The Hardy Orchid Society Newsletter

No.2 October 1996

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INTRODUCTION

Welcome to number 2!

Firstly an apology - to those who received their newsletters late and also to anyone who did not receive a copy at all. In the latter case if you would like a copy please contact the Membership secretary Richard Nicol at 1364 Evesham Road, Astwood Bank, Redditch, Worcs. B96 6BD. We still are not entirely sure why or how people were missed out and can only apologise and put it down to teething problems and hope it does not happen again.

Thankyou to everyone who commented on the newsletter - mostly favourable I might add! If you have any views or requests please write in. Also thankyou to the people who have made offers to help with typing. I may come back to you as we may set up a rota system to assist with typing. This has yet to be decided, but you will not be forgotten!

I still want your articles PLEASE! so get scribbling. A reminder of where to send them:

Newsletter secretary, Mrs Carol Dash, Lower Lakes, Suckley Knowle, Whitbourne, Worcestershire, WR6 5RH.

Just to remind you that letters or articles may have to be shortened or adapted for the newsletter and also that views expressed in articles do not necessarily reflect the views of the editor or the society. We are particularly keen to include more conservation issues/information in the newsletter, so if you know of any orchid related issues local to you please let us know. Has it been a particularly good or bad year for a particular orchid on your local reserve? do you know why? More information on places to visit - not only abroad but also in

Britain - would be of value to members. We are also currently planning next years field visits - if you have any suggestions or even better would like to lead a meeting please contact the Honorary Secretary, Richard Manuel (address follows) or speak to a member of the committee when we meet in November.
It has been suggested that we should have more meetings/visits further north so any suggestions with this in mind would be particularly appreciated.

INFORMATION ON THE NEXT MEETING

Richard Manuel, Hon.Secretary

Dear Members,
It's that time of year again, when, as my old granny used to say: Summer leaves off - Winter draw(er)s on! Yes, the short days and long nights are rapidly approaching; why is it that Spring always takes so much longer to follow? The main consolation at this time of year is that those of us who grow winter-green orchids can start spotting new growths poking cautiously through the compost, and even think about giving them a bit of water ... But not too much yet. The November meeting is in sight. Despite several responses to my request for suggestions for new venues - many thanks to those who replied - for various reasons none of them were either available or suitable (too expensive); so we are back at Pershore College of Horticulture for November and the next AGM (10th May 1997). Beyond that, we would still be delighted to have other places and perhaps areas of the country to consider.

Programme for the HOS meeting, Saturday November 9th 1996

10.00 am Arrival; coffee available until 10.45. Sales tables upstairs
11.00 am Morning Session. Theme: ORCHID TRAVELS IN EUROPE. A series of short talks about various locations - what there is to see, and the logistics of getting there and exploring; each talk to be followed by Q & A/discussion time.
1.00-2.00 pm Buffet lunch.
2.00 pm Brief business meeting. Suggested points for your consideration are: what are your views on meetings - locations, accommodation, programme content, etc. What and who would YOU like to hear; there must be some suitable speakers that you may know of that we don't? Field trips for 1997 - we need volunteers to organise trips to sites in their regions.
Afternoon session. Theme: GROWING ORCHIDS FROM SEED, a forum starting with a talk by Adrian Blundell, (our 'seed and fungus banker') on "Fungus and low-tech growing", followed by Q&A session.
Leading on from this Richard Manuel will talk on "Tuberous Orchids: seedling culture and weaning", again followed by Q&A session.
4.00 pm Tea and close. Our booking extends to 5.00pm.

The cost of this meeting is £10.00 per person to include Buffet lunch, coffee and tea. Please return the slip at the end of this newsletter with payment (cheques made out to The Hardy Orchid Society) by November 1st at the latest, to me, Richard Manuel, 45 Thorncliffe Road, Oxford OX2 7BA

Membership renewal reminder - if your membership for 1996 has not yet been renewed and you wish to continue as a member of the society you should receive a letter with this newsletter. Another way of telling is that there will be a 5 rather than a 6 (for 1996) as the first digit on your address label. Please send subscriptions to Mr W.R. Nicol (Membership secretary), 1364 Evesham Road, Astwood Bank, Redditch, Worcs, B96 6BD (not to the Treasurer Mrs C Cook as previously advised - My apologies the error is regretted CD) - don't panic all money has been forwarded to the relevant person! Please make all cheques payable to The Hardy Orchid Society.

HARDY ORCHID SOCIETY VISIT TO KENFIG - Saturday 22nd June 1996
led by Paul Harcourt-Davies

The gathering of HOS members in the car park of the nature centre at Kenfig faced one of those "grey" days for which Wales is infamous; at least the horizontal rain was absent.

Some 1500 acres, 70 of which are taken up by a fresh water lake - Kenfig pool - now comprise the Kenfig National Nature reserve. This is a remnant of a much larger dune system which once skirted the coast from the Ogmore estuary to the Gower peninsular. Large-scale industry and extensive caravan sites might have eaten their way into the dunes but what remains is a little bit of paradise.

The area is steeped in history: Roman legions trooped past on the Via Julia. The inexorable build up of the current dune system at Kenfig has been occuring since the 10th century at least. The harbour on the river Kenfig was a thriving concern in the 11th century. In fact, the sand became the curse of settlers there and provided a diversion for my Welsh ancestors when they were not burning the castles of their English overlords. In 1540 the inveterate traveller John Leland wrote in evocative fashion - "Ther is a litle Village on the Est side of Kenfik, and a Castel, booth in Ruine and almost shokid and devourid with the Sandes that the Severn Se ther castith up."

