

The Hardy Orchid Society
Newsletter



No. 10 October 1998

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Extra Sheets: Application Form for the Autumn Meeting

Front Cover: Cypripedium tibeticum by Carol Dash

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* * * Information on the Autumn meeting * * *

PLEASE NOTE THIS INFORMATION AS THE NEXT MEETING IS SOON!!

ACT NOW - SEND OFF YOUR APPLICATION FORM NOW!!

The next meeting will be on 31st October at the HRI Wellesbourne near Warwick. A sketch map and application is included with this newsletter. Attendance of the meeting is free for members however for security reasons at the HRI we need to inform them of the names of all who will be attending. It is therefore very important to let Richard Manuel know, even if you do not require lunch. Unfortunately the cost of lunch and coffee etc is slightly higher than we have had to pay at Pershore and therefore this is reflected in the increased charge of £12.50 for those who require refreshments and lunch. Please also note that a B&B list is available from Richard if required (a SAE would be appreciated).

PROVISIONAL PROGRAMME

Please note this may be subject to change - particularly in terms of fine tuning the timings on the day.

9.00 am Rooms available - time for informal chat and staging of the photographic competition (see later).

Coffee and biscuits are available on arrival (see above)

9.45 am brief committee meeting

10 - 10.15 am Chairmans introduction

10.15 Peter Corkhill - Cypripediums in China

11.15 approx break for coffee

11.30 Roger Gelder - Orchids in the Eastern USA

1 - 2pm Buffet Lunch

2.00 Barry Chambers - Orchids of Turkey

3.15 Tony Hughes - "Serapias and other bastards"

5.15 Meeting closes - we must vacate HRI by 5.30pm

Time will also be allowed either before lunch and/or in the afternoon for discussion and viewing of slide entries for the Photographic competition - see Tony Hughes notes below, this is in addition to our normal photographic competition. So you need to bring some slides AND some prints.

The meeting will finish with coffee and biscuits and close at approx 5pm as usual.

There will also be sales tables as usual - under the arrangements, agreed at the AGM, sales tables will be available to anyone who has lots of plants or whatever for sale at a flat rate of £10.00 per table. In addition there will be a 'Society Table' as usual on which any member can place one or more

plants for sale, on the basis of 10% of the proceeds to the Society. Please make sure that such plants are clearly labelled with species name, your name and price.

PHOTOGRAPHIC COMPETITION 1998

Tony Hughes (show secretary)

This, the second HOS Photographic Competition, will be held during the October meeting at Wellesbourne, as mentioned above. We intend to be more ambitious this time and include three classes for 35mm slides, in addition to the six classes for prints we had last year. However, since the slide classes may prove popular and we don't want to take all day judging, we are restricting each entrant to only one slide per class. So that everyone will be able to view the slide entries conveniently, there will be a slot in the days programme to project (and discuss?) them.

The classes are as follows:

1. An orchidaceous landscape, print size approx 6x4".
2. A single orchid plant, print size approx 6x4".
3. A close-up, print size approx 6x4".
4. An orchidaceous landscape, print size 10x7".
5. A single orchid plant, print size approx 10x7".
6. A close-up, print size approx 10x7".
7. An orchidaceous landscape, 35mm colour slide.
8. A single orchid plant, 35mm colour slide.
9. A close-up, 35mm colour slide.

NOTES

- a) Judging will be based on the quality of the pictures, not the rarity of the plants.
- b) Plants may be wild or cultivated, though only 'hardy' plants are acceptable.
- c) Advance entry is not required, but all entries must be staged by 9.45am so that judging can be completed before the meeting.
- d) Prints must be unmounted, so that we can insert them in plastic pouches for protection when on display.
- e) You may enter up to 3 prints in each of classes 1 to 6 but may receive only one award per class.
- f) Prints entered last year are not permitted, but if you bring them along we could display them.
- g) You may enter only one slide in each of classes 7 to 9.
- h) Slides should be labelled with your name (you do want them back don't you?) and with an alignment dot on the bottom left corner of the mount (when viewed the right way up). Any standard mount should be acceptable.
- i) Once again, there are no prizes! - just the honour and glory (and a mention in the newsletter if you are lucky) - unless anyone would like to donate a trophy?!

NOTES FOR YOU DIARY

On Saturday 27th March 1999 the Society is staging a display to publicize ourselves! This will be at the Wiltshire Orchid Society Show in Devizes, Wilts. Anyone able to bring along plants to use in the display or if anyone is able to offer general help, please contact Ian Robertson or a member of the committee.

A reminder again that the HOS AGM is on SUNDAY May 9th 1999 at Pershore & Hindlip College, Pershore.

SEED AND FUNGUS BANK

At the time of going to print not all *Dactylorhiza* seed had been sent in, so we were unable to send out the seed and fungus list with the newsletter (unlike last year). Therefore to obtain your list please send a SAE to Mr. Adrian Blundell, 30 Crowmere Road, Shrewsbury, Shropshire SY 2 5HX. Please mark your envelope "HOS Seed list". Much less seed has so far been sent in to the Bank so if you still have fresh seed please send it in ASAP.

SECOND HARDY ORCHID SOCIETY OVERSEAS FIELD TRIP

by Trevor Marks with illustrations by Sarah Marks

Following the success of the first HOS trip to Cyprus in 1997, we assembled at Heathrow Airport on 31 March 1998, waiting to see if Paul Davies could provide us with a trip to rival that of the previous year. Things didn't start too well with a "wildcat" baggage handlers strike delaying our progress by a couple of hours in Athens, and we landed at Chania airport rather weary to find continuous heavy rain. A short taxi ride brought us to our first hotel, the Doma, on the waterfront in Chania, where we were grateful to find our rooms ready for us, the owner of the hotel had waited up to greet us.

Day 1

We got up and ventured to the breakfast room on the third floor, which provided us with magnificent views across the bay and over to the old town area of Chania with its venetian fortifications. The view from the bedroom balconies were nearly as impressive, across Chania to the snow-capped White Mountains. Freshly squeezed orange juice lifted our spirits still further. However by the time we reached our minibus, the rain had returned, albeit light. We ventured onto the Akrotiri peninsula and made our way to the Katholiko Monastery where we disembarked and climbed into waterproofs and walked down the side of a valley towards the sea. One of the first plants we came across was *Tulipa cretica* looking very bedraggled in the rain. It wasn't long before our first orchids were found, *Ophrys sicula* and *Op. fusca*. A sharp descent left us overlooking old monastic buildings and hermitages. During the return trek to the vehicle we found *Ophrys iricolor* in its splendour. However, during the morning the orchids took second

place as in the skies above we counted over a dozen Bonelli's eagles drifting overhead, ably identified by the ornithologists in the party, Steve and Linda. We also had views of Marsh Harrier and a Montagu's Harrier loping by over our heads. We saw a great variety of birds, including eagles and vultures, and many of our stops were graced with the presence of large birds of prey overhead.

