the Charlesworth efforts. Viewing these slides in the light of today's flowers will be most exciting.

0930 - 1015
Philip Altmann
"Odm. nobile syn. pescatorei - Is It for Real?

Doubt has been cast over the validity of many plants labeled as Odm. nobile. A discussion of the forms commonly available with reference to chromosome counts. The use of two forms of Odm. nobile in breeding. What do Odm. nobile hybrids offer, and why use it as a parent? Commercial potential, hobbyists delight and a Judges paradox.

Inside This Issue

Philip Altmann is a premier grower and hybridizer from Australia. His nursery, Warrnambool Orchids, is located in Warrnambool, Victoria, Australia. The ability to construct a greenhouse with materials left from building sites was a catalyst for Philip entering the orchid world twelve years ago. After a period of growing Cattleyas, Phalaenopsis and many species, He bloomed a seedling of Oda. Shelly Anne. Besotted with its charm, a quest for more odonts began. Importing was the only way to obtain sufficient plants to satisfy his needs. and as the greenhouses increased is size and number his time and interest in building waned. Warrnambool Orchids began operating in 1986 as a part time nursery, and developed to full time in 1992. While specializing in odonts he also grows a number of orchids that are compatible wit Odontoglossum growing conditions. He produces his own hybrids and raises many species in the Laboratory of the nursery. These are grown in the 4500 square foot area nursery of controlled growing. The Nursery is situated in the City of Warnnambool, on the southern tip of the Australian mainland coastline where the weather is reasonably kind.

1015 - 1030 Break

1030 -1115
Dr. Howard Liebman
"Cytrochilums:
A little known but spectacular member of the Odontoglossum Alliance"

The genus cyrtochilum, which is usually included as a subtribe of the genus oncidium, include some of the largest and most spectacular flowers of the odontoglossum alliance. Except for cyrtochilum macranthum, most growers are not familiar with other members of this genus. This talk will survey many of the cyrtochilum species, discuss a few of cyrtochilum hybrids made to date and review the future role of this genus in hybridizing in the odontoglossum alliance. Howard recently turned his attention to the cyrtochilum species and some of the few existing hybrids. He has collected these plants in the wild and commenced a hybridization program. His results will be most interesting to hear and see.

Dr. Howard Liebman has long been recognized in the orchid world for his work with the Odontoglossum Alliance material. He has done a great deal of intergeneric breeding and his plants have won many awards. He is a frequent speaker of the Alliance, because he continues to find new and interesting avenues. Dr. Howard Liebman has been raising orchids for over 30 years and has been growing and hybridizing odontoglossums and miltonopsis hybrids for over 20 years. He has registered 150 crosses in the odontoglossum and miltonopsis alliance and over 30 of his crosses have received awards from various societies including the AOS and the RHS. He has also presented papers at three World Orchid Conferences. Professionally, Dr. Liebman is a physician-scientist and a professor of medicine and pathology at the University of Southern California School of Medicine. He is the author of over 50 scientific papers on blood diseases and aids.

1115 - 1200
Marilyn Light
"Seed Propagation within the Odontoglossum Alliance"

Raising orchids from seed presents a series of challenges including a consideration of clonal compatibility and pollen germinability, optimal harvest times for embryo culture and for mature seed, and of seed germinability on a variety of flasking media.

Cultivar selection, line breeding, and hybridization play a major role in the development of the modern cultivated orchid. While horticultural goals address flower quality and quantity, plant vigor and disease resistance, these goals are not necessarily consistent with conservation objectives.

This presentation will address the challenges in raising Odontoglossums alliance genera from seed and will review what is known by specialist growers of particular genera and research. Among the genera to be discussed are Brassia, Cochlioda, Cyrtochilum, Lemboglossum, Miltonia, Rossioglossum and Tolumnia.

Marilyn Light was born in Montreal, Quebec and was educated at McGill University where she earned a B.Sc (Agriculture) and a M.Sc. (Microbiology). During her formative years, she saw land development overwhelm Yellow Lady's-Slipper orchids. She wondered why the European colonist orchid, the Broad-leaved Helleborine (Epipactis helleborine), could be so successful while intensive land use threatened native species.

Her horticultural interest in orchids began at a Barbados orchid show in 1970 while living there. Her collection has grown and evolved to now include numerous species and hybrids raised from seed. Over the past 15 years, she has taught a flasking course both at the University of Ottawa where she works, as well as in other parts of Canada. Marilyn has raised and registered several hybrids including C. Doctorbird, C. Fruit Salad, Lc. Mem. Evelyn Light, Masd. Dainty Miss (reg. pending) and Odtna. Warbler.

Marilyn's research program in orchid conservation involves a long term study of both Epipactis helleborine and of Cypripedium calceolus var. pubscens. Of particular interest are the factors affecting germinable seed yield in these species. She was invited to present on this topic at an Orchid Population Biology conference in London, England in November 1995.

She is a member of the Garden Writers Association of America, Marilyn is co-author of Gardening in the Caribbean, Baannochie & Light (1993) MacMillan.

1200 - 1400
Lunch, Business Meeting, and Auction

Following the lectures there is an Odontoglossum Alliance lunch. The registration material contains information on reserving a luncheon ticket. Following the lunch will be a short business meeting conducted by the President, Robert Hamilton.

Then the item that many believe is very exciting, the Auction of Odontoglossum Alliance material. In the past members have been very generous in donating fine material, not otherwise available, for this auction. These auctions have been lively. If you do not plan to attend the luncheon, please come to the business meeting and by all means attend the Auction.

This will be a wonderful opportunity for Odontoglossum lovers to be in Odontoglossum country. The show itself is expected to have displays of the Alliance material in its peak. I have been assured that the sales area will have plenty of good quality and interesting material for you to ponder with the opportunity to acquire. Vancouver is a beautiful city and a great place to visit. I hope to see you all in Vancouver.
John E. Miller-Editor

Vancouver - Revisited

Vancouver, British Columbia is Canada's Western Gateway, an exquisite city situated in an area of great scenic beauty. Vancouver is a spectacular city to visit. On 11 - 14 April, The Vancouver Orchid Society will host the Spring 1996 American Orchid Society Trustees' Meeting and the Annual Orchid Digest Corporation Meeting. This event celebrates several notable anniversaries. The AOS celebrates its diamond anniversary, 75 years of service to orchid growers. The Vancouver Orchid Society Celebrates its 50th anniversary and The Odontoglossum Alliance celebrates its first decade.

The Odontoglossum Alliance lectures, scheduled for 13 April 1996 are not the first Alliance lectures held in Vancouver. Shortly after the inception of the Odontoglossum Alliance, Director Dr. J. W. Thomas suggested an Odontoglossum lecture series be presented concurrent with the 1986 Vancouver Orchid Society Show, held that year at the Van Duzen Botanical Garden. One great draw to Vancouver for Odont growers was a chance to visit Wally Thomas' Charles Island Nursery, a nursery with a reputation for fine crispum Odontoglossums such as "Island Shirley" FCC-AOS and excellent red odontiodas such as Oda Island Red.

So successful was this first lecture we continue to repeat the format. When the first lecture program was over, attendees spontaneously offered fine plants for auction along with other Odontoglossum related items. The proceeds of this auction produced our initial treasury. Attendees also had a chance to acquire some superb plants for a fair price.

Now, ten years later the Alliance is a robust organization. We worked together to endow The Robert Dugger Trophy, an AOS trophy specifically for our genera. We now head back to Vancouver where our lectures began. Thanks Wally Thomas for your organizing skills – see you in April. Robert Hamilton

Odontoglossum Alliance Dinner

The Odontoglossum Alliance meeting is on Saturday morning, 13 April 1996. We thought it would be fun to have an opportunity to get together for dinner and we have picked Saturday evening, 13 April 1996.
The dinner will be at the XYZ Chinese restaurant which is located five blocks from the hotel. We have scheduled get together at 8:00 pm which will allow you to participate in the AOS auction which begins at 6:30 pm. There will be a pay as you go bar. The cost of the dinner is $52.00 Canadian which includes tax and gratuity.

Odontoglossum Alliance Dinner Menu

- Deep fried seafood salad roll
- Pan fried sliced beef with honey and garlic sauce
- Sautéed diced chicken in Kungpo Szechwan style
- Deep fried black cod with spicy sauce
- Fried rice with egg white and conpoy
- Pan fried diced duck meat with crispy lettuce
- Roasted Peking Duck
- Deep fried crab claw stuffed with shrimp paste
- Hot and Sour soup
- Sautéed lobster and crab with ginger and green onion
- Mango pudding.

We will have a separate room and can have as many as 48 people. You can sign up for this dinner through your registration for the Western Orchid Congress. This should be a fun time for all and a great way to conclude the meeting of the Odontoglossum Alliance.

Auction

Fine Odontoglossum Alliance Material Wanted

One of the highlights of the Odontoglossum Alliance meeting is the auction of fine Odontoglossum Alliance material. The proceeds of the auction are used to enhance the quarterly publication of the newsletter and other special projects. We need donations of fine quality material. In the past these auctions have seen many things not otherwise available. Plants, (mature and seedlings) flasks, and literature have been contributed.

We need contributions for our auction this year which will be held at the end of the luncheon on 13 April. Even if you do not plan to attend the luncheon you are welcome at the meeting and auction. If you can find one or more items to be donated you can bring them to the meeting. You may also leave them with me, John Miller. I will be staying at the Vancouver Hotel. Just call my room or leave me a message. You can also bring your material to the luncheon.

So look over your collection before coming and pick out that division of a fine plant, a seedling, one or more, of unusual or fine potential and contribute it to the auction. Previous auctions have shown the generosity of both contributors and buyers.