Just by walking along the main path across the dunes one can see all the orchid species and varieties growing at Kenfig. The richest areas occur in the slacks, those wet areas between sand dunes, where the shells of long dead molluscs create an alkaline environment. Over a dozen species and subspecies of orchid grow here (a fifth of the British list) and, of some 1500 species of flowering plant in the UK, about one third occur here on the South Wales coast. As the path heads away from Kenfig pool large spikes of Southern Marsh Orchid

(Dactylorhiza praetermissa) appear at the track side and the dune slacks are dotted with pale spikes of Early Marsh Orchid (Dactylorhiza incarnata) and the intense red spikes of D. incarnata ssp coccinea. Kenfig is famed for the Fen Orchid (Liparis loeselii) and the first of these light green orchids was appearing in the short wet turf beside the path. Near the sea Pyramidal Orchids (Anacamptis pyramidalis) were coming into flower and there were more Bee Orchids (Ophrys apifera) than I have ever seen along the old coast track - a week later they were brown and dried. Early flowering plants of the Marsh Helleborine (Epipactis palustris) were just coming into flower, a herald of the display later in July when there are veritable drifts of the plants including the colour form var. ochroleuca, lacking in any red pigment.

The first few flowers were appearing on Fragrant Orchids (Gymnadenia conopsea) and, far away to the other side of the lake, we found the bent spikes of 'helleborines'. In late July these were to provide an interesting diversion when I decided to try and solve the problems of the Kenfig Epipactis....

If at times the tramp through the dunes must have seemed a slog it was the only way of showing the sheer richness of this area. My mania for the natural world began in earnest here when I chased butterflies across the dunes as a ten year old. It is a joy sharing the pleasure of others who are discovering this area for the first time. And, on this occasion, with such a diverse flora there was a correspondingly rich insect fauna all providing subjects for the natural history photographer - from orchid pictures, to insect close-ups and dramatic flower filled landscapes.

Nearly four decades later, in June of 1996, nostalgia became the order of several days filming for a TV programme for BBC2's "Tracks" on the wildlife of the sand hills. I have just received one letter from a pedantic gentleman accusing me of not being able to pronounce the word Kenfig properly, telling me how and hoping this will help me on my further visits to Wales...one of the few people seemingly unable to tell from the accent that there is a certain element of Welshness there! I am no nationalist but, as far as Kenfig is concerned I feel a tremendous sense of privilege at knowing the place so well.

Our thanks to Paul on behalf of HOS for organising this trip.

FLASKING FORUM

Richard Manuel

Growing hardy orchids from seed is an aspect of orchid culture that seems to be rapidly expanding, so this column has been started in the hope that we can, through these pages, start a dialogue involving those interested in growing from seed that will be of interest and value to us all. I am going to start by describing my own methods, and hope - nay expect - feedback which can be included in future columns, or as separate complete articles in this newsletter, from other growers with

different methods, ideas, helpful tips, and any other comments - even criticism.

I have been growing orchids from seed for about 5 years now and am fortunate in working in a science laboratory and having access to various items of expensive equipment. In fact I only started growing from seed because all this stuff was available and rarely used by anyone else. So I have never been a "kitchen - sink" type of grower and I would love to hear from those who are, as their methods would presumably be of more interest to the bulk of readers than mine.

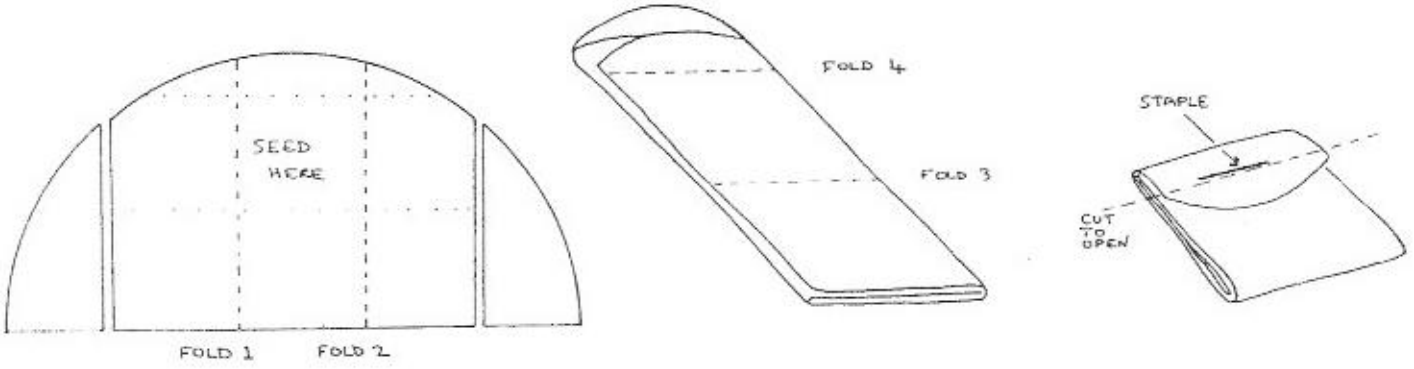
To kick off this series I shall start by explaining, for the benefit of the uninitiated, just what we are trying to achieve in our sowings and by describing my own sowing method. I am well aware that many other growers have different methods and that we all swear by our own. But this is a good reason for others to contribute as well! I like to keep things as simple as possible and once I have a method that works for me I tend to stick with it unless I can be persuaded that some other way might be better.

Orchid seeds are germinated in one of two ways: either by sowing them on a nutrient jelly made of agar and various nutritious goodies, which supply all the food necessary for the seeds to develop (asymbiotic method), or they are sown on a weakly nutrient jelly, usually Oats medium, and a culture of a suitable fungus is introduced. The fungus feeds on the porridge and the orchid seeds, in theory at any rate, are germinated and nourished by the activities of the fungus (symbiotic method). Whatever the method, the resultant seedlings need to be moved ("replated") to fresh medium at least once during their development before they can finally be weaned into open pots of compost.

