# Odontoglossum Alliance Newsletter

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This Issue is devoted almost entirely to the decision to move Odontoglossum in to Oncidium. We have tried to give you some background to the decision, the views of Steve Beckendorf and Stig Dalstrom and following that some comments on

the consequences,



### Odontoglossum Moved to Oncidium

A decision has been made by the RHS Advisory sub-Committee on Orchid Hybrid Registration (ASCOHR) that Odontoglossums will be merged into Oncidiums. Your Alliance strongly objected to this with the efforts to bring a reasonable decision to retain Odontoglossums as separate genera were carried by Stig Dalstrom and Steve Beckendorf, our President. This issue of the Odontoglossum Alliance Newsletter is devoted to this decision.

First we will continue to be the Odontoglossum Alliance. We will continue to have our quarterly newsletter. We will have our annual meeting as the Odontoglossum Alliance. We will continue to encourage orchid growers to grow Odontoglossums even though they may be also called Oncidiums. They are such a beautiful genera and provide much pleasure and challenge for all orchid growers.

While this may be a sad day for all Odontoglossum lovers and growers, we will survive and continue. Included in this issue are the details of the ASCOHR meeting report. This is followed by comments from Sig Dalstrom, Andy Easton and Steve Beckendorf.

### Changes to the Orchid Hybrid Register following Genera Orchidacearum 5. UPDATE 31 May 2011

The RHS Advisory sub-Committee on Orchid Hybrid Registration (ASCOHR) met on the 25<sup>th</sup> May and continued discussion on the implications for the Orchid Hybrid Register of name changes made in *Genera Orchidacearum* Volume 5 (GO5); the main adjustments concern generic boundaries of the *Oncidiinae*. Several new contributions were received, and all evidence was carefully considered by ASCOHR members. At my request the RHS Advisory Committee on Nomenclature and Taxonomy (a body of independent taxonomists and scientists) looked at the issues earlier this year and advised that the GO5 treatment should be accepted as it is. Additional opinion of other orchid scientists was sought, and the vast majority agreed with the interpretation published in GO5.

After discussion and a vote (not attended by GO authors/editors) ASCOHR advised the RHS that all changes proposed in GO5 should be accepted with the following adjustments: *Ida* will be replaced by *Sudamerlycaste, Brasiliorchis* will be replaced by *Bolbidium*, and *Ada, Brachtia* and *Mesospinidium* are to be included within *Brassia*.

This recommendation will undoubtedly be unpopular with a number of people, especially those who will miss *Odontoglossum crispum* and its hybrids, but all genus names in present use will be retained in the Register and the on-line version is soon to be changed to make it searchable by synonyms, and thus it will therefore be possible to easily retrieve *Odontoglossum* and other records. With this enhancement in the Register it will also still be possible to register *Odontoglossum* hybrids without problem. It also means that if researchers produce compelling evidence to support an alternative view in the future and this is accepted the Register will be able to accommodate such changes.

The views of researchers and orchid amateurs who are against some of the GO changes have been circulated widely; to balance these I have attached some recent notes by Stig Dalström and Mark Chase. The main reasons why ASCOHR recommended accepting GO5 nomenclature are: the coherence with current interpretation of other groups in the *Orchidaceae* and other plant families, it is based on solid evidence and a large sample base, the international team behind GO research are well recognised and contains scientists who have a lifelong experience with the *Oncidiinae*, recognition of broad genera shows plant relationships and is horticulturally more useable than the recognition of smaller ones, and the interpretation is supported by most international scientists and by the members of ACONAT.

Implementing the changes to Orchidaceae in the World Checklist of Selected Plant Families and to the Hybrid Register will take place over the next few months, and it is very much hoped that synonyms and other fields will be accessible by November.

Julian Shaw and Mark Chase will be at the Singapore World Orchid Conference to talk about the changes.

Johan Hermans Chairman ASCOHR

#### Oncidium versus Odontoglossum: a review of the evidence

#### From Mark Chase 19 November 2010

Below, I again summarise the arguments for lumping of *Odontoglossum* in *Oncidium*. The taxonomic points have all been covered previously, but I will add a few additional observations based on the criticisms by Stig Dalström and Steve Beckendorf of my *Genera Orchidacearum* volume 5 treatment. I would also like to point out that many of these arguments have nothing to do with DNA studies – they would be the same even if we did not have the DNA evidence to back them up.

The issues Stig and Steve have pointed out fall into two categories: A) lumping versus splitting and B) concerns over using DNA and the quality of the data and analyses used by Williams, Whitten and Chase. I have organized my response in these two categories.

#### A. Lumping versus splitting

The concept of Odontoglossum has not been stable at any point in its history. By sinking it into Oncidium, we eliminate one of the thorniest problems in orchid taxonomy, which goes right back to the time of Lindley. Beer transferred in 1854 all of the then-known species of Odontoglossum, including the type species of Odontoglossum, O. epidendroides, into Oncidium because he could see no real differences in the flowers and because the character used by Lindley, the angle of lip/column attachment, did not work (i.e. there are many intermediates, such that an arbitrary decision has to be made). This broad concept of Oncidium was irregularly followed by subsequent authors, but the tendency was to try to recognize those species with the column at a 90 degree or greater angle as Oncidium and less than this as Odontoglossum. Given that this trait is related to the size and behaviour of the pollinating insect, this is, a priori, a problematic way to separate genera. It proved to be such, and over time each author treating these genera assigned a different set of species to each genus, plus there was the concept of Cyrtochilum and which species should be assigned to it. Over the last 50 years, most of the species assigned to Odontoglossum are now generally agreed to be members of other genera. For most orchid growers, the genus Odontoglossum left their living collections when Odontoglossum grande and Odontoglossum bictoniense were transferred to Rossioglossum and Rhynchostele, respectively, on the basis, please note, of their morphological characters, not DNA studies, which subsequently reinforced the necessity of these changes. Getting rid of Odontoglossum is just the last step in a process that has been underway since the

beginning of the 20<sup>th</sup> century – we're now down to the last nub, the relatively small group of species closely related to the type species, *O. epidendroides*. With my treatment in GO5, I merely carried out a mercy killing by administering a final coup de grace to a long-standing problem. Steve Beckendorf advocates "a more traditional treatment" for *Odontoglossum*, which he adds "would also help preserve horticultural history". Steve is obviously unfamiliar with the taxonomic and horticultural history of *Odontoglossum* or he would not say such things. It is a myth to say that there is a "traditional treatment" of *Odontoglossum*, and we have already agreed to change the names of all the *bictoniense* hybrids, which affects far more growers than these last changes would, plus losing *Odontoglossum* simplifies hybrid nomenclature in the *Oncidium* alliance a great deal by eliminating many intergeneric names.

No one has ever found an acceptable set of morphological characters on which to base the concepts of Oncidium versus Odontoglossum, so their circumscription has been in a state of continual flux. Even the most recent monograph, by Bockemühl in 1989, could not decide how to handle the circumscription of Odontoglossum based on morphological characters. She invested a great deal of detailed study of their floral morphology and still managed to include some groups in Odontoglossum that were distantly related to the type species. Everyone seems to be happy with the transfer of these two groups plus Oncidium subgenus Cyrtochilum to genus Cyrtochilum (carried out by Stig Dalström; he was happy to make these changes then based on the same sort of evidence with which he now is unhappy: largely DNA studies backed up by some evidence from their habit, round pseudobulbs and lots of leaves versus laterally com-