Odontoglossum Alliance Suppliers

We can expect to a have a good number of suppliers of Odontoglossum Alliance material to have sales booths at the Vancouver show. With Vancouver being in Odontoglossum country and the Odontoglossum Alliance meeting attraction a large number of suppliers have signed up to be present. The list I have at the present time is as follows:

Sunset Orchids	(Steve Gettel)	California
Strawberry Creek Orchids	(Pat Hill/John Hainsworth)	California
Bob Burkey/Steven Skoien		Hawaii
Plested Orchids/Eric Young Orchid Foundation		England & Jersey
Hillsview Orchids	(Teresa Hill)	Oregon
Charles Island Gardens	(Wally Thomas)	Vancouver
Gypsy Glenn Orchids	(Dennis D'Allessandro)	Pennsylvania
The Exotic Plant Company	(Mike Tibbs)	England
Norman's Orchids	(Norman Chan)	California
Warrnambool Orchids	(Philip Altmann)	Australia
Sunswept Orchids		California

Moving Plants out of Canada

If you are attending the Vancouver Orchid Show and Odontoglossum Alliance meeting in Canada, special arrangements have been made for taking plants out of Canada. Located at the Vancouver Hotel will be Plant Inspectors who will issue CITIES and Phytosanitary Certificates. If you are taking flasks out of Canada you will need only the Phytosanitary document.

I called the Department of Agriculture and inquired about entering the United States with plants from Canada which have the necessary CITIES and Phytosanitary documentation. I was told that if I had an Import Permit for Orchids that would be all that was necessary. If you are planning on bring plants back to the United States I suggest you obtain an Import Permit if you do not already have one. This permit can be obtained, without charge, from the Department of Agriculture.

anws

Charles Vuylsteke - King of the hybridisers

by Graham Yearsley

There must be very few orchid growers who have not heard of or grown a plant of *Vuylstekeara*, particularly the varieties Cambria 'Plush' FCC/RHS and Edna 'Stamperland' FCC/RHS. Most will probably know that this odd sounding artificial generic hybrid is made up of *Cochlioda x Miltonia x Odontoglossum*, but that is as far as their knowledge extends. Many manmade hybrids are given the name of their originator, but who was this man with the strange-sounding name of Vuylsteke (I am informed the translation from Flemish means 'dirty stick'), and what is his story?

Charles Vuylsteke was born in Ghent, Belgium in September 1844 into a family well aquainted with country life and horticulture. His grandparents were well known in agricultural circles in Meulebeke (North Belgium), as was his father Ferdinand Vuylsteke in Ghent. Not surprisingly Charles also proved to have 'green fingers'.

In 1859 the family moved to Lochristi, where father and son started working in the gardens of Castle Rooselaer. Eight years later Charles rented his own patch in the grounds of the castle. He employed several experienced young men whom he found by writing to well-known growers and business men at home and abroad. Owing to the variety of his stock as his own innovation, his business did well and between 1867 and the First World War in 1914 the nursery continued to expand.

In 1879 Charles decided to extend his activities with exotic plants using his own growing methods. Unlike many at that time, he did not send out his own plant hunters to plunder natural habitats, but used official channels, via Belgium Embassies and Consulates in Africa, Asia, America, West Indies and Oceana. With his contacts he made exchanges, or sales with plants and seeds. This proved so successful he soon became the middleman between Eastern and Western Agriculture (horticulture).

Charles started to raise hybrids, having success with palms, begonias, azaleas, and especially orchids. His exhibits at home and overseas gave him the title 'King of the hybridisers'.

In 1897 he introduced the lovely *Cypripedium* Zampia Phidias, and the following year he brought out the first *Odontoglossum* hybrid, a cross between *O. crispum* and *O. harrayanum* which he named Crispo-Harryanum (illustrated in *The Orchid Review* July 1925), thus opening up a whole new world. He exhibited at The Temple Show in London in the same year. In 1902 he produced *Odontoglossum* Ardentissimum (illustrated in *The Orchid Review* July 1925), a cross between *O. crispum* and *O. pescatorei*, which due to its attractive qualities quickly gained favour with hybridisers. In 1904 he proved that it was possible to cross different genera by producing *Odontioda* Vuylstekeae using *Odontoglossum* and *Cochlioda*. Following this success he introduced the first trigeneric hybrid just before the First World War using *Odontioda* Vuylsteke and *Miltonia vexillaria*. It proved to be very popular, being generally tolerant of excessive heat, and normally having the large flamboyant lip associated with miltonias. Eventually these produced the well-known varieties Cambria 'Plush' (1931), Edna 'Stamperland', Beard Hill, Helmut Songanja, and Linda Isher.

In his laboratories he experimented with methods of moving from the natural symbiotic culture to an artificial asymbiotic culture for the growing of seedlings.

His work with introducing new orchids and decorative flowers did not prevent him from initiating new creations in other fields. In 1886 he published his own magazine, *Dictionnaire Iconographique des Orchidees*. In 1889 he produced ideas and plans for conservatories and new heating installations. He was also the power behind the professional organisations in North West Flanders for gardens and nurseries.

Charles Vuylsteke exhibited his plants at many international exhibitions, gaining numerous awards. These included medals and Objects D'Art from St. Petersburg in 1884, Dresden in 1887, The Royal Horticultural Society in 1904 and the Manchester and North of England Orchid Society in 1906; At the Temple Show in London on May 23-25th 1911 he exhibited plants of *Odontoglossum crispum* 'King George V', a magnificent variety; (see article on page x x) *Odm* Grand Monarque and *Odontioda* Coronation. The later gained a First Class Certificate from the RHS. This variety showed great advance in size over previous odontiodas. It had a spike of 14 flowers with large scarlet blotches on a pinkish white ground. Charles went on to receive a Diploma of Honour at the Royal International Horticultural Exhibition of 1912 and at the Chelsea Show in 1914 he was awarded a First Class Certificate for *Miltonia* Princess Victoria Alexandra, a charming white flower with a triangular crimson mask on the lip. He also gained Awards of Merit for *Odontioda* Princess de Galles, a pretty flower of *Oda*. Coronation class, having a large salmon blotch on a pale ground, and *Miltonia* Adonis, blush white with butterfly-like markings on the base of the lip. He was a well-known exhibitor at many other shows.

The First World War brought an end to the 'Belle Epoque'. and the raising of orchids slackened in pace. In 1927 Charles Vuylsteke died soon to be followed by his son, also Charles, in 1936. 1937 saw the liquidation of most of the business bringing to an end the work of a national and international pioneer in the world of hybridisation. Prior to this time the Vuylstekes owned 164 different nurseries in Flanders (not all devoted to orchids, they were also noted for *Azalea indica* hybrids for example), over 20 of these were situated between Antwerp and their main nursery at Lochristi.

Nationally Charles was heralded by the press as the founder of orchid growing in Belgium. He also co-operated with growers in Great Britain, introducing these creations here.

The magnificent Ghent Show held once every five years, took place between 24 April and 1 May. An exhibition to commemorate Charles Vuylsteke sr. and jr. was held in the Museum voor Industriele Archeologieen Textiel, Ghent from 26 March to 28 May. It gave a fascinating insight into the life of these worthy horticulturalists during a rich period of orchid history. On display were examples of equipment used at the turn of the century, including watering devices, wooden blinds, pots of all sizes from 1 inch diameter upwards, original flasks for seed sowing, the medium agar agar and sterilsers. In glass cases were to be seen original orders and testimonials from all over Europe and Russia, alongside the many medals and Objects D'Art, including diplomas for the many success at international shows. It could easily be seen why his reputation as a hybridiser was so highly thought of by looking at the many paintings of Charles' odontoglossums. odontiodas, and vuylstekearas which adorned the walls. These were also depicted on coloured plates illustrating books and journals as diverse as *Dictionaire Iconographies des Orchidees* (1899), *The RHS Journal* (1907), *The Orchid Review* (1900), *The Orchid Album* (1881), *The Gardeners Chronicle* (1841), and the *Lindenia*. There was also a collection of pressed specimen flowers from the late 1800s of Colombian orchids, including seven different forms of *Odontoglossum crispum* dated 1887.

This fascinating life story has now been recorded in a recently published book *Chas. Vuylsteke Sr. & Jr., Fine Fleur van de Belgische Sierfeeli* (1867-1937) which has many beautiful illustrations. Unfortunately, it is only printed in Flemish, and because of the cost of its production there are no plans to print in English.

Acknowledgements
Mrs. Hesketh for translation from Flemish.

Editors Note
This interesting article was reprinted from *The Orchid Review*, November - December 1995 with the kind permission of the Director of the RHS and the author Graham Yearsley. Graham Yearsley is a member of the North of England Orchid Society. He wrote this article following a recent visit to an exhibition on Charles Vuylsteke in Ghent, Belgium. The colored illustrations are from slides kindly supplied by Graham Yearsley.

The following color illustrations are on page 25

Cypripedium Zampia Phidias raised by Charles Vuylsteke in 1897.

A view of one Charles Vuylsteke's nurseries in Belgium.