Before sowing orchid seeds onto an agar medium everything must be sterilised, otherwise very soon an amazing army of bacterial and fungal colonies will encamp on your agar and not only gobble up your seeds but may actually be capable of harming you too! So the medium has to be sterile, and sterile seeds sown onto it in a sterile work area. This in effect means not introducing the spores of any microrganisms - it only takes one airborn spore to spoil a flask or plate. There are various ways of achieving a sterile work area, ranging from the glove-box type of construction up to a laminar flow cabinet which blows filtered sterile air out through the working aperture and in theory prevents ingress of nasty spores and things, but unfortunately not flies! (Any bug coming in contact with a sterile surface inevitably contaminates it by introducing spores from its body). And as if this were not enough, orchid seeds are minute and handling them poses other problems, which form the main subject of the following description.

So to the basic method of sowing seed, starting with fresh dry, fully ripened seed. I like the method described by Robert Mitchell in his essential 1989 article (Growing Hardy Orchids from Seed at Kew...The Plantsman vol 11, pt 3: 152-169.) The seeds are put into a small packet of filter-paper, in which they are carried through the whole process of sterilisation and

washing, up to actual sowing. Whatman type 114 wet-strengthened filter paper is greatly superior to normal grades, especially when acid pre-treatment is used. Use 125mm diameter circles of the paper, cut in half, trimmed and folded as in the diagram below. Always label the packet clearly with a soft (BB) pencil. The seeds are gently and thinly scattered on the area indicated; if too many are enclosed the liquids may not penetrate and sterility will not be achieved. The packet is closed with an ordinary desk stapler.



I have tried various methods of sterilisation (every paper one reads on the subject recommends a different method) but the simplest and best so far is Sodium Hypochlorite at a strength of a 15% w/v solution, to which is added two drops (and I mean two drops!) per 100ml of Fairy Liquid, to aid wetting. Ordinary supermarket bleach or babywear sterilising fluids are also commonly used, but the manufacturers rarely state the strength of hypochlorite in their products, which is a problem. (Any recommendations from personal experience, anyone?) The packets should be soaked for 30 minutes in this solution, stirring frequently. When immersing the packets (it saves a lot of effort to process several batches at once) slide them down the inside of the container with a finger, rolling it from side to side once it is submerged to exclude all air from the packet; this is important. After the half hour is up transfer the packets from the bleach to sterile distilled water, inside the sterile cabinet, using long forceps which themselves have been flame sterilised. Experience has led me to believe there are benefits in leaving the seeds to soak in water for a couple of hours or so before processing. then the sowing begins in earnest.

Put the packets through two more changes of distilled water (although I'm not sure that it is necessary) then sow them one by one into previously labelled petri-dishes of the agar medium - "plates" (see later). Sowing this way is easy: remove a packet of seed from the water, allowing it to drain briefly, then lay it down in a (sterile) open petri dish. Using the forceps and a (sterile) pair of scissors cut the packet along the dotted line and unfold it carefully - a careless flip of the paper can sow seed all over your work area! Assuming you wish to sow several plates, my favourite method is to cut a

strip from the paper, avoiding any folds, and by dabbing, use this to pick up small quantities of seed and transfer them to the agar surface. The seed can be spread out by dragging the paper across the surface. You should be able to do this with one hand, whilst holding the lid of the dish with the other. The last plate can be sown by using the remainder of the seed on the other piece of paper in the same way. With a little practice this method works well and wastes very little seed. The main drawback is that a perfectly sterile work area is essential because the plates, with their large surface areas, are completely open for the 30 seconds or so that the operation takes. After sowing, the plates should be sealed with two turns of laboratory wax film (Nescofilm, Parafilm, etc) and the labels completed by adding date of sowing, any fungus used, type of medium - all information you will wish you had noted when later you discover you haven't! Exactly the same method can be followed for symbiotic sowing (with a fungus) - but a piece of agar medium bearing the fungus is added to the plate after sowing and before sealing.

A note here about green podding: There is a stage in the development of the seed within the capsule (pod) when, before the germination- inhibiting seed coat is laid down over each seed the embryos are sufficiently developed to be capable of germinating and growing. Furthermore, since development is entirely internal, these delicate embryos are, in theory at least, sterile. If this stage can be accurately calculated (=guessed), the embryonic seeds can be sown direct onto agar and will often grow very successfully, and often more rapidly than 'mature' dry seeds. The pod must be carefully removed from the stem so that the end is not torn, and old flower remains trimmed off.

Then it is simply a matter of sterilising the whole outside of the pod - I find that 3% Sodium Hypochlorite + Fairy Liquid, strongly agitated for an hour, to be adequate - cutting it open under sterile conditions, and spreading the seed embryos onto the agar surface using a scalpel blade. The main problem is getting the timing right. Many hardy orchid species produce fair numbers of smallish pods and I like to gauge ripeness by opening a typical pod and studying the developing seed inside. If I am satisfied that the right stage has been reached then I can sow another similar pod. I reckon - and this may well be wrong - that the optimum time is when the seeds are clearly differentiated but still colourless - they tend to stick together in clumps at this stage. Once a brownish tinge develops I believe it is too late for 'proper' green pod sowing, although these seeds can still be dried and sown in the normal way.

Now comes the worst bit - waiting. Waiting first of all to see whether you have introduced a contaminant (bacterium or fungus) into the cultures. After a couple of weeks with nothing sinister appearing - obvious patches of mould, 'cotton wool' or alien blobs - you should be safe. Then, secondly, waiting for the seeds to do something. The plates should be stored somewhere dark and at an even temperature, ideally about 23 C.

The first sign of germination is a swelling of the embryos which then often start producing radiating root hairs. You will need a magnifying glass or microscope to see this at first, though. Subsequent development of the seeds and seedlings is a broad subject which I will deal with in the next issue.