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pressed pseudobulbs and few leaves in Oncidium/Odontoglossum). He was perfectly happy to create a heterogeneous "waste basket" (known in the UK as a "rubbish bin") genus then, so I'm more than a little surprised to see that he now objects so strongly to this in his recent letter to the Committee. It's just because Odontoglossum is his "pet" genus, I suppose. I'm otherwise at a loss to understand why he is so opposed to the transfer of Odontoglossum to Oncidium given his approval of the major change in recognizing genus Cyrtochilum, which in many ways is more unprecedented than the sinking of Odontoglossum in Oncidium. Mark Whitten has challenged Steve Beckendorf to come up with a good set of morphological characters that can be used to recognize these genera and the up to 10 additional ones (not all new names) that would be required if we are to retain Oncidium and Odontoglossum as distinct. I have spent years studying these plants and their morphology. In spite of what I am now best known for (DNA taxonomy). I am a classically trained plant taxonomist, and I can show you my notebooks in which I have made hundreds of detailed drawings of the morphology of the species of Oncidiinae, both gross floral traits as well as floral dissections. I have published papers on their seeds, pollinaria, vegetative characteristics and chromosome numbers, and I can state with certainty that there is no reliable way to tell someone who has never seen these plants previously how to determine if a species should be placed in Oncidium or Odontoglossum. The long history of the problems with circumscribing these genera easily refutes Stig's contention that "he doubts easy, why have there been so many problems over their long history? Stig also says "let's wait until we can get some things better sorted out" before we do this. This problem has been around for a lot longer than Stig or me, and no one has ever sorted it out satisfactorily (except for my treatment in GO5, which should provide a stable classifications that most people are happy to accept). How will more time improve the situation? There is nothing left to study. I agree with Stig's assessment, Oncidium including Odontoglossum is a messy genus, but my overall argument is that one big messy genus is preferable to 12 smaller, but still not much less messy genera that no one except a handful of very experienced people like Stig. Steve and me can tell apart. The only reason why we can do this is because we have learned which species go into which genera, and that is not an insurmountable problem with the 65 or so genera recognized for Oncidiinae in GO5, but let the splitters loose and you will quickly have 130 genera that are as heterogeneous as the 65 and no more easily circumscribed. The problem with how to separate Oncidium from Odontoglossum was clearly described in Williams and Dressler's (1975) paper in which they related the conundrum of where to place one species (Oncidium schroederianum); they humorously termed it "Oncidoglossum confusum". The results provided by DNA analysis are clear: floral morphology does not provide reliable generic characters in Oncidiinae. Williams and Dressler concluded this in 1975, and I worked hard throughout the 1980s and 1990s to find some additional, non-molecular characters that might throw some light on these problems. There are no new datasets that can be brought to bear on this problem, so it's time to grasp the nettle and come to a global taxonomic treatment that summarises everything we know about these plants, but which has to use DNA analyses as a meter to evaluate our conclusions drawn primarily from the detailed study of the morphology of Oncidiinae.

I criticized the use of pollination syndromes as a basis for assigning species to genera. Stig defends this, but overlooks the fact that using the characteristics associated with pollination syndromes does not produce good genera. If you use the lip/column relationship to separate *Oncidium* and *Odontoglossum*, then you end up with species like *Oncidium laeve* placed among the species of *Odontoglossum* and *Odontoglossum harryanum* in *Oncidium*. Species like *Odontoglossum trilobum (aurarium)* and *Oncidium hastilabium* demonstrate the problem of using these syndromes – these species are intermediate. The same problems apply to *Oncidium* morphology – these bright yellow flowers with brown spotting are mimicking members of the tropical family Malpighiaceae, which rewards bees with oil. Some species of Oncidiinae also produce oil on their lip callus (particularly those now placed in *Gomesa*). Reliance upon this oil-bee pollina-

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tion syndrome to define *Oncidium* definitely does not work; it evolved at least eight times independently within Oncidiinae. Using pollination syndromes as generic characters has also been abandoned in other families, including the gesneriads (Gesnericaeae), iris family (Iridaceae) and Melastomataceae (e.g. *Micania*). This is a minor point – the major point is that use of floral traits is not a reliable way to tell these genera apart.

Stig's solution for keeping Odontoglossum also has the disadvantage of encouraging the splitting of many genera into smaller equally difficult to circumscribe genera. In the GO series, we have been attempting to hold back this process. We have advocated broad versions of Cattleya, Epidendrum, Masdevallia, Dendrobium and Bulbophyllum (the last two upcoming in GO6). Stig is correct, there has been a general trend in plant taxonomy to split large genera into smaller units, but this has not always resulted in a better taxonomy. Unless there are obvious benefits, splitting of large genera should be discouraged, and the general trend in plant taxonomy is now turning in favour of maintaining these larger genera. Within Oncidiinae, I have advocated broader circumscriptions routinely: Comparettia s.l., Cuitlauzina s.l., Cyrtochilum s.l., Gomesa s.l., Rossioglossum s.l. and Trichocentrum s.l. The broader treatment of Oncidium is in keeping with this. If we agree to narrow circumscriptions in this case, because it upsets some people without achieving any improvements in people's abilities to be able to recognize the genera, then we will be establishing a precedent that will result in splitting of Masdevallia, Dendrobium, Bulbophyllum and many others. The result will be a hopelessly unworkable taxonomy that only an expert can use. Stig and Steve are perfectly happy with broad concepts for Cyrtochilum and other genera in Oncidinae; it seems clear to me that this is just a personal preference for Odontoglossum (i.e. not one with a solid theoretical or philosophical basis).

B. Methodological concerns - problems with the DNA analyses used to reinforce the decisions drawn from study of the morphology of Oncidium and Odontoglossum (plus nearly all other genera of Oncidiinae) Steve emphasizes that the tree used in GO5 has "major changes" from that provided now by Mark Whitten (the 5-gene tree in Steve's letter). It is slightly different because it contains more data and slightly different species (I will address the O. trilobum/aurarium problem below; it was caused by a completely different issue), but these differences only affect matters if you wish to keep these genera separate. If you agree to lump Odontoglossum in Oncidium on the basis of its overall generic similarity and lack of differentiating characters, then the minor differences do not matter at all. The overall conclusion is still the same, based on the rules of naming, Odontoglossum (and Sigmatostalix) is embedded in Oncidium, which is not permitted. This, in combination with the high degree of genetic relatedness and the lack of distinguishing traits, made my decision to lump Odontoglossum in Oncidium in GO5 an easy one. Keeping Odontoglossum will force us into splitting the things that could otherwise be retained in Oncidium s.s. I have indicated on the 5-gene tree the groups that would need to be split from Oncidium in order to maintain some version of Odontoglossum (and this is not changed by Stig's suggestion to put things like Cochlioda and the astranthum group, Collare-stuartense, in Odontoglossum). At a minimum, we would need to accept an expanded version of Heteranthocidium, which Szlachetko proposed to include those species of Oncidium with a mixture of sterile and fertile flowers (O. heteranthum, O. abortivum and their relatives), but mixed with these relatively distinctive species are others with an identical floral morphology but with only fertile flowers, so we would need to transfer as well species with all fertile flowers, making the new version of the genus impossible to separate from Oncidium s.s. (the species closely related to O. altissimum). Similarly, the clade of Oncidium species that is closest to Odontoglossum, including O. obryzatum, O. chrysomorphum and relatives) would need to be segregated in their own genus (or be included as Stig suggests in Odontoglossum, which seems to me to be the worst of all possible solutions). If you really know these plants well, you can see that they share with Odontoglossum a very subtle waxy surface on their pseudobulbs, such that most collectors of wild plants think that they have collected a member of Odontoglossum

s.s. and are disappointed when it flowers with typical *Oncidium* morphology. I am not about to suggest that such an obscure, impossible to accurately describe character should be the basis of a new genus or be used to include this clade of *Oncidium* species in *Odontoglossum*.