Odontoglossum armainvillienense var. Ardentissimum (Rolfe) taken from the *Dict. Icon de Orchidees.*

Lewis Knudson (1884-1958): His Science, His Times, His Legacy

by Joseph Arditti

Part III

STERILANTS AND FUNGICIDES - In 1946 and 1947 the *American Orchid Society Bulletin* published several articles regarding the use of Clorox as orchid seed disinfectant instead of calcium hypochlorite. Clorox had the obvious advantage of being a solution which was easy to use, but it could be toxic. Calcium hypochlorite was not toxic, but more difficult to prepare. The calcium hypochlorite method was developed in Knudson's laboratory by J. K. Wilson, one of his graduate students (who was a good tennis player according to Giltner J. Knudson). To resolve the problem Knudson carried out comparative experiments and concluded that there was "nothing better....." than calcium hypochlorite. Many, myself included, agree with him even at present. Others use Clorox (a 5.25% solution of sodium hypochlorite) or similar bleaches successfully.
Even with the best disinfectant cultures may become contaminated. Therefore "it would be ideal it one could add to the culture medium a chemical agent which would kill any microorganism present or ... prevent the growth of fungi and bacteria". The first article on the subject was published in the *Orchid Review* by a Canadian investigator. Knudson had the same idea because he published his findings a month or two after McAlpine having started his experiments on November 12, 1946. He cited McAlpine, gave him credit, and compared their results. His conclusion was that ethyl vanillate may kill contaminants, but it also inhibits the orchids and should not be used.

McAlpine also suggested that inclusion of hydrogen peroxide (30% in water) in the culture medium could prevent contamination. Knudson did not question the effects of this compound but warned potential users that this concentration hydrogen peroxide is dangerous and should be used with care and knowledge.

The search for effective anticontaminants has continued into the present, but none of the available methods, including our own has gained wide acceptance.

Native American Orchids

Knudson became interested in the germination of terrestrial orchids during the early phases of work with these plants. His first attempt to germinate their seeds took place on December 26, 1922. He used seeds of four *Ophrys* species from Spain. Later he isolated a fungus from *Epipactis* and possibly *Cypripedium* (in all his time all *Paphiopedilum* species were included in *Cypripediuim* and therefore it is not always clear to which genus he is referring). He also tried to germinate native *Cypripedium* species. As might be expected at present, he was not very successful in these attempts because North Temperate orchids generally fail to germinate under asymbiotic conditions.

In the fall of 1939 Knudson collected seeds of *Goodyera pubescens* and on December 8 of that year attempted to germinate them on his medium B with 2% glucose at a pH of 5 under 600 foot-candles of natural daylight in a greenhouse. Only 20% of the seeds germinated, but growth became apparent within a few days. After 10 months his seedlings had formed rhizoid-bearing protocorms which also had leaves but lacked chlorophyll.

Knudson concluded that these seedlings could not carry out photosynthesis, and he was probably right. He also described the young plant as "a saprophyte during ... early stages and ..probably one of the best examples of the saprophytic character of the early seedling stages of orchids". This description contains an error, perhaps of semantics, because such seedlings are parasitic on their fungi and not saprophytes.

Storage and Viability of Orchid Seeds- In his early experiments Knudson failed to germinate seeds of *Odontoglossum* given to him by "Mr. Sander of Belgium" who "brought (them) after several weeks of traveling and immature (seeds) of *Paphiopedilum venustum"* the age of which was unknown. It is possible that this experience led him to a study of orchid seed viability. He obtained seeds from Lager and Hurrell and used them for experiments with seeds "kept in a rather warm dry office in paper packages" convinced him that orchid seeds can lose viability on storage and "should be planted as soon as possible after collection."

With time Knudson found that "it is not possible at all times to sow seeds immediately after removal from the pod" (*sic*; orchid fruits are capsules) and for that reason he felt that "a consideration of viability and storage" would be important. He noted that *Odontoglossum* seeds left on his desk during July lost their viability in three weeks. Seeds stored in a refrigerator at 8°C remained viable for much longer. Subsequent research has confirmed Knudson's findings.

Vanilla-*Vanilla planifolia,* the source of vanilla, is native to Mexico, but at present most of this flavoring comes from Madagascar. At one time *Vanilla* was cultivated in Puerto Rico, but a root disease caused serious problems. A solution "appeared to be the development of hybrids resistant to root rot and of equal or better quality than that of..." *Vanilla planifolia.*

A major problem faced by *Vanilla* breeders was seed germination. French workers in Madagascar obtained some seedlings asymbiotically, but they could not germinate seeds consistently enough to sustain a breeding program. For this reason the Federal Experiment Station in Puerto Rico approached Knudson in July 1938 and asked him to develop a germination procedure "solely [for] the improvement of hybridization. Propagation under field conditions will continue to be by the use of cuttings". He used Hoagland's medium plus microelements (Table I) and his solution B for these experiments, because most of them were carried out before the formulation of medium C. The first experiments were started on July 20, 1938, with seeds of *Vanilla planifolia (Vanilla fragrans), Vanilla pompona,* and *vanilla claviculata* from Puerto Rico. Eight months after the start of the experiments 5 seeds (out of approximately 50,000) of *Vanilla planifolia* germinated. They were maintained at 25°C in the dark.

On January 26, 1939, Knudson started a second experiment, but by October 2 of that year" not a single seed had germinated". Some of the cultures dried during this period and were dehydrated with sterile distilled water, but the seeds still failed to germinate. To bring about germination Knudson decided to subject some of the cultures to other treatments. These included an atmosphere of pure oxygen, removal of the seed coat, and on January 11, 1940, temperatures of 32°C, 28°C and 25°C in the dark. In less than two months germination attempts were carried out at this temperature so that by the end of 1940 Knudson was able to produce hybrid seedlings of *Vanilla planifolia x Vanilla pompono* for the first time. Seeds of the reciprocal cross (*Vanilla pompona x Vanilla planifolia)* failed to germinate. In 1944 Knudson germinated seeds of *Vanilla fragrans x Vanilla phaeantha.* Knudson showed some of his *Vanilla* cultures at the 1946 meeting of the American Orchid Society.

Due to other factors Knudson's work was not enough to save the vanilla in Puerto Rico. The root rot has continued to be a problem in vanilla-growing areas (including Tahiti). Resistant cultivars have still not been obtained.

Velamen: The Last Paper

According to one source Knudson "was not very active any more, either socially or academically" as his retirement was approaching and after he retired. However he continued to visit his laboratory regularly and was active in research. His last graduate student, Augustus M. Dycus, was at the Botany Department, Oberlin College, in 1957 and then moved to Arizona. He visited me once, perhaps 20 years ago, but was not very forthcoming with recollections.

Dycus research on the velamen of orchids served as a basis for Knudson's last paper published in 1957. This paper (Dycus and Knudson, 1957) had a great impact on the views regarding the function of the velamen for 20 years. Unfortunately, some of the information in this paper was subsequently proven to be wrong. Several botanists who knew both Knudson and Dycus ascribe this to Knudson's advanced age at the time and to Dycus' youth and inexperience. Their findings were that:

- In excised roots the water absorption and loss rates were equal.
- Only the apical regions of roots with living velamen cells can absorb water for periods not exceeding eight days.
- Roots did not accumulate P during immersions in dilute nutrient solutions (Hoagland's) for as long as two hours.
- Absorption of P took place through apical portions, but the label was not translocated even after 48 hours in *Cattleya* and 72 hours in *Vanda.*
- Aerial roots cannot absorb potassium nitrate (KNO3).
- Intact mature velamen of aerial roots of some orchids appears to be almost impermeable to water and certain solutes.
- The velamen is not a barrier to oxygen and carbon dioxide.
- Gaseous vapors do not condense measurably in the velamen.
- Velamen or exodermis cells of injured or attached roots have thinner walls; as a result absorption of water and nutrients and translocation into the cortex and stele can occur.

Dycus and Knudson concluded that 1) "the principal roles of the velamen in free aerial roots are mechanical protection and the prevention of excess loss of water from the cortex" and 2) "the aerial roots which fails to reach a substratum which it can enter or to which it can become affixed is a liability rather than an asset to the plant".

These views (Dycus and Knudson, 1957) buttressed by the authority of Knudson, crept into the literature and became generally accepted.7

The first report to contradict the views expressed by Dycus and Knudson showed that within 30 minutes of application to aerial roots of *Epidendrum* label from SO4 was transported to the xylem . Excellent work with P, Na, and T and *Vanda tricolor* showed that the label moved at a speed of 3 cm h-1 in dry roots and 6 cm h-1 in saturated ones. Experiments with H2O and P and several orchids showed rapid absorption and transport in roots with intact velamina. Work with *Cattleya* and P also produced similar results. Thus it is safe to state that Dycus either erred or carried out his experiments in a manner which did not allow him to discover the true function of the velamen in uptake and transport. In two respects Dycus and Knudson were right: the velamen does redu water loss, and it does not impede photosynthesis. These points were confirmed recently in sophisticated desiccation and photosynthesis experiments.

Noël Bernard: The Role of Mycorrhiza in Orchid Seed Germination

Short Biography- Noël8 Bernard was born on March 13, 1874. His mother was Marie Marguerite Sabot, 19 years of age and the second wife of Francois Bernard, 46. The father died in December 1879, and his mother had to work to earn a living for herself and her son. Noël spent his vacations at the home of his uncle Joseph, who treated him like his own son, and never forgot his mother's sacrifice and his uncles kindness.

An outstanding student during all stages of his education, Noël was eventually admitted to the École Normale Supérieure and the École Polytechnique. He spent six very studious years there. His biographer (Boullard, 1985) describes him as 1.85 m tall at that time with brown hair, fascinating , personable, and with a strong enough character to irritate some important people. At the age of 21 he decided to become a biologist, and Julien Costantin became his mentor. The two developed a very close relationship, Costantin considered Bernard to be a rigorous observer, bold, daring and inductive thinker, tenacious in the pursuit of his goals, and a careful worker. Bernard in turn was inspired and fastinated by Costantin and worked enthusiastically while at the École Normale Supérieure. In November 1897 Bernard earned his "*Licencié*" in *"Sciences Naturelles."* A year later he decided to specialize in orchids. However this had to be postponed because the young scientist was called to military service.