Plates : There are perhaps three options of container types to use for seed sowing. Some people sow directly into flask (honey jar or similar) but this has the twin disadvantages of not being able to study the seed's development, and is very difficult to work in when separating the protocorms for replating, something I will write about later. Glass test-tubes have similar draw-backs but are 'safer' for sterile work. Both types of container, being glass, can be reused and sterilised with the medium inside, which is more convenient than plastic containers.

The clear plastic petri-dishes('plates') I use are 3" (90mm) diameter and about 10mm deep. They come in sterile packs of 20, requiring about 700ml of medium to fill 20 of them, (this must be done inside a sterile cabinet) and are not easily re-usable. But their contents are easily studied under a low powered microscope to watch development and a lot of plates can be stored in quite a small space, so that several can be used for each batch of seed, allowing different media to be tried, which reduces the risk of contaminating the whole batch of seed.

The easiest medium for asymbiotic germination (without a fungus), in terms of simplicity and ease of obtaining ingredients, is Greenaway, according to the following recipe:

Greenaway Orchid Seedling Medium (Invented by Bob Dadd)

Greenaway Orchid Food (a seaweed based concoction obtainable from Greenaway Orchid Nursry, Puxton, Avon)	2ml
Calcium nitrate, 1%stock solution	10ml
Pineapple juice (unsweetened - I use Delmonte)	25ml
Sucrose (ordinary sugar will do)	20gm
Powdered activated charcoal	0.5gm
Agar	6gm
Distilled water	1 litre

The various ingredients, except the agar, are mixed and heated to nearly boiling in half the quantity of water in a glass beaker, then the agar is scattered in whilst stirring with a glass rod. Once it has dissolved add the remaining water and keep stirring for a few minutes. It pays at this stage to test that the mix will gel properly by pouring a small quantity into, say, a teaspoon and allowing it to cool and set. While the sample is setting (or not!) the acidity should be adjusted to about pH 6.0 by adding drops of saturated Potassium Hydroxide (Warning: this is very caustic) as the mix will start off too acidic. Testing with modern colour test strips, e.g. BDH Indicator strips pH 5-10 Product No 31 506, from Merck, is sufficiently accurate. Once you are happy that all is OK, the beakerful of medium, covered with foil, can be sterilised by

autoclaving or pressure cooking. If this cannot be done immediately the covered pot of medium (which will of course set when cool) can be left in the fridge for a couple of days if required - it will re-melt when autoclaved. After sterilising the plates can be poured, once the molten medium has cooled enough to be safely handled, in the sterile work area. Pour about half each plate's depth of liquid medium, uncovering each plate as little as possible while doing this, and leaving them to cool and set with the minimum of disturbance. Then label each plate with type of medium and date, with a permanent felt tip pen.

Also mentioned above, for symbiotic culture, is Basic Oats medium:

Powdered oats (oatmeal)	3.5gms
Yeast extract	0.1gms
Agar	5.5 - 6.0gms
Distilled water	1 litre

This very simple formula is remarkably successful and forms the basis of all symbiotic orchid culture. Various enriched versions have been suggested but I have never felt they were any better and are always, of course, more complicated.

That ought to be enough boring detail for one newsletter, so I will end by reiterating that it would be nice if one or more of our HOS sowers could produce a piece telling how their methods differ from mine and, in particular, how they cope with making things sterile and keeping them that way.

Footnote: Many scientific suppliers will not sell chemicals to private persons, because of the possibility of misuse. The only supplier I know that is an exception is Sigma (any others?). Phone Customer Service (0800 447788) for their Plant Culture Catalogue; explain that you wish to buy chemicals for orchid culture and they are usually very obliging. I will try in this series not to recommend any substance that cannot be obtained relatively easily. However, this is not always possible, so it will pay you to cultivate any friends you may have who work in laboratories! They may be able to help you with some items. But don't expect to save money by rolling your own orchids! Even the simplest chemicals are relatively expensive (e.g.agar) and you need to acquire quite a lot of bits and pieces of materials and equipment before you can get started.

Note - hopefully in the next issue we will feature two designs for a simple home made glove box and laminar flow cabinet.....watch this space!

SEED AND FUNGUS BANK UPDATE

Adrian Blundell

As previously mentioned in the first Hardy Orchid Society newsletter it is hoped that the society can set up a seed and fungus bank. The aim of which is to give growers access to a comprehensive list of fungi and seed, and also raise money for the society. This obviously will only be possible if growers with flowering collections donate seed and also people who have isolated viable fungi allow the society to sell them.

Since the first issue I have been asked on many occasions how best to collect, package, store and send seed. As many hobby growers do not have easy access to chemicals and apparatus commonly used in growing and keeping seed it has been necessary to find alternatives. Once the seed pod has been collected it is important to dry it and the seed out. For this process I use a large air tight sandwich box with some silica gel contained in a pot. The silica gel can be purchased from most DIY stores and is usually found in the insulation and secondary glazing department. This material collects any moisture in the sandwich box creating the correct conditions to dry and dehisce the seed pods. Once the seed is dry this container can be placed in the fridge for storage and will keep seed viable for a long period. A good source of information on this is the book "Orchids from Seed" by P.A.Thompson and is available from the Royal Botanic Gardens, Kew.

Packaging and sending seed through the post in a safe way can cause immense problems due to its size. Seed will find any gap to disperse itself throughout the contents of an envelope, usually mixing with seed from other packets. The packaging method illustrated overleaf is only one of a variety available, but I find it contains both pods and seed very well (see instruction page opposite).