Driving back from the monastery, Paul stopped by the side of the road, and we found Op. tenthredinifera, and Op. spruneri growing together with large patches of Orchis quadripunctata, O. papilionacea and our first O. pauciflora. By this time the rain had eased off and the cameras were out in earnest.

We then drove to the most westerly peninsula in the north of Crete, Gramvousa, where we parked by the ancient settlement of Phalasarua, in dramatic scenery. Although orchids were not frequent, the scent of the Spanish Broom Spartium junceum, was worth the trip alone. We made our way back to the hotel well satisfied with our first day. Our hotel was extremely interesting, being the former British Consulate building in Chania, and was full of reminders of its former use. We walked to a taverna in Chania's Old Quarter, where an excellent meal was followed by our introduction to raki, a spirit distilled from fermentations of the grape skins following wine making. A bottle of this spirit was provided free at the end of our meal (and several other times during our trip), and certainly left one with a warm glow at the end of the day. The hospitality of the Cretans was remarkable throughout our trip.



Cretan Scenery

Day 2

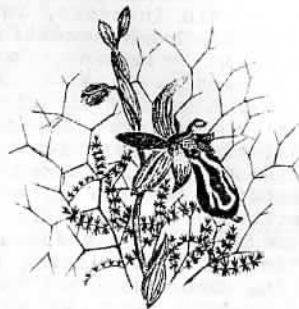
Paul's original plan to visit the Omalos plateau were thwarted by recent falls of snow, so instead we travelled south, past

glorious views of the White Mountains to the south coast. This involved driving into the mountains and across Askifou plateau, a remarkable area of cultivated land at about 750 metres above sea level. Unlike the previous day, today was sunny, indeed we never saw rain again, the weather warming each day. A number of botanising stops were made to view flower filled meadows, with some orchid interest, including our first Barlia robertiana in wonderful fresh condition. In the mountains we had our first sight of vultures, with Lammergeiers floating seemingly effortlessly. We also saw Golden Eagle soaring above mountain ridges. A series of hairpin bends brought us down to the south coast, where we stopped for lunch, one of Paul's specials consisting of tyropita (cheese pasties - a Greek speciality and delicious), fresh baked bread, feta cheese and wonderful fresh tomatoes. At this site we saw our first Cretan Ebony Ebenus creticus, as well as Crag Martins wheeling in front of impressive rock faces, and Lesser Kestrel. After lunch another series of hair-raising hairpins took us back into the hills. During the climb, we had wonderful views of Blue Rock Thrush and Crested Lark. We passed through Anopoli, where we saw our first dark blue lupins Lupinus albus. We were later to see this in huge drifts, in both the dark and light blue forms. A short drive (and a crossing of a very interesting bridge with a road surface of wooden slabs about the same size and shape of railway sleepers) brought us to a small deserted village where we parked. A Hoopoe displayed in a tree in front of us. We walked through the village, past banks of Arum creticum, sadly not yet in flower, and Dracunculus vulgaris, which was never far away when we were botanising. We then dropped down into a gorge by way of a steep donkey path. The gorge itself was full of interest, with the first flowers of Cyclamen creticum enjoying the cooler shady conditions at the bottom of the gorge. Also struggling to flower on the gorge floor was Op. lutea. We climbed up the other side of the gorge by another donkey path, and found patches of Orchis quadripunctata and Ophrys fusca.

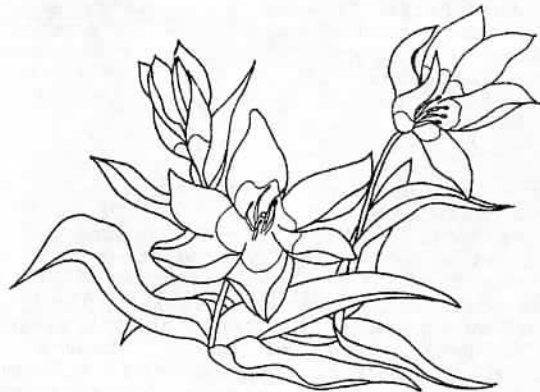
Day 3

Our final breakfast at the Doma was crowned by views of little egrets fishing in the bay below. We drove down the coast road to Rethimno, where we turned inland before dropping into the Imbros valley. Our first stop of the day brought us our first Orchis italica and our first iris Iris cretensis, both on a steep, thorn covered hillside, which had orchids aplenty. One feature of these hillsides were the asphodels flowering in profusion and the heavenly scent of thyme, whenever feet trampled upon it. After passing through the village of Gerakari, we headed towards Spili across Gious-Kambos, a mountain plateau about 700-800 metres above sea level which is still subject to primitive agricultural techniques.

Our lunch stop at the edge of this plateau brought us more orchids including the endemic gem Ophrys cretica, our first Orchis lactea and Aceras anthropophorum. Our second iris was spotted, the Widow Iris, Hermodactylus tuberosus, with it's attractive green and black flower. Wandering through small ploughed fields with flowering anemones showed acres of leaves of Tulipa doeferi, a triploid tulip and sterile, propagated by division of the bulbs. Some buds were showing colour, giving hope of seeing the flower later in the week. Examining the far bank of a stream that runs across the plateau showed drifts of Widow Iris - but how to get to it? A fallen tree trunk gave us access to the other bank, Famous Five style. The drifts of Widow Iris were impressive, as was examination of an uncultivated rocky outcrop, many of which occurred across the plateau, escaping the attentions of the plough. Large clumps of O. pauciflora were found, together with Ophrys of the lutea and fusca groups. Also found were the wonderful Op. heldreichii and Op. episcopalis. In addition were banks of Daphne sericea, with a pink flower and heavenly scent. However probably the most impressive find of the day were drifts of Tulipa saxatilis with glorious pink and yellow flowers.



Ophrys cretica and
Sarcopoterium spinosum



Tulipa
saxatilis

On leaving Gious-Kambos we dropped through Spili, and through the impressive Kourtaliotiko gorge to our second hotel, the Alianthos, at the beach at Plakias, to watch the sunset over Akrotiri Stavros.

Day 4

Day 4 saw us pass through Spili, before turning down a side road to find what is believed to be the only clump of Op. speculum in Crete. This still had fresh flowers open, but there were no more to come, so we had only just made it in time. Another minor road saw us examining the area around a dried up stream bed, with a wide variety of orchid species, including Op. heldreichii, Op. episcopalis and Op. iricolor. It also provided our first sight of O. saccata and the even more attractive Op. cretica var rosea. We also had an encounter with a singing shepherd, called Alex (who spoke no English, and we no Greek, as Paul had disappeared photographing), who posed on his donkey for us before continuing on his way.

Nothing, however, had prepared us for the richness of the site a kilometre or so away where we stopped for lunch. We were all stunned by the richness and variety of orchids and other plants on the hillside. O. pauciflora was found in yellow drifts "like cowslips in England", O. italica in impressive stands, and orchids everywhere under foot. This site has been described as one of the richest in the Mediterranean, and it would be hard to disagree with that description. Here we encountered probably the most unusual plant of the trip Aristolochia cretica, somewhat similar to a pitcher plant with it's water filled modified leaves. Behind us, we could hear the distant roar of a waterfall, probably some 150 feet high, resulting from the melting of the snowcaps in the mountains. Further down the road we found hillsides smothered with the wild lupin, in both dark and light blue forms.