As a soldier Bernard was stationed at the Melum barracks which were not far from Fontainebleau forest. There on May 3, 1899, while on a walk Bernard made his great discovery. On being released from the military in November of that year Bernard returned to the École Normale Supérieure and stayed there until 1901 when he accepted a position at the University of Caen. He lived on a property owned by the botanist, Leon Guignard (who had some interest in orchids), and worked with Professors Julien Costantin and Gaston Bonnier.

At Caen Bernard lived with his mother for a time. During that period he corresponded with Marie Louis Martin, a mathematician at the École Normale Fontenay-aux-Roses. They were married on August 8, 1907, despite warnings to Miss Martin that Noël had a difficult character. He was 33 at the time and had only three years to live. She was 29, having been born on December 7, 1878. Their son Francis was born prematurely on April 30, 1908 after his mother fell from a bicycle.

In 1908 Noël Bernard moved to Poitiers where he became Professor of Botany a year later. His wife received an appointment at the ÉcoleSupérieure de Jeunes. While at Poitiers Bernard made important scientific contributions to the biology of orchids, potatoes, and symbiosis. The future seemed bright, but in early 1910 his cousin Joseph Magrou detected Koch's bacillus (the tuberculosis bacterium) in Bernards sputum. This diagnosis was confirmed by the family physician in March 1910. Despite the illness which was to prove fatal, Bernard completed his major review *l'Evolution dans lal Symbiose (*Bernard 1909). As the disease progressed, Bernard and his wife moved to an estate in Mauroc, a few kilometers from Poitiers. On December 19, 1910, the Academie of Sciences honored him with the Prix Saintour which carried with it the sum of 3,000 francs and a commendation for his scientific achievements.

Noël Bernard died at 03:00 on January 26, 1911. Like his father, young Francis Bernard became an orphan at a tender age, a fact that probably did not escape Bernard's mother9 , who was still alive at the time, and his wife, who stood by him until the very end (Boullard). Bernard is buried in the small cemetery of Saint-Benoit near Mauroc. His grave is marked by a simple monument made of concrete and now covered with lichens. The plaque reads:

Noël Bernard, Professeur A La Faculté des
Sciences de l'Université de Poitiers - 1874/1911

Marie-Louise Bernard10 became an educator and an administrator at several schools and died in 1946. She is buried at Fréjus. Like Bernard's mother she had to raise her son alone and did so extremely well.

Francis Bernard, the son of Marie-Loiuse and Noël Bernard did not become a botonist like his father. He is a marine biologist of note with 226 publications and three dives to depths of 2300 meters. As one might expect he is very proud of his father and once wrote that the "philosophy and work of Noël Bernard as ... the genius of Pasteur applied to orchids". As late as 1968 Francis Bernard felt that despite his own substantial achievements he is not the man of genius his father was.

Mycorrhiza-Bernard was not the first to observe mycorrhiza in general and that of orchids in particular. The first observation of fungi on orchid roots seems to have taken place 75 years earlier. However Link failed to recognize and appreciatethe fungus even after drawing it. Subsequent studies, some of them extensive , also failed to appreciate the role played by the fungus in orchid seed germination.

What Bernard saw that afternoon were plantlets of *Neottia nidus-avis,* 3 mm to 5 mm long, all of them harboring mycorrhiza. On May 3, 1899, he wrote his uncle Joseph Bernard that he observed "germinating seeds of *Neottia...*" and seedlings which no one had seen before. In his article on the subject (which was published on May 15, 1899, according to Boullard [1985]) he reported observing 1) starch-containing parenchymatous cells in the center of the seedlings, 2) layers of cells which contained pelotons (a three-dimensional network of hyphae), and 3) epidermal cells that contained neither fungi nor starch. He also added that "germination of the seeds occurs in the midst of ...mycorrhizal fungi.

On the basis of his observations Bernard concluded that "mycorrhizae are indispensible for the plant i.e., [seeds] during the germination period...*Neottia* plants are associated with their fungi during all stages of development". He restated these findings and conclusions seven years later in what seems to be his only English language papers: "Although the fungi can live apart from their host plants, the orchids themselves require the presence of their guests for their own development. I have sown the seeds of many orchids 'aseptically'...under these conditions the seeds have not freely germinated; they swell, and later on they get green, but their growth remains insignificant. On the other hand, if germs of the appropriate fungus are sown with the seeds, they commence to germinate almost immediately in a very regular manner...I have examined a large number of young orchids which had germinated in very varying conditions, and I always noticed that they were invaded by the fungus from the beginning of their life. The orchids are therefore practically dependent on their parasitic fungi, since they do not grow without them."

Bernard could have easily fallen into the trap of simply describing what he saw and letting it go at that. Had he done that he would have merely added to the general knowledge of orchids. He could have assumed that the *Neottia* seedlings were infected by pathogenic fungi. That he may not have been far from such a conclusion is suggested by his reference to the fungi as "parasitic", but his good sense and inductive thinking prevailed. Another blind alley was open to him also; he could have assumed and suggested that the seedlings became infected following, not before, germination of the seeds. He did not do that, either. His brilliance led him to the correct conclusion.

Others could have reached Bernard's conclusion even before his birth. The list of those who could have done so includes 1) the early observers and/or students of orchid mycorrhiza (Reissek, 1847; Prillieux, 1856, 1860; Reinke, 1873; Mollberg, 1884; Wahrlich, 1886;Dangeard and Armand, 1897; MacDougal, 1899a, 1899b) and 2) horticulturists who germinated orchid seeds using the methods developed in England in 1849; these methods were symbiotic because the seeds were scattered at the base of mature plants or other areas where the mycorrhizal fungi were present. They could have, but none of them did, and this attests to Bernard's genius.

Noël Bernard spent the remaining years of his life studying orchids and their fungi, potatoes, and tuberization. His excellent work laid the foundation of orchid mycorrhiza studies. Many of his findings are valid even at present. He summarized his findings regarding orchids in a paper which has been "recognized as a classic study of mycorrhiza". Other leading students of orchids and mycorrhiza have been equally and justifiably lavish in their praise. And Bernard's achievements both in terms of quality and quantity are astounding. All of his research and writing were accomplished between 1899 and 1911 during less than 10 very productive years (in 1908 he had to care for a premature baby and a sick wife; during the last year of his like he was severely limited by debilitating tuberculosis).

Bernard's discovery of the requirement for mycorrhiza for orchid seed germination was an entirely new concept which required original thinking. His work on the subject led him to develop an interest in what was then called immunity in plants. He initiated studies in this area but died before being able to complete them. His notes were preserved by Mrs. Bernard. In 1911, shortly after Bernard's death, his mentor, Julien Costantin, and his cousin, Joseph Magrou (1883-1951), edited and published them (Bernard, 1911).

It is clear from this paper (Bernard 1911) that Bernard made at least two additional major discoveries far ahead of his time. One was the utilization of zones of inhibition ("halos") to study the effects of antifungal and antimicrobial agents. Utilization of halos for antibiotic studies gained prominence when Alexander Fleming discovered penicillin some 30 years later. The second discovery was that of phytoalexins, which were studied in more detail, recognized and named many years after Bernard's death.

While germinating orchid seeds with the aid of fungi Bernard also attempted to develop asymbiotic methods. Probably acting on the assumption that preparations made from orchids may satisfy the requirements of orchid seeds, he added salep to his culture media. In his first attempt he added only
2g /l , increasing the amount later to 5 g, 10 g, 15 g, 20 g, 40 g, and 60 g. Salep is a powder or drink prepared from dried tubers of *Aceras, Anacamptis, Bletilla, Cremastra, Eulophia, Himantoglossum, Loroglossum, Ophrys, Orchis,* and *Serapias.* Their composition was studied as early as 1844 by C. Schmidt (who coined the term "carbohydrate" as a result of these studies) and they were shown to contain sugars. More recent analyses have shown that reducing sugar content in such tubers may vary from 1.01% to 4.5%: sucrose content ranges from 0.17% to 1.84%.

Assuming an average sucrose content of about 0.70% and not considering the reducing sugars (average content approximately 2%) because not all of them can be utilized by germinating orchid seeds, Bernard's cultures contained 14 mg (2 g salep), 35 mg (5 g salep), 70 mg (10 g salep), 105 mg (15 g salep), 140 mg (20 g salep), 280 mg (40 g salep), and 420 mg (60 g salep) sucrose. Even if these amounts were to be quadrupled, assuming that all reducing sugars were usable [(2% + 0.7% = 2.7)/0.7 = 3.9] the highest sugar content in Bernard's media was 1.7 grams (420 mg x 4 = 1680). The highest level of reducing sugars and sucrose (4.5% and 0.44%, respectively, for a total of nearly 5%) is found in tubers of *Orchis romana.* Assuming a salep made of these tubers only, the highest concentration of potentially usable sugars in Bernard's 60 g salep medium would have been 3 g /l . Such concentrations are insufficient to support reasonable growth, and despite development to the point of leaf formation, Bernard's experiments with asymbiotic germination of *Bletilla* and *Laelia* were not successful.

It is entirely possible, and even very probable, that had he lived long enough Bernard would have discovered asymbiotic seed germination. But he did not, and at the time of his death Bernard's papers could be interpreted very narrowly and somewhat unscientifically to suggest that orchid mycorrhiza was obligate and seed germination could not take place without it. Another possible interpretation could have been that the fungi provided the orchids with as yet unknown substance which Bernard did not identify due to his premature death. The later would have been a more reasonable and scientific approach, but Julien Costantin and Joseph Magrou chose not to take it. Instead they took a narrow, unscientific approach when Lewis Knudson discovered asymbiotic seed germination and added to it chauvinism, personal attacks, and invective. The resulting controversy served no useful scientific purpose and may have sullied the memory of a great scientist.