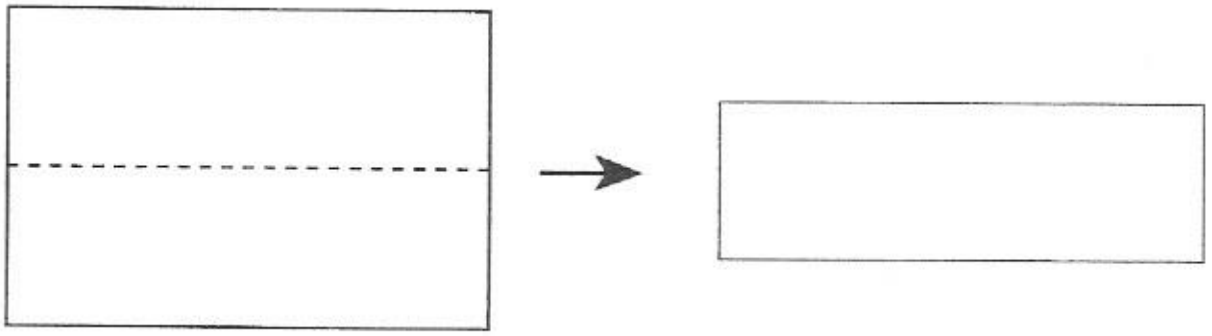
As for fungus, I have already got fungi which is suitable for Dactylorhiza, Serapias, Spiranthes, Orchis morio, Orchis laxiflora, and Orchis mascula, which I have isolated and am willing to distribute for the society. I am also waiting for clearance to add a number of other interesting types to the list, but I would be most grateful for donations of other proven types.

The method of isolating and growing fungus which I use is a slightly modified version of a simple technique which needs no expensive or complicated equipment. The article by Jim Hill "Symbiotic Culture of Hardy Orchid Seedlings" National Pleione Report 1995 is very useful. This method has yielded numerous fungi, some suitable, others not, but it does work.

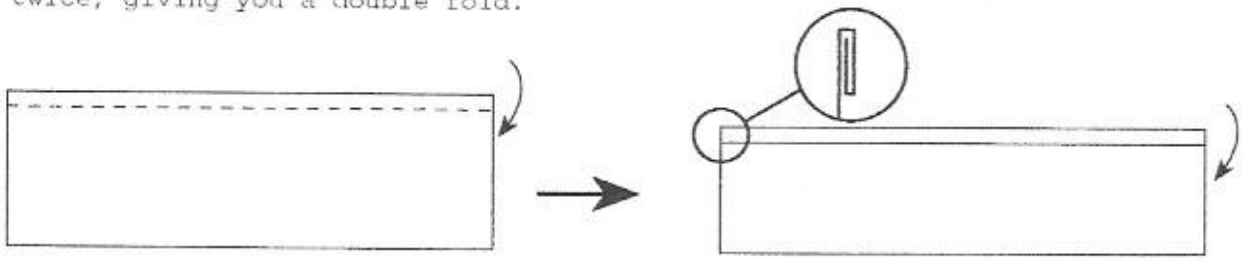
I will prepare lists for both the seed and fungi, sometime in November, when all the seed from this year's crop is in. I do hope we can make a success of this, but it does need input from everyone. Please write with a SAE if you require a list, to:

Adrian Blundell, 35 King Street, Cherry Orchard, Shrewsbury, Shropshire, SY2 5ES.

Using a rectangular piece of paper, preferably 10cms x 15cms, fold in half and crease the fold, producing a 5cms x 15cms rectangle.

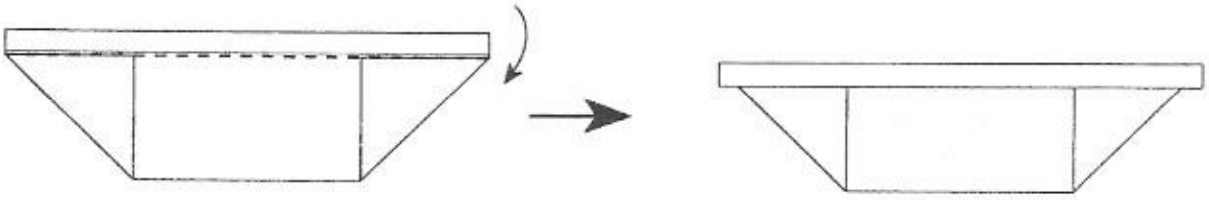


Take the top edge of the rectangle and fold over a 5mm strip. Do this twice, giving you a double fold.

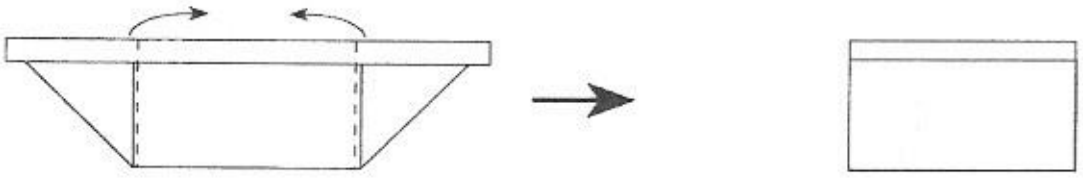


Now lift the second fold up, showing a crease line. This is used as a guide for the next set of folds.

Once the two triangular folds have been made drop the top fold down over the two flaps to secure them



Fold the triangular ends backwards leaving a rectangular front with a flap. Now at the back tuck one flap under the other to secure it.



To put seed into the packet, just unfold one of the flaps secured at the back so that there is an opening, then refold securing the packet as before.

ORCHID MYCORRHIZAL FUNGI AND THEIR LONG TERM STORAGE

Phil Meek

The society members will soon have a fungal bank at their disposal, kindly set up and held by Adrian Blundell. I thought that an article giving some background information on the known properties of orchid mycorrhizal fungi might be useful.

If a suitable fungus is available for a species of orchid, the propagation of that plant from seed becomes much easier. The growth medium is simple (gelled dilute porridge), and the chance of successful transplantation into the "real world" is greatly improved. Even if the member does not have access to specialised equipment, it should be possible to grow orchids using a fungus.