We moved to Agios Galini to visit a recommended valley site, however impending development work, with associated scrub removal had affected the site, although we still found Op. cretensis in full flower, together with a single example of Fritillaria messanensis, with it's attractive green and purple flower. We returned to Plakias to contemplate a wonderful day on the Cretan hillsides.

Day 5

Culture day. We left Plakias and set off for the Minoan palace of Agia Triada. This small palace was believed to be used in the summer months. Set on a low hill, surrounded by a horseshoe of higher peaks, it commanded wonderful views over the Messara plain. The countryside around the palace was full of wild flowers, including Ranunculus asiaticus, Gladiolus byzantinus, Chrysanthemum coronaria, Anemone coronaria and Anemone heldreichii. A splendid patchwork of whites, pinks, reds and yellows surrounded us as we ate lunch.

After lunch we moved on to Phaestos, a larger Minoan palace with impressive remains. The site was almost deserted except when coaches descended to disgorge their human loads. From the palace we moved to a hillside which Paul had visited on his first visit to Crete many years ago. He told us he had seen Orchis simia there, but that it might not be there now. He need not have worried. It was growing in profusion through the scrub on the sides of the hill. On the same hillside, we found Op.

gortynia and also Neotinea maculata hiding under some low scrub.

Day 6

Our last full day on Crete. We returned to Gious-Kambos for the whole day. The first of the Tulipa doefleri were now in flower, and we found one field just starting to blush red under it's influence. Close by, alongside a burbling brook were extensive patches of Narcissus tazetta still in flower. In many of the damp patches, swathes of small white flowers of Romulea bulbocodium proved photogenic. Amongst the "new" orchid finds were O. tridentata and the vivid purple O. boryi. The O. boryi was found in areas we had searched only three days earlier, when it had not been evident. One feature of the trip was the speed at which species were either coming into flower or going over. Again, birds of prey were much in evidence, together with Black Eared Wheatear and the ubiquitous Stonechat. The day was rounded off by finding a spring with surrounding wet ground where we found several tree frogs, some of which proved amenable to photography.

Overall the trip presented just a small vista of Crete, each day seeming to yield new discoveries. Some of the abiding memories will be Paul's ability to take parties to excellent sites and "sniff out" the botanical interest, the excellent company of the party, the breath-taking rugged scenery of Crete and the wonderful hospitality of the Cretan people. We didn't have a single meal without being given free drinks, either of raki or the local beer, which proved to be exceptionally drinkable.

Total Orchid list included 35 species. Bird list included over 60 species.

CULTIVATION OF MEDITERRANEAN ORCHIDS

Richard Manuel

Part 3 - Plant Management

Although it sounds horribly formal, managing your plants is the most enjoyable part of orchid growing. Put another way it means pottering around, handling them, gloating over each new leaf or flower spike, and generally giving them the care and attention such aristocratic plants deserve. And if you don't enjoy doing this why grow orchids?

These winter growth-cycle orchids should be repotted as dormant tubers into fresh compost in autumn, by which time there ought to be a new green bud at the top end. When to begin watering is a subject of some controversy. I prefer to wait until the bud shows above the surface thus proclaiming that root growth has started down below, before giving any

water, and then only lightly at first. Others prefer to keep the soil moist from potting time onwards, but why risk rotting the tuber before it is in growth? It has no roots to start with and thus no need of water. The tuber, whatever its size, should be at least 1 - 1.5" below the surface (or, if larger, at least its own length) as the roots emerge from the base of the bud above the tuber and can suffer from drying out if their cover is too shallow.

Some growers swear by clay pots, others by plastic, both work well. Clays dry out more quickly than plastics, and are more suitable for plunging in sand, but do take up much more space. I would recommend beginners to use a clay pot to start with as overwatering is less likely to cause damage to the plants, but conversely, plants will not appreciate drying right out either, they may die! These plants should not be underpotted like tropical orchids. A single flowering size Ophrys tuber, for example, needs no less than a 4" round pot; larger plants pro rata, and big things like Barlia, Himantoglossum or some of the Orchis militaris group need long root runs and a 6" - 8" very deep pot is advisable.

In autumn, once the bud is visible above ground these plants like nothing better than being out in the open, in the sun and rain, where the leaf rosette develops with satisfying speed. But once there is a risk of damaging frosts they should be moved to their winter quarters (greenhouse, frame etc). As I have said before, Mediterranean orchids are nearly all hardy to a degree, but if they freeze in their pots they will be damaged or killed, and anyway they grow on much more steadily if placed under cover at this time. Like you and me they don't like frost but can tolerate it in moderation. Very few other plants, even alpines, are actually in growth in the winter and few of these can stand being frozen solid without damage (Cyclamen coum springs to mind here). Most 'fully hardy' plants are dormant in the winter.

In the depths of winter growth slows and watering should be kept to a minimum - the soil should just be damp - but increased once temperatures increase and things start to happen. Be careful not to let them dry out completely during long periods of frost, which can happen very easily with fatal consequences. I like to water with a back-pack type of sprayer with a fine spray lance, this allows the surface of the compost to be sprayed but not the leaves. If water sits in the crown in cold weather there is a danger of rot, but it is easily removed by blowing into the crown with a drinking straw. This may sound unduly pernickitty, but it does help to avoid crown rot!

Water quality is important and if your tap water is heavily chlorinated or very hard then rain water may be the best option. In desperate times of drought tap water that has stood for several days will have to do. But droughts usually come in the summer when the orchids don't need much water anyway! By the way, does anyone know what effect fluoride might have?

When the plants start to grow again seriously in the early spring a moderate amount of shade should be given - 50% shade cloth is about right. Ventilation should also be at a maximum

now, leaving all vents and doors open is good but you must be sure that animals, pets or otherwise, are excluded. Unfortunately little can be done to keep out aphids, a particular menace that is an unfortunate consequence of the recent mild winters. These little bugs love to get under those leaves that lie flat on the surface, and breed there, so a careful regular inspection is necessary to prevent them increasing faster than rabbits. Spraying with insecticidal soap or pyrethroids doesn't seem to harm the orchids, and when it is warm biological controls can be used.

Watering should stop when the leaves start to yellow and wither, usually soon after flowering, and the pots should be allowed to dry out gently - DON'T leave them in hot sun or drying winds. The notion that Mediterranean orchids need to be baked by the sun is mere fallacy. If this were necessary then the tubers would form at soil surface, just like those bulbs that do like to be cooked through the summer. Once the soil has dried out it is worth checking the tubers for any decay, and counting them! Well grown mature plants often make a supplementary tuber next to the main new one. Store the tubers dry in some of their old soil, with the label of course, in a cool dry place until repotting them in the autumn.