Costantin, Magrou and the
Grande Découverte Francaise

Julien Costantin (1857-1936) was raised by a family of tradesmen in Paris. He was a student at the École Normale Supérieure in 1877 and became a *licencié (licentiate)* in mathematics (1879), and physical sciences (1880 and natural sciences (1881). In 1883 Costantin became a Doctor of Natural Sciences. After holding several positions he was appointed Professor at the Museum of Natural History in 1901. A year later Costantin was made Professor of Botany at the National Horticulture School in Versailles. In 1907 he was elected President of the French Botanical Society. The following year he became Professor of Plant Pathology at the École Supérieure Coloniale de Nogent-sur-Marne. He studied fungi, water lillies, distribution of stomata. the littoral flora, plant pathology. rubber-producing Asclepiadacae of Madagascar, mycorrhiza, thallophytes, orchids, potatoes, and other plants. Costantin was also a staunch defender of the inheritance of acquired characters long after this theory was discredited. His first paper was published in the *Bulletin* of the French Botanical Society in 1882, and the last one in the *Comptes Rendus* of The Academy of Sciences, Paris, in 1936. The total number of publications is 268, but they do not seem impressive.

Costantin's biographer (Blaringhem, 1937) describes him as a model of French scholars and a teacher who always impressed on his students the need to improve humanity. He was also a devoted husband and father to three daughters (Hélène, Marie, and Jeanne) and one son (René). His son, a soldier in the 45th infantry regiment was killed at Maimetz in December 1914. Before his death the son was a physics student at the École Normale Supériere. His paper on the osmotic properties of emulsions was held in high regard. Costantin dedicated his book *Origine de la Vie Sur le Globe* to René's memory. He was sustained during his last years by the high esteem in which his son's paper was being held (Blaringhem, 1937)11 It is possible that his son's death was the reason Costantin's excessive patriotism and strong defense of French honor, glory, culture and science. Noël Bernard's work and Knudson's discovery became the focus for his strong feelings, especially because Bernard was his favorite and probably best student. Unfortunately, Costantin's manner and approach did more harm than good to Bernard and France.

Joseph Magrou was born in Béziers (where Noël Bernard used to spend vacations with his uncle Joseph Bernard) on August 6, 1883, and died in Paris on February 10, 1951. Before becoming a biologist he studied musical composition and organ-playing with the famed composer, César Franck, and was awarded two second prizes for his compositions. He also wrote an opera called *La Belle et la Bête (Beauty and the Beast),* but the directors of the Paris Opéra turned it down. Magrou took up medicine after the conservatory. He went to the Pasteur Institute in 1910 on a scholarship and remained there as a scientist and eventually head of the Mycology Service until his death. Noël Bernard, Joseph Magrou, and his brother, Jean Magrou, were close and shared a great admiration for the writer Emile Zola (of Dreyfus-affair fame). Bernard also shared a love for plant biology with the latter being mostly interested in plant pathogenic fungi at first. On returning from the military, Bernard lived in Paris where he was again close to his cousin. After Bernard moved to Caen the two kept in touch by correspondence and apparently visits, because Joseph Magrou was the first to identify the tuberculosis bacillus in Bernard's sputum.

Bernard kept in touch with Joseph Magrou in the best and worst of times. After his first paper was published, Bernard sent his cousin a reprint with the dedication "To my cousin Joseph Magrou as a souvenir of the interests we share in our studies." His last letters were addressed to Joseph Magrou. On August 29, 1910, when his disease was worsening, he wrote that Francis, his

son, was growing well and the only bright point on the horizon12 . Six weeks before his death and realizing its inevitability, Bernard wrote to Magrou that he (Bernard) must face the truth of the situation without illusions(Boullard, 1985). In view of the close and constant contacts it is not surprising that Joseph Magrou viewed Bernard as his teacher and benefactor (Boullard, 1985) as well as a relative and a friend.

On Bernard's death Magrou decided to continue Bernard's work (Mariat, 1951). He did that, but without Bernard's brilliance. From 1911 until his death, Magrou worked on mycorrhiza, tuberization, and orchids, all subjects which were studied by Bernard. One of his students, Francois Mariat (now at the Pasteur Institute), carried out early and important work on vitamin requirements by orchid seedlings.

Wanting to continue Bernard's work was an admirable decision by Magrou. Joining Constantin in his attacks on Knudson and others who worked on the asymbiotic germination of orchid seeds was questionable. Their diatribes accomplished not much beyond forcing Knudson and others to fight back, and in the process they pointed out some of the weak points in Bernard's work. Thus, Magrou did more harm than good to the memory of a cousin he loved. Magrou and Costantin would have served Bernard much better it they had accepted Knudson's research as extension of his work.

Costantin had good reason to be proud of his star student, Noël Bernard, and his findings. And he wrote about it in glowing terms even before Knudson published his first English-language paper. One of his papers contains a description of the use of orchid endophytes for seed germination. In a second paper, Bernard's works on orchids and their mycorrhizae were used to support the validity of Lamark's evolution and genetic theories: "The Mendelian laws, so long forgotten, and recently [12 years earlier] brought to light ...are applicable only to very simple cases...of two varieties which differ...by one or a small number of characters...They do not seem applicable ...to...species...differing from each other by numerous characters. If...these complex cases could be ...reconciled with Mendelian principles, the result would be a theory that evolution...takes place only in the ovule. Can we admit that an exterior influence can never cause the appearance of new characters? Upon this there cannot be a division of opinion. All that has been set forth...by Lamarck, the famous disciple of Buffon" In truth "all that has been set forth with regards to "orchid evolution points away from Lamarkian ideas, but Costantin could not be swayed. He remained a Lamarckian ideas, but Costantin could not be swayed. He remained a Lamackian in part, I think, because Larck and Buffon were French.

In December of 1922 Costantin described the use of Bernard's symbiotic method by horticultural establishments. He pointed to Bernard's prophetic suggestion that "a laboratory attached to a greenhouse...specially reserved for this...work would...furnish...fungi...for...germination of [orchid] seeds..., listed horticulturists in England (with help by James Ramsbottom), Germany (alluding to Hans Burgeff, but names not given), and France (G. Bultel, grower for Edmond de Rothchild at Armainvilliers and Vacherot at Boissy-Saint-Léger). The fact that Costantin did not mention Knudson's work suggests that he wrote the article before reading the first papers on asymbiotic germination, one of which is dated June-July 1921 and the other January 1922. Slow communication (sea mail) between the U.S. and France could be one reason for that. Also, it is not uncommon for journals to be published later than the printed publication date. The Spanish paper could have reached him earlier, but it is possible that Costantin did not read that journal because he never cited the article.

Costantin must have read Knudson's paper(s) some time before the end of 1922 because he and Joseph Magrou contributed an article that seems to have been inserted in the journal (Costantin was its editor at the time) out of order or late because its pages are numbered with roman numerals and it is followed by a paper which starts on page 1 of volume IV, Series 10, 1921. An inverted drawing of a photograph of the Charlesworth greenhouses in the U.K. illustrates the article. The first half of the article is essentially a repetition of a previous one. Arguments start of page XVI when they first mention that G. Bultel showed the French Horticultural Society four tubes, each containing six young plants of *Vanda tricolor* and *Vanda caerulea (sic; Vanda coerulea* is the correct spelling at present). The points made by Costantin and Magrou in this paper are that:

- asymbiotic seedlings are not as healthy as those containing fungus:
- fungus-free seedlings do not develop well and may die if not inoculated with mycorrhizae;
- being non-symbiotic these seedlings were "new plants," and their development would probably be other than normal:
- the plants may not be orchids in the true sense because the fungus of a lichen cultured without the appropriate alga is not a lichen.

Knudson interpreted this statement to mean "that it is no more permissible to consider an orchid, which lacks the fungus, an orchid than it is permissible to consider the individual plant components of a lichen as a lichen";
they may not flower.

Attention shifts to Knudson on page XXVI with a description of his early experiments and the comment that on reading the "American author" one is disposed to conclude "that the theory of symbiosis formulated by Noël Bernard is a novel." But, the reader is assured that this may be an indication of Knudson's...naïveté." This is the mild part of the attack. Petulance, vitriol, and arguments follow, escalate and are repeated in subsequent papers. A second, more gentle approach could have been simply to accept asymbiotic orchid seed germination as a fact and claim (incorrectly) that"...asymbiotic germination as well as symbiotic germination were both discovered by Bernard..." Even without discovering asymbiotic germination Bernard made major and extremely important contributions to orchidology. It would have been enough to point to these and to the fact that Bernard's work laid the

groundwork for Knudson's research.

As the years passed Costantin repeated these claims several times in his arguments with Knudson and added new wrinkles as needed. On of his major points was that asymbiotic orchid plants are abnormal. He based this contention on the fact that they lack fungus and accumulate starch.

Knudson's reply was that constancy of association is not a proof for abligate symbiosis and "may ...signify that the orchid fungus is widely distributed and that the orchid is readily infected." The latter is indeed the case. As to the starch accumulation, Knudson pointed out that this occurs on sugar concentrations of 0.8% or h higher (8 g /l) due to " absorption in excess of utilization".

Under the constant barrage by Costantin, Knudson's remarks were sharp on occasion: This argument by Costantin that the presence of starch is an abnormality would not impress any physiologist of importance..." And, "Costantin is so impressed with the idea of obligate symbiosis that it is the only reason he can ascribe to the failure of *Psilotum triquertrum* to fruit..this plant [being] raised asymbiotically and ...apparently in fine...vigour..." But one, cannot blame him because Costantin's comments were argumentative, often unprofessional, and seldom made any scientific sense.