The Fungi are a large group of organisms distinct from plants or animals. They cannot photosynthesise, nor can they ingest food. They have to absorb soluble inorganic and organic materials from whatever source they have evolved to utilise. This may be dead organic matter or live plants or animals. The fungi are divided into four subdivisions: the Mastigomycotina, Zygomycotina, Ascomycotina and Basidiomycotina. The fungi that concern us come from the divisions Ascomycotina and (mainly) Basidiomycotina. The Ascomycotina include many of the moulds like mildew and penicillin. The Basidiomycotina include the higher fungi that form large fruiting bodies - the mushrooms. The vegetative phase of most fungi (not yeast like fungi) consists of long tubular filaments called hyphae and measure typically from between 1 to 10 micrometers in diameter. The hyphae grow only at their tips, but form branches a little way back from these. A network of hyphae is known as a mycelium. In the natural environment, as the hyphae grow, they are reinforced by other hyphae to form what is known as a mycelial strand. This does not happen in nutrient agar culture. Fungi fruit to produce spores and for a particular fungus this can usually be done in different ways, some asexual and some sexual. It is a complicated business and anyway orchid mycorrhizae are not usually in a fruiting state. This makes them very difficult to identify. Sometimes these fungi can be induced to fruit by providing special culture conditions. Most of the few identifications that have been made have been achieved by microscopic examination of the hyphae, which differ in their physiology and morphology from species to species. Often it is a matter of comparing the hyphae with that of identified fruiting species.

Emerging research data suggests that all or nearly all higher plants have significant symbiotic relationships with fungi. Plants obtain mainly phosphorus and nitrogen (plus some vitamins and other useful organics) from the fungi. The fungi in return receive carbon compounds from the plants' roots, providing energy (from sugars) and growth enhancing substances. Many of these fungi belong to the fungal order Glomales (division Zygomycotina), which are now the focus of many researchers worldwide. The kind of fungi that we are concerned

with are not of this group, or at least not to this date (there are still a number of orchids for which compatible fungi have not been found). The fungi that promote orchid seed germination and/or subsequent growth of the plant are grouped under the somewhat loose term "symbiotic fungi". Observation and experiment suggest that known orchid mycorrhiza are basically saprophytic fungi (breaking down dead vegetable matter for food) but also have to some degree the ability to become parasitic. Parasitic is also a somewhat wide term but its use here means the invasion and killing of live vegetable tissue in order to create dead vegetable matter for food. According to common opinion the orchid is thus just another source of available vegetable matter to break down and consume. Armed with chemical defences the orchid controls the fungal invasion and limits it to cells within certain preferred areas. Then when enough mycelium has built up (as little coils or "peletons") the orchid digests the fungus, thus gaining sugars for energy and other nutrients essential for growth. Note that in the orchid fungus relationship, the sugar flow is in the opposite direction to that of plant-fungi relationships in general. In a "stable" situation (i.e. plant and fungus remain alive), it is regarded that the fungus gains nothing from the orchid. I wonder though whether the fungus could not gain some advantage by having a long term base from which to grow after periods of adverse environmental conditions such as drought.

The subject of fungal storage deserves special attention. When fungi are stored for prolonged periods at fridge temperatures (1 to 5 C) they may lose their vigour. In order to explain this phenomenon, one has to look into fungal biology and genetics. Firstly, a fungal strain will probably have inherited two nuclei from differing genotypes. Secondly, when two hyphae of the same species cross and come into contact with each other they will often fuse at that point (a process called anastomosis). Nuclei at the contact points can interact resulting in the exchange of some linear chromosome sections from whence emerge new nuclei with slightly varying genes. There is also random mutation to consider. Taking these effects into account, a single mycelium will have a degree of genetic diversity from one point to another. This is a state known as heterokaryosis ("different nuclei"). For a particular hyphal section, its characteristics are roughly an average of the genotypes held within. This has important consequences for selection. Part of the mycelium may grow better than the rest at fridge temperatures and this may select a strain that is inferior for orchid growth. In fact in time anything that you do with a fungus may select out particular variants. The best approach for long term storage is to lower the temperature to a point where all biological activity stops (approx -140 C). I am looking into the possibility of cryogenic storage for very small sample of our best fungi as I have access to a supply of liquid nitrogen. In the mean time, perhaps a safer approach would be to maintain cultures at normal temperatures in contact with appropriate orchid protocorms. Then the protocorms could be surface sterilised and the fungi subcultured from these.

GROWERS DIARY PART 2. October to December 1995

Alan Dash

October 1995

Weather continues to be exceptionally mild through to the end of October, with good light levels most of the time. All of the Mediterranean orchids' leaf rosettes are growing quite rapidly. Watering is carried out every 7 to 10 days - trying to keep the compost just moist. The pots (mostly plastic) are plunged to 1/2 to 3/4 depth in sharp sand in the greenhouse. This probably helps to stabilise conditions at the roots. The plunge sand is watered freely and if conditions are mild the pots are also watered from above, trying not to splash the leaves. The fan in the greenhouse circulates air continuously. A thermostatically controlled fan heater is set to switch on at 5 C. Greenhouse shading has been removed.

One concern I have is the way the orchids seem to etiolate, forming uncharacteristically tall flower spikes later on. This seems likely to be due to low light levels in our winters compared to their Mediterranean home. I am considering supplementary lighting. It may not be as simple as this, as some growers manage to produce sturdy small flower spikes such as you might see on a springtime Mediterranean hillside. These growers do not have supplementary lighting but do grow their orchids "hard" and suggest that during British low light levels the temperatures tend to be such that there is very little growth.