Young seedlings do not require different treatment from adults, but they may be later in coming into growth. They certainly seem to benefit from being potted into little groups rather than singly, and once flowering size is reached a clump is even more attractive than a single plant.

You may wish to pollinate your plants to obtain seed. This is praiseworthy and a useful way of helping to perpetuate them - and the HOS seed bank will be most appreciative. But don't overload the plants with pods, particularly *Ophrys*, which make large capsules in relation to the plants size. The production of flowers and then pods uses all the remaining goodies stored in the old tuber, and if this is used up before the pods are ripe the new tuber becomes depleted and the plant weakened. I am convinced that this is the reason that Bee orchids *Ophrys apifera* in this country are often monocarpic - that is, they die after flowering - because, being freely self-pollinating, they often set one pod for each flower - far more than the tuber can possibly support. One pod per *Ophrys* gives enough seed for anyone, two or three per *Orchis* (which make smaller pods) gives the option of sowing an unripe (green) pod and still keeping one or two to ripen naturally.

So to sum up the requirements of these wonderful plants. Give them lots of light, fresh air and water when in active growth from autumn to spring. Be very cautious in cold weather, and allow them a cool dry dormancy in the summer. Don't forget that orchids have the same basic requirements as most other plants, even though they are just that bit more special.

A LAYMAN'S INTERPRETATION OF GENE SEQUENCING

Tony Hughes

The high point of the April '97 HOS meeting at Pershore was undoubtedly Richard Bateman's talk. This provided a preview of some very exciting recent work that he and his colleagues have done on the evolution of some of our hardy orchids, as indicated from the results of 'gene sequencing' experiments. The interpretation of these results, in terms of the naming and classification of terrestrial orchids, will cause ripples for a long time to come. It was also good to read Bill Temple's summary of this talk in the June '97 edition of the HOS Newsletter. The first two instalments of this work have now been formally published (Lindleyana, vol. 12, pp. 89-109, June 1997 and pp. 113-141, Sept. 1997), and Richard has kindly provided me with reprints, so more leisurely consideration of the work is possible. Richard admits that much of the first paper is somewhat impenetrable to the layman, and I (as a devout laymen) cannot disagree! However, after many re-readings, I believe I have some grasp of the interpretation of the results, though I have to leave any discussion of the experimental and statistical techniques used to others. The first paper deals mainly with the experimental details and the interpretation of results at the generic level, while the second paper looks in more detail at relationships within genera.

The essence of the work is a detailed study of a very small section of the chromosomes. Sophisticated analysis techniques are used to reveal the details of the genetic code in the chosen region, expressed as 'base pair sequences'. These are denoted in terms of permutations of the letters A, C, T and G which represent the chemical building units of all genetic material. These sequences, which for the region studied are some 675 units long, are fundamentally similar for all orchids, but contain subtle differences. The differences are the result of genetic mutations that have occurred spontaneously throughout the evolution of the various species. The clever bit is to identify the extent to which these changes are unique to an individual species, shared by a small group of closely related species, or common to a larger group.

Painstaking analysis can then deduce the time sequence in which the mutations must have occurred, and a sort of 'family tree' can be built up. Each branching point in this tree indicates one or more divergent mutations, with each node representing a hypothetical ancestor shared by all subsequent twigs of that branch. Sophisticated statistical analysis is then applied to

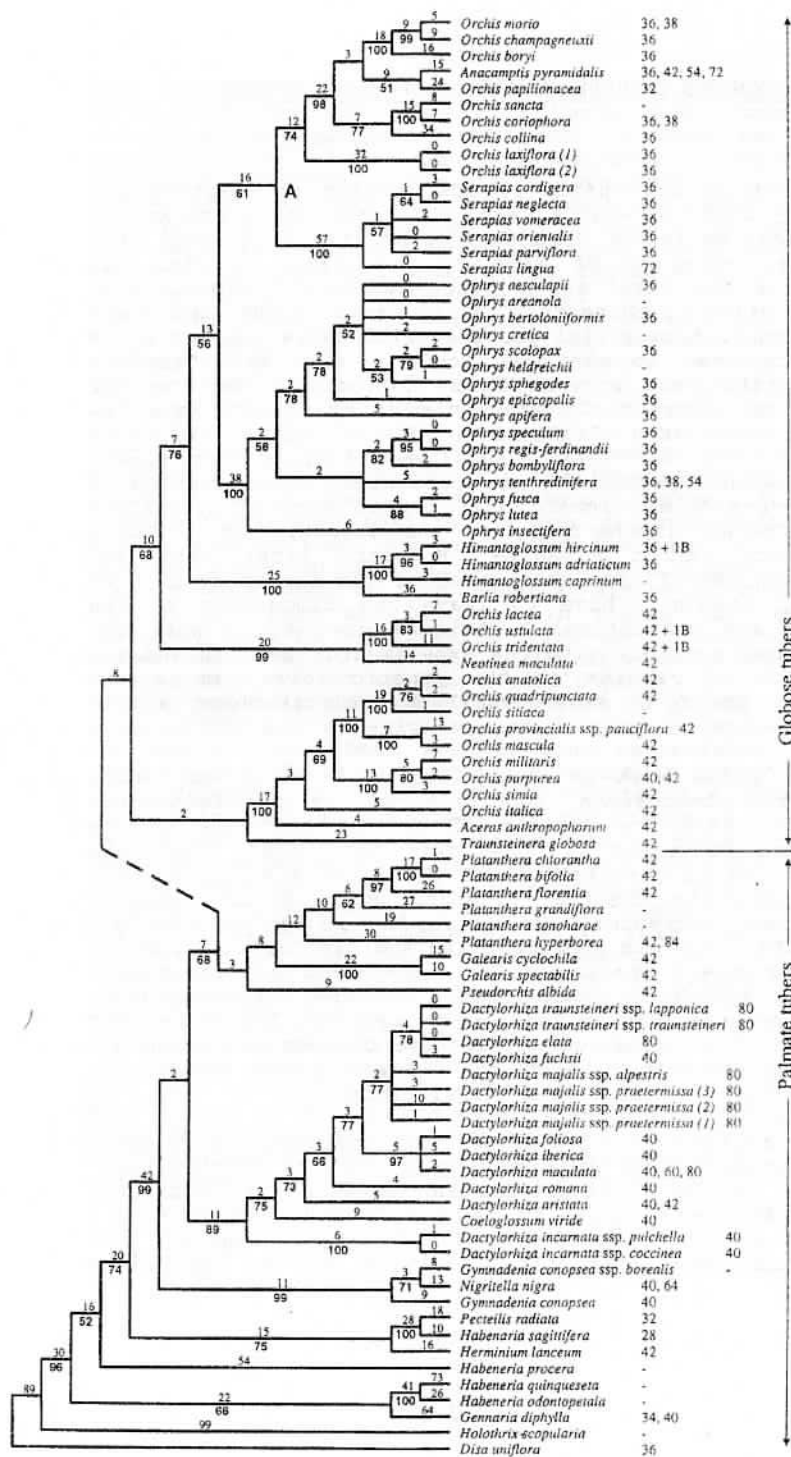


Figure Caption: One of the 'Evolutionary Trees' derived from gene sequence data. Re-drawn from Reference 1, with chromosome counts included. See text for details.

refine these trees, and to ascertain the confidence with which each branching event is supported by the underlying sequence data. The diagram is reproduced from Richard's first paper (presented there as Fig. 1 and Fig. 2), with the total number of chromosomes for each species added. Above each horizontal line in the figure is a number representing the count of base pair differences relating to the branching event immediately to the left. The figure beneath the line represents the confidence (as a percentage) with which that branch is supported by the data. When 'confidence' was less than 50%, the lower figure was omitted from the original paper. Clearly, there are considerable uncertainties remaining, and slightly different diagrams can result from modifications to the analysis and statistical methods. However, such variations are only minor.