A second point made by Costantin is that the fungus is ultimately digested, but before that it has a pronounced effect on the nuclei of the host plant. Costantin, like Bernard, favored the erroneous view that the nuclei act as phagocytes. Knudson pointed to different possibilities and suggested, also erroneously, that the fungus may be unable to penetrate cells adjacent to those that were invaded initially and therefore is autolysed "because of lack of food".

Costantin also suggested that orchid seedlings produced asymbiotically would not flower and challenged Knudson to produce flowers on such plants. "intimating that thus it is not possible". Knudson's reply to this argument was to 1) point out that "a small species of *Oncidium* growing in Guatemala produced seeds and the roots were free of the fungus...," and 2) show experimentally that a *Laeliocattleya* hybrid could flower asymbiotically in vitro.

During the debate most of Costantin's arguments were theoretical or based repeatedly on Bernard's work. In contrast Knudson, as one would expect from a modern and brilliant scientist, based his replies and arguments on actual observations (i.e. the *Oncidium* plant in Guatemala and experimental evidence, in respect to the flowering of asymbiotic plants). Knudson never questioned the validity and/or importance of Bernard's work: "At the outset I ... accepted as a mater of fact the essential conclusions of Bernard...[and]...was impressed with the extreme novelty...Great credit is due Bernard for the excellence of much of his work..."

But Knudson also pointed to some weaknesses: "The deductions made by him relative to the necessity of the fungus for germination are not warranted by the experimental evidence". And more than that: "In attempting to explain the action of the fungus, Bernard made...an experiment which should have given him the real clue. He found that the fungus could invert sugar....This...increased the osmotic concentration." Therefore the action of the fungus according to Bernard was to change starch within the embryo to sugar. This [according to Bernard] increased the concentration within the cells and acted as a physical and physical-chemical stimulus to growth. Bernard...used high concentrations of salep (which, therefore, contained higher quantities of soluble sugars, etc.) and obtained germination of seeds which he described as normal. But the explanation given was that the high concentration used was equivalent to a physical-chemical stimulus... He ignored entirely the food relationship".

Costantin stuck to the explanation that the fungus digests starch in the embryo. In his usual scientific (even at times irritated) manner Knudson countered this point by stating that "this view...by Costantin cannot hold, for even though the fungus enters the embryo there is no starch...to be digested. I have examined various seeds of *Laelia, Cattleya. Cymbidium,* and *Odontoglossum,* and have never found starch...unless sugar had been supplied...[or] ...on...only nutrient salts and agar. The reserve food at the outset is largely fat"13 . However, he was right is suggesting that the fungus merely hydrolyzed large molecules and transformed "insoluble organic food ...to soluble foods...", and that "germination is induced not by any action of the fungus within the embryo, but by products produced externally by digestion or secreted by fungus". Experiments carried by Knudson himself and others have shown that the fungus acts primarily by hydrolyzing polysaccharides and making available sugars on which the orchid seeds can germinate and also providing certain vitamins.

The major problem was that Costantin considered the elucidation of the role of the fungus in orchid seed germination to be a Great French Discovery by a Great French Scientist and he did not want anyone "messing" with it. He was willing to accept research that supported Bernard's discoveries, and views pleased him. On the other hand, he viewed the discoveries by Knudson, Bultel, and Ballion as casting doubt on The Greatness and attacked. However, he "did not attempt to verify some of the views, held by himself in respect to the 'abnormality' of plants grown asymbiotically". Instead, "Costantin emphasizes the point that we should not ignore the teachings of Nature". He seems to have ignored the fact that "nature presents a set of conditions and the interpretation is made by man...[and]...mere statements based on the 'teachings of nature' are no adequate proof to those who believe in the experimental method".

Knudson was a firm believer, an effective practitioner, and excellent teacher of the experimental method. Therefore, he was able to counter Costantin's arguments with facts. When he proved that orchids grown asymbiotically can produce flowers, Costantin apparently realized the futility of further arguments and gave up. He continued to extol the theories and views of Lamarck, but none of his nearly 70 papers between 1930 and 1936 (when he died) dealt with orchids. Knudson continued to work

and publish on orchids (seed germination and other topics) until 1957 a year before his death.

Bernard's work on orchids is still impressive, valid and relevant. The same is true of Knudson's work on seed germination. Costantin contributed little but rancor and should be remembered as a tragic figure (a father morning the loss of a son), who was Noël Bernard's mentor and then cast a shadow on his memory by very unprofessional behavior. Joseph Magrou's fault (if one can call it that) was his love for his cousin, Noël Bernard, but he was wise enough to allow himself to be used only twice . On his own he was reasonable.

7 This is reminiscent of Fritz Müller's view, in a letter to Darwin, that orchid pollen was poisonous to flowers. Darwin accepted Müller's idea, included it in his book on orchid pollination and thereby gave it authority. As a result this erroneous view became generally accepted and held sway until Prof. Hans Fitting carried out experiments with *Phalaenopsis* flowers at the Bolgor (then Buitenzorg) Botanical Gardens in Java and in 1909 published a paper suggesting that the active principal in orchid pollen was a hormone he called *Pillenhormon.* This hormone was later shown to be auxin.

8 Or Noel. Both spellings can be found in the literature, but only Noël is correct according to his son Prof. Francis Bernard, and his biographer, Bernard Boullard.

9 A poignant parallel exists between Bernard's mother who lost a husband early in her life and later a son, and G. E. Rumphius, the first naturalist to describe orchid seeds, whose wife and son died in an earthquake in Ambon, Indonesia, 250 years before that.

10 For thos who find coincidences interesting: As a child in the city of Russe (Rustchuk), Bulgaria, I grew up in a house on No. 11 (Bernard died in 1911), Maria Louisa (the Bulgarian equivalent of Marie-Louise) Street.

11 A saying during the Viet Nam War was " 'old generals never die' [phrase borrowed from Gen. Douglas MacArthur's last speech at the West Point Military Academy] ...only young soldiers." A great pity, the former; tragic and devastating, the latter.

12 I became a father for the first time at the age of 52 and can attest to the fact that a child is indeed a very bright spot on the horizon no matter what else may be happening.

13 (Knudson, 1927) "We observed both fat and starch in orchid seeds and young seedlings, but they are incapapble of utilizing their own reserves.

Cal Orchids Suffers Fire Damage

I visited Cal Orchids in Santa Barbara in mid January 1996. They had suffered great damage due to a fire on New Years Eve. A strong wind had blown down the power line which ignited some palms and then spread to several green houses. These greenhouses contained almost all the Odontoglossum Alliance material of Cal Orchids. Jim Rose, owner, showed Howard Liebman and myself around at the great damage. Some of the fine odontoglossum large plants may come back, but only after a couple of years. Many plants were destroyed. including almost all the odontoglossum alliance material Jim had planned for upcoming shows and sales. A number of his houses miraculously escaped damage. How can you help Cal Orchids? We asked Jim that question and his answer was immediate "Buy a hundred dollars worth of plants." While there both Howard and I did so.

We wish Cal Orchids a speedy recovery from this tragedy

Editorial

⊗ Odonts' -Who's Limiting Us ⊗

Looking through Bockemühl's monograph of Odontoglossum, it is wonderful to see all these species which surely provide a rich source of inspiration for the hybridist. But wait, before the blood flows too strongly, let's look long and hard.
Of the 58 species now classified as Odonts. about 50% are really what we may call of more botanical interest than being horticulturally "desirable". By this we generally mean that the flowers are perhaps a little small, have poor colour or the plant's growth/flowering habit may be undesirable. By selecting these out we have not greatly limited ourselves for the other 50% all have enough variation to offer the budding hybridist scope to run wild. Odm. *ioplocon, edwardii, cirrhosum, praenitens, wearii* and *polyxanthum* all offer colours and shapes that could produce new and exciting material.

Now most work in hybridising of Odonts. has been performed in the Commercial sector, which would seem natural enough, as they tend to have the greatest stock to select from. So let's pretend you are a hybridiser longing to create a new beauty, bearing in mind that you are somewhat constrained by the fact that it costs money to produce these hybrids, and some will need to be sold to recoup the outlay and maybe also buy some food for the table. Where would you start?
You have 29 species to use, but you see that you are limited to using only one of these for a certain financial return, perhaps two or at the outside four. I refer of course to Odm. *crispum*, perhaps *pescatorei* and maybe *triumphans* and *harryanum*. Why is this? Well we have standards for judging, and these are based upon Odm. *crispum*, this leaves the judges and most exhibitors confused. Surely the other species must be inferior, they not only don't conform, they don't win either! Perhaps the judging could be based upon appreciation, this would seem to solve the problem. I fear not, for so long has this idea of the desirable shape been with us, that we now see a generation of growers and judges who not only are unaware of these alternative hybrids, but see the only good form as *crispum* form.

Who's fault is this, and why should Masdevallia growers have all the fun? Well I guess the problems began at, you guessed it, the beginning of hybridizing, as growers longed for the full shape that was so scarce in those early days of importing from the jungles. Indeed it was the fact that 99% of Odonts. were "star" shaped that the "rounded" forms were therefore scarce. Why are they not more sought after then? Well it seem that everyone likes winning, and we limit ourselves to what we believe others want to see. That's our mistake as much as it is the judges for following the standards. Now don't get me wrong and go away believing that I don't enjoy seeing crispum types, they are undoubtedly among the most beautiful of orchids. But need we be limited to one species? What could we be missing out on?

It amazes me that often I see growers walk through a greenhouse full of plants, and the first flower that catches their eye (and we all know that your first choice is where your heart really lies) is an unusual "star" shaped "different" type of bloom. But after closer inspection and a comment of "Isn't it beautiful, look at the colour, and it looks so nice, but". Yes you guessed it "but the shape is not quite right." So off to choose with the head and not the heart. To change this attitude after so long will be very difficult, and for the hybridisers themselves, I say impossible. The judging system must lead the way. While they may not realize it, these few people (the judges) I believe hold the fate of Odont. growing as a pastime in their hands. Sure we can go on limiting ourselves for another decade or two, but where will the new and exciting come from to capture people's imagination. The world is changing more rapidly than ever in history, yet we are still bound by ideas borne of a 100 years ago.