Barlia robertiana is one of the earliest flowering species and indeed it is romping away by late October, I can see a flower spike bud forming at the base of the rosette. Stenoglottis longifolia is magnificent in flower on a windowsill indoors - such a long flowering period September to December.

Late October sees the arrival of a batch of imported Cypripedium seedlings from Spangle Creek Laboratories USA. The importation of this batch has been organised by one member of the society and distributed to many others. The seedlings are one year old, straight from flask and need to be vernalised at 1 to 4 C for approximately 3 months. I decide to pot them into compost before fridging, other people either place in moist moss/perlite or keep roots in water in a sealed plastic bag (see Kath Dryden discussion in newsletter No 1). These other techniques may be more suitable and certainly take up less space in the fridge. Compost/medium? In the end I opt for a mixture of John Innes 2 : perlite : grit : sand, in a ratio of 1:2:1:1. Pots are placed in the fridge 27 October 1995 which coincides with the first frost of the year.

November 1995

First week is very cold but the fan heater copes well and keeps the greenhouse temperatures to a minimum of 3 C. No need to water during cold periods.

HOS meeting at Solihull November 4th. Interesting talks and lovely slides of British and Mediterranean orchids. Interesting discussion - HOS appears to be evolving. Free distribution of seed from some members plants - I receive a cast off seed

sowing set-up. This consists of a modified fish tank, assorted jars, bottles of agar, medium etc. Once again I am struck by the generosity of members of the HOS - long may it continue! By 24 hours later I have sown my first flasks of orchids.

Throughout November and December I continue to sow orchid seed mainly on sterile medium, but some onto Oats medium with fungus. Contamination of medium is a problem but at a manageable rate of about 30% of flasks. Germination of seed is by no means quick, taking many weeks. Eventually some success, most notably Orchis morio with fungus Bl. Excellent germination and rapid development - I am later told that this is about the easiest species! Nevertheless it is encouraging to see some success along with the failures.

December 1995

Weather is very cold with freezing nights for over a week. Greenhouse temperature falls to 1 C minimum. Do not water. First flower opens on Ophrys tenthredinifera on December 7th. This spike is unusually early and others in the same pot have buds just forming deep in the rosettes. Barlia spike is in bud.

A strip light has been installed over the plunge bed. This has two functions; firstly it provides a light in the previously unlit greenhouse and secondly it is meant to provide supplementary lighting for the orchids. This light is left on for a few hours some evenings and during some gloomy days. My scientific method is however seriously flawed, as there is no consistency of regime and no control plants either. Unfortunately I cannot say whether the supplementary lighting was beneficial or not.

On Christmas Eve the O. tenthredinifera is flowering nicely and the Barlia celebrates the New Year by opening its first flower.

ORCHIDS OF APULIA part 1

Paul Harcourt-Davies

The varied geography and geology of Italy provide for a wide range of habitats and an orchid flora that is truly remarkable. Anyone who has purchased the heavily illustrated works of Othmar and Edeltraud Danesch will have drooled, as I did, over their endless pictures of Ophrys, many of which had been photographed in southern Italy. Two names predominated in the accompanying text: **Gargano** and **Lecce** both of them in the province of Apulia, which encompasses an area of some 7472 sq. miles (19345 sq. km) and forms the heel to Italy's boot.

Gargano

The Gargano peninsula, now almost elevated to legendary status among lovers of wild orchids is a wonderful limestone lump forming the heel to Italy's boot. Geologically, the Gargano has links with the limestone Karst region of Yugoslavia rather than the rest of Foggia and for a long time through the Quaternary

Age, Gargano was separated from the Italian mainland by a channel. This isolation enabled plants to evolve quite separately from their one time nearest neighbours and there are four "species" of orchid more or less endemic to the peninsula.

Because of the change in altitude between base and summit, orchids on the heights of Gargano can flower some 3 to 4 weeks after the same species bloom closer to sea level. A visit in late April will reveal drifts of orchids on the stone strewn heights with later species such as the Tongue orchids (Serapias) flowering lower down accompanied by colourful displays of annuals and flowering shrubs such as Cistus and Rosemary which make up the garrigue and "macchie".

Habitats

Stone strewn hillsides of Gargano provide visitors with some of the best memories of the peninsula - not only for a plethora of orchids but also for dwarf wild irises (Iris pseudattica) in blue, lemon yellow and intermediate colour forms. As spring advances these hillsides become colourful rock gardens, thanks to a comparitively small number of species such as the intense blue Dyer's Alkannet (Alkanna tinctoria) and alyssum (Alyssum saxatile) and a pink form of the Kidney Vetch (Anthyllis vulneraria ssp.praepropera). Here two orchid species grow in drifts - the deep colour belonging to the Green-winged orchid (Orchis morio ssp. picta) and the lighter pink to the Butterfly orchid (Orchis papilionacea).

Foresta di Umbra - Over 100 sq. km of this forest form a national park where teams of foresters and locals with ancient rights to collection of wood make it very much a working woodland. Although these traditional practices have legislated against trees reaching a great age the forest floor is carpeted in spring with magenta cyclamen (Cyclamen repandum) and myriads of anemones (Anemone blanda) in blue through to white: the common orchid here is Dactylorhiza romana.

The central part of the Gargano cannot strictly be described as a 'plateau' because it is surprisingly hilly but there are two ridges which separate the fertile valley which runs between Monte St Angalo and San Giovanni Rotondo. As one descends into the valley from the north, the woodlands of low-growing oak prove to be a sanctuary for orchids - not only the species mentioned so far, but two yellow Orchis species - the Few-flowered orchid (Orchis pauciflora) and the Provence orchid (Orchis provincialis) together with numerous spikes of Man orchid (Aceras anthropophorum). Hereto one encounters the first plants of a pair of Gargano specialities; Ophrys bertoloniformis and Ophrys biscutella. In the sunlight (not always guaranteed this early in the year) on the heights there are areas of gold visible in the fields along the valley - close investigation shows that some patches are buttercups but others are bright yellow tulips (Tulipa australis).