Stig criticizes the methodology of using DNA to place species into genera and also cites the problem of O. trilobum/aurarium as demonstration that there is a large degree of interpretation involved in DNA analysis and that in some cases it does completely silly things (I actually think that O. trilobum/aurarium is a species complex that needs to be sorted out better, but that is another matter). I would agree that at some points in collecting DNA data there are some somewhat subjective decisions that have to be made, but these pale in comparison with the level of interpretation involved in morphological studies. In the GO5 trees, O. trilobum/aurarium was placed near Odontoglossum povedanum and the Cochlioda/Collare-stuartense (astranthum) clade, and in the trees sent by Steve Beckendorf O. aurarium is next to Oncidium leucochilum. They both claim that something is really wrong with the use of DNA if a species can jump around like that in the results. Yes, I agree that something would be wrong if such things could happen, but the problem is not with the DNA methodology. It's a matter of "operator error". The first clue to what has happened here is to examine the number of differences in the DNA between these differing placements (the numbers in those trees are the actual number of changes in piece of DNA analysed). In the GO5 tree, O. trilobum has five changes in its sequence relative to that of O. povedanum. If you compare the two sequences visually, you can actually find those five changes – there is no interpretation involved in this. In the results supplied by Steve Beckendorf (based on five DNA regions), there are no differences between the sequence of "O. aurarium" and that of O. leucochilum. I asked Mark Whitten to help me figure out this strange change in position. The same DNA sample cannot have five differences from one species and then later on have no differences from a completely different species in a clade far away from first placement. That is simply not genetically possible. The answer to this strange result was simple: the DNA sample Mark used to produce the GO5 tree was my sample of O. trilobum, collected many years ago in Peru, but this sample was degraded so they started all over with another DNA sample, produced from a plant collected in Mexico, which was annotated as *aurarium*, perhaps by Stig on one of his visits to Gainesville, Florida (where Mark and Norris Williams are based). Oncidium aurarium is strictly known from the Andes of Bolivia, Peru and Ecuador, and the material from Mexico is in fact Oncidium leucochilum. The GO5 tree used a bona fide specimen of trilobum/aurarium, and the one sent by Steve Beckendorf used instead a sample that really is O. leucochilum. I looked at the voucher (thanks to its being available as a scanned image, and it is definitely O. leucochilum). The DNA methodology did not produce this problematic shift of placement; this anomaly was due to human error. The use of DNA in plant classification is not something new, and it has now a 20-year record in which no flaws have been detected. The use of DNA in taxonomic studies may be new stuff to Stig, but it is not new in general. I personally have been involved in many re-classifications in numerous families, and the principles being applied to the Orchidaceae are exactly those being used broadly and with general acceptance by botanists worldwide. In fact, I was one of the principal researchers involved with a reclassification of the whole of the flowering plants, 455 families and 400,000 species. I am fine with admitting that we have had some problems with the names put on the plants we've used for our orchid DNA studies, but those are "operator errors" and have nothing to do with the reliability of the general methods of DNA taxonomy. Many of the wrong names on plants in fact have come from Stig and Steve - we have used a large number of plants from Steve's living collection, in particular. Once we discover that there is a problem with the name that has been applied to a sample, we correct the problem. None of this has anything to do with the issue of generic circumscription in Oncidiinae. Stig also complains that I transferred a lot of names that are synonyms with others and says that I made many errors. I am indeed guilty of this, but I asked Stig to help me with these transfers and sent him a copy of the page proofs for the article published in Orchids. He would not help me, which is strange if he

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was really worried about some extra names in the literature. I also asked him a few years ago to make the transfers to *Cyrtochilum* because I know that he knows these Andean species and their possible synonyms much better than I, and he was happy to this. For the *Odontoglossum* transfers, I worked from the *Monocot Checklist*, which I know contains errors, but it was the best thing I could do without the help of someone who knows the species problems in greater detail. Of course, none of this has anything to do with the issue of generic delimitation in Oncidiinae.

Both Stig and Steve have alleged that "there are many weak spots in this work", which is easily refuted. There are several peer reviewed and published studies that could have been used as the basis for the GO treatment, but the level of species sampling in these was sparse, so I felt that the inclusion of many more species would help to demonstrate that with additional sampling the patterns of relationships would not change. We are now in the process of preparing the large 5-gene analysis for publication in a peer-reviewed journal, but I did not base the name changes solely on the tree published in GO5, which was previously unpublished, and I have made that clear. The published, peer-reviewed studies that show the same general results are:

Chase, M. W. and J. D. Palmer. 1992. Floral morphology and chromosome number in subtribe Oncidiinae (Orchidaceae): evolutionary insights from a phylogenetic analysis of chloroplast DNA restriction site variation. Pp. 324-339, *in* Soltis, Soltis, and Doyle [eds.], *Molecular Systematics of Plants*. Chapman and Hall.

Williams, N. H., M. W. Chase, T. Fulcher, and W. M. Whitten. 2001. Molecular systematics of the Oncidiinae based on evidence from four DNA sequence regions: expanded circumscriptions of *Cyrtochilum, Erycina, Otoglossum*, and *Trichocentrum* and a new genus (Orchidaceae). Lindleyana 16: 113-139.

Williams, N. H., M. W. Chase, and W. M. Whitten. 2001. Phylogenetic positions of *Miltoniopsis*, *Caucaea*, a new genus, *Cyrtochiloides*, and *Oncidium phymatochilum* (Orchidaceae: Oncidiinae) based on nuclear and plastid DNA data. Lindleyana 16: 272-285.

Chase, M. W., N. H. Williams, A. Donisete de Faria, K. M. Neubig, M. Amaral, and W. M. Whitten. 2009. Floral convergence in Oncidiinae (Cymbidieae: Orchidaceae): an expanded concept of *Gomesa* and a new genus, *Nohawilliamsia*. Annals of Botany 104: 387-402.

As I pointed above, none of this research is in any way problematic. Stig and Steve have been collaborating with Norris, Mark and me on these molecular studies, and they were provided with cladograms that were being circulated pre-publication so that they could help us identify problems with names (many of them on plants that came from Steve or that have been named by Stig). It is unfair of them to use our efforts to put these results in good order before they are published in an attempt to discredit our research. There are problems with the names being applied, but as I explained above this has nothing to do with the issue of generic circumscription. There have been lots of published, peer-reviewed studies that have previously demonstrated these same basic results, including one of my oldest ones from 1992. This line of argument is simply a smoke-screen being thrown up to detract from the real issues: the lack of morphological characters to identify these genera and the high degree of genetic similarity (leading to the high levels of fertility in their hybrids, *Odontocidium, Odontioda* etc.). It is merely Stig's and Steve's preference based largely on an emotional response devoid of any consideration for the implications of retaining *Odontoglossum* to the circumscription of other genera in Oncidiinae and orchids in general.

I apologise to the Committee for being so long-winded. This is almost certainly more information than you really wanted, but because I was unable to join you for this meeting, I felt obliged to provide you with a longer response so that some potential additional questions could be answered.

I believe that I have covered the major arguments surrounding this issue in a number of forums, and I will

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be presenting a more general talk on orchid taxonomy and DNA studies at the WOC in November and at the Orchid Digest Speaker's Day next June in Los Angeles. I want to assure the Committee that my decision to include the species of Odontoglossum in Oncidium was not a decision that I rushed into at the last minute. I personally am very fond of the species of Odontoglossum s.s. and grow several of them in the windows of my office and at home. This is no vendetta. For the last 30 years, I have been studying these plants in detail in the laboratory, greenhouse and field, and I have done my best to produce in GO5 the most useful taxonomic scheme I could devise. It does require a period of transition, but a new generation of orchid enthusiasts will have no trouble getting used to this scheme, and they will find it less problematic to learn than one with 130 or more genera. I do regret the loss of the epithet "crispum", but that alone is not a good reason to keep the name Odontoglossum, and the transfer of names and sorting out the hybrid genus nomenclature is greatly facilitated by their now-electronic nature. We spent a far longer time than was desirable reaching a decision that defining Cattleya in the broad sense was preferable to all other alternatives, that the genetic relatedness of Sophronitis and the rupiculous species of Laelia and the difficulties in sorting out clear generic characters were best served in the end by going for a broader rather than narrower generic circumscription. We should not repeat the mistakes of that process again here. Mark Chase

19 November 2010.

#### From Stig Dalström, 1 March 2011

#### Dear fellow orchid friends,

The debate is getting hotter and I suggest that we keep our heads cool and remember a few facts. First of all, we don't need any further evidence at this point to make good decisions. Mark Chase and his team has produced several DNA cladograms that present alternative versions of the situation we are dealing with. Even though the "facts" are a bit "flaky" (some species and clades jumping around and end up in different places depending on which DNA "tree" we are looking at), I think we can still use them as a basis for our choices. It's the <u>interpretation</u> of the facts that vary, because they are subjective by nature and this creates a conflict. The cladograms offer <u>several equally legal and correct</u> alternative interpretations. Chase et al have opted for sinking everything into *Oncidium* (I believe because they fail to find distinguishing features between the clades), and many others, including me, prefer to keep at least *Odontoglossum* as a distinct genus, which can be done with only a couple of name changes.