Why should Masdevallia growers be able to enjoy the unique flowers produced from such a wide range of species. Why don't we say to them "Stop, your blooms must all look like *veitchiana*, limit yourself now." Let's hope this never happens. Why are Paph. growers given the freedom of enjoying success on the show bench with primary hybrids? Sure these are different and reflect the charm and delight of the parents, shape does not matter. Does anyone really believe we could get away with this in Odonts? They put stripes in phals, but lost some shape, so what, everyone loved them. So let's not make shape and size the criteria, throw away the mold and look anew. There is an opportunity to excite and advance, we are limited by both growers and judges attitudes, let's all work together and take Odonts. into the 21st century with other orchids, not leave them bound and gagged.

I often wonder where we would be now is all those Odonts. from the jungle had been round and filled in. perhaps we would all be striving for those rare "stars".

Philip Altmann
March 1995

Odontoglossums
by Leslie A. Garay

Recently while in Florida at the American Orchid Society Headquarters, I notice a set of books on the library shelf because they were titled **"Odontoglossums".** This set of books were about 8 inches high and 7 inches deep with a number of volumes that used up two feet of shelf space. I took one out and found that this hard bound set had been assembled by Leslie A. Garay, noted tonomist and Curator of the Oakes Ames Herbarium. Leslie had laboriously gone through an enormous number of early horticultural publications and copied from them material on odontoglossums. These copies from the original were assembled in these hard back books. The books had been donated to the American Orchid Society and were noted not to be removed from the society.

I examined a number of the volumes and then carefully looked at the volume that contained Odontoglossum nobile (pescatorei). From it I copied a number of the articles which are reproduced in this newsletter. This set of books is a wonderful resource for anyone researching historical material on odonts. It is interesting to note that at the current location of the American Orchid Society under the zoning laws of West Palm Beach, the library is not available for members to visit and conduct research. The new AOS Headquarters planned for Delray Beach, Florida has within the design of the building a library room with space for conducting research. Further the zoning restrictions of the present location will not apply. The Headquarters and the Library within it will be open to members and visitors.

While on this short visit I had time, only to look at this set and then only a volume or two. The new building will provide facilities for browsing and research. There is no telling what interesting material has been hidden in the library, virtually unavailable to our AOS members and visitors.

I made copies which are reproduced on pages 17-24. Some of this material may be difficult to read because of the copy. However I thought it better to show the original rather than re-type the articles.

ODONTOGLOSSUM CRISPUM HIS MAJESTY KING GEORGE V.

This very fine variety of O. crispum was exhibited at the recent Temple Show by Mr. Ch. Vuylsteke, Loochristi, Ghent, Belgium. The flowers are of perfect form, of a rich rose ground colour almost covered with solid, dark claret-purple blotches. All the segments of the flower have a narrow white margin, which gives a very distinct appearance to this variety.

It is of interest to note that the plant was flowered in Belgium, exhibited for three days in the hot tents of the Temple Show, returned to Belgium where it remained for a week, and afterwards the cut spike was again sent to this country by post in order that a photograph, which is reproduced on this page, might be taken for this journal. By placing the stem and occasionally dipping the whole spike in water, the flowers remained fresh for a further period of six days.

The marvellous advance made during recent years in the production of blotched Odontoglossums makes one wonder what will be the next step. Commencing with a flower having a few stray spots, then blotches, and afterwards almost entirely covering it with a solid mass of colour, it is difficult to predict what the hybridist will attempt to do next.

Odontoglossum crispum His Majesty King George V.
From a Photograph three-quarters natural size.

ODONTOGLOSSUM PESCATOREI.

Simple as the matter might seem to an expert, we often have flowers of Odontogloss ms submitted to us to determine whether they are those of O. Alexandrae (i.e., crispum) or of O. Pescatorei; we therefore take the opportunigy of giving an illustration (fig. 62) of the typical O. Pescatorei, by which it will be seen that the peculiar form of the lip, which the species rather closely retains throughout all its varieties, affords a means of clearly distinguishing it from the irregularly-shaped, crimped, and fringed lip of O. Alexandrae, and thus furnishes a good general test by which to distinguish the one from the other. O. Pescatorei, as a rule, has flowers rather smaller than those of the ordinary O. crispum, and is also much more branching in its flower-spikes than those of th at species. A stout well-flowered plant of it, such as we often see, with gracefully branched spike bearing from 100 to 150 of its snow-white flowers, brightly marked in their centres with violet and orange, is a very lovely and attractive object, and one which lasts a very long time to reward the grower for his care. O. Pescatorei has not yet got to the height of its fame, although it was discovered by Funck and Schlim in Pamplona and Ocana, at a h i gh altitude, in the year 1847, and was flowered by Linden and others in 1851, and although it has ever since been well represented in our collections for many years, nothing like a marked variation was seen in the flowers of the different specimens, a few spots more or less on the labellum, or a difference in the arrangement of those marks, constituted the chief difference; and, notwithstanding that the plant was always beautiful when in flower to a casual observer the flowers were all much alike. However, in 1882, with one gigantic stride from the ordinary form to that which every one at present imported, Messrs. James Veitch & Son, of Chelsea, made a great break with their O. P. Veitchianum—a lovely variety, w i th flowers of the most perfect form, the sepals and petals being heavily blotched, even to the tips. In 1883 several finely marked varieties bloomed with Messrs. F. Sander & Co., of St. Alban's, out of their immense importation, and the best of them were secured by Messrs. James Veitch & Son at Messrs. Protheroe & Morris' auction rooms, Cheapside, for 70 guineas. It was of the O. P. Veitchianum class, but differed from it in having purple bands and blotches not reaching quite so far up the petals. The variety was afterwards named by Prof. Reichenbach O. P. Schroederianum, in honour of Baron Schroder, of The Dell, S t aines, into whose magnificent collection both these beauties have passed. O Pescatorei, however, so far as we have seen it, does not seem anything like so variable as O. Alexandrae, although the importations often give forms the first flowering of which presents very large flowers. This is from two causes: the first flower-spikes are generally unbranched, and the flowers are larger in consequence, but on becoming branched they get back to the ordinary size. The second cause is, that freshly imported pieces often send up an abnormal growth, half bulb, and finishing up at top with a short flower-spike, the flowers on which generally get to an unusual

size on account of their getting, as it were, the strength of a bulb. Often have buyers been deceived in buying such plants, and finding that when they flower in the ordinary way they are only ordinary varieties, or that the plants died, the abnormal flower-spikes being their last efforts. Unfortunately for the easy identification of O. Pescatorei, a few years ago Mr. Lehmann discovered and sent over a lot of what was called O. Alexandrae Lehmanni, a variety which in all its characteristics seems exactly intermediate between O. Pescatorei and O. Alexandrae. It is a lovely and a variable variety, not yet generally known, and as it is distince enough to be easily recognised we must welcome it, and forgive its encroachment on the other kinds. O. Pescatorei is a strictly cold-house, moisture, and shade-loving Orchid, and one of the most thrifty and free-flowering when grown in a cool pure atmosphere.

Gard. Chron. II, 1884, p. 332

Odontoglossum Pescatorei, p. 131 in, Gardn. Chron. February 1904
Part - I.-

A remark passed by my employer recently, to the effect that he could not understand why Odontoglossum Pescatorei was not more extensively cultivated, has probably been made by many lovers of Orchids who appreciate the refinement possessed by the varieties of this beautiful species. When this species is grown in a satisfactory manner even the least handsome varieties are attractive, carrying as they sometimes do racemes of from 50 to 100 blooms, and at a season of the year when cool-house Orchids are but sparingly represented in flower.

It may seem strange that one having charge of perhaps the most remarkable collection of Odontoglossum crispum ever brought together should draw attention to such a despised subject as O. Pescatorei. If I were not convinced that Orchid cultivation is annually drawing into narrower limits, I would not attempt to divert attention from any of the more fashionable cultivated kinds.

I have seen many changes of fashion in Orchid culture, in my all too short carreer among them. I can look at a time when the Vandas, Aerides, and Saccolabiums of the East were as highly appreciated as the attleyas and Odontoglossum crispums of the present day. The Phalaenopsis of a few years later-what but the tide of fashion has discarded even representatives of these beautiful species of plants from the Orchid collections of to-day? As the glow of brilliant "stars" from the East have faded from our houses, even so with Masdevallias and other botanically interesting subjects of the Western world, which are discarded for the pure gaudy subjects that satisfy the prevailing fashion. It is as difficult to find the hat that will cover the head of a fashionable Orchid-grower and of a true lover of Orchids who is actuated solely by the interest in his plants, as it is to combine the scientific botanist in the practical gardener.

O. Pescatorei has not of late years been imported in large quantities, for the reason that importers cannot get sufficient financial return for the plants, and they are at the present time by no means over plentiful. There is not the wide variation among them that there is found to exist in O. crispum, but occasionally varieties which are as valuable as the best of the last-named species. O.P. Veitchianum, which forms the centre flower in the accompanying illustration, was described by Prof. Reichenbach in the Gardn. Chron. vol. xvii., 1882, p.588 The plant passed into the collection of Baron Sir H. Schroder. Nothing approaching the violet colour of the blotches represented in the central area of the flower has since appeared. It is deserving of all the appreciation its owner and the Orchid specialists afford it. O.P. Schroderianum in the lower left-hand corner, and O. P. Lindeni above it in the illustration; O.P. Charlesworthii, which received a First-class Certificate at the Temple Show of 1902-all have particular violet markings. One remarkable subject appeared some years ago, and was later certificated, from the collection of Sir T. Lawrence, Bart., in O.P. "Prince of [illegible]

the golden-yellow ground and brown spotting making it one of the most attractive among the section. Although not recognised at the time, this variety may prove to be of hybrid origin.