Now the fun of interpretation begins! The obvious first question is: to what extent can I believe that this diagram really represents what happened in evolution? My own opinion is that, unless one could identify some fundamental flaw in the experimental methods (and this is most unlikely, since the general approach used is now the accepted basis for many huge investigations around the world), the general structure of this tree is very well supported. However, one might expect that more comprehensive sequencing of other parts of the chromosomes might enable some of the branching events to be revised or established with greater confidence, and the inclusion of further species may add more detail, but the broad picture is probably very close to what actually occurred.

So, having accepted the picture, what can one make of it in terms of the today's 'snap-shot' of the evolution of orchids? Thanks to Linnaeus, we divide and group what we see into 'Genera' and 'Species'. We must remember, however, that this is a totally artificial approach, invented largely for our convenience. If we believe in the continuity of evolutionary processes, there will always be discussion over where boundaries between genera, species, sub-species and varieties should be placed. Furthermore, the way we classify organisms today will not be appropriate after further evolution in a million years.

The excellent news from this new work is that many of our existing beliefs are confirmed. For example, all *Ophrys* species are grouped together, as are the *Serapias*, showing that classifications based on macroscopic shape and structure are in these cases fully supported by the sub-microscopic genetic data. It is good, too, to see that all the plants with globose tubers are well separated from those with more-or-less palmate tubers. Furthermore, the chromosome counts (not something you

can check on a field trip!) are well correlated with the genetic tree.

But, beside the comfort of the confirmation of long-held beliefs, there are also significant new insights. Perhaps the most startling result is that the genus Orchis is clearly split into three distinct groups in the evolutionary tree. In the diagram, the topmost group, referred to as the O. morio group, is well separated from the two lower groups, referred to as the O. ustulata and O. militaris groups respectively. Note also that Anacamptis pyramidalis appears in the middle of the O. morio group, Neotinea maculata is closely associated with the O. ustulata group, and Aceras anthropophorum lies alongside the O. militaris group. Moving away from Orchis, Barlia robertiana is close to Himantoglossum, which is perhaps not surprising, since Barlia has been placed within Himantoglossum by some authorities. Further down we see that Coeloglossum viride is surrounded by Dactylorhizas, and Nigritella nigra by Gymnadenias.

The suggested revisions of Richard and his co-workers are as follows:-

- the Orchis morio group should be re-named 'Anacamptis', and include the existing Anacamptis pyramidalis;
- the Orchis ustulata group should be re-named 'Neotinea', and include the existing Neotinea maculata;
- the Orchis militaris group should retain the name 'Orchis', and absorb Aceras anthropophorum;
- Coeloglossum viride should be included in Dactylorhiza;
- Nigritella should be put back into Gymnadenia (where it once was placed).

These suggestions do not arise just from looking at the branching of the evolutionary tree, but are supported by a detailed review of many of the macroscopic considerations that conventionally have been used to aid classification. Support for the division between species with 'palmate' tubers and those with 'globose' tubers has already been mentioned. Furthermore, the chromosome counts strongly support the separation of the Orchis morio group (mostly with 36 chromosomes) from the other Orchis groups (mostly with 42 chromosomes). However, Richard points out that not all the chromosome counts in the literature are reliable, so some of the apparently anomalous values shown in the figure may in fact be incorrect.

The chemical study of floral pigments has been used by some to attempt to deduce taxonomic relations. However, the careful review of data presented in these papers indicates that the seven or so pigment types detected in this range of orchids are all present to greater or lesser extent in most species. Perhaps not surprisingly, they may vary considerably in concentration within individual flowers and between different specimens of the same species. Consequently, although pigment data are relevant, they must be interpreted with great care.

Finally, hybridisation between genera is considered. This is not an easy topic, since there is often uncertainty of the parentage of particular hybrid specimens. However, the above proposed re-classification results in several reported hybrids between the old-style genera now being viewed as hybrids within a new genus, e.g. hybrids between Aceras anthropophorum and members of the Orchis militaris group. This is good, because one might reasonably expect hybrids between genera to be far less likely than those within a genus.

Well, so much for a general summary of the papers. The real question is - can we believe it all? I have to admit that I don't like having to learn new names for plants, so I relish the role of 'Devil's advocate'! This rapidly led to the question - how does a new genus evolve? Looking at the left hand side of evolutionary tree one can see that, a long time ago, a single hypothetical species existed from which all the genera and species listed at the right have evolved. Some of the earlier mutations, those towards the left of the tree, clearly gave rise to branches in the tree from which distinct genera have evolved. For example, the node labelled 'A' in the figure marks the separation of Serapias from the O. morio group. Conversely, the more recent branching events towards the right have usually given rise to the separation of species within a genus. Two main questions then arise. Is there any mechanism whereby a branching event near the right could have produced separate genera? How do we decide whether branches towards the middle should be seen as separating species or genera?

It must be remembered that this analysis has looked at only an infinitesimal section of the total length of the chromosomes. However, the structural features of plants that have been used traditionally to separate genera and species are generated from the coding information held on a much larger proportion of the chromosomes. It is quite conceivable that highly significant changes could have occurred at any time in other parts of the chromosomes, while only minor changes have occurred in the regions analysed here. Consequently, the counts of base-pair

differences given in the figure do not necessarily represent the magnitude of the total evolutionary changes that have occurred on a particular branch. An extreme example of this comes from comparing Himantoglossum adriaticum with Neotinea maculata. The count of base pair differences between these two species is quite unremarkable, totalling 86, whereas N. maculata has managed to acquire four extra chromosomes. A more controversial example is Anacamptis pyramidalis, which appears deeply embedded in the Orchis morio group; the current gene sequence data can give no clue as to whether sufficient changes might have occurred elsewhere in the chromosomes for Anacamptis to be regarded as a distinct genus. I can see no reason in principle why a new genus should not evolve from any point in an evolutionary tree.