I attach two DNA trees here for you to analyze and compare (5-gene tree, and the COMB ML tree). The way I interpret the cladograms, it appears we need to establish two, alternatively only one new name in order to keep my "pet genus" *Odontoglossum* as a solid and definable group. I suggest that we transfer *Cochlioda* and *Solenidiopsis* into *Odontoglossum* in order to solidify that group. The first species of both *Cochlioda* and *Solenidiopsis* were described as *Odontoglossum* species and they share many morphological features. There is also a recently discovered new species (undescribed) that fits perfectly between these three genera and ties them together (see the Odontoglossum Alliance Newsletter Jan. 2011). This group can then be defined as a separate genus by a combination of features.

The intermediate Onc/Od chrysomorphum clade, and the Onc boothianum clade need separate names, however, unless we include the chrysomorphum clade into Odontoglossum, which I advise against since they look more like oncidiums and will break the Odontoglossum generic profile. As you can see in the attached trees, the boothianum clade jumps from being a sistergroup to the Sigmatostalix clade (5-gene tree), to being a sistergroup of the Odontoglossum/Onc chrysomorphum clade (COMB ML tree). Regardless of this inconsistency, I think it's safe to assume that we need a name for this group as well, unless further DNA sequencing will show that it belongs together with the chrysomorphum clade, or fits comfortably inside Oncidium sensu strictu somewhere.

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All other "Oncidium" clades are then genetically easily separated into *Oncidium* sensu strictu, *Sigmatostalix* and the *Heteranthum* clade (which I believe already has a valid name that escapes me at the moment). And yes, I think we can morphologically define that genus, as well as Sigmatostalix, with a little effort and research. If the DNA tells us that there are indeed differences, then we should be able to find them. Maybe they are microscopic, or etherial, but they should be there. To lump them into a big and undefinable *Oncidium* waste basket is taking the lazy way out.

If you look further down in the 5-gene tree, you will also find a Chase collection (C 171) of *Trichocentrum tigrinum* in the middle of *Oncidium* (between *unguiculatum* and *hastatum*). What is it doing there? We also see that the enigmatic *Onc/Od aurarium* (*Od trilobum*) still lingers between two specimens of *Onc leucochilum*. It has been explained by Chase (I understand) that this specimen apparently is a misidentified Mexican species (which should have raised a red flag immediately since *aurarium* is an Andean species). And no, I did not identify that specimen  $\mathfrak{O}$ ! So, where does *Onc/Od aurarium* belong? I put my money on *Odontoglossum*!

We can also find *Onc baueri* both next to *altissimum* and *volvox*, as well as in the *fuscatum anthocrene* clade. Obviously another misidentification of at least one of them.

In conclusion, it seems clear to me that we need more data, more specimens and verification of the previous identifications. This work has begun, but will take time, and may in some cases prove impossible. I am convinced, however, that we will be able to find features that will make it possible to distinguish the here proposed groups, even if the differences may seem vague at this point. I also think it's reasonable to expect that the molecular scientists who already have a grasp of the DNA sequencing, will continue to dig deeper in the molecular maze in order to find more clues and facts that will help us come to an acceptable solution for everybody. To sink everything into *Oncidium* is not acceptable to me.

With sunny Floridian greetings

Stig Dalström

### 1 March 2011

#### **Odontoglossum** versus **Oncidium** – again: a response to Stig Dalström's email of 1 March 2011 From Mark Chase, 18 May 2011

The basic situation here, and the BIG problem, is clearly stated by Stig at the beginning of his letter: "in order to keep my "pet genus"". When I started this project many years ago, I had no *a priori* desire to keep or get rid of any genus. I wanted to develop the best and most workable taxonomic scheme that I could, and I wanted it to be as consistent as possible across the whole of this subtribe, Oncidiinae. Stig was perfectly happy to accept a similarly broad concept of *Cyrtochilum* (he made the new combinations in an article in Lindleyana), for which many authors (e.g. Königer, Senghas and others) have proposed several segregate genera, but for his "pet genus" he wants to accept a much narrower generic circumscription. I would be embarrassed to let any one know that I was making taxonomic decisions on the basis of my personal preferences, that I was literally throwing objectivity out the window, and that I would prefer to create new genera that would also be impossible to separate from related genera in order to do so. This is the antithesis of reasonable taxonomic practice.

Returning to his argument, based on the DNA results, Stig makes several "concessions" in order to keep Odontoglossum, arguing to lump Collare-stuartense (the astranthum complex), Cochlioda and Solenidiopsis in Odontoglossum, saying that they share many morphological features, but never naming them. He also argues that "This group can then be defined as a separate genus Odontoglossum by a combination of features", again not naming what these features are. Yes, there is a clade in the DNA tree that corresponds to Stig's proposed expanded version of Odontoglossum – I have always admitted that this clade exists and that it can be recognized as a genus. If it is a clade, then you can name it: that is the only rule of this sort of nomenclature, and

Stig is correct in this. I have considered this possibility, but I chose not to do this because there are no morphological characters to define any of these groups as distinct from Oncidium. If Stig knows of some features, I really wish he would let us know what they are. I have studied the morphology of these plants for 30 years and found none. Bill Stern at U of Florida and Elstela Sandoval at UNAM (Mexico) have studied their internal anatomy for many years and also found nothing to distinguish Odontoglossum from Oncidium. If it is as easy to distinguish these genera as Stig argues, then why has the circumscription of Odontoglossum been such a plague upon the orchid taxonomic community since the time of Lindley? Here's what Leslie Garay said in a paper published in 1963 in the Bulletin of the American Orchid Society (32: 19-24): "Genera such as Solenidium, Oncidium, Miltonia, Brassia, Odontoglossum, Aspasia and Oliveriana differ from each other solely in the angle of the lip and column. Therefore, these genera are wholly artificial, and, at best, they should be considered as sections of the genus Oncidium. To the taxonomist as well as the horticulturalist, it appears to be a serious and unpleasant thought to unite all these genera with Oncidium, but this course seems inevitable. since the information gained from experiments in hybridization and from cytological studies strongly points in this direction." I have to admit that this statement is somewhat excessive, and we now have data that make it necessary to maintain some of these (Miltonia, Brassia) as distinct, but the sentiment and reasoning are the same: floral morphology is useless to define genera in this group of orchids. I was still in grade school when Garay's assessment was made, so it does not seem so drastic to me to now finally have fulfilled his prediction. What Stig proposes here is exactly the same line of argument we used when we were faced with the situation in Cattleya (versus Sophronitis and the Brazilian species of Laelia), and these halfway solutions do not in the end satisfy anyone. By adding Cochlioda, Collare-stuartense and Solenidiopsis to Odontoglossum you just make that core group centred on the type species of Odontoglossum bigger and more heterogeneous, and it certainly does make things any easier to identify. Lumping these into Oncidium is not the "lazy way", it is the practical and, according to Garay, the "inevitable" way.

The other problems to which Stig alludes (misplaced and misidentified specimens in the DNA results) are typical in a large study like this – we admit that things do get mixed up, which is why we often include duplicate specimens if available. We sent him and others who supplied plant specimens the preliminary results in order to enlist their help in sorting out these problems. The paper describing these results has just been submitted to the *Botanical Journal of the Linnean Society*, and in these results the problems pointed out by Stig are sorted out. It has taken some time, but this work is extremely time-consuming.