The other two flowers in the illustration include one that is pure white with the exception of the yellow disc of the centre of the labellum, and one of the typical varieties. Perhaps the largest and best variety of the type I have seen what was exhibited at one of the Drill Hall meetings a year or two past by Mr. Wilson Potter, of Croydon. But the quantity of the flowers is affected by cultivation.

O. Pescatorei with us is one of the most easily-grown species of any in the cool-house Orchid house, and the treatment afforded is in every respect similar to that afforded O. crispum. We never permit the temperature to fall below 50°, except in very severe weather. The mean is as near as 55° as we can possibly keep it. Potting is done when new roots are being produced from the base of the newly-developing pseudobulb. The compost consists of fibrous peat, chopped living sphagnum-moss, and leaf soil in equal proportions, with sufficient rough sand added to render the compost porous.

The material is pressed firm, and the surface is made with a layer of chopped living sphagnum-moss. We have found remarkable vigour in our plants since leaf-soil has been extensively included in the potting compost. Not only is the growth vigorous, but the flower-scapes have been all that could be wished, and the individual flowers finer in substance and in form.

If there is one Odontoglossum more than another deserving of the attention of amateurs, it is Odontoglossum Pescatorei. H.J.C.

ODONTOGLOSSUM PESCATOREI

To anyone unacquainted with the practical results of the hybridist it may appear strange that Odontoglossum Pescatorei is ever utilised when there is an apparently much finer flower in O. crispum. It is wise to state apparently, for O. crispum has had such a long run of popularity that the mere suggestion of doubting its right to the highest position of honor in the genus seems a little absurd. One presumes that any special qualifications possessed by Pescatorei would have made it famous contemporarily with crispum, but it has fallen to the lot of the hybridist to discover the various means by which Pescatorei has proved itself of remarkable value in the making of many of our present-day popular hybrids. While some Pescatorei deserve equal recognition for the part they have played in recent years, there are others who assert that crispum comes first, with Pescatorei a close rival, and with this latter opinion most readers will probably agree.

Before discussing the artificially raised hybrids, mention must be made of O. excellens (Pescatorei X triumphans), one of the natural hybrids for which high prices were paid; in the year 1886 Knox's variety of excellens realised 165 pounds sterlin, and many other instances could be given of the value then set upon examples of this hybrid. O. elegantius (Pescatorei X Lindleyanum) is another rare natural hybrid, and, like excellens and elegantius derive this yellow from triumphans and Lindleyanum respectively, the brightness and clearness of it, as seen in the above hybrids, is entirely due to Pescatorei.

In almost all hybrids containing crispum and Pescatorei in their parentage it has been noticed that the greater the proportion of Pescatorei so much the whiter and clearer is the background of the flower, consequently the blotches and spots stand out in a decisive manner. On the other hand, crispum encourages the formation of a rose-tinted ground, which is, nevertheless, quite as much appreciated by the majority of amateurs, and rightly so. Both sections are fast becoming quite distinct.

In May, 1900, M. Vuylsteke showed o. Rolfeae (which at once opened the eyes of the hybridist to the immense future possibilities of increasing the interest in Odontoglossums, no matter whether scientific or commercial; as events have since shown, these expectations have been fully realised.

O. Pescatorei obtained a considerable amount of notoriety through the raising of O. ardentissimum (crispum X Pescatorei), first seen at the Temple Show, May, 1902, when exhibited by M. Vuylsteke under the name O. crispum ardentissimum. Blotched crispums were then realizing high prices, and it may have been due to this fact that M. Vuylsteke made the attempt, and succeeded, in producing what were in some respects blotched forms of crispum, although they have ever since been recorded under the name ardentissimum. In other respects these hybrids resembled blotched varieties of Pescatorei; but the combining of this species with crispum produced an unexpected violet tinge in the flower, which has proved so characteristic of

O. PESCATOREI, cont.

ardentissimum that it has always been the chief means of distinguishing it from a blotched crispum.

In O. eximium (ardentissimum X crispum) are to be seen some of the best shaped flowers yet produced, and the fact that they are, on the whole, better than crispum proves the beneficial influence in this respect of Pescatorei, contained in the former parent. Although the individual flowers of Pescatorei are smaller than those of crispum, their chief means of making these round flowered hybrids lies in the base of the D-shaped petals. Reference to the accompanying illustration will show how these basal edges almost meet one another just above the column; in typical forms of crispum this is by no means so apparent, the petals being more ⌒ shaped.

A marked character of Pescatorei is the pandurate or fiddle-shaped labellum, which is more or less inherited in all its progeny. It is a somewaht remarkable fact that in the majority of Pescatorei hybrids the whole of the broad front blade of the labellum is white, or at least much lighter than the other segments. The back of this blade is keeled and furnished with an apiculus, or spur-like organ, which may generally be detected in the hybrids; the presence of this apiculus assists in proving the inclusion of Pescatorei in hybrids of doubtful origin.

Another distinguishing point of Pescatorei is the prominent crest on the base of the labellum; the side wings of this crest are more fully developed than in crispum, and they thus assist very considerably in determining the two species. There is often considerable difficulty in distinguishing certain varieties of Odontioda Bradshawiae (C. Noetzliana X O. crispum) from Odontioda Vuylstekeae (C. Noetzliana X O. Pescatorei), but an examination of the crest on the labellum will generally give sufficient evidence to bring about a decision.

in Orch. World 6: 174, June-July, 1916

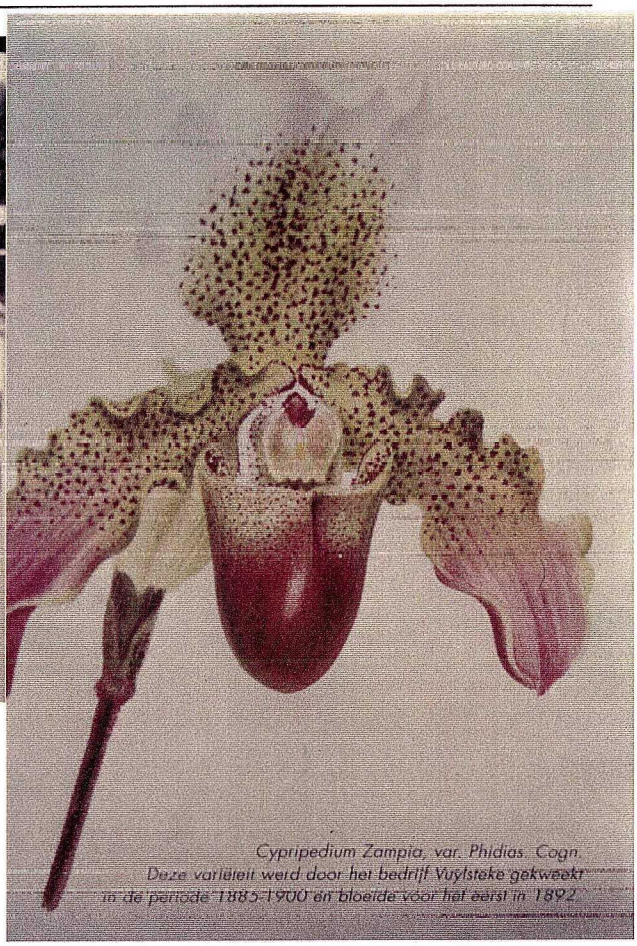
Odontoglossum Pescatorei, Linden, versus O. nobile, Reichb.f. p. 275 in, Gardn. Chron. October 1907 Part - II.-

Of late years a tendency seems to have sprung up on the part of certain writers to replace the name of Odontoglossum Pescatorei, Linden by that of O. nobile Rchb.f. It is, however, beyond question that the first of the above mentioned specific names is the one which ought to be retained. The following quotation from Pescatorea (1860) of which the younger Reichenbach was a distinguished contributor, supports this view: "The original description of this species was given by Reichenbach fil. in Linnea xxii, p.350 (1849). But under the name O. nobile the word "callis" by a typographical error, appeared in place of "cavinis" (sic). Further the labellum is said to be purple, and the rest of the floral whorls rose-colored." On this account Dr. Lindley was unable to recognise with certainty the identity of O. Pescatorei Linden, and O. nobile Reichb.f. The latter author however, has since then definetly stated that the same plant is designated by the two names, and he has generously abandoned the right of priority and adopted the specific name Pescatorei, under which the plant is now generally known. More-over, whenever Reichenbach has had occasion to describe a new variety of O. Pescatorei he has always used this name (e.g. O. Pescatorei Leucoxanthum, Gardn. Chron. 1887, p.606; O. Pescatorei Schroderianum, Gardn. Magazine1892, p. 135 and other examples could be cited).

Having regard to the above facts, there can remain no doubt as to O. Pescatorei being the name which should be retained for this species.

Perhaps this short note, by correcting some error of citation or description that have recently appeared, may serve to conduce to the more precise nanding of Orchids. L.Linden.

(We acknowledge the right of an author to withdraw a prior name on relaively slight grounds is not in accordance with modern usage.



Illustrations starting at the upper left hand corner and proceeding clockwise.

A view of one of Charles Vuylsteke's nurseries in Belgium.

Cypripedium Zampia Phidas raised by Charles Vuylsteke in 1897

Odontoglossum armainvillenese var. Ardentissimum (rolfe) taken from the *Dict. Icon de Orchidees.*