So how should we decide where one genus ends and another one begins? At present, I am not aware that either the structure of an evolutionary tree or the counts of associated base-pair differences provide conclusive criteria for identifying inter-generic boundaries. The difficulty of interpreting counts of base pair differences can be illustrated by considering two pairs of species. On the one hand, the count of base pair differences between Dactylorhiza incarnata and Pseudorchis albida, representatives of two distinct genera, is only 36. On the other hand, the count of base pair differences between Orchis collina and O. laxiflora, two members of the same genus (the proposed Anacamptis genus), is over 2.5 times greater at 95. Thus one cannot identify an intergeneric boundary merely by counting base pair differences. Consequently, the traditional methods of analysis of morphological and other data must still be used. Indeed, one might argue that all the features which have been proposed in the past to separate particular genera should still be relevant. The great advantage provided by the gene sequence data is that we now have an evolutionary picture against which to test any proposals.

On this basis, and since the botanical world is populated with 'splitters' and 'lumpers', there is still scope for plenty of discussion. On the one hand, the gene sequence data give excellent support to the arguments for separating Orchis into three genera, and it would be very difficult to dispute that recommendation. On the other hand, the arguments for including Aceras in the O. militaris group, Neotinea in the O. ustulata group, or even Barlia in Himantoglossum (not suggested by Richard Bateman et al.) are less clear cut, because of their comparatively early divergence from their closest relatives. However, one would have to be rather perverse to argue that Anacamptis and Coeloglossum are recently evolved new genera, because of the way they appear to have evolved in the middle of the Orchis and Dactylorhiza branches respectively. The

Gymnadenia/Nigritella issue seems less obvious, partly because of the small number of species so far analysed, and partly because of the rather low confidence in the gene sequence differences. In all cases, a thorough evaluation is required of the observations that caused our predecessors to regard them as separate genera, weighed against the criteria that are traditionally used to define inter-generic boundaries. The advantage we have now is that the evolutionary tree constrains the necessary comparisons; for example, we need to compare Coeloglossum only with Dactylorhiza, and Neotinea only with the O. ustulata group. The necessary comparisons can include not only morphological features but also the results of microscopic examination of the sizes and symmetries of the chromosomes. A further collection of data on hybrids could be of interest, where the frequency of occurrence of a particular hybrid may be viewed as a crude indicator of the genetic similarity of the parents. For a hybrid to occur regularly, however, several conditions must be met. Not only must there be compatibility between chromosomes, but the parents' geographical distributions and flowering times must overlap, and they must share (at least occasionally) a common pollinator.

Let us revisit the more obvious macroscopic features that have contributed previously to the justification of generic boundaries:

- Coeloglossum viride has a very short, almost hemispherical spur, its lateral sepals form part of the 'hood' and its floral pigments produce green and brown colours, whereas Dactylorhizas have long, cylindrical or conical spurs, spreading lateral sepals, and purple, pink or occasionally yellow flower colours.
- The Nigritella species all have a non-twisted ovary so that the lip, which has a single lobe, appears as the topmost petal, whereas Gymnadenia species have ovaries with a standard 180° twist, and have three-lobed lips.
- Aceras has no spur and has green and brown floral pigments, whereas the members of the Orchis militaris group all have significant spurs and pink or purple flowers.
- Anacamptis has several features that relate to its adaptation to pollination by butterflies and moths. These include a very long, down-curved spur, a pair of protuberances near the base of the lip, and the two pollinia attached to a single lump of glue - features that none of the O. morio group possess.

So the question remains - are these characteristics (and any others that may be relevant) sufficiently significant to

justify leaving Coeloglossum, Nigritella, Aceras or Anacamptis as separate genera?

At this point, I must duck out of the arguments, having neither the knowledge nor the courage to recommend any particular resolution. From my position on the fence, I shall eagerly watch the ensuing debate. One thing is certain - the gene sequence data are the result of a superbly conceived and executed piece of work that greatly clarifies the evolutionary affinities between orchids. However, the placing of inter-generic boundaries will remain a topic for intense discussion for a very long time, probably until there are even more mutations to contend with! And we can always hope that, when the genera have been circumscribed, techniques will have been further refined to help define the boundaries between species. And then will someone please develop a cheap, pocket-sized, gene sequencing kit to help the confused field botanist?!

Acknowledgment: Thanks are due to Richard Bateman and Alec Pridgeon for allowing this plagiarism, and for providing many helpful comments.

References:

Pridgeon, A. M., R. M. Bateman, A. V. Cox, J. R. Hapeman, and M. W. Chase. 1997. Phylogenetics of subtribe Orchidinae (Orchidoideae, Orchidaceae) based on nuclear ITS sequences.

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CULTIVATION OF CYPRIPEDIUMS - part 5

This concludes our series by Peter White

Cypripedium kentuckiense Kentucky Lady's Slipper
This is a fairly recently described species and is the most southerly of the North American Cypripediums. It is closely related to Cyp. parviflorum and its allies, but is larger in stature and the flowers are also larger. The lip varies in colour from pale yellow through to white, the petals and sepals are corkscrewed but are usually longer than in Cyp. parviflorum.

Cyp. kentuckiense is very easy to cater for and is probably the easiest of all Cypripediums to grow. Being a more southerly species it does have a longer growing period and enjoys warm shady conditions - although good light will encourage it to grow faster. Greenhouse culture would suit it well and unlike some species which resent disturbance, annual repotting, although not strictly necessary, is certainly not a problem as it does seem to relish being moved.

Compost can be totally inorganic and can comprise of pure coarse sand or grit although I find that half and half of sand/grit (or Seramis) and leafmould is a good compromise - either way feeding is a necessity. Abundant water is also a requirement during the growing season - this is borne out by their habit in nature of always growing near to running water where they no doubt get submerged in flood water every now and then.

I remember, several years ago, being told of a group of Cyp. kentuckiense that were thought to be lost when the bank of the stream where they were growing was washed away during winter storms, the following year they reappeared several hundred yards downstream where they had been deposited by the flood waters.

Cypripedium macranthum Large flowered Lady's Slipper

Another problem plant that is prone to rotting of the underground parts and should be given the same treatment and conditions as Cyp. cordigerum. It can be difficult to establish when first imported but quite often this is due to very small, poorly rooted pieces of rhizome which in most cases do not have enough reserves to carry the plant through the subsequent growing season. This also applies, perhaps to a lesser extent to all the species of Cypripedium, it appears that the current trend by some greedy traders is to cut as many new plants from a rhizome as possible with no thought or care whether the plants will survive or not once they have sold them on. I purchased several rhizomes recently of which two of them were slightly less than 1" long, as these plants had been in the country for several months and the cuts looked fresh it was obvious that this was not done by the exporter - who incidentally, usually gets the blame for this anyway. This type of thing does not give the plants much chance of survival and

in particular with Cyp. macranthum as it does seem to resent being divided, nor does it enhance the reputation of these traders.

Once established, Cyp. macranthum will thrive and multiply well under good cultivation techniques but as with other Asian species they are susceptible to rot of the buds etc. if subjected to excess moisture, particularly during the winter dormancy. The two-tier technique as mentioned under Cyp. cordigerum and described earlier is ideal for this species and was in fact perfected with this, and a couple of other species in mind, when in the early years many plants were lost due to rotting of the underground parts.