Stig in end argues that more time is needed to study more specimens and that he is convinced that features will be found to make distinguishing these groups possible. History is not on his side on this point; one of the reasons why I turned to DNA was to obtain data that, in addition to morphology, would help us make the decisions about what to lump and what to split. I spent the first 15 years of my scientific career studying the morphology and anatomy of these plants, and I could not find a way to distinguish *Odontoglossum* from *Oncidium*: Garay reached the same conclusion in 1963, predicting their eventual merger. It is time to settle this issue; Stig's solution is to postpone a decision until we find these features, but if they have taken so long to find, then they will be of no use to most people because they are so cryptic. There is no easy solution here, and I return to my original logic: several, larger, difficult to describe genera are preferable to many more, smaller difficult to describe genera.

Mark Chase Kew, 18 May 2011 Volume 6 Dec. 7, 2010

# Comments From steve Beckendorf 7 December 2010

#### Dear Johan,

I'm sorry that this additional response is so late and so close to your meeting. I was in Peru for two weeks and did not get Mark Chase's response to my previous submission until very recently. As you might imagine, I was disturbed by Mark's pointed personal remarks, but I will try not to respond directly to them here. Throughout this process I have tried to be professional in my comments and to focus on the science. I will continue to do that here.

As you will have expected, I see the history of the genus Odontoglossum differently than Mark does. In the early days, a wide variety of species, many of them unrelated, were included in Odontoglossum. I don't find it surprising that it was difficult to define such a heterogeneous group. As subsequent investigators studied these plants, they identified several distinct groups within this large genus and segregated them as distinct genera - Rhynchostele, Rossioglossum, Cuitlauzina, etc. The most recent of these segregations was the transfer of several high altitude species to Cyrtochilum. All of these transfers were subsequently validated by DNA studies. (By the way, I've never questioned the validity of DNA sequence analysis in assessing orchid species relationships. After all, I'm a molecular biologist.)

After these transfers, the remaining species in Odontoglossum were all closely related to the type species, Odontoglossum epidendroides. Thus my perspective is that as we gained more knowledge and information about the plants, the concept of Odontoglossum has been continually refined and improved. That is the same process that has occurred with many other genera. Mark mentions again that up to ten additional genera would be required if Odontoglossum and Oncidium were to remain distinct. I think this is an overestimate. I've suggested a scheme that would require three or four new genera and Stig has suggested even fewer. Such modest changes to align the DNA results with morphology are similar to what has been done in such groups as the Maxillarianae, and the Huntleya clade. These options do require that the new genera be clearly described by unique characters. Despite Mark's assertion that there are no characters and that there "is nothing left to study", Stig and I have decided to try. Our preliminary studies are encouraging, and we plan to expand them using both living and preserved specimens.

Just a note about the horticultural history, since Mark says that I am "obviously unfamiliar" with it. Mark implies that "Odontoglossum bictoniense" is centrally important to this history, but that neglects most of the early horticultural history that was dominated by Odontoglossum crispum. There was only one Odm. bictoniense hybrid made before 1963, Odm. Stamfordiense in 1909. In contrast Odm. crispum hybridizing began in 1898 and nearly every hybrid from that time on had the majority of its genes contributed by crispum. Thousands of these Odontoglossum hybrids were produced, a large fraction of them in England at famous firms like Charlesworth, McBeans, and Mansell and Hatcher. This is some of the horticultural history that would be impacted by loss of Odontoglossum.

Finally, a couple of comments about Mark's methodological categories. He suggests that the changes in the tree that are seen when comparing the ITS and 5 gene trees are not important if the species are all lumped in Oncidium. Of course that's true, but it begs the point. Relationships of species within the clade are quite dif-

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ferent in the two trees, especially the relationship of Sigmatostalix and some of the Oncidium ss species. It's difficult to tell whether further refinement of the trees will continue to change the apparent relationships.

That's all for now. I hope these comments will further inform your discussions.

Sincerely,

Steve Beckendorf

### Some notes on the consequences of molecular based taxonomy. By Stig Dalstrom

When Chase et al. transferred orchid genera *Cochlioda*, *Odontoglossum*, *Sigmatostalix* and *Solenidiopsis* into *Oncidium* (2008), a rather strange situation developed, seen from a taxonomic point of view. Many different looking plants with very different looking flowers ended up in the same genus. In fact, the flowers are so different that it becomes virtually impossible to visually define the genus *Oncidium*, and to separate it from many other genera in the Oncidiinae. In a matter of speaking and for all practical purposes, this maneuver puts user-friendly Oncidiinae taxonomy "out of business".

There have been many protests against this decision, from growers and orchid researchers alike, and for various reasons. Therefore, an attempt is made here to closer analyze the situation and to suggest an alternative solution to this dilemma, that combines the DNA results with user-friendly morphology (the shape) based features. But before the *Oncidium/Odontoglossum* situation is discussed, we should take a closer look at some previous decisions in other cases. It seems logical to have a reasonably consistent approach to this process, and to solve similar cases in a similar way.

From the very beginning of modern orchid taxonomy, problems have existed in separating different plant groups based on morphology alone. One such case is how to define *Cyrtochilum* from *Odontoglossum*, *Oncidium* and other genera. Many attempts were made over the years but no system lasted for long. Not until DNA sequencing techniques were introduced by Mark Chase, Norris Williams, Mark Whitten and others could we begin to understand the genetic inter-relationships between these plant groups. This allowed for the first time a chance to gather all the concerned species in natural groups and from there on build a classification system that hopefully might last. The molecular results revealed some surprises, however, and with them came new challenges. One of these was how to deal with the plants in a broad *Cyrtochilum* clade (branch), which consisted of species that previously had belonged in many other genera, such as *Bousiella*, *Caucaea*, *Dasyglossum*, *Neodryas*, *Odontoglossum*, *Oncidium*, *Miltoniopsis*, *Rusbyella* and *Trigonochilum*. Due to the limited "resolution" in the sequencing technique, which showed where to draw generic lines with reasonable clarity but failed to convincingly define specific entities, Chase et al. decided to distinguish the larger groups only, and place them in separate genera.

This solved a problem for the author of this paper (Dalström), in that it removed many species previously treated as *Odontoglossum*, but which really did not share many features with the more typical plants of that genus. Before the arrival of molecular evidence it had been difficult to justify removing these ill-fitting odontoglossums, even though several attempts had been made by different authors. The DNA sequences solved that problem and all the *Cyrtochilum* species ended up in the same wide-mouthed "basket" (Dalström, 2001). The motivation to remove all the species that did not belong in *Odontoglossum* was to be able to produce a floristic treatment of the genus *Odontoglossum* for Flora of Ecuador. It turned out to be a side-track that lasted for many years and resulted in a treatment of the genus *Cyrtochilum* for Flora of Ecuador instead (published in 2010). The odontoglossums will be dealt with later once we have "finalized" the taxonomic status.

It became clear during the transfer of the many different species into *Cyrtochilum*, that there existed considerable differences in the floral morphology between different groups of species within the re-circumscribed genus, and that the last word concerning how to treat them taxonomically most likely remained unspoken. Vegetative, however, the plants were more easily recognized as closely related to each other and the genus was therefore based on a combination of anatomical, ecological, floral and vegetative features.

Königer and Schildhauer (1994) established genera *Dasyglossum* and *Trigonochilum* for some of the *Cyrtochilum* groups. The generic delineations of these groups do not seem clear and consistent, however, and it made more sense at the time (2001) to lump them all together. Further molecular investigations are now under way (Whitten pers. comm., in collaboration with Beckendorf, Dalström and others) to try and resolve the unclear inter-relationships within the core group of *Cyrtochilum* (as was defined by Dalström, 2001), and future generic splitting is to be expected, whether desired or not.