The heights will amply repay exploration for those prepared to stray more than a few metres from their car. For the real Gargano exists in hidden valleys and along mountain ridges where the stony ground makes cultivation impracticable - though it is amazing how extensive are the areas which have been cleared of stones: the thought of the work brings empathetic twinges to the back. Fortunately these valleys are not easy to find. Access is along paths and good maps are not generally available. But on these hills and between them the orchids fill the gaps between stony ridges: here grows the third of the endemic Ophrys - Ophrys promontorii with side lobes reminiscent of Ophrys atrata (from which it is thought to have arisen as a natural hybrid). One source of confusion for visiting botanists are those plants which can be put under the umberella term Ophrys arachnitiformis where no two labella seem the same and patterns are fragmented. Several of these 'species' occur in southern Italy and on Gargano the plants have been named Ophrys archipelagi.

The true prize among Gargano endemics is Ophrys sipontensis, both rare and lovely and named after Siponto the ancient Roman city on the Gulf below Manfredonia - appropriately since most of its sites are on slopes overlooking the Gulf. I first encountered it by chance after looking at an old map which showed Siponto and then wandering until the land, a disused quarry, looked right. That quarry is now overgrown and so are five out of six of the roadsides where I have found it in the past five years - it is a 'species' which needs special protection.

The slopes which face the lagoons along the northern coast have a very different 'feel' from those on the southern side of the peninsula, attributable to a difference in aspect. Much of the grazing on these hills is done by cows which do not have the same billiard table lawn-mowing capability of sheep or the voraciousness of goats. Whereas in most of the Mediterranean one instinctively avoids asphodel-covered slopes because they have been denuded of anything of interest, here a lot survives, orchids included, among the asphodels. On these slopes another relative of Ophrys holoserica can be found. This is the green-tepaled Ophrys holoserica ssp. parvimaculata (now called O. parvimaculata) - the name means small patterned which describes the restricted 'bib' near the base of the blunt lip. Like Ophrys apulica this has a wider distribution and is found elsewhere in Apulia, particularly in the Murgia hills to the west of Bari.

The main threat to our European orchids comes not from collectors but from habitat loss due to change in land usage. A thoughtless stroke of the pen on E.C. documents allowing apportioning of funds for 'improvement' to poor areas often results in little more than grazing patterns changing - and within a season small fields which once boasted a dozen or more species of orchids are full of plants which do not allow orchids to survive in competition. This practice has happened to a disturbing degree in Gargano over the past decade and a half, the time over which my visits have been made. The

evidence does not include counting of plants - it is empirical, the changes are there to be seen.

Hybrids occur more frequently in the Gargano than anywhere I have visited and it is believed that this association with pollinating Hymenopterans has allowed several 'species' to arise on the Gargano from hybrid swarms. Over a period of time pollinators tend to visit plants with particular characteristics ensuring their propagation rather than others, after many generations of both pollinator and plant a stability sets in. A useful indicator of these recently evolved species is the fragmentation of patterns on the labellum which occurs with many of the 'arachnitiform' orchids arising from liaison of taxa within the 'sphegodes' and 'holoserica' groups and back-crossing between hybrids.

Scent is not the only determining factor at work, in the Gargano it becomes clear that visual selection is important too. Several taxa have evolved on the peninsula which show more than a passing resemblance to taxa from Greece - a question of parallel evolution. Ophrys sipontensis from Gargano looks remarkably like Ophrys spruneri from southern Greece - they happen to have the same pollinator (Xylocopa iris) whose visual preferences for a 'mate' have presumably led to its choosing plants with similar flowers in these widely separated areas.

In March 1987, the quarterly journal of the A.H.O Baden Wurtemburg devoted the entire issue to the orchids of Gargano. It described some 61 species and sub-species of orchid and recorded a further 64 named hybrids - no region of similar size within Europe can even begin to compare.

LETTERS TO THE EDITOR

Last year I exchanged some of my Marsh Helleborines for some Bee Orchids belonging to a friend. I planted these in potting compost in a 1.5 litre pot, sunk into the lawn and left them to it. When it was very dry I watered them and in due course I was rewarded with some fine flowers. When the wild Bee Orchids in the area started to flower they had lost their leaves, but mine still had all their leaves as the seed pods were swelling. Suddenly the leaves vanished at the start of August and the stems keeled over - over-watered and rotted? I dug up the tubers in order to dry them out - they were the diameter of golf balls rather than pencils.

The Bee Orchid normally grows on very barren and dry areas around here - I suspect that this is a response to competition rather than the conditions that they would like. Although I clearly overdid the watering while they were in flower, they seem to like more water and fertiliser than they get in the wild in this area. I would be interested in hearing the views of others about this.

This year has been a bad one for Bee Orchids in this area, as it followed the drought last year when most of them aborted their flowers. One colony which had about 50 flowers last year

produced none this year, and another colony which has had over 1000 in the past only produced 100 or so.
I have some tubers of Dactylorhiza fuchsii "Bressingham Bonus" and some Epipactis palustris rhizomes. If any one is interested in an exchange I would be interested in having Dactylorhiza praetermissa, Gymnadenia conopsea var densiflora or Orchis morio in exchange.

From: Bill Temple,
Primrose Cottage,
Hanney Road,
Steventon,
Oxfordshire.
OX13 6 AP Tel; 01235 831449

I expect to have a small surplus of home produced Cypripedium seedlings available ex flask including C. parviflorum makasin, C. calceolus x parviflorum makasin, C. calceolus (a continental clone) and perhaps C flavum.

From: Peter Corkhill,
4 Hall Close,
Austwick,
Via Lancaster
LA2 8BX Tel; 01524 251465

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