A variable species with a widespread distribution from Russia, across China to Japan, colours can vary from pure white through various shades of pink to deep purple. There is also a yellow variety, once thought to be a separate species in its own right.

Varieties and natural hybrids:

Cyp. macranthum var. hotei-atsumorianum

A very deep, solid, purple-red form.

Cyp. macranthum var rebunense

A Japanese population of pure yellow flowers, when available on rare occasions this variety usually goes under the name of Cyp. rebunense.

Cypridium x barbeyi

A natural hybrid between Cyp. calceolus and Cyp. macranthum.

Cypridium margaritaceum

An easily recognisable Cypridium, even when not in flower, with its pair of prostrate leaves that closely hug the ground and are spotted with blackish-purple spots. This species has an unusual flower which nestles on a short stalk between the leaves with the petals clasping the forward pointing lip on both sides. The lip has a very small mouth and has a base colour of yellow with maroon spotting, the sepal likewise is yellow with heavy spotting in maroon.

Although now becoming more available, not a lot is known about its cultivation in the UK. We have to investigate its habits in the wild and try to draw some conclusions. It is a montane species found in the south-western Chinese provinces of Yunnan and Sichuan, where it grows in partial shade amongst rocks in pine or mixed pine woods, at altitudes between 8,000 and 12,500 feet. This corner of China has a considerable rainfall and is very humid for most of the year.

So, we have a cool growing plant that requires moist but well drained compost with a pH of 7.0 or below, which would ideally contain pine duff or oak leafmould with an annual topping of pine needles. Fairly high humidity would be in order along with good air movement. This may not be perfect but it is certainly a good starting point.

The two-tier system may also be utilised for Cyp. margaritaceum with some modification. It may also benefit from a cool root system, particularly if kept in a greenhouse.

Cypridium montanum

The very specific natural habitat of high elevations in the cool montane region of North America make it imperative that this species is kept cool and shaded during the summer months, as with Cyp. arietnum. This species therefore benefits from a cool root system.

This is another species which is highly sensitive to excessive moisture around the roots and does not enjoy continual damp conditions, particularly during the winter dormancy period when the pot should be allowed to almost dry out. Perfect drainage is a must for this species and the cultural conditions laid down earlier for Cyp. cordigerum would be ideally suited to Cyp. montanum in all respects. This species does perhaps enjoy a little more sun than most of the others in this genus and in return will usually produce upto 3 flowers per stem.

An annual sprinkling of lime will be beneficial for this species.

Cypridium parviflorum

Small Yellow Lady's Slipper

Cyp. parviflorum is part of a highly variable complex with an extremely large North American distribution and was once described as a variety of Cyp. calceolus but now appears to have specie status in its own right.

As its common name suggests, it is the smaller of the trio (the other two being Cyp. pubescens and kentuckiense). The plant is identical to Cyp. pubescens both vegetatively and in stature but the flowers are smaller. Cyp. kentuckiense has the larger flowers of the three.

Cultivation of this species is undemanding and it is one of the easiest in the genus to master, as it does not seem to be too fussy concerning the make-up of the potting media. It has perhaps a slight preference for a peat-based compost with, as always, perfect drainage - although it does like to grow slightly drier than its two close relatives. A mix of 6:2:2, coarse grit, peat and beech leafmould with limestone chips added, seems to be well suited to Cyp. parviflorum. An annual top-up of lime will not go amiss especially if it is mixed with leafmould at the rate of 20gms lime to 1 litre of leafmould.

Cypridium parviflorum var makasin

Northern Yellow Lady's Slipper

This is the northern variety of Cyp. parviflorum and is virtually identical to it except that the flowers are smaller and the dark brown of the petals does not cover the entire length of them. It also prefers damper conditions than Cyp. parviflorum so extra peat or leafmould, depending on preference, to the ratio of 5:3:2 or 5:2:3 of coarse grit:peat and leafmould otherwise the cultivation would be as the last species.

Cypridium passerinum

Sparrow's Egg Lady's Slipper

I have never grown this species but mention it here as it has been available in the UK over the last couple of years and I would hope to add it to my collection in the very near future.

It is a cool growing plant which would suggest the need to provide a cool root system as suggested with Cyp. arietnum. From what I can gather it is rather susceptible to rotting of the underground parts so perfect drainage is a must - the techniques described under "Care of Asian Species" and again briefly under Cyp. cordigerum would no doubt benefit this species.

Cypripedium pubescens Large Yellow Lady's Slipper
As with it's smaller flowered relation, this was once described as a variety of Cyp. calceolus but it is now regarded as a variety of it's smaller cousin Cyp. parviflorum.

This is easy to grow and flower and the cultural conditions for Cyp. parviflorum will apply very well although it does prefer it somewhat drier.

Cypripedium reginae Showy Lady's Slipper
This is said to be the showiest of all the Cypripediums, it is certainly the showiest of the North American species and richly deserves the title of Queen Lady's Slipper Orchid, the other common name often bestowed upon it.

With good cultivation Cyp. reginae will very quickly form large clumps with up to 20 or more stems. Cool shaded conditions suit it very well, although it will enjoy a few hours of early morning sun. In it's natural habitat it is usually associated with bogs and is often found growing beside or certainly near to them. So the compost needs to retain a good level of moisture but must certainly not be allowed to become soaking wet. Extra peat in the mix will not go amiss a ratio of 5:3:2 of coarse grit, peat and oak leafmould is a very good starting point, with fine tuning required to suit individual watering regimes. This last point would also go without saying for all compost mixes mentioned throughout the article, as it is unlikely that any two growers will water exactly the same.

Whilst still on the subject of compost and watering, some growers suggest standing the pot in a shallow saucer of water. Having tried this I would certainly not recommend it, and definitely not with the above compost mix. However, Cyp. reginae is very adaptable and can be grown in a variety of composts including those of a solely inorganic nature such as pure grit, Seramis and even Perlite, either by themselves or a mix of each or all. With this type of compost pots can be stood in a saucer of water and Cyp. reginae certainly seems to benefit from this sort of treatment but will of course require regular feeding. Also the pH for this species will need adjusting within the region of 6.7 to 7.0.

Using this method one could always try a 'mini bog' technique. This is a method I have used with tropical orchids with good success, especially with small seedlings and Paphiopedilums, where the moisture content in the pot could be kept even at all times. What is required are pots without holes in the bottom or, holes that are already there being sealed and depending on the depth of the pot, a row of holes will need drilling 1 and

1/2" to 2" up from the bottom. This area then acts as a reservoir that allows moisture to gently work it's way up through the pot as and when needed. I have yet to try this method with Cypripediums, but I see no reason why it should not work with certain species, if not all. It would obviously be advantageous to the busy grower as watering is not required so often, though obviously setting this system up from scratch in the first place would require a lot of work.