Aside from the taxonomic challenges that remained within the "new" *Cyrtochilum sensu strictu*, there were other and rather unexpected plant groups residing in the larger *Cyrtochilum* clade as well, such as the sole member of the little known genus *Caucaea*, the genus *Miltoniopsis*, and species in the *Oncidium* section *cucullata* complex, as well as *Onc. cardiochilum* and its close relatives. In some ways, it would have made sense to lump all these plants into *Cyrtochilum*. It would be molecular based and genetically justifiable if one preferred large genera. The authors (Chase et al.) probably realized at the time that there would be a fair amount of resistance among orchid people in general to accept that all the classic *Miltonia* hybrids, for instance, would become *Cyrtochilum* hybrids, so an alternative solution was seeked. The answer was to keep *Miltoniopsis* as a separate genus, and to merge all the members of the *Oncidium* section *cucullata* complex together with *Caucaea radiata*, which fortunately turned out to be a previously "hidden" but genetically close relative. Both these genera are now defined by a combination of features that makes them reasonably recognizable.

The problem was the last little group, which consisted of members of the odd *Onc. cardiochilum* complex. The vegetative features of this group are "dead ringers" for *Cyrtochilum*, but the flowers look like "classic" oncidiums. Without flowers, the plants would end up in *Cyrtochilum* without hesitation, but scientific specimens without the plant parts would just as surely end up in *Oncidium*. To transfer them into *Cyrtochilum* was not an option either since that meant that both *Miltoniopsis* and *Caucaea* would have to be transferred as well, based on the existing cladistic rules. So what to do with them? The solution was to create a separate genus, based on a combination of features, none of which is unique in any way, but <u>the combination</u> made it possible to somewhat define the new genus *Cyrtochiloides*. Not a perfect solution but a workable one. We just need to be a little flexible sometimes and soften our scientific dogmatism in order to adjust to reality. After all, taxonomy is not an exact science and two-dimensional cladistic diagrams can only cover so much of a multidimensional reality. Perhaps the genus *Cyrtochiloides* really originates from an ancient natural hybridization between a member of *Cyrtochilum* and an *Oncidium*?

One of the remaining problems in defining the genus *Cyrtochilum* is that some of the sequenced specimens appear to be misidentified. In other cases it seems that some samples are anonymous since no floristic vouchers were made, which would allow a confirmation of the identities (only un-vouchered leaf samples were provided). The same problem afflicts the recent *Oncidium* transfer. As the reconfirmation process has begun, it shows that some specimens are misidentified, and some appear to be anonymous. To try to create a user-friendly taxonomic system that is based on anonymous DNA samples is an exercise in futility. It seems obvious that these un-verifiable specimens/samples should be deleted entirely from the system and new samples, with available herbarium and photographic vouchers, that hopefully represent the same species, should be resequenced. An unfortunate and costly, but necessary procedure.

By re-examining some of the existing specimens it has become possible to correct some of the names that seemed misplaced in the existing DNA trees. One Ecuadorian "stray" sample of "Odontoglossum hallii" (B2529), which lingered among samples of Odm. epidendroides (fide Bockemühl; Odm. epidendroides subsp. spectatissimum, or Odm. spectatissimum fide Dalström) turns out to be another sample of that same species. In

other words, the placement is correct but the original identification is wrong.

In another case, a sample of "Odm. epidendroides" (N140) is placed next to Odm. hauensteinii (a synonym for Odm. subuligerum). When discussing this with Steve Beckendorf, who provided the sample, color slides of the flowering plant really proved to be of Odm. epidendroides (sensu stricto – the Peruvian form). This in turn demonstrates that the typical Odm. epidendroides (from Peru) appear closer to the Bolivian Odm. subuligerum and not so closely related to Odm. spectatissimum (Odm. epidendroides fide Bockemühl, Odm. epidendroides subsp. spectatissimum fide Dalström) as was previously believed and that the two should be kept separate.

Another example is the placement of three samples of *Odm. portmannii* (W1612, N130 and N139). This group is listed as a member of the *Odm. wallisii* clade, and a sister group to *Odm. tenue* (where one sample was previously misidentified as *Odm. cirrhosum*). When examining one available specimen of these *Odm. portmannii* (W1612), it becomes clear (much to the surprise of Dalström), that it indeed is a true plant of that species. How is this possible? These species are morphologically very different. The provided explanation is that the resolution on the specific level is still not clear enough to actually define species with certainty, or allow them to appear where they seem to belong best (the same as for *Cyrtochilum*). *Odontoglossum portmannii* is morphologically closely related to members of the *Odm. epidendroides* complex, having a strap-like claw to the flexible lip etc., and should logically appear somewhere nearby in the "tree". The explanation is unfortunate but acceptable due to the limitations of the currently available sequence technique. This also shows that a certain amount of tolerance for misplacements of species/samples in the system has to be allowed even if they are correctly identified (but it also makes the entire system rather "wobbly", particularly when chosen as a foundation for taxonomic transfers).

Another example is the identification of species in the "*heteranthum*" complex of *Oncidium*. Only a few of these samples are apparently readily available for identification and in several cases the identities are doubtful or incorrect. This entire group consists of species that produce abortive flowers to various degrees, with one exception (or so it seems). The species in question is *Onc. lancifolium* (W2420). A closer examination, however, shows this specimen to be identical with *Onc. pyramidale*.

Königer lists Onc. pyramidale as a synonym of the older Onc. lancifolium and includes a photograph and drawing of the former, as Onc. lancifolium in his monographic treatment of Oncidium (vol. 1; 2004). The differences between these two obviously closely related species may be debatable, but are distinct enough for the author of this paper to recognize. In any case, neither Onc. lancifolium or Onc. pyramidale show any abortive flowers on the very few specimens available for examination. It has therefore been questioned whether the presence of abortive flowers is a valid feature to include in a delineation of this group as a separate genus.

The picture becomes clearer though when another sampled species is thrown into the mix; *Onc. heterodacty-lum*. This species is very similar to both *Onc. lancifolium* and *Onc. pyramidale* and ties them nicely together in a close-knitted natural group. And *Onc. heterodactylum* does produce abortive flowers! It would therefore not be surprising if individual plants of the other two species also produce occasional abortive flowers. One might also argue that they all represent one single variable species, in which case abortive flowers are present in some cases. Otherwise, the *heteranthum* clade seems rather easy to distinguish as a separate genus based on a combination of features such as the abortive flowers, an extremely recurved, variously pubescent column with very large and prominent column wings and the elongated anthercap covering an extremely long and narrow stipe on a minute viscidium. The one exception is the possible placement of *Onc. acinaceum* in this group. This species display several features that are "different" from the other species, such as a deviating shape of the flower, with a flatter lip bearing a different callus, and straight column with a round anther cap. Otherwise, the general habit is similar to many other "heteranthum" species, including the production of

abortive flowers. Since this species has not been sequenced yet, it will be interesting to see where it ends up once we know more about its molecular identity.

The last group I will mention here is the *Onc. chrysomorphum* clade. Or rather, the *boothianum-chrysomorphum* clades. This group is the one that throws a monkey wrench into the entire system if we want to keep *Odontoglossum* as a separate genus.

First of all, however, if we want to maintain *Odontoglossum*, it also becomes necessary to accept the *heteran-thum* clade as a distinct genus. This seems possible based on the combination of features listed above. We also need to distinguish the *Sigmatostalix* clade as a genus, and the rest of the *Oncidium* species either as a single clade/genus, or split it up further. *Sigmatostalix* seems to be easily recognized based on the diminutive plants in combination with the distinctly flattened pseudobulbs, the thin and papery bracts and leaves, as well as the very distinct floral morphology in general. The column is either extremely elongate in comparison with the rest of the flower, and very narrow without any appendages, lobes or wings, <u>or</u> similarly narrow at the base, but shorter and with large and rounded apical lobes. There is also an odd similarity in the callus structure of the lip among most species. Combined, these features should make it easy to recognize the genus.

The remaining *Oncidium* clade(s), which contains the type of *Oncidium* (and most Central American species) can be left alone, or be split up further if desirable and when more data becomes available.

Returning to the *boothianum-chrysomorphum* case, we find similar identification problems as in the other clades. There is also an additional level of problems with this group and that concerns its relationship to the other clades. If we examine the DNA tree that was published in Genera Orchidacearum 5, we can see a diagram on page 216 that represents a parsimony analysis of ITS rDNA of Oncidiinae (a 1-gene tree; Whitten pers. comm.). Here, a clade that includes *Oncidium boothianum* (four Whitten collections that have been verified), *Onc. obryzatoides* and *Onc. zelenkoanum* represents a sister-clade to a much larger *Odontoglossum* clade, which includes the bulk of the typical *Odontoglossum* species, the *Odm. astranthum* complex, *Odm. povedanum*, *Odm. tenuifolium*, *Odm. trilobum* [= *Odm. aurarium*], members of *Cochlioda* and *Solenidiopsis*, as well as a small clade that includes *Onc. chrysomorphum*, *Onc. obryzatum* and *Onc. trinasutum*. One could call this entire group *Odontoglossum* if so desired, provided that the included *Oncidium-Cochlioda* and *Solenidiopsis* species are transferred to *Odontoglossum*.

It is then possible to distinguish three main "sister" clades (or possibly subgenera) in the genus; *Odontoglossum sensu strictu*, the *astranthum-Cochlioda-Solenidiopsis* clade, and the *chrysomorphum* clade. If we want to maintain the genus *Odontoglossum*, based on this particular DNA tree, we have to elevate the small "sister" *boothianum* clade to a generic level. We would also have to define and justify the *chrysomorphum* clade as members of *Odontoglossum*.

We can also see that both the *heteranthum* clade and the *Sigmatostalix* clade further down in the diagram are deeply embedded in *Oncidium sensu lato* and not readily separated.

If we then analyze a subsequent 5-gene tree (Whitten, unpublished), a slightly different picture becomes apparent. Here the *boothianum* clade is a sister clade to *Sigmatostalix*, which together with the *heteranthum* clade now are separated from the main *Oncidium* bulk. The question is then whether to include the *boothianum* clade in *Sigmatostalix*, which would not make morphological sense, or to treat that group, again, as a separate genus.

The chrysomorphum clade has in the 5-gene tree become a sister clade to the rest of the Odontoglossum sensu

*lato* clade, including the *astranthum* complex, *Cochlioda* and *Solenidiopsis*. The inclusion in the 1-gene tree of *Odm. aurarium* (as *trilobum*) in the *Odontoglossum* clade is now deleted, and a sample (N499) of *Oncidium aurarium* (the oldest name for *Odm. trilobum*) is inserted next to two samples of *Onc. leucochilum*, within the main *Oncidium* clade. The identification of N499 was later apparently changed to something else (a Mexican species), and the whereabouts of the real *Odm./Onc. aurarium* (Andean species) is currently unknown. It was claimed that the sequence of the original sample of this taxon was flawed and therefore misplaced, but in retrospect maybe that was not so?

In a subsequent and most recent COMB ML partitioned DNA analysis (Whitten, pers. comm.), the *heteran-thum* clade is a sister clade to all the other here mentioned clades. In the next step up, the bulk of *Oncidium* species represents a sister clade to the bulk of the *Odontoglossum* clade, which now includes both the *Sigmatostalix* clade and the *boothianum* clade, as well as the *chrysomorphum* clade, which now also includes two samples of *Onc.* cf *schmidtianum* (W1676, W 2421), one *Onc. tipuloides* (N294) and one nameless *Onc.* species (N178). The first step up, however, shows that *Sigmatostalix* is a sister clade to the others, and then the *boothianum* clade becomes a sister clade to the remaining *Odontoglossum* taxa. In the next step up the DNA ladder, the *chrysomorphum* clade is separated as a sister clade to the rest of the *Odontoglossum sensu lato* clade etc.

It becomes clear at this point that we need to make up our minds and decide which particular DNA analysis we want to use before we continue. According to Mark Whitten, who is very forthcoming and helpful with providing data and information, we should use the COMB ML tree from here on. Based on this model, we can now distinguish both the *heteranthum* clade and the *Sigmatostalix* clade as separate from the rest, and since both are morphologically reasonably distinguishable, it seems like a good idea to treat them as separate genera. This will allow us to maintain *Odontoglossum*, but only under certain circumstances. Before this can be accomplished, however, the placements of the remaining *boothianum-chrysomorphum* clades have to be solved.

The problem is that only some of the sequenced samples may be available for identity verifications. And when the available specimens are examined it turns out that the "cf *schmidtianum*" specimens (W1676, W 2421) both represent *Onc. tipuloides*. This leaves three different specimens of *Onc. tipuloides* (two are verified) together with the two *Onc. chrysomorphum* specimens (W1671 is verified). The identity of the nameless N178 species remains an enigma. It would also be desirable to verify the identity of the *Onc. trinasutum* (N335).

In the case of the *boothianum* clade, we have one sample of *Onc. obryzatoides* (N639), one *Onc. zelenkoanum* (N552), and one *Onc. obryzatum* (W2343). The only specimen that has been available for verification so far is the W2343, which turns out to be different from *Onc. obryzatum* and represents what Königer identifies as *Onc. massangei* (Königer, 2007). There are some question marks concerning the identity of this particular species, however, since Königer's specimen supposedly comes from 2100 m elevation, while the W2343, together with another collection of the same taxon (Hirtz 5411) both come from very low elevation along the Ecuadorian coast. Further investigation is needed to verify the correct identity of this species (it is still not *obryzatum*!)

If we summarize the observations made so far concerning the placements of the *boothianum-chrysomorphum* clades, and the identities of the samples involved, it stands out that much more work is needed before firm taxonomic decisions can be made. Several samples remain un-verified and may not even be available depending on the quality of the material that was used for sequencing. Another reason to be cautious is the fact that these groups seem to be "floating" between DNA models, and unresolved to some degree (compare with the *Odm. portmannii* case). Again, more work is needed, more samples sequenced and more DNA analyzed before taxonomic transfers can be made, based on firm evidence.

This said, the remaining taxa in the Odontoglossum sensu lato clade can be united in a convincing and mor-

# Advice From Steve Beckendorf President Odontoglossum Alliance

Most of the readers of this newsletter will already know that in May the RHS advisory committee on hybrid registration approved the broad concept of Oncidium proposed by Mark Chase. This means that both the RHS Hybrid Registrar and the Kew World Checklist will regard Odontoglossum and several other genera (Cochlioda, Solenediopsis, Sigmatostalix) as synonyms for Oncidium. You can still search the World Checklist for Odontoglossum species names but it will tell you that the accepted name is Oncidium. At the moment it is not possible to search the hybrid registry with Odontoglossum hybrid names. For example, Odontioda Joe's Drum gives no result although Oncidium Joe's Drum does. I couldn't figure out how to find Vuylstekeara Cambria. It doesn't come up as Miltonidium as you might expect. I think there is the intent to make this database searchable with all of the synonyms but I don't know how soon that will happen. The AOS awards database, Orchids Plus, can still be searched for Odontoglossum names. I'm not sure whether that will change. I think that Orchid Wiz will continue to allow Odontoglossum searches for the near future.

So where do we go from here? Stig Dalstrom and I have been trying to come up with alternative schemes that fit with the DNA analysis but don't lump all these distinctive genera into Oncidium. Stig has probably outlined one possibility in this newsletter. It's still difficult to define a few groups that are genetically close to Odontoglossum but have flowers that resemble many of the oncidiums. We have found a couple of characters that are unique to one of these groups, but need more before we can establish them as separate genera.

In answer to a question some of you have asked, for now I don't plan to change the labels on my plants. They provide important information that would be lost if all were dumped into Oncidium.