Cypripedium speciosum
Another problem plant and very closely related to Cyp. macranthum and I wonder if the present plants being sold under Cyp. m. var speciosum are as advertised or are they this species? I do at the moment have a number of Cyp. macranthum and have recently aquired several of the var. speciosum so it is going to be interesting to compare the two.

I have not grown Cyp. speciosum in recent years and my successes in the past were pretty dismal to say the least as I was never able to keep it alive for more than a year or two. The problems associated with this one were the same as Cyp. cordigerum and macranthum and I suspect should be dealt with accordingly. The same would no doubt apply to general culture.

Cypripedium tibeticum Tibetan Lady's Slipper
As with Cyp. passerinum, I have not grown this species either but add it in here as it is occasionally available in the UK and I hope to aquire a couple of plants later in the year. Cyp. tibeticum, which hails from northern China and the Himalayas is another plant closely related to Cyp. macranthum but is shorter in stature and has a larger lip of dark purple. Cultivation should be as Cyp. macranthum, certainly as a starting point anyway, I think it would also be safe to say that the techniques for avoiding rotting of the underground parts, described under Cyp. cordigerum would also apply to this species.

Cypripedium yatabeanum Yellow Spotted Lady's Slipper
This species was once described as a variety of Cyp. guttatum but now apparently enjoys recognition as a species in it's own right. It is basically an Asian species and is not found on the North American mainland, only on a few offshore islands. It does hybridise with Cyp. guttatum and this hybrid, Cypripedium x alaskum, which can be found both offshore and on the mainland has in the past added to the confusion between these two species.

Cyp. yatabeanum is not only larger in stature with larger leaves than it's close relation, but also bears larger flowers, the base colour being basically yellow overlaid with markings ranging from rust-brown to greenish. It also prefers a much sunnier aspect than Cyp. guttatum, which is basically a woodland species.

Cultivation should be as Cyp. guttatum with special emphasis on the feeding regime where care has to be taken to avoid damage to the root system which is highly sensitive to

fertilisers. Compost can be of 6:2:2 ratio of coarse grit (or Seramis), fine bark and beech leafmould. This species can be quite vigorous with good cultural techniques and problems can occur with pot culture due to the wandering nature of the rhizome over a large area. The best pot would be the large clay half-pots where "potting-on" to a larger pot can be carried out as frequently as necessary with the minimum disturbance to the plant.

Editors note: This concludes Peter's series of articles on *Cypripedium* Care and Culture. I am sure members would agree that they have been very interesting and useful. If anyone has any other ideas and experiences on *Cyp.* growing please write in as they would be very welcome - it is an area where we are all still learning so the more opinions shared the better.

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BOOK REVIEW

Simon Tarrant

Members may be interested in a couple of continental orchid books, one Italian and one French, we acquired on recent trips abroad. They were displayed at the November 1997 meeting at Pershore.

Orchidee spontanee in Trentino-Alto Adige, by Giorgio Perazza, published by Manfrini Editori in 1992, ISBN 88 7024 476 8, price 25,000 lire

Atlas des orchidees sauvages de Haute-Normandie, by Michel Demares, published by the Societe Francaise d'Orchidophilie - Groupement Normandie in 1997, ISBN 2 905734 08 6, price 210FF.

Both books have much in common-

both are studies of the orchids of a specific, administrative area;

both start with accounts of the geology and geography of the region and information about the lifecycle and classification of orchids;

the bulk of both books is given over to a species by species description of the orchids with distribution maps and photographs;

both give dates and approximate locations of the photographs - invaluable indications of local flowering times;

both have comprehensive bibliographies designed to whet the appetite of any biblio-orchidologist!

Perazza covers Trentino-Alto Adige (the province of Trento), an area stretching from Monte Baldo and Lake Garda to Marmolada in the Dolomites. Much of the text is incomprehensible to a non-Italian speaker, and not relieved by illustrations, but the maps indicating numbers of species per 5 and 10 kilometre quadrant are easy enough to follow.

Species are listed more or less alphabetically by scientific

name, with very brief descriptions. The distribution maps appear to err on the side of caution - I am aware of two instances where significant colonies of an orchid are not recorded. The amount of local information on *Dactylorhizas* is an enormous help for those rash enough to try and identify individual plants.

Demares, covering the departments of Eure and Seine-Maritime, is a newer and more lavish production. The early sections covering topography, climate, geology etc. are well illustrated with maps and photographs, which alleviates the language problem. Once we get onto orchids, again we find helpful maps showing number of species per quadrant. I was particularly entertained by the map of France showing numbers of species per department across the whole country.

The main sequence is arranged by genera and is lavishly illustrated, with photographs and sketches intended to help identification, so for example there is a picture of the flowers of *Platanthera bifolia* and *P. chlorantha* clearly showing the different set of the pollinia. Also included are sections on freaks, hybrids and species now extinct in the area. It is a beautiful and informative book going way beyond its basic function as an orchid atlas for Haute Normandie. I have only two criticisms: on a couple of pages in my copy the colours are slightly out of register, and there is so much colour throughout, with artistic background and borders that it sometimes becomes difficult to separate information from wallpaper.

Perazza was purchased at the Nature Reserve at Lago d'Ampola, and Demares was found on the SFO stand at the Journées des Plantes at Courson near Paris.

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LETTERS

CYCLAMEN AND SUPERGLUE

This clipping was sent in by Shirley Pierce about a fellow member! It is taken from "Cyclamen" Vol.22 No.1. June 1998

Peter Revell, who divides his attention between cyclamen and native orchids, was struck by the possible relevance to cyclamen of an item in the "Proceedings of the North American Native Terrestrial Orchid Conference" held at the National Arboretum, Washington on 16 and 17 March 1996.

Carson Whitlow, doyen of the US native orchid movement, was describing the propagation of a tuberous terrestrial orchid by cutting its corm in half, leaving each half with an eye. Instead of sealing the cut surfaces, and planting each half separately (so Mr Whitlow wrote), "to reduce loss through rot, to keep the clones together and reduce planting time and space requirements, I glue the two cut halves back together with SuperGlue and plant them as one". This seems to work.

Peter says this "inventiveness poleaxed me - American ingenuity at its best". It's not clear that the technique would

work with cyclamen. It sounds as if the orchid really is functioning as a corm, producing new corms from the eyes of the old one. The eyes on a cyclamen tuber normally serve instead merely as growing points for flowers and leaves, and not as the points of origin for development of a new tuber - but we'd very much like to hear from anyone who does try the superglue trick. Editors note - Has anyone tried this with orchids? Does it work?

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All contributions (preferably typed) for the newsletter should be sent to the Newsletter secretary at the address printed at the front of the newsletter by the 1st of the month prior to the publication month. The newsletter is published quarterly in January, April, July and October.

Any drawings or illustrations for the newsletter would also be appreciated - though we have not yet progressed to colour I am afraid so line drawings are most applicable. Please note that articles and letters may be shortened for publication and that views expressed in this newsletter do not necessarily reflect the views of the Hardy Orchid Society.

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