Steve

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# WHERE TO NOW?

In light of the stupid decision by the joint collaborators, RHS/AOS to try and change more than a century of quite accurate hybridizing records and attempt to force us into accepting there will be no more Odontoglossum and all attendant ramifications, some Odontoglossum Alliance enthusiasts may be wondering what to do. No problem for me! I became enchanted with this group of orchids in the 1970's, initially with the most lovely and successful of all the trigeneric hybrids: Vuylstekeara. If Mr. Vuylsteke is turning in his grave, he should relax. Many of us have no intention of changing label one.

I have been negotiating with Alex Maximiano of OrchidWiz for some time and expect that he will shortly initiate a new registration system employing all the traditional names. There is nothing that authorizes the RHS to be the only registering system for orchid hybrids in the world and they will quickly find out that they have much less influence than they thought. We make a fair number of hybrids in the Alliance each year and will never register another with the RHS unless Chase and his cronies are long gone. It will have absolutely no effect on our business but it sure will contribute a little more to the confusion that should cause people to demand a return to sensible practice in all genera. We have seen the abomination that the Cattleya Alliance has become, it is not a pretty sight and is clearly not being accepted.

Chase is, in my opinion, a second level researcher. Despite his best efforts and some inside help, he was unable to gain admission to the faculty at UC Berkeley in the recent past. He may be good enough for the Poms at Kew but he did not make the cut for one of the top universities in the US. Agreement amongst taxonomists is as rare as Odontoglossum enthusiasts in Nevada but many leading orchid taxonomists do not consider Chase's work to be cutting edge stuff. Besides, as it is always wise to remember, we are horticulturalists and taxonomy is far more art than science.

Oh, I expect sycophants in every orchid-growing community will fall in behind this name-change nonsense but I would hope that The Odontoglossum Alliance might provide some reasoned and unyielding resistance to these proposed changes. After all we grow them and we know them, far more than some desk-pusher dealing in spirit collections and herbarium sheets with a little DNA analysis thrown in to try and provide some overriding legitimacy to his arbitrary decisions. Will we as a group stand against this nonsense or will we meekly knuckle under?

It's not a difficult decision for me. If anyone tries to change the name of our group to The Oncidium Alliance, I will be long gone, never to return. A threat? No, a promise. I don't care if you pronounce my favorite as "Vulkisteria" like some of the British do but that intergeneric name, honoring a great man from our orchid past is going to survive actively long after I am pushing up orchids. And the mighty Odontoglossum crispum will continue to delight us in plant and print as long as orchids are grown. Andy Easton

### Report on Dues for the Year 2011-2012

We have 14 members who have not paid their dues for the Odontoglossum Alliance for the year May 2011-May 2012. For each of those members I have enclosed this notice along with an envelope for dues submission. I have tried to make it easy and convenient for people to pay the modest amount. All you have to do is write a check on a US Bank for either \$15.00 for one year or \$30.00 for two years. The later will stop me from bugging you. Your Alliance runs on a very slim budget. The dues do not alone cover our expenses. What does make it possible for us to operate is the Annual meeting with the attendant auction. Here generous donations of Odontoglossum Alliance material along with equally generous bidders raise sufficient funds to keep us going. The dues are important and the solid financial foundation of our organization. Please, if you have not paid your dues do so promptly.

Your Treasurer and Editor

John E. Miller

## Interim Report on My Continuing Battle with Scale John Miller

I have been running a continuing battle with scale in my greenhouse now for more than six (6) years . I first tried malathion with almost no lasting success. The weather conditions here in southern Massachusetts are such that during the summer months, June through September, the temperatures warm up to over 70 in the day time, often up to the high 80's. I have often seen night temperatures in the 80's sometimes for a couple days at a time. The scale would really bloom and grow exponentially. I run high humidity and often the weather is very helpful with winds off the ocean at high humidity. I could get rid of scale in the fall when the night temperatures drop below 60. I would scrub each and every plant, then spray with the recommended chemical. I tried Cygon E which for a while would make it go away until the next summer. I tried Enstar. Then Telstar. All with the same results. Most recently I heard about Safari. Several people recommended it to me. With the help of Bob Hamilton I obtained some. This spring I gave the greenhouse a single good spray with Safari. It is now the first of August. We have had more than our share of high temperatures, both day and night. We have had very high humidity. I can't close one of the greenhouse doors as the humidity has swollen it up. But the good news is to this date, I have not seen a single scale on any plant. Believe me I know where to look and I look alot. Should I find scale, I will definitely give it another Safari spray. But knowing how evolution works I am not going to spray again unless I see the enemy. The formulation of Safari is great. The granules don't produce powder and they dissolve easily and completely. It is expensive, but to me it was well worth it. It comes in a 3 lb amount and it will last a long time. I shared my purchase with some of my orchid friends.



#### 19th AOC Conference and Show Perth Western Australia PO Box 576 Morley, Western Australia 6062. Email: acconference@dodo.com.au ABN 14966923212

Bulletin No4. June 2011

Dear Orchid Aficionado

Momentum is beginning to pick up and plans for the best AOC Conference ever are coming together extremely well.

Registration for the 19th AOC Conference & Show is open and the details are now available on line at.. <u>http://www.waorchids.iinet.net.au/Registration.pdf</u> And don't forget that Earlybird Registrations must be received by 31st January 2012. If you are unable to download the registration form, please contact the Secretary at the address above with your postal details. We now have credit card facilities. for your ease of payment. Also attached to the Registration Form is information regarding the <u>Conference Tours</u>.

The Conference Dinner will be held at the Western Australian Golf Club on Saturday 15th September 2012. Arrangements have been made for transport to and from Burswood to the dinner venue should attendees wish to utilise this service, and please make sure that you indicate this on the form and pay the appropriate amount.

We have added another seven, to the eleven world class orchid speakers that were announced in our previous Bulletin, (see here... <u>http://www.waorchids.iinet.net.au/Speakers.htm</u>)

Phalaenopsis growers will be well catered for with the inclusion of ...... Dr. Graham McKay of <u>Gigi Orchids</u> in Queensland, and Mr Kuo-Liang Hung of Tying Shin Orchids, Taiwan.

Also .....

Scott Barrie of <u>Barrita Orchids</u> - NSW Mark Brundrett, Senior Lecturer in Plant Biology at the University of WA Ray Clement of <u>Tinonee Orchids</u>, NSW Murray Shergold of <u>Easy Orchids</u> NSW Rudolf Jenny of Switzerland. Secretary of the European Orchid Council and Research

Sunday, June 19, 2011 AOL: JeMiller49

Associate of the Jany Renz Herbarium, University Basel, Switzerland.

And that's not all !! We expect to have a final line up of 21 lecturers and 27 lectures over a three day period. The lectures will take place, one at a time, in the Botanical Room, so that registrants will be able to hear and see ALL the lectures.

It is proposed to have a system in place for registrants to pre-order orchids and flasks from our guest speakers and vendors before the 19th AOC Conference so that these items can be picked up during the event.

If you are attending the 20th WOC in Singapore in November this year, you will find our promotion booth and display, which will be manned by members of the 19th AOC Conference Committee and other AOC members. Come and have a chat at booth B30 in the Marketplace.

Further information regarding all our latest happenings can be accessed on the 19th AOC Conference web site at .....

http://www.waorchids.iinet.net.au/19th AOC Conference.htm

We urge all orchid societies to feel free to reprint this Bulletin, and anything else from our web site, in your club newsletters.

Should you have any queries or questions regarding the 19th AOC Conference, feel free to contact the Chairman, (email) the Secretary, (email) or the Webmaster. (email)

The fact that you are receiving this email indicates that you are already included on our database for further updates from time to time. However, we would like to give you the opportunity to have your email address removed if you so desire. We hope you will be happy to receive our updates regarding the Good News that is happening here, but we do not want you to feel that we are inflicting you with spam. Should you wish to have your email removed from our database, please reply to this email with the word 'Remove' in the subject line.





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